The criteria that influence the decisions of corporate training developers vis-a-vis the adoption and diffusion of interactive video as part of an overall training system

by

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A Thesis Submitted to the

Graduate Faculty in Partial Fulfillment of the

Requirements for the Degree of

MASTER OF SCIENCE

Department: Professional Studies in Education
Major: Education (Curriculum and Instructional Technology)

Iowa State University
Ames, Iowa
1989

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1 INTRODUCTION

1.1 Background for the Study

1.1.1 The Adoption and Implementation of Innovation

> It is clear that research alone is not enough to solve most problems; research results must be diffused and adopted before their advantage can be realized (Rogers, 1962, p. 3).

The adoption of a new technology may be either an individual or a group decision, occurring over a period of time and varying according to characteristics of the innovation, the individual and the organization to which it is to be applied. New technology which may be developed in a research setting should be introduced to the outside to affect any impact on actual practice.

Mensch (1980) proposed the term "new" technology, also known as discontinuous, radical or "basic" innovations, to convey this departure from earlier waves of innovation. Because of their radical nature, these new technologies evoke adoption scenarios that might be different from any other type of adoption. A new product or process might have to be embedded into the existing technology in order to be incorporated into the structure and culture of the organization. Its use, therefore, is often unclear and awaits clarification while it becomes embedded in the system. Its use might change over time when organizations learn to infuse it with additional

usefulness.

> Reality is painfully different. 'Good' ideas are not always accepted. Change is slow and invariably incremental, requiring nurture and constant facilitation. It can not be mandated. The introduction of any technical innovation into an organization brings uncertainty- -even threat- -and makes effective, established routines absolute (Keen, 1976).

1.1.2 Technology in Corporate Training

Corporate training is now undergoing radical change. There are important influences that make training and development programs grow in size, scope, and importance; the first is technological change and the inevitable learning requirements that come with it. Technological change is the main force now driving education and training in many companies. Not only are corporations providing more education, but it is of a different kind. The methods for delivering training appear to be changed most by developments in training technology, though not to the extent once predicted (Gordon, 1986).

There is evidence to indicate that new technology has influenced and will continue to influence the way that training is developed and implemented in business and industry. Evidence also indicates that media use in companies is growing. In the last 15 years, though, there has been a large-scale and effective introduction of interactive learning and distance teaching methods, initially at the higher education level, but now rapidly spreading to corporate training. The introduction of such new technologies as computer-based training, interactive video and satellite-delivered learning have changed the way educators look at the planning and process of training (Bryan, 1986).

If the 'third wave' or 'fourth revolution' is upon us, if the old approaches

> to training and teaching no longer seem adequate and if institutional commitment seems weaker than it used to, it follows that new training technologies will have far reaching implications for both our programs and our careers. It all seems to boil down to one issue: the key to future success lies in how successful we will be in finding new solutions to old problems (Buther, 1987).

1.1.3 Interactive Video

It is usual to find that the application of a technology occurs outside of its original setting or place of discovery. In the case of interactive videodisc, initial interest in its development was in its use as a data storage medium, rather than its application as an interactive learning tool. It has capabilities such as random access, use of both still frame and motion sequences, computerized control, and high-volume storage of single frames, that had not previously been available for video-based programs (Butterfield Communications Group, 1983). Because interactive video is a relatively new technology that has only recently been utilized as a training medium, it offers a unique opportunity to study innovative practice and media selection in a specific context.

A survey of human resource professionals in Fortune-500 companies in 1986 showed that of the companies surveyed, thirty-six percent used interactive video as part of their overall training system. It was predicted that within the following five years, interactive video would be one of the most important media in the industrial training market (Ralphs and Stephan, 1986). Sayer and Miller (1985) forecast that by 1990, the installed base of videodisc players used in education and training could exceed 124,000. They predicted that about 65% of all videodiscs would be educational or instructional. In light of the growth predicted for training and in the

potential applications of interactive video, it can also be reasonably predicted that decisions to use videodisc will be undertaken by many in the near future.

The recurring theme found was that new technologies are definitely being used in training settings and interest in their use will continue to grow. At the same time, training developers are being challenged to introduce a variety of technological innovations that create changes and serve as new approaches as instructional delivery systems.

In this study, individuals who are involved with the planning, developing, managing, and/or implementing of personnel training programs in industrial settings or corporations are defined as corporate training developers. As an important part of developing and implementing training programs, corporate training developers may have actively sought information to determine if a new technology would help them to solve a particular problem, or they may have become interested in the technology first and then looked for a problem that it might help them solve. In either case, corporate training developers are often responsible for the selection of appropriate instructional delivery systems and promote the diffusion and adoption of the training tools.

Adoption and diffusion of an innovation among organizations presents special challenges because, unlike individuals, organizations are complex aggregates with various decision centers and are endowed with traditions, values, and procedures that impede or enhance the decision-adoption process. Training developers need to make a variety of decisions in the process of adopting and implementing new technologies for instruction in training settings.

1.2 Statement of the Problem

1.2.1 Background of the Problem

1.2.1.1 Adoption and implementation of interactive video

> Once we identify a technology as being potentially used in addressing business training needs, we develop a plan of action to bring about the use of the technology. We need a logical and organized approach so we can obtain the benefits of the new technology. The approach to implementing a new technology should compensate for the initial lack of experience with the technology. The approach should also include ways of 'selling' the new technology to the organization in general and to the training development teams in particular (Dennis, 1984).

The use of new instructional technologies is evidently becoming important for trainers dealing with the "high-tech" information age. The increase in available technologies has led to the problem of choice: what media should be used for corporate training? However, "the key is not to jump into it because it is new, sexy and high-tech, but to really analyze your company's need" (Reinhart et al. 1987, p. 145). It should be realized that new training technologies are not for every organization, nor are they for all parts of a training program. No technology will be effective if it is used without concern for accountability; nor can it be substituted for the trainer's careful planning, designing and following-up.

Interactive video is certainly not for every training situation. It is not a miracle technology, although advancements in computer, video and laser technologies have made them exciting options for training. Decisions to adopt these new devices as training delivery systems may be made on a variety of levels and by a series of steps.

1.2.1.2 Media Selection Process In the instructional development process, selecting efficient and effective media to deliver instruction is a necessary and

important step; however, it is not always understood that media selection should be considered as an integral part of the total instructional development process. Selecting a medium or media for delivery systems depends upon a thorough knowledge about, and consideration of, the objectives of a learning task, the characteristics of the learners, the learning environment, budget considerations, and many other theoretical and practical factors. According to Systems Approach Theory, an empirical and replicable process for instructional design, media selection is one of the serious steps in the process of instructional development because it is carefully linked to each component of the whole instructional design (Anderson, 1983).

When selecting interactive video for corporate training, interactive video should be determined to be the most appropriate instructional vehicle available and best suited for production, distribution, and use within the organization. The question is to determine its most proper and effective use in a particular instructional setting. As mentioned previously, the selection of an appropriate medium for instruction is difficult, but important. There are several factors to be considered, which can not be directly compared to one another quantitatively. These relate to cost, goal of the instruction, characteristics of the learner, nature of the learning task, learning environment, and the attitude of the decision maker towards interactive video. Thus, in the end, an intuitive decision has to be made, but it should be based on a analysis of the situation (Briggs and Wager, 1981). Unfortunately, there are few references and guidelines available for the corporate training developer to make decisions about selecting an interactive video system as a part of the overall training system.

1.2.2 The Problem

The adoption and implementation of interactive video for corporate training requires that a series of decisions be made. The decisions made by corporate training developers to use this new training delivery system may be influenced by factors related to the developers themselves, the setting in which the system is used, and the characteristics of the new training delivery system. The factors that influence corporate training developers concerning their decision to use interactive videodiscs as a training delivery system is the primary concern of this study.

1.3 Purpose of the Study

The purpose of this study is to examine and identify the factors that influence corporate training developers when they are making the decision of whether or not to use interactive video as an training delivery system for a corporate training program. It is anticipated that the result of the study will be used to provide potential users of interactive video with guidelines used in making a decision to use interactive video.

1.4 Research Questions

This study examined and identified the factors that influenced the decision-making process in the context of the use of interactive videodisc learning systems. The persons who participated in the study were individuals involved with corporate training. The following criteria were used to guide the data collection, analysis, and discussion process. The study was designed to attempt to answer these questions.

(1) Who is responsible for making decisions about whether or not to use a certain medium/delivery system for training?

(2) In the process of instructional development followed by a training developer in his/her work, when does he/she decide which medium /delivery system to use?

(3) How does a corporate training developer get the idea of using interactive video for training?

(4) How do trainers obtain in-depth information about interactive video for corporate training?

(5) What are the criteria that guide corporate training developers' selections of interactive video as a training delivery system for training programs?

(6) What are the major problems or obstacles a training developer meets when developing an interactive video training program?

1.5 Definition of Terms

Definitions of terms used in this study are as follows:

1. Corporate Training

Corporate training refers to the instruction provided to personnel in business and industrial settings by their employer. This training is generally designed to teach employees a specific skill or procedure that is directly related to their job requirements.

2. Corporate Training Developers

There are individuals called corporate training developers in business or industrial corporations who are responsible for planning, developing, managing and/or implementing personnel training programs. Their duties may range from management of training departments to actual classroom instruction. These individuals may also be called human resource development specialists, instructional technologists, training managers, or, simply, trainers.

3. Delphi Method

Delphi technique is an approach intended to elicit and refine the opinions of a group of people. It is carried out by interrogating a group of experts with series of questionnaires. Each successive submission of a questionnaire referred to as a "round". The group of experts used for Delphi sequences are more frequently referred to as "panels" or " respondents."

4. Diffusion

Diffusion is the degree of adoption of an innovation among people or organizations. The diffusion process has been defined as the acceptance over time of some specific item–idea or practice–by individuals or other adopting units, linked to specific channels of communication, to a social structure, and a given system of values or culture.

5. Interactive video

Interactive video involves the control of a video format by a computer or microprocessor.

6. Systems Approach (to instruction)

A term used to denote the systematic application of instructional technology to an educational or training problem, starting by identifying the input (the entry behavior of the learners) and the output (the desired terminal behavior of the learners) and then determining how best to convert the former into the latter by employing an appropriate instructional system.

1.6 Summary

Laser videodisk that originally used as data storage device is applied as a computer-based learning tool for education and training. How to use interactive video effectively and efficiently is the major concern of educators and trainers. In the context of corporate training, new technology like interactive video is considered as an example of "high-tech."

Factors that influenced the decisions of corporate training developers when they considered the application of interactive video as a training tool were the major concern in this study. A delphi survey of corporate training developers was conducted to collect and analyze the data provided by corporate training developers. They were asked to provide the criteria used when selecting interactive video for a training program via the delphi process designed for this study. It was predicted that the result of this study could be used as the foundation and rationale for prospective users of interactive video when considering the application of interactive video as a delivery tool for a training program.

This chapter explained the context for the study and provided background information on the problem of the application of interactive video. The purpose

of this study and research questions were also stated. In addition, the definition of special terms used in this study were provided. The next chapter will discuss more about the process of innovation adoption and diffusion as well as the process of media selection. Furthermore, the topics of corporate training and interactive video will be explored via the review of related literature.

2 THE REVIEW OF LITERATURE

This chapter includes an examination of research that was used to guide the development of this study. This review of related literature is organized by grouping the information into the following categories: (1) The adoption and diffusion of innovations; (2) Technology and media used in corporate training; (3) Media selection process; and (4) Interactive video.

Although no research was found that dealt specifically with the criteria employed by corporate training developers when considering to use interactive video for corporate training, research had been conducted on the transfer of technology and on the application of interactive video instruction. That literature was reviewed briefly to identify the relevant factors involved in the diffusion of interactive video to corporate training.

2.1 The Adoption and Diffusion of Innovations

> A technical innovation is a complex activity which proceeds from the conceptualization of a new idea to a solution of the problem and then to the actual utilization of a new item of economic or social value. Alternatively innovation is not a single action but a total process of interrelated subprocesses. It is not just the conception of a new idea, nor the invention of a new device, nor the development of a new market. The process is all of these things acting in an integrated fashion.... (Marquis & Mayers, 1969, p. 1).

Technological advancement is having a major impact on our society. New technologies are being introduced and applied. In the context of education and training, it is believed that technological applications will in the near future considerably change the way people teach and learn. There are indications, however, that not all innovations are accepted and applied appropriately. There are factors that influence the process of adoption and diffusion of an innovation. In the case of interactive video, little research has dealt specifically with its adoption and diffusion in corporate training. However, research has been conducted on the transfer of technology and on the dissemination of innovations. Interactive video is an innovation; its application in corporate training is considered an example of the adoption and diffusion process of this innovation.

Innovation is a rather broad term. The most commonly used definition is the adoption of new products, services, and processes. Rogers and Shoemaker (1971) defined innovation as: " an idea, practice, or object perceived as new by the individual. It matters little, as far as human behavior is concerned, whether or not an idea is 'objectively' new as measured by the lapse of time since its first use or discovery. If the idea seems new and different to the individual, it is an innovation" (p. 57).

The process by which an innovation spreads is termed "diffusion." The diffusion process is the spread of a new idea from its source of invention or creation to the people or organizations that ultimately adopt or use it. The adoption of an innovation may be either by an individual or as the result of a group decision occurring over a period of time and varying according to characteristics of the innovation, the individual, and the organization or setting in which it is to be

applied (Rogers and Shoemaker, 1971). Keen (1976) stated that lots of research on the diffusion of innovation has focused on three topics: (1) characteristics of the innovation that influences the diffusion process; (2) a description of the process of adoption over time, and (3) characteristics of innovators including both individual innovators and innovative organizations.

In one of the most comprehensive studies of the diffusion of innovations, Rogers and Shoemaker (1971) indicated that the critical elements of such studies included the innovation itself, the channels by which it was communicated, the time period involved in its diffusion, and the members of the social system involved in the process. In the literature they found five phases to the adoption of an innovation: (1) awareness or first knowledge of a new idea; (2) interest or gaining more knowledge about the idea; (3) evaluation or establishing a favorable or unfavorable attitude toward the idea; (4) small-scale trial; and (5) the adoption or rejection decision. In addition, they identified their own four-phase process:

> The knowledge function occurs when the individual is exposed to the innovation's existence and gains some understanding of how it functions. The persuasion function occurs when the individual forms a favorable or unfavorable attitude toward the innovation. The decision function occurs when the individual engages in activities which lead to a choice to adopt or reject the innovation. The confirmation function occurs when the individual seeks reinforcement for the innovation-decision he has made, but he may reverse his previous decision if exposed to conflicting message about the innovation (1971, p. 25).

In fact, technological change could be described as incremental and occurring in several stages, extending well beyond the moment of scientific discovery. The invention stage includes the discovery of a scientific or technological advance and its translation into a prototype. Invention, which subsumes basic research, must be dis-

tinguished from innovation, because innovation includes the processes of advanced development. The diffusion of an innovation refers to the period of its adoption by users. Each of these stages– invention, innovation, and diffusion– consists of a series of interacting phases; moreover, the invention, innovation, and diffusion processes are linked in a complex fashion, which can be seen in the extensive modifications that are often made to an innovation during its diffusion.

A study conducted by the U. S. Department of Housing and Urban Development (1976) proposed a framework that grouped the factors influencing organizational innovation and diffusion into four major categories. These were: (a) Individual factors which included the manager's or key decision maker's attitude toward innovation or change-agents; (b) Organizational factors which included such variables as the amount of organizational "slack" (uncommitted resources), the organization's size and its history of past innovativeness along with level of bureaucratization; (c) environmental factors which included the behavior of competitors and other organizations, crisis situations, and clientele pressure for change; and (d) innovation–specific factors which were usually concerned with cost, and magnitude of benefits as well as the depth of individual and/or organizational structure change involve (1976, p. 11).

In addition, three broad and overlapping categories of obstacles to the diffusion of technology were identified in that study: (1) adoption costs; (2) product standards; and (3) the availability and evaluation of relevant information (p. 9).

Another study, conducted by Training Analysis and Evaluation Group (1986), found that two broad factors, which were reported by both theoretical and empirical studies of technology diffusion, influenced the rate of diffusion of technologies. They

were: (1) uncertainty surrounding the characteristics of a new technology and the payoffs from adopting it and (2) the actual profitability of its adoption. >

For most corporations, the process of adoption and diffusion of an innovation may involve a series of procedures such as these six steps or phases –definition, research, introduction, growth, maturity, and decline/update – proposed by Dennis (1984) in the investigation of the formal process for the adoption of new technology at Arthur Andersen and Company; while in other cases, adoption may be related to the individual interests of training department personnel. However, factors such as characteristics of innovation itself, characteristics of innovators (individuals or organizations) and the environment in which the innovation has being adopted may influence the rate and success of the adoption and diffusion of an innovation.

2.2 Media Selection Process

> Before the correct training medium can be selected, careful consideration must be given to a number of issues.
>
> A wide range of computer-based training products, at a variety of prices, is available and can provide economic solutions to many training needs... but which media suit which requirements? Mistakes can be costly (Singh, 1986, p. 133).

Briggs (1970) stressed that there was no generally understood rationale as to why some information was presented by one media type as opposed to another. Romiszowski (1974) also stated that "for one thing, we still know very little about how people learn from different media, and variety of approaches coupled with evaluation of results may help us to extend our knowledge. Also, the interaction between individual learner differences, individual teacher differences and individual

media procedures are so complex that we are never likely to know all the answers anyway" (p. 64).

It is a complex and difficult process to select the best medium for instruction because of a combination of interrelated factors. Media selection is a major component of most comprehensive instructional systems development models (Branson, 1975). By identifying and evaluating the learning effectiveness of the major features found in media selection models, Reiser and Gagne (1982) found that selection factors embodied in instructional systems development affected media choices. However, media selection should be considered an integral part of the total instructional development process. Media decisions must be reconsidered throughout the development process and adjusted to meet production and implementation conditions (Anderson, 1983, p. 3).

Locatis and Atkinson (1984) stated that " procedures for selecting instructional media should be specific, objective and systematic. At every step in the selection process there must be specific statements regarding learning objectives, evaluation criteria, quality of existing resources, and constraints" (p. 62). They provided the procedures for making media selection decisions, as follows (p. 62):

(1) Search: A media search should include consulting colleagues, media specialists, and all appropriate lists, index, directories, and professional publications.

(2) Examine: The examination should give tentative answers to specific questions concerning the appropriateness of the content, instructional design features, technical aspects, packaging qualities, and cost. Media must also be examined

for the capability to deliver instruction and for a compatibility with the existing environment.

(3) Tryout: Media that survive examination must next be subjected to a tryout. The purpose of a tryout is to determine how efficiently and effectively the competing media will work with the intended learners.

Furthermore, Anderson (1983) presented an approach to the procedures for instructional development:

Step 1. Analyze the task;

Step 2. Prepare objectives and tests;

Step 3. Refine and sequence objectives, select media, design and prepare materials;

Step 4. Test the materials and revise the content and media as necessary; and

Step 5. Present the training.

It was emphasized that media should always be selected in the context of the total instructional development process (p. 4).

Briggs and Wager (1981) provided the following steps for media selection when designing instructional materials to attain lesson objectives (p. 143).

1. Define the boundary conditions, such as time, cost, skills, and resources available.
2. Decide between individual and group instruction.
3. Identify the characteristics of the learners.

4. Identify a competency to be analyzed.
5. List the instructional events.
6. Delete those events that will not be utilized.

In another study, Barker (1986) suggested that seven important attributes need to be considered when one (or more) instructional technologies had to be selected as a means of implementing a training or learning task. They were: (1) bandwidth for information transfer; (2) interactivity; (3) versatility; (4) effectiveness; (5) intelligence; (6) availability; and (7) cost. Each of these factors must be given careful consideration before any final media selection decision is made (p. 30).

On the other hand, Clark and Angert (1981) stated that "this reality suggests that until research establishes more precisely which design components activate or supplant specific mental skills, resource selection strategies for the classroom teacher will remain largely unscientific" (p. 12). He contended that the change in or improvement of the instructional design of the material rather than the medium was why in some cases the medium serviced more efficient than another. The media's impact were often confounded by a poorly controlled or defined instructional design. Hannafin and Phillips (1987) also stated that " Hardware options do not constrain effective media selection and lesson design, but are evaluated based upon task and learner demands. (The solution is amenable to any of a variety of hard or soft technology solutions.) Unique methods, if they exist, will have been derived based upon learning, cognition, and instructional design theory, and not upon a generalized unspecified endorsement of the 'superiority' of interactive video" (1987, p. 44). This view was consistent with Clark's (1983) perspective that accentuated the methodological problems and futility of research aimed at identifying "the best

" teaching system. According to Clark, there was no one best way; rarely was there a best decision, but there could be a best choice between alternatives. However, care must be exercised in any adoption, since the effects of many instructional variables remain to be investigated.

Parsloe (1986) stated that learning and cognition perspectives needed to be examined more systematically if interactive video design program was used. In addition, he said " What is needed is a perspective that advocates need that dictates solution. The need is to identify not only the capabilities of technology, but the capacity of individuals to profit from those capabilities" (p. 57).

According to the analysis of a number of media that can be used to support corporate training, Singh (1986) concluded that there was no single medium or delivery system that would solve all training problems. Effective and efficient training involves a mixture of media and methods, combined by the trainer into a blend that motivates the trainees and in which the strengths of each are complemented, while weakness are cancelled out.

2.3 Technology and Media Used in Corporate Training

Education and training programs have changed significantly in most large U.S. corporations during the past few years. In today's economic environment, training is no longer a luxury; training helps an organization enhance the quality of its products and services. Today, companies look at training as an investment in the product, service, or system for which it is required (Ralphs and Stephan, 1986).

As the Carnegie Foundation for the Advancement of Teaching noted in its 1985 report, called Corporate Classrooms: The Learning Business, there has been

a growing commitment by U.S. corporations in education for the workplace. The report stated that U.S. companies were training and educating almost as many people as the four-year colleges and universities–nearly 8 million people.

It is undeniable that in most spheres of economic and social life, there is an ever-increasing need for further training and education. The number of potential trainees thus grows ever large, while, on the other hand, the number of instructors (training-staff) increase at a much slower rate. If the resulting gap is to be closed, the capacity of instructional facilities must be expanded. Technical aids and media must be utilized. They can help to eliminate bottlenecks (Bryan, 1986). There are several reasons for the growth of corporate training and development; foremost is technological change and the inevitable learning requirements that come with it. Because of rapid developments in technology within a particular job, the need for continuing training is rapidly increasing (Gordon, 1986).

Methods of training may be classified in a number of ways. According to Nadler (1980), training can be divided into three major areas: centralized training, decentralized training, and a combination of training procedures.

In centralized training systems, all of the training functions are placed under the control of a training department that is headed by a training director (p. 46). Nadler also stated that trainers can be categorized as either (1) professionally identified with a human resource development organization; (2) defined by organizational experience rather than training experience; and (3) those with collateral duties in personnel, or safety, or as line managers and supervisors. He identified trainers' duties as those of learning specialists (facilitator of learning, curriculum builder, instructional strategies developer); administrators (developer of Human

Resource Development (HRD) personnel, supervisor of HRD programs, maintainer of relations, and arrange of facilities and finance); consultants (advocate, expert, simulator, change agent); or other (p. 16).

Lawson (1984) stated that " the task of the training development specialist (contractors or government employees) was to systematically collect data on possible training approaches and systems (existing and adaptable, under development, or new designs) and to provide guidance, resources and recommendations based on their research. It is their job to build a data base as the foundation for effective training device decisions" (p. 320).

According to Barker (1986), decision making required that a person (or a group of people) had the capability of being able to select an appropriate course of action from within a set of alternative options. There are two basic ways in which this selection may be undertaken: (a) randomly: by flipping a coin or drawing an option out of a hat or (b) logically and scientifically: that is, having in view some target or goal and then using the available information in such a way as to optimize the likelihood of achieving that goal.

It is possible to optimize a learning or teaching process by selecting an appropriate technology with which to implement it. The term "instructional technology" is often used to refer to the wide range of machines, devices, and other aids that are used to implement a teaching or learning process, even though this is an inaccurate definition. Several instructional media such as videodiscs, computers, and computer networks are examples of instructional resources (Barker, 1986). Barker also stated that within the wide spectrum of educational activity, each type of resource had its particular role to play. Increasingly however, for a number of reasons, instruc-

tional designers have turned to the use of computer-based systems as a means of implementing effective training and learning processes.

As early as the 1930s, radio began to play a part in both education and training. Television, however, became part, or even the mainstay, of many instructional systems during the 1960s. During the mid 1970s, the telecommunications sector became a leader in the development of modular, self- instructional, and instructor-led packages for training. The microcomputer industry began to boom in the 1980s. New industrial processes and techniques demanded ever greater use of microelectronics technologies. Barker (1986) believed that videodisc, microelectronic aids, and computer networks would significantly influence the direction taken by CBT (computer-based-training) during the next decade. He stated, "we are currently experiencing the effects of the micro in these areas; however, the widespread use of videodisc and networks is yet to come. Their arrival will no doubt be accompanied by many novel approaches to instruction" (p. 32).

According to Russ-Eft (1985), "new technologies" were defined as specially designed training systems based on microcomputers that incorporated high resolution color display, special input devices for responses, laser videodiscs for storage of stimulus materials and hard-disk storage for programs and responses. Such systems had several advantages over existing training options in business and industry (e.g., reduced time needed for training and more effective, individualized instruction results from utilizing computer based training).

> However, new technology is not the complete answer to previously unsolved training problems, it opens up a number of exciting possibilities for providing learning experiences which were previously impractical. We now have the technological means to do many things that we could not do before. It is a general principle in the application of new technolo-

> gies in training that anything the trainer wants to do is technologically possible: we are limited by our ability to make effective use of what already exists (Singh, 1986, p. 141).

New technologies, such as computer and interactive video, have provided the means whereby training has been able to modernize its image faster than expected; however, new technologies are not able to provide effective and efficient training without the professional application of training technology. In addition, three major issues should be considered when introducing new technologies into industrial training programs: the needs of those who will be using the system, the attitudes and reactions of trainees, and the attitudes and reactions of the trainers.

2.4 Interactive Video

> In interactive video, a computer controls a video-disk player and the person in front of the screen controls them both. The essence is the interplay between the two technologies (video and computer) and the living intelligence of the user. The beauty of interactive video is the tremendous range of images, ideas and options it brings together under the control of the video disk and the computer diskette. It has brought a new dimension to the world of trainers and simulators (Parsloe, 1986, p. 75).

The interactive video (IV) refers to an instructional system that links the computer's power of control to the videodisc's capacity for storing visual images, audio, and data. Floyd and Floyd(1982) illustrated the system (see Figure 2.1 on page 25) and explained its function as follows:

- the program controls the functions of the video player;
- the program can also send output (such as computer- generated text) directly from the computer to the monitor;

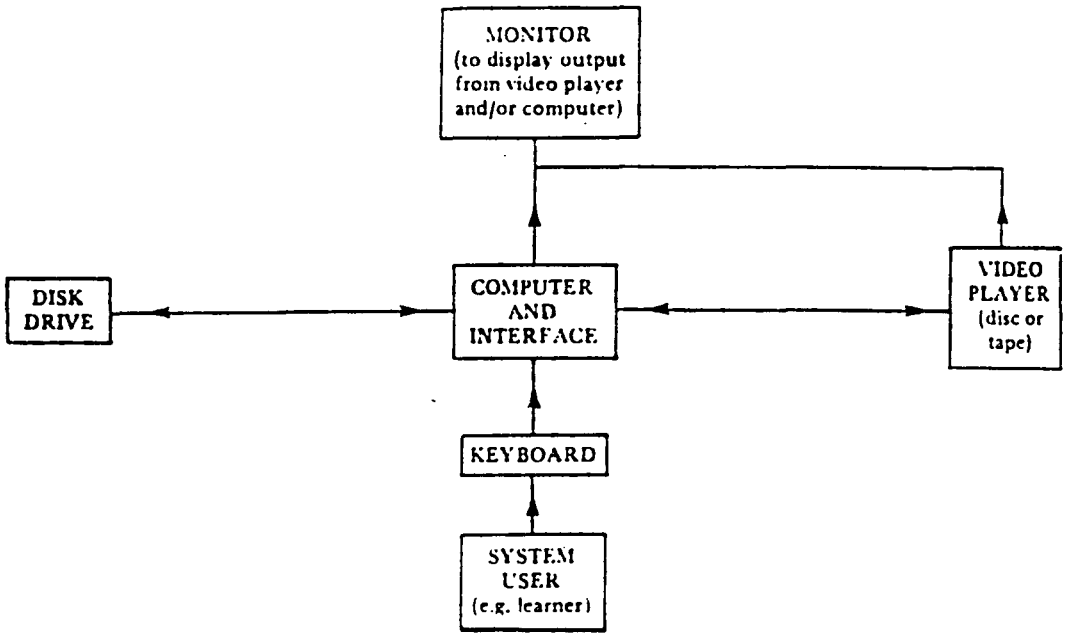


Figure 2.1: An Interactive Video System

- the program decides whether it is more appropriate to display computer-generated materials or video materials or a combination of both in any given situation;
- the computer's decisions as to what should be displayed on the monitor will usually be taken in response to the user's input;
- the video player emits audio and video output as instructed by the computer;
- the user interacts with the system via the keyboard.

Interactive video was defined by Floyd and Floyd (1982) as " any video program in which the sequence and selection of messages is determined by user's response to the material." There are three major categories of users of interactive video:

the military and government, private industry, and education. Private industry uses interactive video in two ways: one use is to present information to prospective customers, and the other is industry's use of interactive video for employee training and information dissemination. Interactive video training programs are complex creations that require the successful integration of four essential design elements: instructional design, audiovisual design, computer programming design, and graphic design, and are equally important to the medium's success as a training tool (Beausey, 1988).

In a research regarding the use of interactive video in corporate training conducted by McLean (1985), information-seeking process and information sources employed by corporate training developers were examined. The in-depth interviews were conducted with training development personnel in 20 diverse corporations in California and New York states. According to her study, personal contacts were the primary information sources, the most common information sources included vendors, consultants, and other corporate trainers. It was concluded that the adoption of interactive video for training occurred at a slow pace; information on interactive video was difficult to find. Additionally, available information sources were often inadequate to meet the information requirements and perceptions about sources and strategies changed with the growth of the technology and the phase in the innovation-decision process.

It was revealed by Smith (1988) that the reasons of why and how companies were using interactive video were investigated by three professorsin the college of Education at Kent State University. They targeted 1,000 individuals from interactive video conference rosters, mailing lists and interest group, and received 371

responses. It was reported that more than two-thirds (69 percent) of the survey respondents said they were developing and/or using interactive video.

The following results are based only on that group of respondents.

- IBM and IBM compatibles were the computers of choice.
- Most interactive video programs were used for educational purpose.
- Level three interactive video (external computer control) programs predominate.
- The cost of interactive video ranges all over the map.
- High cost is the main inhibitor of the growth of interactive video (p. 135).

There were several studies dealing with the application of interactive video instruction in the past few years. Borderick (1982) found that interactive videodiscs learners liked the personal control of the materials, the ability to repeat segments, and the ability to jump through materials; however, some learners missed the teacher contact and the social environment of the classroom.

In another study, Lawson (1984) found that participants using Army training videodisc materials enjoyed the lessons, and felt the lessons were very effective. Bunderson et al. (1983) compared the cost for teaching a farmer/rancher how to develop a cash flow plan along with follow-up coaching in the application of the materials. The three scenarios compared were (a) an extension agent doing all the teaching and coaching, (b) an extension agent using the videodiscs as a supplement to live teaching and coaching, and (c) an extension agent serving only as an overseer utilizing the interactive videodisc for both teaching and coaching. Results of

this study illustrated the potential cost effectiveness of videodisc instruction. Other variables which would significantly influence the per users cost of videodisc instruction in future year included (a) multiple users of the equipment for other videodisc programs and (b) a reduction in the initial cost of the equipment as the technology advances.

A study conducted by Browning et al. (1986) examined an interactive video-based program for teaching a life enhancement skill to handicapped learners. Twelve special education teachers taught an eight-lesson interactive video curriculum to 116 secondary-aged mildly (105) and moderately (11) handicapped students. These teachers/students represented 17 high school classrooms settings in the State of Oregon. Five measures were used to evaluate a number of dimensions, including learning performance gains, and teacher and student satisfaction with the curriculum. Results were promising across all measures.

In a nine-videodisc project for Florida State Department of Health and Rehabilitation conducted in 1984, the results showed a 25% reduction in training time compared with the conventional training used previously. Students scored an average of 83 % (70 % was judged successful) and all students said they preferred IV to other forms of learning (Borderick, 1982).

In a benchmark study conducted by a Digital Equipment Corporation (DEC), interactive video was used to teach field service engineers. The results showed that the course took less time (from 23.1 % to 46.5 % less time) than that used previously and that students had a high opinion of the course and perceived it as more stimulating and motivating than previous courses (DEC, 1983).

In two independent studies by Schaffer and Hannefin (1986) and Copeland

(1988), which examined the effects of increasing interactivity, both reported an increase in learning gain that was directly attributable to an increase in interactivity. Both studies suggested that considerable opportunity existed for investigating the effects of varying the nature and type of interaction facilitated by interactive video.

A report completed recently by the Council for Educational Skills Training for the Ford Motor Company, Education and Training Department, Manufacturing, on the first two discs of the Ford interactive video on Statistical Process Control (SPC), revealed some further supportive evidence for interactive video. The studies reported were conducted over four locations and involved 54 users of varied age and educational background. They involved an interview based on a questionnaire, a pre-test, program utilization, post-test and final interview. The comparison of pre-test and post-test scores for all users showed that most users improved their score considerably. Additionally, most of the participants responses indicated that they had strong positive feelings towards the program.

Attributes of interactive videodiscs have been widely reported. According to Smith (1987), the excitement for interactive video arises from what experts see as the medium's greatest strength: interactivity. The contention is that any medium encouraging active participation on the part of the learner is better than a purely passive information presentation (Bunderson, Hoekema, Hon, Wilson, Worcester & Woodward, 1983; Donahue and Donahue, 1983).

The combination of features available offers a virtually infinite range of presentation and sequence options. The videodisc is a significant breakthrough in instructional technology. It is superior to older technologies because of inherent features, such as the random versus linear access capability across lesson content,

and the speed with which given segments can be accessed (Hoffis, 1983; Schwartz, 1981). Because the videodisc is read without physical contact it is exceptionally durable (Sturm, 1985). Moreover, videodisc technology permits rapid access to various segments of a lesson (Buchan, 1983), excellent display quality, slow motion display, and a maximum of 30 minutes of continuous video and as much as 60 minutes of audio on each side of the videodisc (Newell, Sims, and Myers, 1983). Each frame on a videodisc is implicitly identified with a unique frame number. This permits precise and rapid "frame accurate" location of lesson segments (Donahue & Donahue, 1983). It is also considered superior for "free frame" viewing, because of the image's high resolution and the possibility of lengthy viewing of a specific image with minimal distortion (Brawley and Peterson, 1983).

The benefits of interactive video to trainees are: increased motivation, increased attention span, availability of more information, individualized instruction, more immediate feedback, and endless repetition. In addition, the benefits of interactive video to training institutions are: servicing is more efficient, information is more uniform, organization is better, training information is controlled, and capacity to provide information to trainees and instructors is greater (Chamber and Spencer, 1980).

Kearsley and Frost (1985) summarize their review of research results on interactive video as follows:

> The available evidence suggests that videodisc is a highly effective instructional medium across all types of educational and training applications. Typically, students who learn via interactive video achieve better test scores with less training time required. Videodisc is well accepted by students, instructors, employees, and managers. In the hands of talented and experienced instructional developers, videodisc has been

> demonstrated to be one of the most powerful instructional technologies currently available (p. 9).

However, videodisc use in training is not without limitations. According to Hoffis (1983), there were two major limitations of videodisc systems. First, optical videodisc is a read-only memory medium, (meaning that once the disc is pressed, it can no longer be directly modified). Second, videodisc mastering is an expensive process requiring high-volume to make it truly cost-effective (p. 199). Hoffis also stated that the relatively high cost, the lack of standards, and the paucity of generic courseware were the major obstacles plaguing the videodisc industry.

Selecting a videodisc system involves more than just the acquisition of hardware. The focus instead is on the incremental decisions made throughout a process, so that all components, including hardware, software, money, levels of interactivity, project expertise, user's characteristics, and so forth, fit and work together. Jones (1987) stated that " We look at the characteristics of an application area that would benefit from the videodisc's advantage and minimize its disadvantages. These characteristics are: audiences which are heterogeneous in background, aptitude, and interests; situations where group meetings at prearranged times are not convenient; situations where realistic portrayals are important and difficult or dangerous to provide 'live'; situations where learners may exist at dispersed locations; situations where it is not feasible to provide a person, expert in content and delivery, for one-on-one interaction; and situations where potential learners possess a relatively high level of maturity and motivation" (p. 62).

In another study, Helgerson (1986) indicated that when considering whether or not videodisc technology was the appropriate medium for training, it was important

to establish criteria for selecting the videodisc as opposed to other delivery systems. Assuming that specific training applications and target populations for that training have been identified, an application that meets several of the following criteria should be selected: (1) the user population is large; (2) the user population is physically and/or geographically dispersed; (3) a subject matter expert is unavailable; (4) the material is inherently visual; (5) the disc content is inappropriate for live staging; (6) the demonstration equipment is unavailable; (7) the content includes extensive variations; (8) the users have varying levels of experience and skill; (9) the content is relatively stable or extremely vital; and (10) the content is used repeatedly.

Some other considerations about the selection of interactive video were reported in the literature. They were: (1) When there are a large number of learners distributed over time and place, it is more economical and efficient to use self-paced training rather than lecture (Helgerson, 1986; Pribble 1985); (2) when teachers with subject matter expertise are in short supply, interactive video should be considered (Pribble, 1985); (3) when using a large collection of multimedia materials for instruction, the cost of setting up videodisc system would be less than that of producing large slides collections or a mixture of slides and motion sequences on film or video (Helgerson, 1986); (4) when a simulation is required, interactive video could be the proper solution to safety and equipment problems (Shriver, 1984; Ketner, 1984); (5) when the subject matter is stable or relatively stable, the use of interactive video should be considered for reducing the cost of delivery (Pribble, 1985); and (6) when subject area is intended for beginners in the selected content, interactive video should be considered (Reinhart et al. 1987).

Training is by far the largest market for videodiscs. Based on figures given in the November, 1986, issue of the Videodisc Monitor, about 65,000 videodiscs systems are used for some kind of training, including those used for dual training -sales purposes (Jones, 1987). Beausey (1988) stated that although there has been clear growth for videodiscs use in training, it has not been as rapid as many videodiscs proponents had expected. However, he pointed out that according to the 1988 Corporate Training Report conducted by Training magazine, the usage of videodisc in training is still largely concentrated in large companies. The greater use of videodisc in training by large organizations can be attributed to their financial resources and inclination to employ such training methods. It was concluded that organizations must have a certain "mind set" and "broad view" of training before they were willing to embrace the use of interactive video in training.

2.5 Summary

Transfer of technology has been an important issue in applied psychology for over a decade. The transfer of technology is the movement of the results of laboratory research, development, testing, and evaluation into the field or classroom.

Interactive videodisc technology, as defined by Rogers and Shoemaker (1971), is considered an example of an innovation. In addition, interactive video applied in training settings can also be considered an example of technology transfer.

While research to date has taught woefully little about media selection, it at least has taught that trainers should not expect to accomplish great things. Based merely on the media selection in training, all existing media have limitations in the type of information they can display and the way they can present it. An ideal

medium for a certain learning situation is one that not only can support a number of message systems (i.e., text, diagrams, animation, filmic imagery and sound), but also it should be developed with considerations made for the characteristics of learners, the characteristics of learning task, and the learning environment. As Anderson (1983) stated, there were no simple, foolproof formulae or reference tables that match any specific medium with any particular course objectives.

The research on training devices or technologies is somewhat vague, not only because of system changes, but also because the operation and maintenance of systems are not well defined or documented. The introduction of new technologies into corporate training has many potential possibilities. Because of rapid advances in laser technology and the miniaturization of microprocessors, interactive video may offer and create a learning environment that capitalizes on the advantages of both educational TV and computer-assisted-instruction. However, new training technologies are not for every organization, nor for all parts of a training program. Careful consideration is required to determine whether the technology should be used.

The literature review was provided as the basis for development of an approach to study the problem of decision-making of corporate training developers and a guide for development of an appropriate methodology. The methodology used is explained in the following chapter.

3 METHODOLOGY

3.1 Overview

This study was an investigation that used descriptive statistics to identify trends and implications. The Delphi method was used in the study to collect and analyze the criteria for selecting interactive video for corporate training. These criteria were obtained from individuals involved in the use of interactive video training systems.

The Delphi technique was created by Dalkey et al. at the Rand corporation in 1950. It was developed as a method for the systematic solicitation and collection of judgments on a particular topic through a set of carefully designed sequential questionnaires interspersed with summarized information and feedback of opinions derived from earlier responses (Delbecq, 1975).

A Delphi sequence is carried out by interrogating a group of experts with a series of questionnaires. Each subsequent questionnaire is built upon responses from the preceding questionnaire. Each successive submission of a questionnaire is referred to as a "round."

Prior to the first round, there must be preliminaries such as clarifying the subject area in which the panel is to make its forecast, explaining the methodology, and so on. In general, Delphi procedures have three features: (1) anonymity, (2)

controlled feedback, and (3) statistical group response (Martino, 1971).

3.2 Subject Selection

The sample used for this study was a group of individuals involved in the use of interactive video as an instructional delivery system for corporate training. These respondents to the Delphi survey were non-randomly selected by the researcher based on the following criteria:

(a) a variety of geographic regions represented;
(b) near equal number of respondents, by sex;
(c) various types of professions represented; and
(d) experience or knowledgeability
on interactive video training system.

Potential subjects for this study were identified through a review of current publications, leads from the vendor of IBM Interactive video systems in Des Moines, the 1988 membership directory of the American Society for Training and Development, and telephone calls to corporations considered likely to have implemented or be planning to implement interactive video training programs.

A preliminary letter was used to determine if the potential subject was involved with the use of interactive video training systems, and whether he or she would be willing and available to participate in this study. Results and conclusions were based on a final subject total of 22 interactive video experts representing diversity in terms of occupation type, company type, geographical location, and interactive video application.

The primary unit of study was the individual involved with the training development/management process, rather than the specific corporation itself. Specifically, an effort was made to select subjects who had input into decisions on whether and/or how to implement this new interactive video delivery system.

It was anticipated that the specific title of the individuals selected might be diverse, but that their roles as interactive video specialists and experts would be more important in their selection than any specific titles.

3.3 Instrument Design

A Delphi questionnaire was used as the primary data collection instrument, and included the following sections:

(1) a preliminary letter to explain the purpose of this study and ask for the respondents participation.
(2) the first round questionnaire including both specific and open-ended questions;
(3) the second round questionnaire;
(4) the third round questionnaire; and
(5) the summary of the final results.

Questionnaires were developed through a review of the relevant literature which provided a conceptual framework for the study.

3.3.1 Pilot Test

Two pilot tests were used to determine potential problems with the first round questionnaire. Two panelists were asked to provide opinions and suggestions about the content and arrangement of the first round questionnaire.

These pilot surveys were conducted during the week of Feb 27 to March 5, 1989. One of the subjects surveyed was a trainer who had administrative responsibilities within the training department of a chemical company. The other was an experienced interactive video programs producer working for a media production company. Both companies were developing interactive videodisc programs for training.

Results indicated that the questions in the first round Delphi instrument were generally effective in eliciting appropriate responses, although the format of the tables in Part III needed to be rearranged. In addition, the Delphi round one instrument was given to Dr. Donald A. Rieck, the assistant director of the Media Resources Center at Iowa State University, who had experiences with the Delphi process. He was asked to indicate whether or not the structure of the questions was appropriate. The structure generally was determined to be acceptable.

No changes were made in the Delphi first round questionnaire following the pilot tests, except to rearrange the format of Part III Delphi items (Tables A to E). The preliminary letter and Delphi round one questionnaire were reviewed and certified by the Iowa State University Human Subject Review Committee (see Appendix F).

3.3.2 Preliminary Letter

A letter (see Appendix A) was used to determine if the individual was involved with interactive video (although some of this information was already known through other means), and whether he or she would be willing and available to participate in the study. The purpose of this study and the Delphi process were also explained and described. If they would not be able to participate, they were thanked and asked to recommend names of other individuals that might meet the criteria proposed previously. From the sixty-five preliminary letters which were sent out prior to the Delphi study, twenty-five individuals responded that they would be willing to participate in this study. Only after these 25 individuals had agreed to participate in this study and had a complete understanding of Delphi process, was the first round questionnaires distributed.

3.3.3 Round #1 Questionnaire

Objectives of Delphi first round questionnaire were:

(a) To identify the issues and concerns about the application
of interactive video for corporate training, in terms of
the study's research questions.

(b) To validate the criteria for selecting interactive video.
These criteria were to be added to or deleted from the criteria
proposed based on the literature review.

(c) To establish the foundation for subsequent round's questionnaires.

There were five sections in the first questionnaire:

(1) a cover letter to establish rapport, explain the study purpose and address any questions or concerns about this research study.

(2) Part I (question #1-#9) : the section contained questions about Demographic information.

(3) Part II: This section consisted of five open-ended questions dealing with the process of adoption and diffusion of interactive video training systems.

These questions related to research question 1 and were posed in the open response format so that Delphi panelists could freely express their opinions. These responses were analyzed and used to establish the foundation for the following Delphi questionnaires.

(4) Part III: This section included five tables (Tables A to E) dealing with the criteria for selecting interactive video for corporate training.

The Delphi panelists were asked to respond to 37 of the criteria using the following Likert-like scale:

1= very weak influence

2= weak influence

3= average

4= strong influence

5= very strong influence.

Each criteria item was placed into an attitude category which related to research questions 3 and 4. The responses were assigned in descending order, with five given to the strongest influence and to one to the weakest influence.

The Delphi panel was requested to suggest additional opinions. These were integrated into the appropriate section of the survey instrument.

3.3.4 Round #2 Questionnaire

Data collected from the first round were analyzed and used as the basis for the second round questionnaire. The second round questionnaire was divided into two parts. Part one consisted of 43 statements developed from the responses of the Part II open-ended questions in round #1. The Delphi panel members were asked to respond to these 43 statements using the following Likert-like agreement scale:

1= strongly agree

2= agree

3= neutral

4= disagree

5= strongly disagree

Part two of the round #2 questionnaire asked each panel member to re-evaluate 37 criteria items from Part III, tables A to E, of round #1. During each succeeding round, these criteria were tabulated by frequency, mean, and standard deviation and reported to the panel in the next round's instrument. The comments from the previous round were also reported to the panel as part of each succeeding rounds

instrument. Each Delphi panel member was asked to comment on or support his/her position to a criterion item if his/her previous responses for this item was less or more than one standard deviation from the mean of the panel summary.

3.3.5 Round #3 Questionnaire

Results obtained from the second round questionnaire were given to the Delphi panelists. Each respondent was again asked to examine the data and reassess his or her own position, based on the group's responses. Those whose previous positions varied significantly from the group norm were asked to provide a rationale to support their divergent view. The summary of each round and the panel's responses are included in Appendices C to E.

3.4 Data Collection

The first round Delphi instrument with instructions, cover letter, and self-addressed return envelope was mailed to the 25 individuals who indicated they would be panelists. Respondents' names were kept confidential throughout the Delphi process and in the reporting of the results at the end of the study.

Fifteen days were allowed for each round of questionnaires. A reminder letter was sent approximately five days before the due date. A final reminder was made via telephone on or near each round's due date to those who had not yet returned their mailing.

The three rounds of Delphi process were conducted as follows:

	Date Mailed	Date Reminder	Date Due	Number Mailed	Number Responded
Pre. Letter	March 1st		March 20	65	25
Round #1	March 23	April 2	April 7	25	22
Round #2	April 15	April 25	April 30	22	20
Round #3	May 12	May 20	May 25	20	20

This Delphi study consisted of three rounds of questionnaires. There was a return rate of 38.4% for the preliminary contact (25 returns from the 65 individuals invited to participate). Once 25 panel members had agreed to participate, there was little panelist attrition: 22 of the 25 invited panel members completed round one (88% return rate); 20 of the 22 round one panelists completed round two (91% return rate); and 20 panelists completed round three (100% return rate).

3.5 Data Analysis

A. Demographic/Information items

The responses from demographic/information items (questions 1 to 9) of Part I of Delphi round #1 questionnaire were tabulated and analyzed to determine the variety of characteristics of the 20 responding panel members. This demographic information was used to determine if the responding panel members actually met the pre-determined criteria for subject selection in the Delphi process.

B. Questions on media selection process

The responses to questions 1 and 2 in Part II of the Delphi round #1 questionnaire were categorized, tabulated and consolidated into like statements for use in round #2 of the Delphi procedure. Final Delphi panel rankings, by mean, of the statements on these two questions were provided to all responding panel members.

C. Questions on the diffusion and implementation of IVD

Because of the diversity and variety of responses from 22 panel members, the responses to question 3 in Part II of the Delphi round #1 questionnaire were all listed. The list of these Delphi panel responses were reported to all panel members in the final statistics summary.

The responses to question 4 in Part II of the Delphi round #1 questionnaire were categorized, tabulated and consolidated into like statements. Frequency distributions of the Delphi panel responses to this question were provided in the final statistical summary given to all panel members.

The responses to question 5 in Part II of the Delphi round #1 questionnaire were categorized, tabulated and consolidated into like statements for use in round #2 of the Delphi procedure. Final Delphi panel rankings, by mean, of the statements on this question, were reported to all panel members in the final statistics summary.

D. The criteria of IVD selection

The Delphi round #1, part III (Tables A to E) responses were tabulated, and frequency of responses, means, and standard deviation were calculated for each

criteria item. These statistics, and all individual comments, were reported to the panel members in each succeeding round.

The final Delphi panel rankings, by mean of these criteria that influence corporate training developers to use interactive video for training, were provided to all panel members in the final statistical summary. All statistics for each criteria item and frequency distributions (bar charts) for each responding statement in these Delphi questionnaire were calculated.

4 RESULTS

4.1 Introduction

This study was designed to identify the selection criteria used by corporate training developers when considering the adoption and implementation of interactive video for training. These criteria and considerations identified as relevant to the future selection of interactive video for corporate training were utilized to develop recommendations for potential users and corporate training developers.

From February, 1989, to May, 1989, a twenty-member Delphi panel which had been selected nationally, participated in three rounds of the Delphi process. Responses from the Delphi procedure, which consisted of three rounds of questionnaires, were used to validate the criteria and considerations determined to influence corporate training developers' decisions to use interactive video for training.

The data reported in this chapter were collected from the Delphi process and then statistically analyzed. This chapter contains the results of the statistical procedures used to:

(1) present a description of the participating panel members,

(2) provide a summary of considerations regarding the media-selection process of corporate training developers,

(3) provide a summary of statements regarding the diffusion and implementation

of interactive video for corporate training,

(4) provide a summary of the criteria used by corporate training developers considering the use of interactive video for training, and

(5) present a summary of comments and suggestions elicited from the Delphi panel members.

4.2 Description of Respondents

The purpose of the demographic information items in Part I of the round #1 questionnaire was to provide a descriptive profile of the selected sample. In order to accurately describe certain characteristics of the sample and to determine if respondents met the predetermined criteria for the Delphi process, frequency distributions were computed for each item in Part I of round #1.

These distributions are illustrated in Figure 4.1 to Figure 4.8 (see p. 54 to p. 61). In addition, responses from the demographic information items in Part I of round #1 have been tabulated and summarized in Table 4.1 (see p. 52).

Characteristics of the subjects are described and reported according to the order in which the criteria for subject selection appeared (see Chapter Three, p. 34):

1. Geographic regions

   Twenty-five percent of the responding panelists were working in the northeast United States. Twenty percent of the respondents were in the north central region. Ten percent of the respondents were in the south central region. The remaining respondents could be divided into three groups. These three groups, consisting of fifteen percent of the responding panel members apiece, were

working in the southeast, northwest, and far west (Figure 4.1, p. 54).

2. Gender

Figure 4.2 (see p. 55) shows that forty percent (eight out of twenty) of the panel members were female. Sixty percent (twelve out of twenty) of the panel members were male.

3. Professional and educational backgrounds

a. Professional backgrounds

Half (50%) of the responding panel members were employed in industries or corporations. Twenty-five percent were employed in private training organizations. Of the remaining respondents, two were professors in universities, two were videotape/videodisc producers, and one was an independent writer (See Figure 4.3, p. 56).

Figure 4.4 (see p. 57) shows that forty-five percent of the responding panelists were supervisors or directors of training departments in their organizations. Twenty percent were presidents or vice presidents in private training organizations. Of the remaining respondents, two were instructional designers, two were trainers, one was a marketing manager, one a manager of a communications and employee department, and one a director of product development.

b. Educational backgrounds

The majority of responding panelists (60%) had doctorate degrees. Twenty percent of the responding panel members had master's degrees, and twenty percent had bachelor's degrees (see Figure 4.5, p. 58).

Twenty percent of the responding panelists had degrees in psychology. Twenty percent of the panelists were instructional technologists. Of the remaining respondents, two were in the field of educational psychology , two in education, two in adult education, two in computer science, and two in business (see Figure 4.6, p. 59).

4. Professional involvement with interactive video

The vast majority (95%) of panel members had used interactive video systems for training programs. Only one panelist had never been involved with IVD selection.

In response to the question of how many years of experience panelists had in using interactive video for training, fifteen percent of the responding panel members had had 1 to 3 years of experience, thirty-five percent had had 4 to 6 years of experience, thirty percent had had 7 to 9 years of experience, and fifteen percent had had more than 10 years of experience (see Figure 4.7, p. 60).

In response to the question about how they would summarize their experience using interactive video, forty-five percent of the respondents

indicated that they were currently using IVD for training. Thirty-five percent had had experience developing, designing, or producing IVD programs for corporate training. The remaining panelists (20%) said that they were consulting people about the use of IVD for corporate training (see Figure 4.8, p. 61).

4.3 Questions about Media Selection

Question 1 in Part II of Delphi round #1 asked panel members to write a short answer indicating when in the process of instructional development they chose a medium. The second question in the same part (round #1 part II) asked panel members to indicate who was responsible for making the decision regarding the choice of a medium for training programs.

The responses of the Delphi panel to these two questions (questions 1 and 2) were grouped and then consolidated into like statements. These statements became the reaction items for questions 1 and 2 in Part I of the round #2 and round #3 Delphi instruments (see Appendix C for a listing of these statements).

During each succeeding round, statements were tabulated by frequency, mean, and standard deviation and reported to the panel in the next round's instrument. Comments from the previous round were also reported to the panel at this time.

During each round, panel members were asked to re-evaluate their positions on all statements by taking into account comments and statistics from the previous round. A summary of each round and its instrument are contained in Appendices C to E.

As part of round two, the panel was asked to suggest additional statements

that they felt should be included. These suggestions were incorporated into the round-three Delphi instrument.

Statements regarding the media-selection process were judged to have reached stability and group consensus at the conclusion of round three. Appendix E contains the statistical summary and panel comments on the final Delphi-panel positions.

Table 4.3 and Table 4.2 (see p. 64 and p. 62) give the mean scores for all Delphi panel statements for these two questions, in rank-order. The lower the mean score, the more important the rating of the statement. Dotted lines were drawn through each table, in order to indicate the strength of agreement and to give a visual impression of where the majority of responses were made. If the mean of the responses was above 4.00, the item was considered to elicit strong disagreement; if the mean was between 3.99 and 2.00, the item was considered to elicit a neutral response; and if the mean was below 2.00, the item was considered to elicit strong agreement.

Tables 2 and 3 show the final Delphi panel rankings of the statements regarding the media-selection process. These statements were generated in round #1 of the delphi process and were rated during rounds #2 and #3 of the Delphi phase. A discussion of these statements is in contained in the next chapter.

Table 4.1: Frequency distribution of the Delphi Panel's responses on demographic information items

	Item	Possible response	Frequency
1.	How many years of experience do you have using interactive video learning system.	1. none	1
		2. 1 to 3 years	3
		3. 4 to 6 years	7
		4. 7 to 9 years	6
		5. 10+ years	3
2.	Have you ever been involved with the process of selecting an interactive video system for corporate training?	1. yes	19
		2. no	1
3.	What is your gender?	1. female	8
		2. male	12
4.	What is your level of education?	1. some college	0
		2. B.A.	3
		3. M.A.	3
		4. above M.A.	12
		5. B.S.	1
		6. two master's degrees	1
5.	In what geographic region of the United States do you work?	1. northeastern	5
		2. southeastern	3
		3. north central	4
		4. south central	2
		5. northwestern	3
		6. far western	3

Table 4.1 (continued)

	Item	Possible response	Frequency
6.	With what type of institution are you employed?	1. educational organization	2
		2. industrial/corporate	10
		3. training company	5
		4. independent writer	1
		5. videotape/videodisc producer	2
7.	What is the field in which you obtained your most advanced degrees?	1. educational psychology	2
		2. psychology	4
		3. education	2
		4. instructional technology	4
		5. computer science	2
		6. adult education	2
		7. business	2
		8. other	2
8.	What is the title of your job position?	1. president/vidce president	4
		2. supervisor/director of the training department	9
		3. instructional designer	2
		4. trainer	2
		5. other	3
9.	Please summarize the experiences you have in the use of interactive video.	1. developing, designing, or producing IV program	7
		2. using IV for training	9
		3. IVD consultant	3
		4. other	1

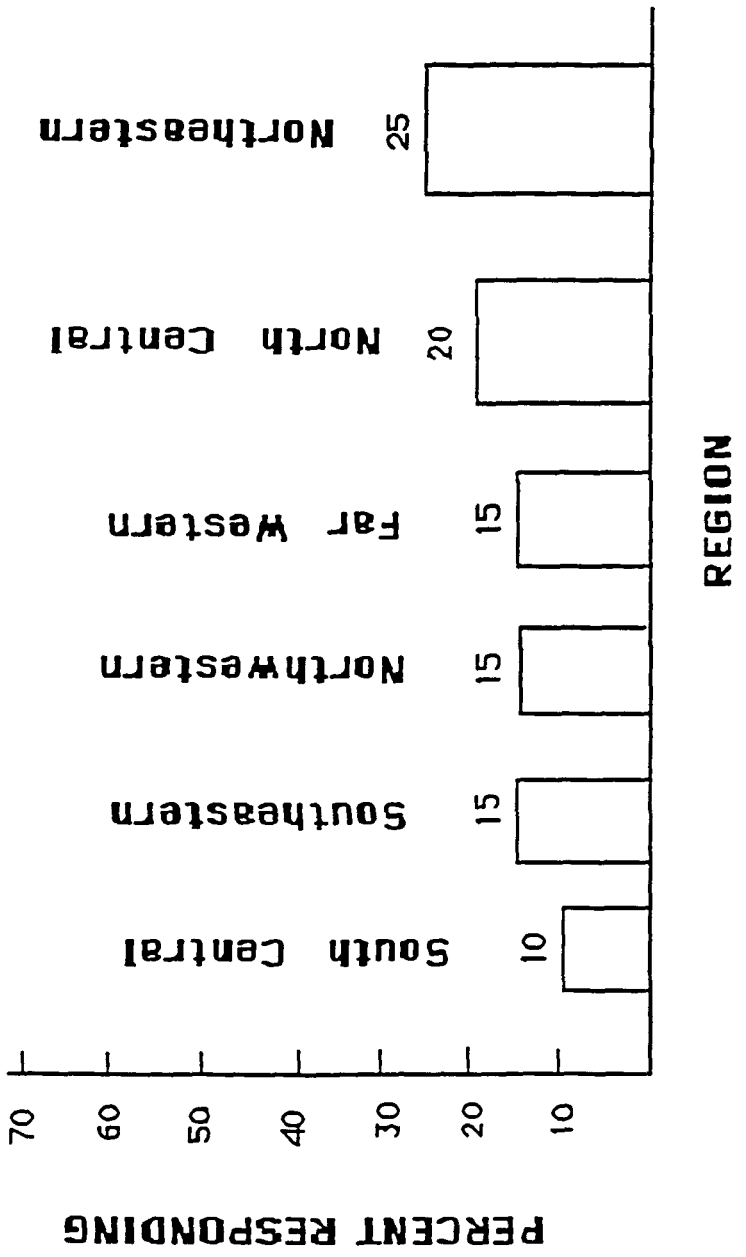


Figure 4.1: Geographic regions of panelists' working areas

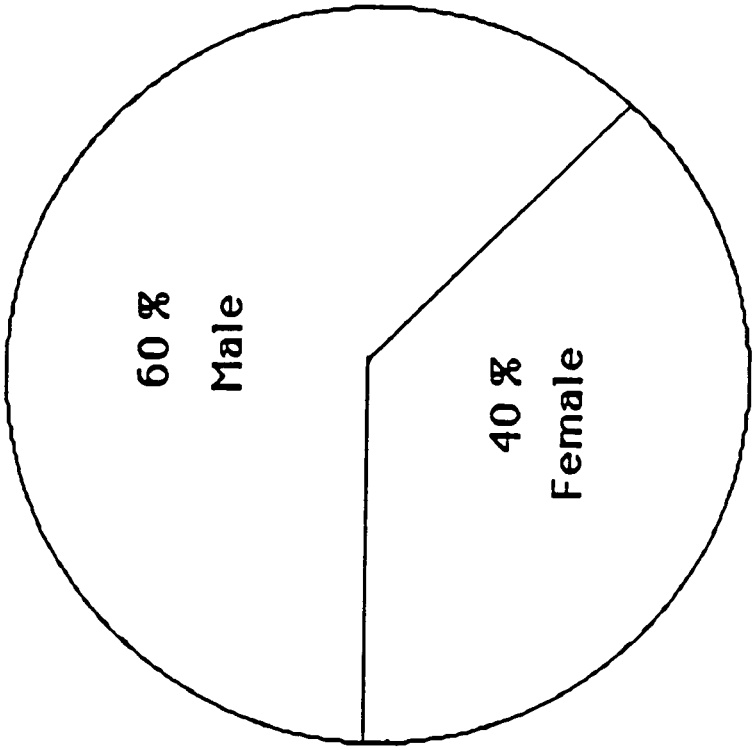


Figure 4.2: Gender of panelists

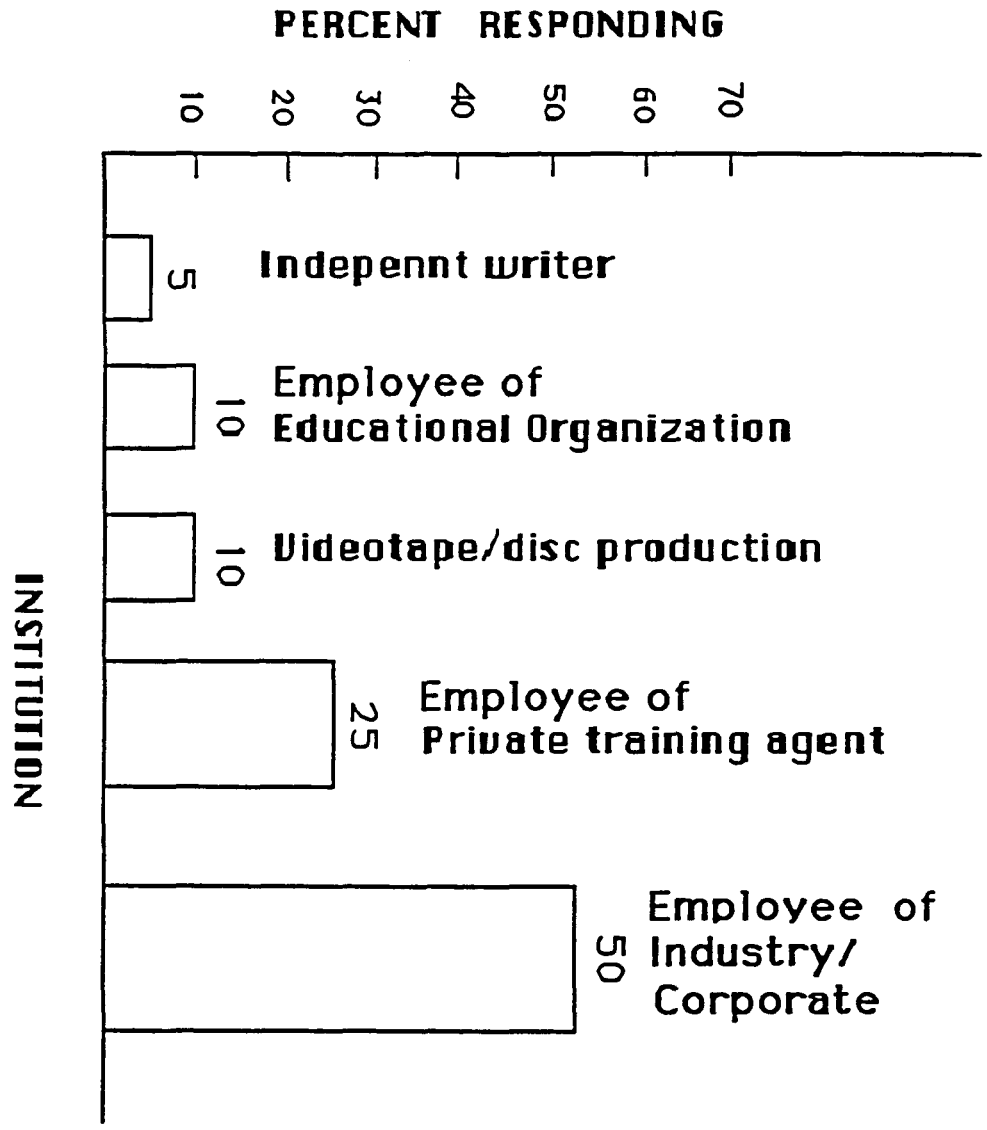


Figure 4.3: Professional background of Delphi panelists

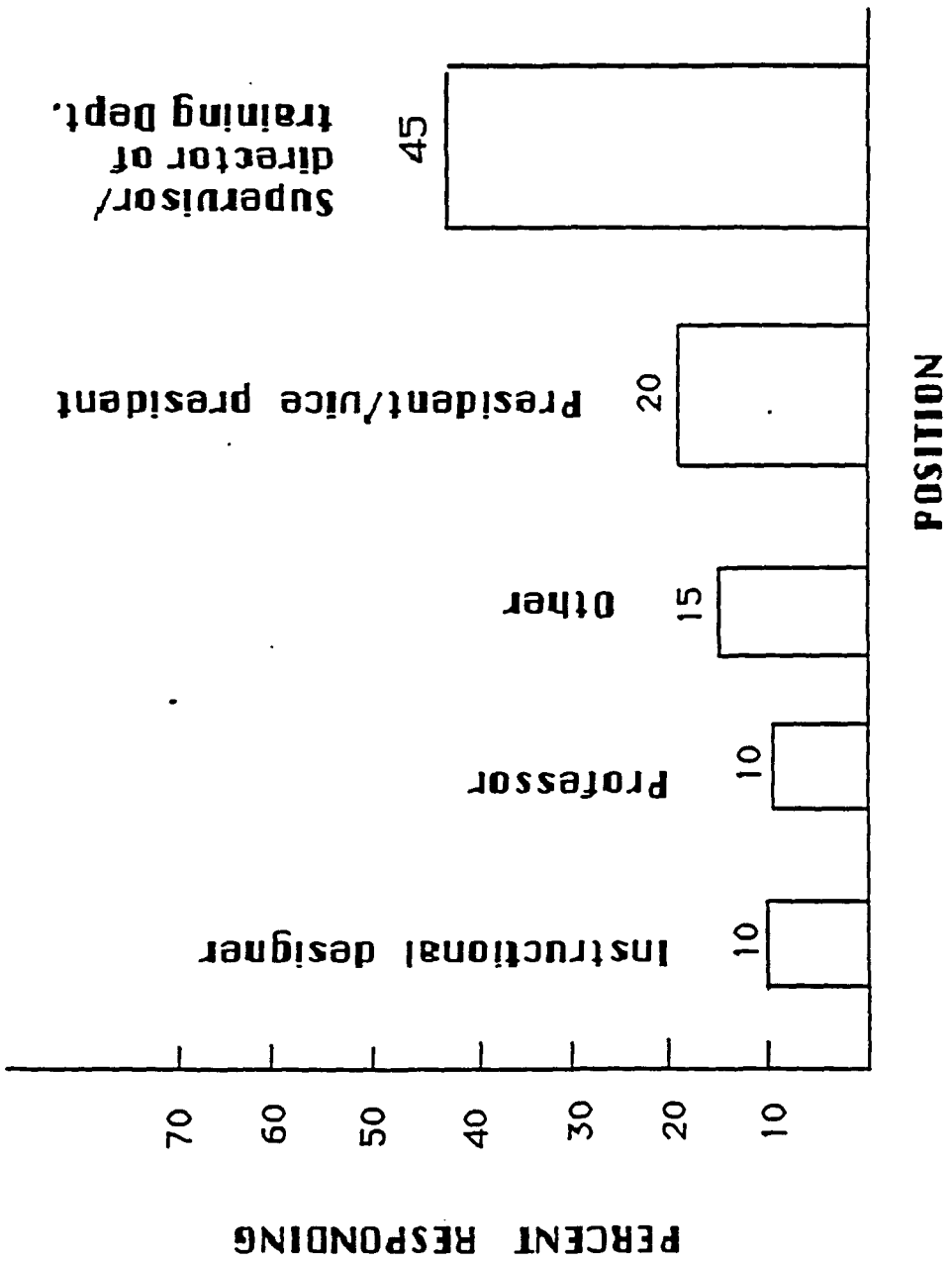


Figure 4.4: Title of panelists' job positions

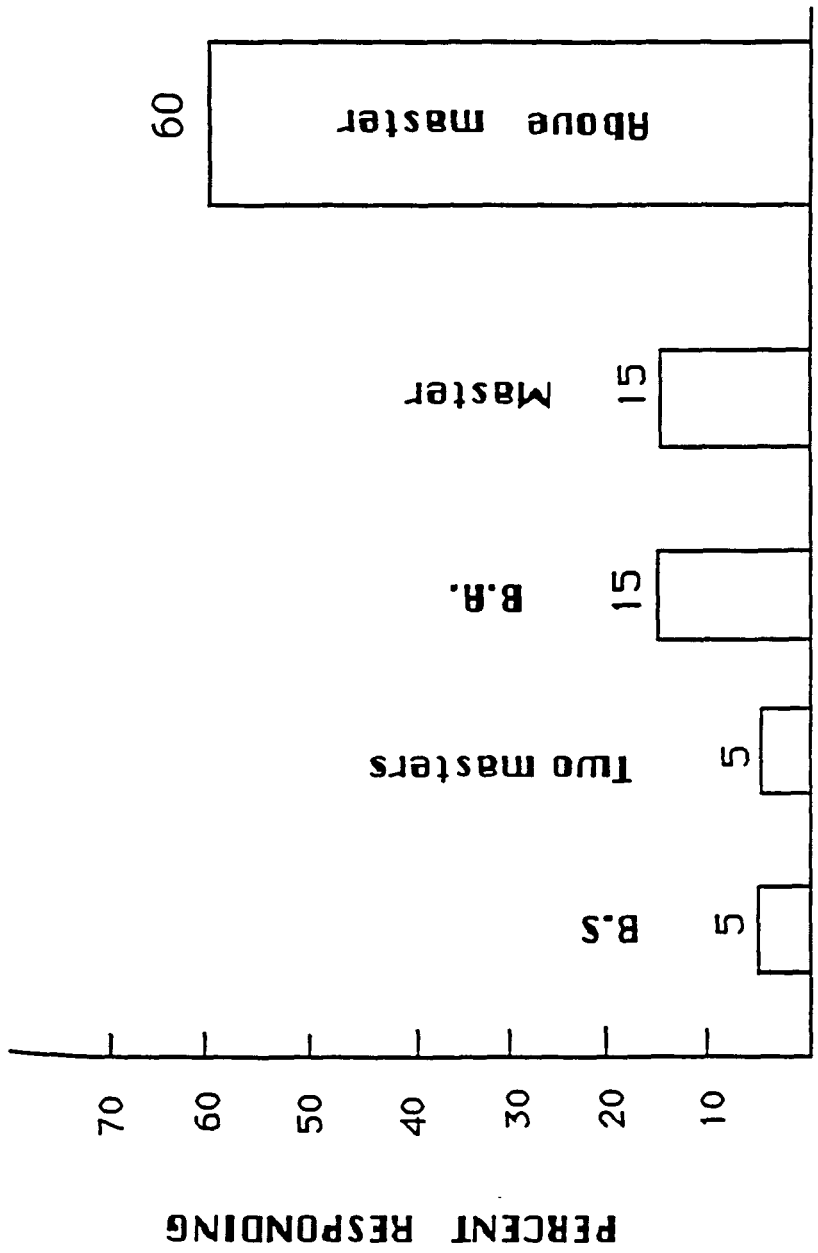


Figure 4.5: Panelists' level of education

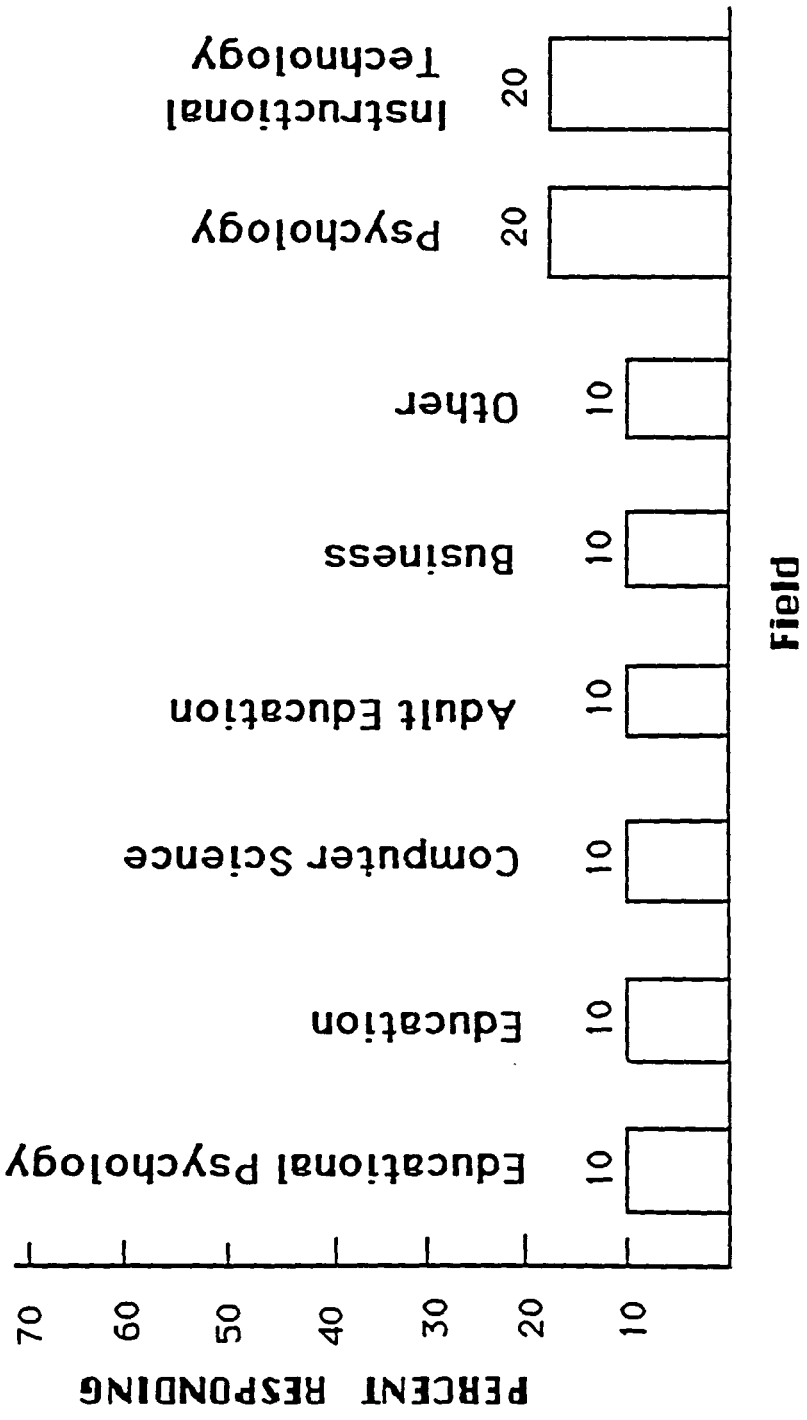


Figure 4.6: Fields of study in which panelists obtained their most advanced degrees

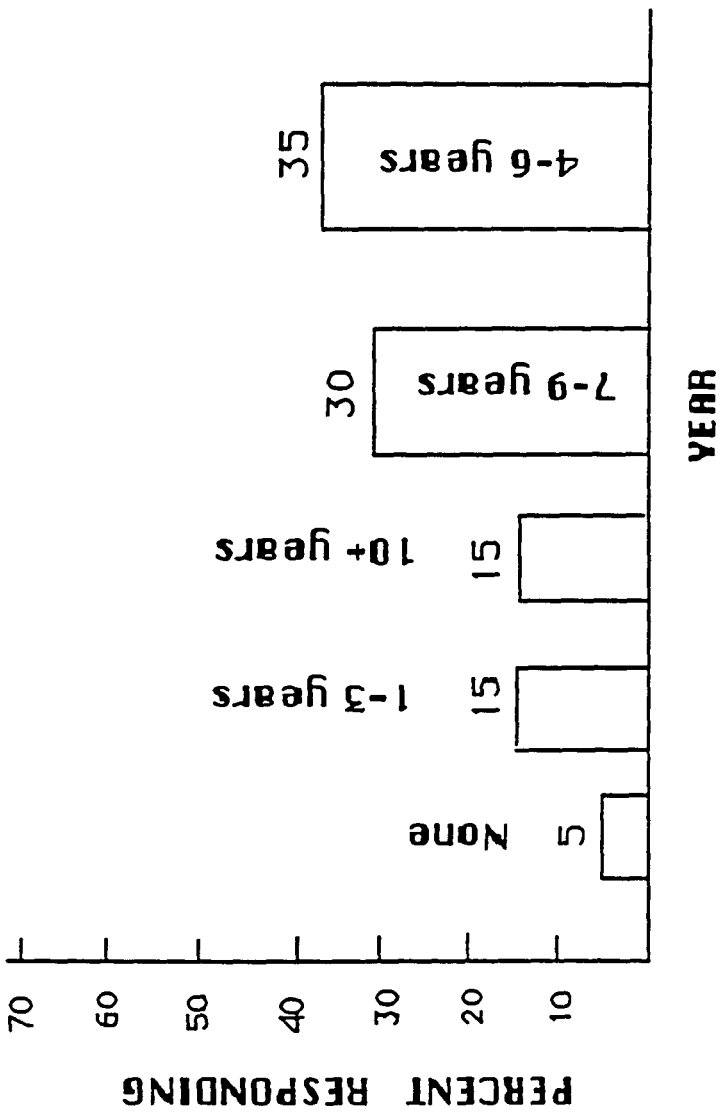


Figure 4.7: Years of experience panelists have using interactive video

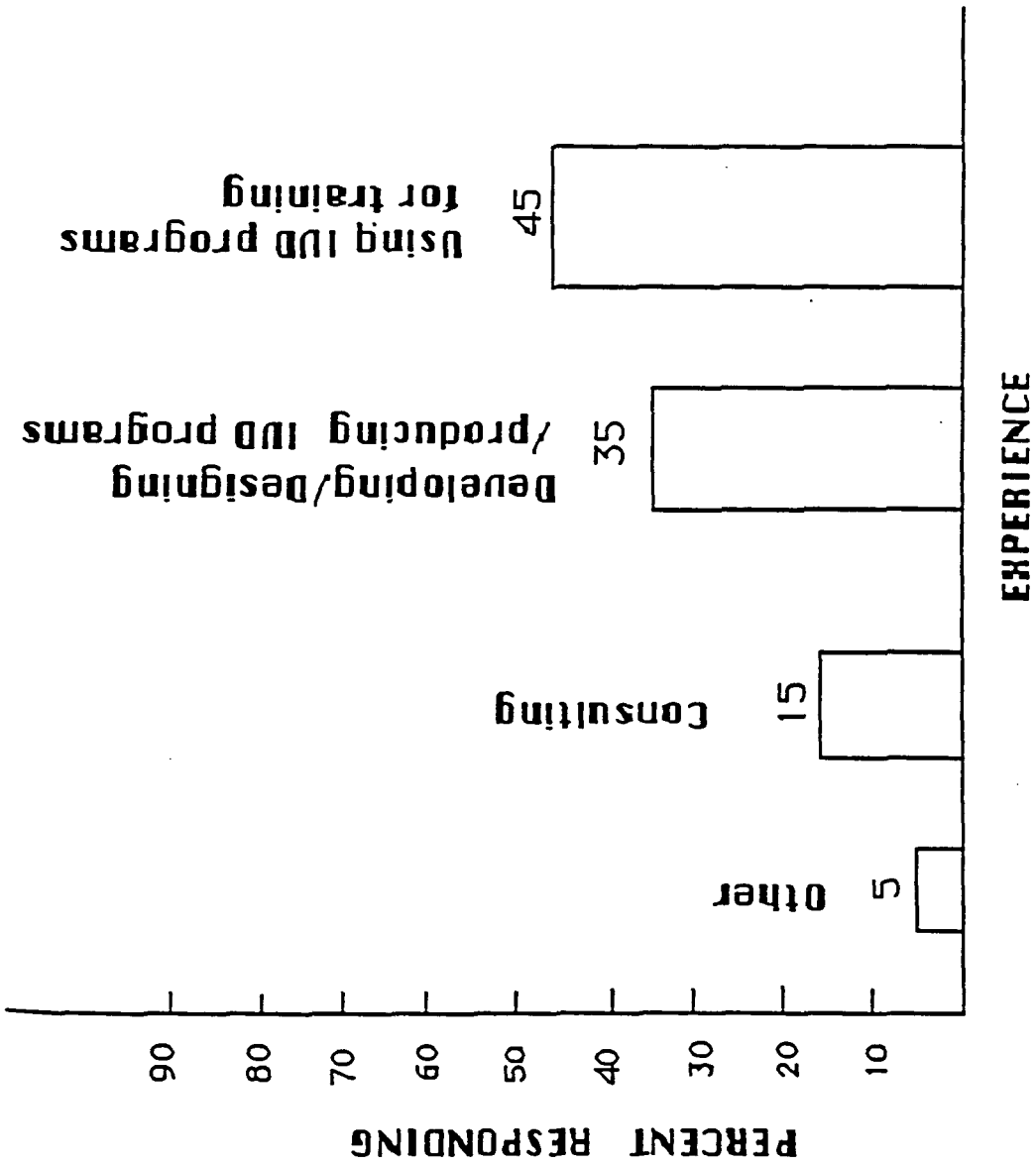


Figure 4.8: Panelists' experience with interactive video

Table 4.2: Final Delphi panel rankings, by mean, of statement regarding the question, "who is responsible for making decisions about whether or not to use a certain medium/delivery system for a training program?"

Rank	Statement	Mean
	————-(neutral)————	
1.5	director of a training program	2.1
1.5	manager/director of a training department	2.1
3	high level management	2.2
4	client/customer	2.4
5	instructional designer/technologist	2.5
6	program team	2.6
7	instructor	3.0
	———(strong disagreement)——-	
8	trainee	4.0

Table 4.3: Final Delphi rankings, by mean, of statements regarding the question, " In the process of instructional development you follow in your work, when do you decide which medium/delivery system to use? "

Rank	Statement	Mean
	———-(neutral)———	
1.5	after cost/benefit analysis	2.1
1.5	after objectives have been developed	2.1
3.5	after needs analysis phase	2.3
3.5	according to the budget	2.3
5	after audience demographics and learning styles have been determined	2.5
6	as early as possible	2.7
7	during the training device analysis process	3.0
8	after the course content have been decided	3.1
9.5	during the development of the course content outline	3.2
9.5	based on market demand	3.2
11	following client's choice	3.4
12	during objectives development	3.6
13.5	after trial and testing	3.7
13.5	before learning objectives have been written	3.7
	——— (strong disagreement)———	
15	during the needs analysis phase	4.0
16	as late in production as possible, because of the changing technology	4.4

4.4 Questions About the Diffusion and Implementation of IVD for Corporate Training

Question 3 in Part II of Delphi #1 round asked panel members to explain where and how they first got the idea to use interactive video for training. Table 4.4 (see p. 66) contains a listing of the responses collected from all 20 panelists for this question.

Question 4 in Part II of Delphi round #1 asked panel members to describe how they obtained in-depth information about interactive video (Table 4.5, p. 68). The most frequent responses in descending order were

(1) by reading journals/literature
(2) by participating in professional conferences/seminars
(3) by participating in trade shows
(4) from fellow professionals/colleagues
(5) by trial and error.

Question 5 in Part II of Delphi round #1 asked panel members to indicate the major problems/obstacles they encountered as they developed an interactive video training system. Responses of the Delphi panel to this question in round #1 were grouped and consolidated into like statements. These statements became the reaction items for question 3 in Part I of the round #2 and round #3 Delphi instruments. See Appendix C for a listing of these statements.

During the second and third rounds, statements were tabulated by frequency, mean, and standard deviation and reported to the panel in the next round's instrument. Comments from the previous round were also reported to the panel on

succeeding instruments.

During each round, panel members were asked to re-evaluate their positions on all statements, by utilizing comments and statistics from the previous round. A summary of each round and its instrument is contained in Appendices C to E.

As part of round two, the panel was asked to suggest additional statements that they felt should be included. These additional statements were incorporated into the round-three Delphi instrument.

Statements regarding the problems/obstacles to IVD development were judged to have reached stability and group consensus at the conclusion of round three. Appendix E contains the statistical summary and panel comments on the final Delphi-panel positions.

Table 4.6 (see p. 69) gives the average scores for all Delphi panel statements for all questions, in rank-order. The higher the mean score the less important the rating of the statement. The dotted lines were drawn through each table in order to indicate the strength of agreement and to give a visual impression of where the majority of responses were made. If the mean response was above 4.00, the item was considered to elicit strong disagreement; if the mean was between 3.99 and 2.00, the item was considered to elicit a neutral response; and if the mean was below 2.00, the item was considered to elicit strong agreement.

Table 4.6 shows the final Delphi panel rankings of the statements regarding the major problems/obstacles to IVD development. These statements were generated in round #1 of the delphi process and were rated during rounds #2 and #3 of the Delphi phase. A discussion of these statements is in contained in the next chapter.

Table 4.4: List of Delphi Panel responses to the question of "When and how did you first get the idea about using interactive video systems for training?"

Response
-1984 when I was first exposed to such a system and asked to help design authoring software for it.
-About 10 years ago working with the American Medical Associ. Telefunken had a simple system that we never used, but the idea was planted.
-When I was at RCA in training and they had CED videodisc technology for consumer viewing.
-A meeting where someone described the technology.
-During the late '70s. I was peripherally involved in developing and evaluating discs for use with the hearing impaired.
-Graduate school.
-Reading literature 1970.
-ASTD National Conference (Boston).
-In the process of using interactive video for reference purposes. A consultant told me about the medium in 1979.
-In discussion with clients.

Table 4.4 (continued)

Response
-ASTD National Boston. 1980 saw a presentation of CPR training by David Hon.
-Approached by CAVRI, an early player in the interactive videotape area when I was with Arthur Anderson Co.'s consulting group.
-Saw early articles in 1979.
-Dr. Gordon and ASTD advised me in 1983 to take a look at IVD.
-Literature, probably 4 years ago in Chicago.
-From industry contacts.
-1973 University Wisconsin, school of nursing.
-We had heard about the Nebraska Group and spent a year investigating the feasibility of IVD, then we converted many of our tape programs to IVD.
-At University of Akron 1974. I was asked to prepare a white paper for education that dealt with the computer and the camera. Presentation given at EDUCOM 10th annual meeting fall 1974.
-When I took a job with a vendor organization which developed IVD.
-WICAT.

Table 4.5: Frequency distribution of the Delphi panel's responses to the question of "where and how did you obtain in-depth information about interactive video?"

Response	Number of responses
1. Literature/Journal/Article	16
2. Professional conference/seminar	10
3. Trade show	9
4. Fellow professional/colleague	7
5. Trial and error	5
6. Consultant	4
7. On the job training	3
8. Workshop	2
9.5 Participating in users group	1
9.5 Attending Nebraska and Sony course	1
9.5 Investigated throughout United States	1

Table 4.6: Final Delphi-panel rankings, by mean, of statements concerning the major problems/obstacles to develop an IVD training program

Rank	Statement	Mean
	———-(strong agreement)———	
1	development time	1.7
2	staying with budget	1.9
	————(neutral)————	
3.5	initial hardware costs	2.0
3.5	variety of skills needed	2.0
5	selling to those who do not have hardware	2.1
6	the need for teamwork rather than individual effort	2.5
7.5	lack of understanding and knowledge about IVD by client	2.6
7.5	scheduling and availability of content experts	2.6
7.5	lack of formative and summative evaluation	2.6
10.5	changing of IVD technology is too fast	2.7
10.5	lack of understanding and knowledge about IVD by management	2.7
13.5	difficulty in designing "interactive" program	2.8
13.5	convincing client to use it	2.8
13.5	operation software not compatible	2.8
16.5	failure of project management	2.9
16.5	hardware selection	2.9
16.5	lack of advanced planning	2.9

Table 4.6 (continued)

Rank	Statement	Mean
19	software selection	3.0
20	programming skills	3.1
21	authoring system not standardized	3.2
22	lack of understanding about market/client demand by traning developers	3.3
	——-(strong disagreement)——	
23	no way to do audio easily	4.0
24	to create 1" video tape masters	4.4

4.5 Criteria for IVD Selection

One of the purposes of this study was to identify the criteria that influence a corporate training developer's decision to use interactive video for training. This purpose was the basis for the items comprised by Part III, Tables A to E, of the Delphi round #1 questionnaire.

Panel members were asked to choose the response that best described how they felt about each of the criteria in Part III, Tables A to E. Panelists used the following Likert-like scale:

1 = very weak influence

2 = weak influence

3 = average

4 = strong influence

5 = very strong influence

During succeeding rounds, these criteria were tabulated by frequency, mean, and standard deviation and reported to the panel in the next round's instrument. Comments from the previous round were also reported to the panel on succeeding instruments.

During each round, panel members were asked to re-evaluate their positions on all criteria items by utilizing the comments and statistics from the previous round. A summary of each round and its instrument is contained in Appendices C to E.

The selection criteria were judged to have reached stability and group consensus at the conclusion of round three. Appendix E contains the final Delphi-panel positions.

The next step in the analysis of the Delphi panel data on Part III, Tables A to E, of round #1 was to calculate the mean scores for each of the items in the final round and to rank-order the items by mean scores. Table 4.7 (see p. 73) gives the final Delphi panel rankings, by means of the criteria that influence a corporate training developer's decision to use interactive video for training.

The higher the mean score, the more important the rating of the criteria item. Dotted lines were drawn through each table in order to indicate the strength of influence and to give a visual impression of where the majority of responses were made. If the mean of the responses was above 4.00, the item was considered to have a strong influence; if the mean was between 3.99 and 2.00, the item was considered to have a neutral influence; and if the mean was below 2.00, the item was considered to have a weak influence. No attempt was made to determine any significant differences between the mean scores of any of the individual criteria.

Table 4.7 displays the final Delphi panel ranking of the criteria for IVD selection. These criteria were rated by the 20 panel members through out the three rounds of the Delphi phase. A discussion of these criteria appears in the next chapter.

As part of round one, the panel was asked to suggest additional criteria that they felt should be part of the selection criteria. The panel suggested 14 additional criteria. Table 4.8 (see p. 75) contains a listing of these additional criteria. The 14 items were incorporated into the round #2 and #3 Delphi instruments.

Table 4.7: Final Delphi panel rankings, by mean, of the criteria that influence corporate training developers' decisions to use interactive video for training

Rank	Criteria	Mean
	———(strong influence)———	
1	cost of developing courseware	4.8
2	dispersed geographic locations	4.6
3.5	self-paced instruction	4.5
3.5	stability of instructional material	4.5
3.5	a large number of learners	4.5
6	user-friendly software	4.4
7	various compentence levels of learners	4.4
8	management commitment	4.3
9	high interactivity level of IVD program	4.2
10.5	objectives of learning task	4.2
10.5	flexibility of learning schedule	4.2
10.5	inherently visual learning material	4.2
13.5	learner is in control during learning	4.1
13.5	required lots of simulations	4.1
15.5	required interactivity between trainer and trainee	4.0
15.5	extensively variable contents	4.0
15.5	costs of purchasing hardware devices	4.0
	———(average)———	
18.5	training time	3.9
18.5	whether any current training material exist	3.9
20	compatibility of different hardware systems	3.8
21.5	unavailability of subject expertise	3.6
21.5	development time	3.6
21.5	trainer's attitude toward IVD	3.6

Table 4.7 (continued)

Rank	Criteria	Mean
	————(average)————	
24	quality of software products	3.6
25.5	health hazard and safety of learning task	3.5
25.5	reliability of hardware equipment	3.5
25.5	repetitive contents	3.5
28.5	organization's policies and traditions	3.4
28.5	difficulty of learning task	3.4
30	level remediation	3.3
31.5	learner's attitude toward interactive video	3.1
31.5	a large collection of multimedia material	3.1
31.5	behavior of competitor and other organizations	3.1
31.5	availability of content experts	3.1
31.5	cost of acquiring courseware	3.1
36.5	availability of information about interactive video	3.0
36.5	ability to compile group statistics of "mastery" scores	3.0
38	cost of purchasing authoring software	2.9
39	clientele pressure for changing	2.9
40	maintenance costs for facilities	2.8
41.5	standardization of authoring system	2.6
41.5	ability to compile student "time on task"	2.6
43	costs of instructor's salary	2.5
44.5	ability to compile student scores	2.4
44.5	overhead costs	2.4

Table 4.8: Additional criteria items suggested by Delphi panel during the Delphi process

Criteria
1. development time
2. whether any current training material exist
3. standardization of authoring system
4. learner is in control during learning
5. level of remediation
6. required lots of simulations
7. training time
8. health hazard and safety of learning task
9. difficulty of learning task
10. quality of software products
11. reliability of hardware equipment
12. ability to compile student scores
13. ability to compile student "time on task"
14. ability to compile group statistics of "mastery" scores

4.6 Summary

Three rounds of Delphi questionnaires were distributed to 20 panelists who had been nationally selected. A composite profile of characteristics and involvement with interactive video of these 20 panelists were presented. Criteria for deciding whether or not to use interactive video for corporate training employed by the panelists were statistically computed from the responses.

Results to the questions about how panelists first obtained the idea to use interactive video and about how they obtained in-depth interactive video information were reported. Final panel rankings of the statements regarding when was appropriate and who was responsible to select a certain medium for training delivery systems were provided. The final panel rankings of the obstacles to IVD development were also presented.

5 CONCLUSIONS

5.1 Review of Chapters I, II, and III

The purpose of this study was to identify the criteria and issues that influence corporate training developers when they are deciding whether or not to use interactive video as a training tool for a training program. It was anticipated that the results of the study will provide potential users of interactive video with recommendations regarding future selection of interactive video for training.

In order to adopt and implement interactive video systems, a series of decisions must be made. These decisions may be influenced by factors related to the decision makers themselves, the setting in which the system is used, the characteristics of interactive video training systems, and the characteristics of the training task. These factors were the basis for the research questions developed in this study which attempted to answer these research questions. The research questions were incorporated into the three rounds of Delphi questionnaires used in this study.

(1) Who is responsible for making decisions about whether or not to use a certain medium/delivery system for training?

(2) In the process of instructional development followed by a training developer in his/her work, when does he/she decide which medium /delivery system to use?

(3) How does a corporate training developer get the idea of using interactive video for training?

(4) How do trainers obtain in-depth information about interactive video for corporate training?

(5) What are the criteria that guide corporate training developers' selections of interactive video as a training delivery system for training programs?

(6) What are the major problems or obstacle a training developer meets when developing an interactive video training program?

5.1.1 Review of Literature

The use of new instructional technologies is evidently becoming important to training developers in the information age, who are being challenged to introduce a variety of technologies as instructional delivery systems. The increase in available technologies has led to the problem of choice: which media are appropriate for serving as training delivery systems for a training program?

According to Barker (1986) a person (or group of people) has the capability of being able to select an appropriate course of action from a set of options. Selecting an appropriate medium for a corporate training program is part of the decision-making process. Research question 1 of this study was designed to investigate who is responsible for decision making in the selection of training devices.

Lawson (1984) stated that the training specialist should provide guidance, resources, and recommendations based on research into effective training-device decisions. He believed that corporate training developers were responsible for the

selection of appropriate training devices and for promoting the diffusion and adoption of training technologies.

The decision to adopt a new device as a training delivery system may be made on a variety of levels and in a series of steps. In one of the most comprehensive studies of the diffusion of innovations, Rogers and Shoemaker (1971) found five phases in the adoption of innovations: (1) awareness or first knowledge of a new idea; (2) interest or gained knowledge about the idea; (3) evaluation or the establishment of a favorable or unfavorable attitude toward the idea; (3) small-scale trial; and (5) the adoption or rejection decision. Research questions 3 and 4 were attempted to identify how a training developer first gets the idea to use interactive video and how to obtain in-depth information about interactive video training systems.

In the process of instructional development, selecting efficient and effective media to deliver instruction is a necessary and important step. Selection of a medium or media as a delivery system requires thorough knowledge and consideration of the objectives of a learning task, the characteristics of the learners, the learning environment, and budget considerations, as well as many other theoretical and practical factors. Anderson (1983) emphasized that media should always be selected in the context of the total instructional development process. The purpose of research question 2 was to identify the stage in the instructional development process that a corporate trainer decided on the medium to use.

Selecting an interactive video system involves more than just the acquiring of hardware. The focus must include incremental decisions made throughout a process, so that all components, including hardware, software, cost, level of interactivity, user's characteristics, project expertise, and so forth, fit and work together.

Helgerson (1986) stated that when considering whether or not videodisc technology was the appropriate medium for training, it was important to establish criteria for selecting videodiscs as opposed to other delivery systems.

Criteria and considerations for the selection of interactive video had been reported in the literature. Among the most important were: (1) whether the user population was large; (2) whether the user population was physically and/or geographically dispersed; (3) whether a subject matter expert was unavailable; (4) whether the material was inherently visual; (5) whether the demonstration equipment was unavailable; (6) whether the users had varying levels of experiences and skills; (7) whether the content was relatively stable or extremely variable; (8) whether the content was used repeatedly; (9) whether a large collection of multimedia materials for instruction was used; and (10) whether a simulation was required. Research question 5 was proposed in order to elicit from the training developer other criteria which had a strong influence on interactive video selection.

Three broad categories of obstacles to the diffusion of technology were identified by Rogers and Shoemaker (1971). These were (1) adoption costs, (2) product standards, and (3) the availability and analysis of relevant information. In order to identify obstacles to the development of interactive video training systems, research question 6 asked training developers to describe the major problems they met when developing interactive video training programs.

5.1.2 Methodology

The Delphi method, which was created by Dalkey et al. in 1950, was used in the current study in order to collect and analyze data from corporate training

developers involved in the use of interactive video for training. The Delphi method is carried out by interrogating a group of experts by means of a series of questionnaires. Subsequent questionnaires are built upon responses from preceding questionnaires. Each successive submission of a questionnaire is referred to as a "round." In this study, three rounds of Delphi questionnaires were used.

Prior to the first round, a preliminary letter was sent to 65 potential panel members. The purpose of the preliminary letter was to determine if the individual was involved with interactive video training, and whether he or she would be willing and available to participate in this study. Twenty-five individuals responded in the affirmative. A total of twenty panelists completed three rounds of Delphi questionnaires.

Subjects selected for this study were a group of individuals involved in the use of interactive video for corporate training. Delphi questionnaire round #1 was developed and pilot-tested following the procedures outlined in Linstone and Turoff (1975). All items in the questionnaire were directly related to a specific research question.

5.2 Discussion of Results

5.2.1 Characteristics of Panel Members

Based on the frequency distributions computed for the demographic information items appearing in Part I of round #1, panel members participating in this study could be described generally as follows:

(1) 20 panelists were dispersed throughout the United States: a wide variety

of geographic regions were represented.

(2) Nearly equal numbers of both sexes participated in this study.

(3) The primary unit of the study was the individuals employed in industries and corporations in the position of supervisor or director of the training department.

(4) The vast majority of responding panelists had had the experience of dealing with the selection of interactive video for training. All of the panelists responded they had been using, producing, or consulting others about the use of interactive video training programs.

Before the study, it was predicted that the specific titles of the individuals selected might be diverse. Results of the demographic items showed that the 20 respondents represented diversity in terms of occupation type, company type, geographical location, and interactive video application.

Although half of the panelist were not supervisors or directors of training departments, they all had had the experience with the training development/management process and had participated in the decisions of whether and/or how to implement interactive video training systems. Only one panelist indicated that he had no experience using interactive video for training and had never been involved in the process of interactive video selection. This panel member was an independent writer who wrote about interactive video in training. He was determined to be qualified as a panelist after a follow-up telephone contact.

5.2.2 Discussion of Results to Six Research Questions

5.2.2.1 Research question 1: Who is responsible for making decision about whether or not to use a certain medium for a training program?

The result showed that director or supervisor of the training department was considered to be responsible for making decisions about whether or not to use a certain medium for training. Most of the respondents agreed that the director of a training program had the same type of authority regarding selection of media for training. Although it depended on the company and program, the responsibilities of consulting and managing the development of an interactive video training program were usually posited with the director or with the supervisor of training programs.

High level (executive) management was identified as the kind of person who would influence the director of training programs regarding IVD selection. One of the panelists responded "need top management support to bridge the many departmental crossover issues."

Ideally, instructional designers or trainers should be responsible for media selection; however, in reality, they often have the least to say. The panelists responded that "There are no 'all around' instructional designers; each has a bias"; "Instructional design people should recommend media and delivery systems"; "Many industrial trainers resent the use of IVD and fear that it may replace them."

Because one-fifth of the responding panelists were employed in private training-consulting organizations, one common response was that the customer/client was also responsible for media selection; but should be advised by the training developer when selecting a medium.

The results indicated that the trainee/learner had the lowest priority in terms of

making the decision whether or not to use a certain medium for his or her training program. As one of the panelist stated, "the needs of the student are often the least important in making a decision. This hurts-but it is true." Because of the large amount of money and time needed to develop a training program, careful consideration is required based on a needs/benefit analysis, objectives of learning, and so on. It is not practical and acceptable to let the trainee/learner choose the medium for training.

The responses to this question indicated that the decision of whether or not to use a certain medium for a training program was usually determined by the following individuals, in descending order: manager/director of training department (programs), high-level (executive) management, customer/client, instructional designer, instructor, program team, and trainee/learner.

5.2.2.2 Research question 2 : In the process of instructional development followed by a training developer in his/her work, when does he/she decide which medium /delivery system to use? The results indicated that the objectives of a training task and cost/benefit analysis were the most important considerations when deciding the medium for training. Only after objectives have been developed and after the cost/benefit analysis has been completed, should the corporate training developer decide which medium/delivery system to use. Panelists frequently indicated that the selection of media must not drive the instructional development process, it should be an outcome of careful analysis (such as needs analysis, cost/benefit analysis, audience analysis, and objectives and testing determined).

Obviously, different companies would have different needs and objectives for their training programs. A large manufacturing company's training needs, such as that of a car manufacturer, would be different from those of a large service industry (such as a bank), both in terms of content and delivery of training. Different kinds of learning, such as comprehension, analysis, application of principles to actual cases, problem-solving, inter-personal skills, mechanical skills, and attitude change would lead to different media-selection decision.

One of the panelists stated that the selection of a training delivery system should occur as late as possible, because of the changing technology. In the final analysis, panelists disagreed with this statement. The other panelists responded that technology was not changing that quickly, and that the training delivery system should be decided on before the production occurred. Corporate training developers should make their decisions based upon what is available, and should go with a technology that they can make work.

Answers to this question indicated that the opinions of panel members were consistent with the media selection process stated by Anderson, Locatis and Atkinson, Reiser and Gagne, and Briggs -all of which were discussed in the review of literature. It is concluded that media should be selected only after the examination of learning objectives, instructional design features, technical aspects, and cost/benefit analysis.

Media must also be examined for their ability to deliver instruction and for their compatibility with the existing environment.

5.2.2.3 Research question 3: How does a corporate training developer get the idea to use interactive video for training? As stated in the review of literature concerning the adoption and implementation of new technology for training, the first phase of adoption is awareness or first knowledge of a new idea. Rogers and Shoemaker (1971) also indicated that the knowledge function occurs when the individual is exposed to the innovation's existence and gains some understanding of how it functions.

The current research illustrated that all panelists were in this stage. As one of the panelists stated, "You can learn the technology (IVD) by doing it!" Most of the panelists indicated that they were exposed to IVD by getting involved with the design, production, and/or development of an interactive video instructional program. This response was consistent to the results of the question appearing in Part I of round #1, which asked panelists to summarize their experiences in the use of interactive video. Most panelists stated that they had had experiences in using, designing, and producing interactive video training programs.

Panelists stated that they first got the idea of using IVD from conferences, meetings, the literature, and training consultants. These responses were similar to the responses to research question 4, which will be discussed next.

5.2.2.4 Research question 4: Where and how did the corporate training developer obtain in-depth information about interactive video for corporate training? Locatis and Atkinson (1984) provided three procedures for making media selection decisions: search, examine, and tryout. They stated that a search should include consulting colleagues, media specialists, and all appropriate lists, indexes, directories, and professional publications.

Results of this current study showed that all of the resources presented above were the information resources used by panelists to obtain IV information. Results of this current study showed that literature and/or journals were the primary information sources. The other most common information sources employed by panelists on interactive video were professional conferences, trade shows, consultants, and other corporate trainers.

5.2.2.5 Research question 5: What are the criteria that guide the selection and decision of a corporate training developer to use interactive video as a training delivery system for a training program? Based on the literature reviewed, 32 criteria were culled for the criteria listed in the Delphi round #1 questionnaire. These lists were composites of what various trainers and educators considered fundamental in the use of interactive video training systems. These criteria included established rules, standards, and principles on which judgments of whether or not an interactive video should be used for training programs were based. Delphi panel members were asked to assess each criterion in terms of whether or not it was important and influential. In addition, they were asked to suggest other items that they thought were important. Fourteen criteria

were suggested and subsequently added to the questionnaire throughout the Delphi process.

Seventeen criteria were considered by panelists to have strong influences on the decision whether to use interactive video for training. The remaining 29 criteria were considered to have average influences on the IVD selection decision. No criteria was considered to have a weak influence on the IVD selection decision. The seventeen criteria that were considered to have strong influences by panelists were presented on Table 5.1 and discussed in the following section.

The following conclusions were drawn from the statistical results and from the analysis of comments of all 20 panelists:

(a) criteria about costs

Cost was one of the most important considerations when developing an interactive video training system. A cost/benefit analysis is an essential step in the decision to use interactive video for training. Technology such as satellite TV and interactive video systems require high initial expenditure. One problem is the rapid obsolescence of equipment, particularly in computing. Other costs for using an IVD system include the staff required to run the equipment (e.g., production staff), the money spend on production or purchase of training materials, and the cost of using the system.

The differences in production costs can very considerably between media, and even within a medium. IVD systems differ considerably in their fixed costs of production; according to Bates (1987), the fixed production costs for one hour of IVD training material would be 50 to 100 units compared to those of 1 unit for radio/audio cassette training material.

In this study, the cost for developing interactive video training courseware was considered by the panelists as the most important criterion influencing corporate training developer's decisions to use interactive video for training. However, the cost of purchasing hardware devices and existing courseware were not considered to be as important as the researcher had predicted. Most of the panelists believed that the price for hardware was reasonable. Most of the panelists indicated that acquiring effective or appropriate courseware was difficult. There was almost no good generic, high-quality courseware available. This was also one of the major problems that corporate training developers found when developing interactive video training programs.

When considering cost of an instructor's salary, most of the panelists agreed that this was one of the reasons that made interactive video viable and advantageous over traditional instruction. IVD requires fewer instructors and this is a major justification for the development of IVD. "Some of the trainers resent the use of IVD and fear that it may replace them", one panelist stated.

(b) criteria about the characteristics of learners

Learners/trainees that were in dispersed geographic locations was also an important criterion for IVD selection. Helgerson (1986) and Pribble (1985) stated that "when there are a large number of learners distributed over time and place, it is more economical and efficient to use self-paced training rather than lecture" (p. 18).

Different training delivery systems differ considerably in their costs for delivery. For example, the cost for delivery of a broadcast TV program is low: it costs the same to transmit whether watched by one or one million viewers; IVD costs, on the

other hand, vary according to the number of delivery points. According to Bates (1987), the cut-off point for the distribution of the Hewlett-Packard IVD training system was 500 trainees per workstation: above that number it was cheaper to use IVD; below that number it was not cost efficient to use IVD.

All of the panelists agreed that self-paced instruction was an important feature of interactive video. When a large number of learners at various competency levels were taught in a training program, IVD would be considered an appropriate medium/delivery system for training. In addition, the fact that the learner is in control during learning was also an important feature of IVD that influenced training developers to consider the use of IVD for training. Panel members believed that learners wanted to be self-directing.

(c) criteria about the characteristics of training tasks

Pribble (1985) stated that when the subject matter is stable or relatively stable, the use of interactive video should be considered to reduce the cost of delivery. The responding panelists in this study considered that this criterion would have a strong influence on the IVD selection decision. Panelists stated that "when content was stable, it was easy to modify programs with new IVD systems," and "IVD can help clarity by simplifying." On the other hand, when responding to the criterion of extensively variable contents for a learning task, panelists stated that volatile content ruled out IVD as a candidate system and stated that IVD was not always cost effective when content changed rapidly.

When asked the influence of a high-interactivity level to the IVD selection decision, panelists agreed that it had a strong influence on the decision for IVD selection. They believed the interactivity was the key to interactive video instruc-

tion's success. They also indicated that a high interactivity-level was the key to student motivation. However, they stated that the system did not make a program interactive; only program design did, and that "stop/go", "yes/no" was not interactive video. In addition, they stated that products on the market did not come close to exploiting the potential of the medium.

The data also showed that when a training program required interaction between trainee and trainer, panelists believed that this was a major reason not to use interactive video. "Interactive video is to be learner directed, it would not promote instructor and learner interaction," one of the panelists stated.

(d) criteria about organizational environment

In a study regarding diffusion of innovations, Stewart (1982) stated that advocates in a business had greater credibility in the organization and facilitated that the adoption process. It was important that some of these "internal advocates" be senior supervisory personnel, managers, or administrators. Mensch (1980) also concluded that lack of top-level administrative support was a common reason for the rejection of computer-based technologies in organizations. This was consistent with the results showed in this current study. High level (executive) management support was considered very important to IVD selection and development.

Panelists in this study also indicated that the policies and traditions within a training organization would influence the decision to use IVD for training. If training had traditionally been based on face-to-face instruction in a corporation, it was difficult to persuade the training department about the value of self-paced learning. Another factor that influenced the decision to use interactive video was

competition or pressure from other organizations. "Some of companies want to be leading edge," one of the panelists stated. Another panelist responded that the staff to be trained may feel that their company was being left behind by competitors who had "high-tech" training programs.

5.2.2.6 Research question 6: What are the major problems a training developer meets when developing interactive video training programs? It was predicted that by 1990, the installed base of interactive videodisc players used in education and training could exceed 124,000 (Sayer and Miller, 1985). Reports have shown that the development of IVD in training has not been as rapid as was predicted by Sayer and Miller. The purpose of research question #6 was to find out what the major obstacles were to the use of interactive video for training, in order to provide a guide for potential users of interactive video training.

Hoffis (1983) stated that relatively high cost, lack of standards, and paucity of generic courseware were the major obstacles plaguing the videodisc industry. All of these obstacles were given by panelists as major problems with IVD development. Responding panelist indicated that development time was the most important reason interactive video has not widely used. "To develop an IVD training program took a long time, the tools were not productive enough", one of the panelists stressed. Results also showed that because of the variety of skills and teamwork needed, as opposed to individual efforts, in the production of an IVD program, developing an IVD program was more difficult than developing other computer-based instruction systems.

Nadler (1980) found that the greater the imcompatibility of an innovation

with a deeply held belief or value the less likely it was that the innovation would be adopted. Panelists in this study also indicated that standardization of hardware and software systems for IVD systems would facilitate the adoption and implementation of interactive video in training. "There is still a gap between IBM Info-window and Hypercard", one of the panelists stated. Additionally, scheduling and availability of a content expert, as well as programming skills were both considered as common obstacles to IVD development.

5.3 Suggestions for Further Study

There is a need for additional research in all areas of interactive video training. The enthusiastic response and support received from the corporate training developers who participated in this study indicated that there was a great deal of interest and need for interactive video research. Several panel members expressed their concern for the lack of research available. One of the panelists asked the researcher to provide information collected in this study as reference material for her book concerning IVD training.

Future studies should be considered in the following areas:

1. This study was limited by the lack of a complete list of all interactive video users in corporate training, and by the lack of previous research on the topic. In addition, this study should be expanded and/or repeated to include other populations, such as groups of clients or customers of IVD training programs.

2. A study of the evaluation and selection process, which focuses on user or client opinion rather than on those of the training developers should be attempted.

3. An in-depth study of the trends and criteria used by different industries/corporations should be conducted. This study could evaluate the differences in media selection as related the business type, company size, training type, budget size, staff-size, or director's management approach.

4. A follow-up evaluation of this study should be conducted.

5. A cost-effectiveness study of interactive video training programs should be undertaken. An attempt should be made to identify the most cost-effective management and operational practices for interactive video training programs.

5.4 Summary

The increase in available technologies for instruction has led to the problem of choice: what medium/media should be used for training programs? Should new technologies such as satellite TV or computer-based training systems be selected for a training program? The purpose of this study was to identify the criteria and considerations that influenced corporate training developers' decisions to use interactive video systems for training. This study attempted to provide recommendations for potential users and corporate training developers regarding interactive video training programs.

The selection of an appropriate medium/delivery system as a training tool for a training program is a critical point in the process of developing corporate training programs, and the use of interactive video training has presented an opportunity for industries and corporations to offer interactive video and simulated training in this high-tech information age. Six research questions were developed based on the

purposes of this study. Three rounds of Delphi questionnaires were developed to provide answers to these questions.

The first round Delphi questionnaire was pilot-tested and distributed nationally to 20 invited Delphi panel members. Data were collected from the 20 panelists throughout the three rounds of the Delphi process, which were conducted in a three month period. A profile of the participating panel members was compiled from Delphi round #1 results.

The data from the Delphi questionnaires were analyzed in order to provide a description of the issues and criteria concerning the adoption and implementation of interactive video for corporate training. This study found that the director or manager of the training department or training programs should be the person responsible for selecting an appropriate medium/training tool for a training program. The objectives of a training task, cost/benefit analysis, budget, audience analysis, and development time were the most important criteria related to the decision to use interactive video for corporate training. Only after an examination and analysis of these considerations had been completed should the medium be selected. The results also showed that journals/literature, other trainers, conferences, trade shows, and consultants were the information sources used by the panel to learn about interactive video training.

Criteria influencing corporate training developers' decision to use interactive video were determined. The results showed that several important criteria should be take into consideration when deciding on the use of IVD training systems. These criteria included costs, particularly production costs, related to numbers of trainees; learning task, in terms of skills and objectives of training required; characteristics

of the media and the extent to which they encourage active learning; characteristics of learners, in terms of their competency level and their geographic location; and the organizational environment in which IVD would be used for training purposes. Major problems or obstacles for the development of interactive video training were also determined. These problems included longer time for producing IVD programs, high costs for developing and purchasing IVD systems, and the variety of skills needed to develop IVD programs. It was considered by the researcher that money was the most important thing in adopting an IVD system for training. Although cost was not identified as the most important criterion or obstacle by panelists in IVD selection, some important criteria were affected more or less by the issue of money.

It is concluded that when considering the use of interactive video for training several considerations needed to be taken into account. An intuitive decision based on a careful analysis of the situation should be made by corporate training developers. This study identified several criteria that had stronger influences than others in IVD selection should be considered and analyzed first. It was found that results of this study supported the general procedures prescribed in the literature regarding instructional development and design. This literature included Dick and Carey's systematic approach (1984), Kemp's (1977) instructional development process. It was also found that there was a great deal of interest in interactive video training among corporate training developers, and that many more evaluative studies needed to be conducted in this area.

Table 5.1: Criteria considered by panelists as have stronger influences in deciding whether or not to use interactive video for corporate training

Rank	Criteria	Mean
	* Criteria about cost	
1	cost of developing courseware	4.8
15.5	cost of purchasing hardware devices	4.0
	*Criteria about the characteristics of learners	
2	dispersed geographic locations	4.6
3.5	a large number of learners	4.5
7	various competency levels of learners	4.4
	* Criteria about the characteristics of alearning task	
3.5	stability of instructional material	4.5
6	availability of use-friendly software	4.4
10.5	objectives of a learning task	4.2
10.5	inherently visual learning material	4.2
13.5	required lots of simulation	4.1
15.5	required interactivity between trainer and trainee	4.0
15.5	extensively variable contents	4.0

Table 5.1 (continued)

Rank	Criteria	Mean
	* Criteria about the characteristics of IVD system	
3.5	self-paced instruction	4.5
9	interactivity level of an IVD program	4.2
10.5	flexibility of learning schedule	4.2
13.5	learner is in control during learning	4.1
	* Criteria about organization's environment	
8	management commitment	4.3

6 BIBLIOGRAPHY

Anderson, R. H. (1983). Selecting and developing media for instruction. New York: Van Nostrand Reinhold.

Barker, P. O. (1986). Educational, training and information technologies. New York: Nichols Publishing Company.

Bates, A. W. (1987). Teaching, media choice and cost-effectiveness of alternative delivery systems. Paper presented at a conference on audio-visual technology and vocational training in Europe–A dual challenge, Berlin, East Germany. (ERIC Document Reproduction Service No. 292 441)

Beausey, M. M. (1988). Videodisc development : No lone rangers, please. Training. 25(2), 65-68.

Borderick, R. (1982). Interactive video: Why trainers are turning in. Training, 19(11), 46-49.

Bove, R. (1986). Video training: The state of the industry. Training and Development Journal, 40(8), 27-29.

Brandt, R. (1986). Interactive video: When to consider its use. Student paper, San Jose State University. (ERIC Document Reproduction Service No. 272 174)

Branson, C. J. (1975). Technology and the multinationals. Toronto: Lexington Books.

Brawley, R. & Peterson, B. (1983). Interactive videodisc: An innovative instructional system. American Annals of the Deaf, 128(5), 687-700.

Briggs, L. J. (1970). Handbook of procedures for the design of instruction. Pittsburgh, PA: American Institutes for Research.

Briggs, L. J. & Wager, W. W. (1981). The handbook of procedures for the design of instruction. Englewood Cliffs, NJ: Educational Technology.

Browning, P. & White, W. A. & Nave, G. & Barkin, P. Z. (1986). Interactive video in the classroom: A field study. Education and Training of the Mentally Retarded. 15(6), 85-91.

Bryan, L. A. (1986). Supervisors with micros: Trends and training needs. Training and Development Journal, 40(7), 34-37.

Buchan, R. (1983). The power of computer-managed interactive video instruction. Tappi Journal, 66(10), 108-109.

Bunderson, C. V.; Hoekema, J.; Hon, D.; Wilson, R. L.; Worcester, C.; & Woodward, H. (1983). Interactive video: An elephant in search of a definition. Performance and Instruction Journal, 22(9), 4-5.

Buther, W. (1987). Interactive video: Educational tool or toy? Educational Technology, 24(4), 13-17.

Buttefield Communication Group. (Octorber, 1983). Potential roles for public television stations in the emerging interactive videodisc industry. An Evaluation for the Corporation for Public Broadcasting. BCG, New York.

Chamber, J. A. & Spencer, J. W. (1980). Computer-assisted instruction. Englewood Cliffs, NJ: Prentice-Hall.

Clark, F. E. & Angert, J. F. (1981). Teacher commitment to instructional design: The problem of media selection and use. Educational Technology, 35(5), 9-14.

Clark, R. E. (1983). Reconsidering research on learning from media. Review of Educational Research, 53, 445-459.

Copeland, P. (1988). Interactive video: What the research says. Media in Education and Development, 14(6), 61-63.

Council for Educational Skills Training (1987).
Report on the evaluation of the SPC interactive video programme. Ford internal report document, Education and Training Department, Ford of Europe.

DEC (1983). IVIS benchmark study. Digital equipment corporation, USA.

Delbecq, A. L. (1975). Group techniques for program planning : A guide to nominal group and Delphi processes. Glenview, IL: Scott, Foresman and Company.

Dennis, V. E. (1984). High tech training at Arthur Anderson and Company. Instructional Innovator, 29(3), 6-12.

Dick, W. & Carey, L. (1985). The systematic design of instruction. Glenview, IL: Scott, Foresman and Company.

Donahue, T. J. & Donahue, M. A. (1983). Understanding interactive video. Training and Development Journal, 37(12), 26-31.

Floyd, S. & Floyd, B. (1982). Handbook of interactive video. White Plains, New York: Knowledge Industry Publications.

Gordon, J. (1986). Where the training goes. Training. 23(10), 49-62.

Hannafin, M. J. & Garhart, C. (1985).
Research methods for the study of interactive video. Paper presented at the annual meeting of the development of computer-based instructional systems, Philadelphia.

Hannafin, M. J. & Phillips, T. L. (1987). Perspectives in the design of interactive video: Beyond tape versus disc.
Journal of Research and Development in Education, 21(1), 44-57.

Helgerson, L. W. (1986). What to focus on when selecting a videodisc system. Performance and Instruction, 25(7), 6-10.

Hoffis, S. (1983). Interactive video. Cheshire, UK: Sigma Technical Press.

Jones, M. K. (1987). Interactive videodisc and the self-directed learner. Optical Information Systems, 7(1), 62-64.

Kearsley, G. P. & Frost, J. (1985). Design factors for successful videodisc-based instruction. Educational Technology, 25(3), 7-13.

Keen, P. (1976). Managing organizational change: the role of MIS. Proceedings of the seventh annual conference, society for MIS, Chicago.

Kemp, J. E. (1977). Instructional design: A plan for unit and course development. Belmont, CA: Fearon Publishers.

Ketner, W. D. (1984). Interactive videodisc for electronic equipment simulation, proceedings of the conf. for interactive instructional delivery in education, training and job performance. SALT, Feb 1984, 44-46. (ERIC Document Reproduction NO. ED 272 174)

Lawson, K. R. (1984). Design and development of training devices/systems for emerging military tactical systems. Journal of Educational Technology Systems, 12(4), 319-326.

Linstone, H. A. & Turoff, M. (1975). The Delphi method. Reading, MA: Addison-Wesley Publishing Company.

Locatis, C. & Atkinson, F.D. (1984). Media and technology for education and training. Columbus, Ohio: C.E. Merrill Pub. Co.

Marquis, D. G. & Mayers, S. (1969). Successful industrial innovations. Washington, D.C. : National Science Foundation.

Martino, J. P. (1971). Technological forecasting for decision making. New York: American Elsevier Publishing Company, INC.

McLean, L. M. (1985). Seeking information on interactive video: The information sources and strategies used by corporate training developers. Doctoral dissertation, Syracuse University, New York. (ERIC Document Reproduction Service NO. ED 259 719)

Mensch, G. (1980). Stalemate in technology: Innovations overcome the depression. Cambridge, Mass.: Ballinger.

Michael, M. (1988). Optical media In training. Optical Information Systems, 8(4), 184-187.

Nadler, L. (1980). Corporate human resource development. London: Van Nostrand Reinhold Company.

Newell, W. J.; Sims, D. & Myers, T. (1983). Principles and requisites of computer-assisted interactive video instruction: A sign language lesson. American Annals of the Deaf, 128(5), 662-672.

Olivier, W. P. & Scott, G. F. (1982). Phase II final report: to develop an interactive, computer-based optical videodisc delivery system for skill training. Report prepared for the Ontario ministry of Education, Toronto, Canada.

O'Neill G. (1985). Interactive video as an aid to learning. NIT for Education and Training Technology, 24(2), 143-144.

Parsloe, E. (1986). Technology-based training: State of the art report. England: Pergamon Infotech Limited.

Pribble, R. (1985). Enter the videodisc. Training, 5(7), 91-99.

Ralphs, L.T. & Stephan, E. (1986). HRD in the Fortune 500. Training and Development Journal, 40(10), 69-76.

Reigeluth, C. M. & Garfield, J. M. (1984). Using videodiscs in instruction: Realizing their potential through instructional design. videodisc and optical disc, 4(3), 199-215.

Reinhart, C.; Jamieson, D.; & Baroff, L. (1987). How do you determine the use of new technologies. Training and Development Journal, 41(8), 22-26.

Reiser, R. A. & Gagne, R. M. (1982). Characteristics of media selection models. Review of Educational Research, 52(4), 499-512.

Rogers, M. E. (1962). Diffusion of innovations. New York: The Free Press of Glencoe, A division of the Macmillan Company.

Rogers, M. E. & Shoemaker, F. F. (1971). Elements in the diffusion of innovations,in communication of innovations-

a cross-cultural approach. New York: The Free Press.

Romiszowski, A. J. (1974). The selection and use of instructional media. London: Kogan Page.

Russ-Eft, D. F. (1985). Use of the new technologies in training,. in business and industry. Paper presented at the 69th annual meeting of the American Educational Research Association, Chicago, IL. (ERIC Document Reproduction Service NO. ED 263 900)

Sayer, J. & Miller, J. (1985). Teaching, training and special educational needs. London: C. Helm Press.

Schaffer, L. C. & Hannefin, M. J. (1986) The effects of progressive interactivity on learning from interactive video. ECTJ, 34(2), 89-96.

Schwartz, M. D. (1981). Interactive video: Tape or disc. Educational and Industrial Television, 15(6), 68-70.

Shriver, E. E. (1984). Situational interaction; Or, how to learn without being told. Proceedings of the Conf. for interactive instructional delivery in education, training and job performance. SALT, Feb 1984, 47-50. (ERIC Document Reproduction No. ED 272 174)

Singh, R. (1986). Technology-based training, state of the art report. Maidenhead Berkshire, England: Pergamon Infotech Limited.

Smith, E. E. (1987). Interactive video: An examination of use and effectiveness. Journal of Instructional Development, 10(2), 2-9.

Smith, R. (1988). Some stats from interactive video users. Videodisc Monitor, 11(3), 5.

Stewart, D. W. (1982). The diffusion of innovations: A review of research and theory with implication for computer technology. Paper presented to the 1982 annual convention of the American Psychological Association, Washington, D.C. (ERIC Document Reproduction No. ED 224 480)

Sturm, R. (1985). High tech breakthrough: Interactive videodisc. Wilson Library Bulletin, 59(7), 450-452.

Training Analysis and Evaluation Group. (1986).
The sources and rate of technological change in the United States economy. (TAEG report No. 4). TAEG, Orlando, FL.

U.S. Department of Housing and Urban Development. (1976).
Factors involved in the transfer of innovations. HUD, San Francisco.

7 APPENDIX A: PRELIMINARY LETTER

Iowa State University of Science and Technology Ames, Iowa 50011

March 20, 1989

Dear Sir or Madam:

The purpose of this letter is to ask for your participation in our research study. It is a part of a research project for the master's thesis in Curriculum and Instructional Technology, From the Department of Professional Studies in Education at Iowa State University. Purposes of this research are : (1) To identify the factors that influence corporate training developers' decisions to use interactive video . (2) To determine the criteria for selecting interactive video as a training tool for corporate training.

We plan to use a technique called the Delphi process. This involves asking a small panel of experts to give their opinions about the issue being investigated. which in this case is the use of interactive video in corporate training. We sincerely ask for your assistance.

Your participation and input will be very important to the success of this study.

If you agree to participate in this research study,

you will be responding to three or four questionnaires that will each take less than 15 minutes to complete. A summary copy of the delphi results will be provided to all panel participants at the conclusion of the study. The confidentiality of your responses will be maintained throughout the delphi process and in reporting the results at the end of the study.

If possible, please complete and return Delphi round #1 questionnaire by March 31, 1989.

If you need further information contact us at (515) 294-2183. Thanks in advance for your time and effort.

Sincerely,

Sofia Lee
Graduate student

Michael R. Simonson
Professor

_____ Yes. I agree to participate
in this study. My address and telephone
number are:

Name:
Mailing Address:

Telephone Number:

_____ No, I will not participate
in this study: however.
the person below might be interested in
taking part.

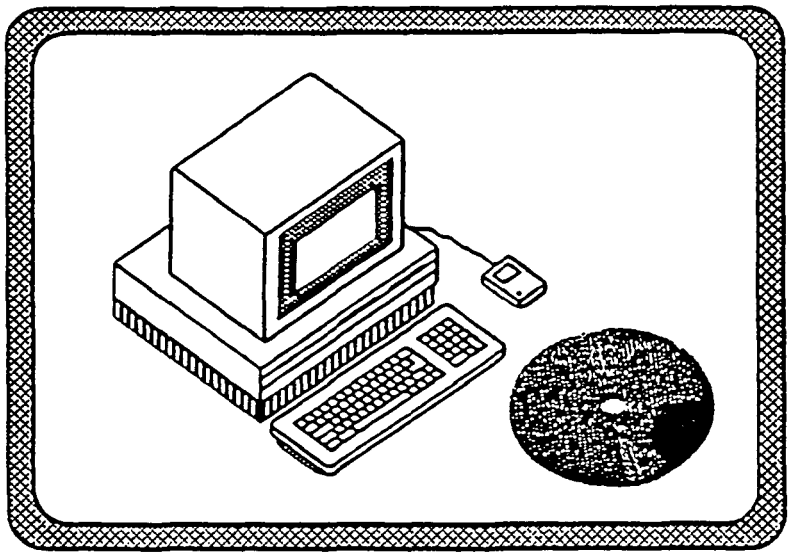
Name:
Mailing Address:

Telephone Number:

8 APPENDIX B: DELPHI ROUND #1 QUESTIONNAIRE

DELPHI ROUND#1 QUESTIONNAIRE

The Criteria That Influence the Decisions of Corporate Training Developers Vis-a-Vis Adoption and Diffusion of Interactive Video as Part of an Overall Training System



INSTRUCTIONAL RESOURCES CENTER

N-157 Lagomarcino Hall

Iowa State University

Ames, Iowa 50011

515-294-2183

Iowa State University of Science and Technology Ames, Iowa 50011

Dear Sir or Madam: March 10, 1989

Thank you for agreeing to participate in my research study as a member of the Delphi panel. Your opinions about the research topics are very important and appreciated. As I discussed with you during my preliminary contact, the purpose of this Delphi process is to identify the factors affecting the decision to use interactive video learning systems as a part of a corporate training program.

I predict that three rounds of responses from you will be needed. The questionnaires will be mailed to you over the next two months. This first round will require more time on your part than the subsequent ones. It requests your input primarily via written statements, whereas, the following rounds will only require your reactions to composite statements derived from the panel members' round one responses. A summary report of the Delphi results will be provided to all panel respondents at the conclusion of the study. All answers will be processed confidentially. No names will be mentioned.

Could you complete and return this first-round instrument by March 31, 1989. If you need further information, please contact me at (515)294-2183. Thanks in advance for your time and effort.

Sincerely,

Sofia Lee
Graduate student

Michael R. Simonson
Professor

PART I. Demographic Information

A. Please indicate an appropriate response for the following questions about your background and personal experience using interactive video.

1. How many years of experience do you have using interactive video learning system?

_____ Approximate number of years

2. Have you ever been involved with the process of selecting an interactive video learning system for corporate training?

_____ Yes
_____ No

3. What is your gender?

_____ Female
_____ Male

4. What is your level of education?

_____ Some College
_____ B.A
_____ M.A
_____ Above M.A

5. In what geographic region of the United States do you work?

_____ Northeastern
_____ Southeastern
_____ North Center
_____ South Center
_____ Northwestern
_____ Southwestern
_____ Far West

6. With what type of institution are you employed ?

_____ Educational Organization
_____ Industrial/Corporate
_____ Private Training Organization
_____ Independent Writer/Trainer
_____ Other, please specify:

B. Please answer these following questions.

7. What's the field in which you obtained your most advanced degree ?

8. What is the title of your job position ?

9. Please summarize the experiences you have in the use of interactive video systems.

ROUND # 1 PART II.

Please answer the following questions as best you can.

1. In the process of instructional development you follow in your work, when do you decide which media/delivery system to use?

   Response:

2. Who is responsible for making decisions about whether or not to use a certain medium for your training program?

   Response:

3. Where and how did you first get the idea about using interactive video systems for training?

   Response:

4. Where and how did you obtain more, in-depth information about interactive video?

   Response:

5. Please indicate the major problems/obstacles you met when you developed an interactive video training system.

   Response:

ROUND #1 PART III.

- Please read the following instructions before you start to answer questions. Thank you.

Factor:

The following five tables each refer to one of five factors:

A. Economic Factors
B. Organizational environment
C. Characteristics of Interactive video
D. Characteristics of Learning task
E. Characteristics of Learners

These factors are considered by the researcher as the causes and conditions that influence a corporate training developer's decision to use interactive video for training. Please provide the additional factors that you think are important on the last page.

Criteria Items

In the tables on the following pages, there are a list of criteria culled from the literature. The lists are a composite of what various trainers and educators have considered basic and important about the use of an interactive video training systems. These criteria are the established rules, standards and principles, on which the judgement of whether or not to use interactive video for training was based. Please assess each item on the list in terms of whether or not it is important and influential. In addition, suggest other items that you think are important. Blanks have been left for these additional items.

Influence Scale

Please indicate the influence that a criterion has had on your decision to use interactive video for training.

Scale
1. very weak influence
2. weak influence
3. average influence
4. strong influence
5. very strong influence

Comments or suggestions

Please give additional comments in the space provided regarding the appropriateness of the criteria listed. (e.g. Was the cost for purchasing hardware devices considered when you decided whether to use interactive video for training?). If possible, state your explanations, suggestions, or any questions concerning the criteria listed.

FACTOR A: ECONOMIC FACTORS

CRITERIA ITEMS	INFLUENCE SCALE (Circle your responses)				
	Weak Influence		Average		Strong Influence
1. Cost of purchasing hardware devices	1	2	3	4	5
Comments/ Suggestions:					
2. Cost of developing or acquiring courseware	1	2	3	4	5
Comments/ Suggestions:					
3. Cost of purchasing authoring software	1	2	3	4	5
Comments/ Suggestions:					
4. Maintenance costs of facilities	1	2	3	4	5
Comments/ Suggestions:					
5. Overhead costs	1	2	3	4	5
Comments/ Suggestions :					
6. Cost of instructors' salary	1	2	3	4	5
Comments/ Suggestions:					

FACTOR B: ORGANIZATIONAL ENVIRONMENT

CRITERIA ITEMS	INFLUENCE SCALE Weak Influence (Circle your responses)		Average		Strong Influence
1. Management's commitment	1	2	3	4	5
Comments/ Suggestions:					
2. Trainer's attitude toward interactive video	1	2	3	4	5
Comments/ Suggestions:					
3. Availability of interactive video experts	1	2	3	4	5
Comments/ Suggestions:					
4. Organization's policies and traditions	1	2	3	4	5
Comments/ Suggestions:					
5. Behavior of competitors and other organizations	1	2	3	4	5
Comments/ Suggestions :					
6. Clientele pressure for chang	1	2	3	4	5
Comments/ Suggestions:					

FACTOR C: INTERACTIVE VIDEO

CRITERIA ITEMS	INFLUENCE SCALE (Circle your responses)				
	Weak Influence		Average		Strong Influence
1. Availability of information about interactive video	1	2	3	4	5
Comments/ Suggestions:					
2. Availability of interactive video experts	1	2	3	4	5
Comments/ Suggestions:					
3. High interactivity level of interactive video system	1	2	3	4	5
Comments/ Suggestions:					
4. Compatability of different hardware systems	1	2	3	4	5
Comments/ Suggestions:					

FACTOR D: CHARACTERISTICS OF LEARNING TASK

CRITERIA ITEMS	INFLUENCE SCALE (Circle your responses)				
	Weak Influence		Average		Strong Influence
1. Objectives of learning task	1	2	3	4	5
Comments/ Suggestions:					
2. Extensively variable cont	1	2	3	4	5
Comments/ Suggestions:					
3. Self-paced instruction	1	2	3	4	5
Comments/ Suggestions:					
4. Stability of instructional material	1	2	3	4	5
Comments/ Suggestions:					
5. Flexibility of learning schedule	1	2	3	4	5
Comments/ suggestions:					
6. Quality of instruction	1	2	3	4	5
Comments/ suggestions:					
7. User-friendly software	1	2	3	4	5
Comments/ suggestions:					

FACTOR D: CHARACTERISTICS OF LEARNING TASK

CRITERIA ITEMS	INFLUENCE SCALE (Circle your responses)				
	Weak Influence		Average		Strong Influence
8. Inherently visual learning materials	1	2	3	4	5
Comments/ Suggestions:					
9. Repetitive contents	1	2	3	4	5
Comments/ Suggestions:					
10. Unavailability of subject matter expertise	1	2	3	4	5
Comments/ Suggestions:					
11. A large collection of multimedia material	1	2	3	4	5
Comments/ Suggestions:					
12. Immediate feedback	1	2	3	4	5
Comments/ suggestions:					
13. Active participation required	1	2	3	4	5
Comments/ suggestions:					

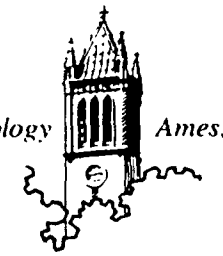
FACTOR E: CHARACTERISTICS OF LEARNERS

123 INFLUENCE SCALE

CRITERIA ITEMS	Weak Influence (Circle your responses)		Average		Strong Influence
1. A large number of learners	1	2	3	4	5
Comments/ Suggestions:					
2. Various Competency levels	1	2	3	4	5
Comments/ Suggestions:					
3. Dispersed geographic locations	1	2	3	4	5
Comments/ Suggestions:					
4. Required interactivity between trainer and trainee	1	2	3	4	5
Comments/ Suggestions:					
5. Learners' attitude toward interactive video	1	2	3	4	5
Comments/ Suggestions :					

- Please make any comment or suggestions you might have regarding the information contained in this questionnaire.

Iowa State University of Science and Technology Ames, Iowa 50011



April 2, 1989

Dear Delphi Panel Member:

As of this date I have not received your responses to the delphi round #1 questionnaire. If you have not yet completed the questionnaire, would you do so now and return it to me at your earliest convenience.

If you did not receive the mailed instrument or need another copy, please notify me as soon as possible. Call me at (515) 296-8080.

If you have already mailed it, accept my thanks for your cooperation and disregard this reminder.

Sincerely,

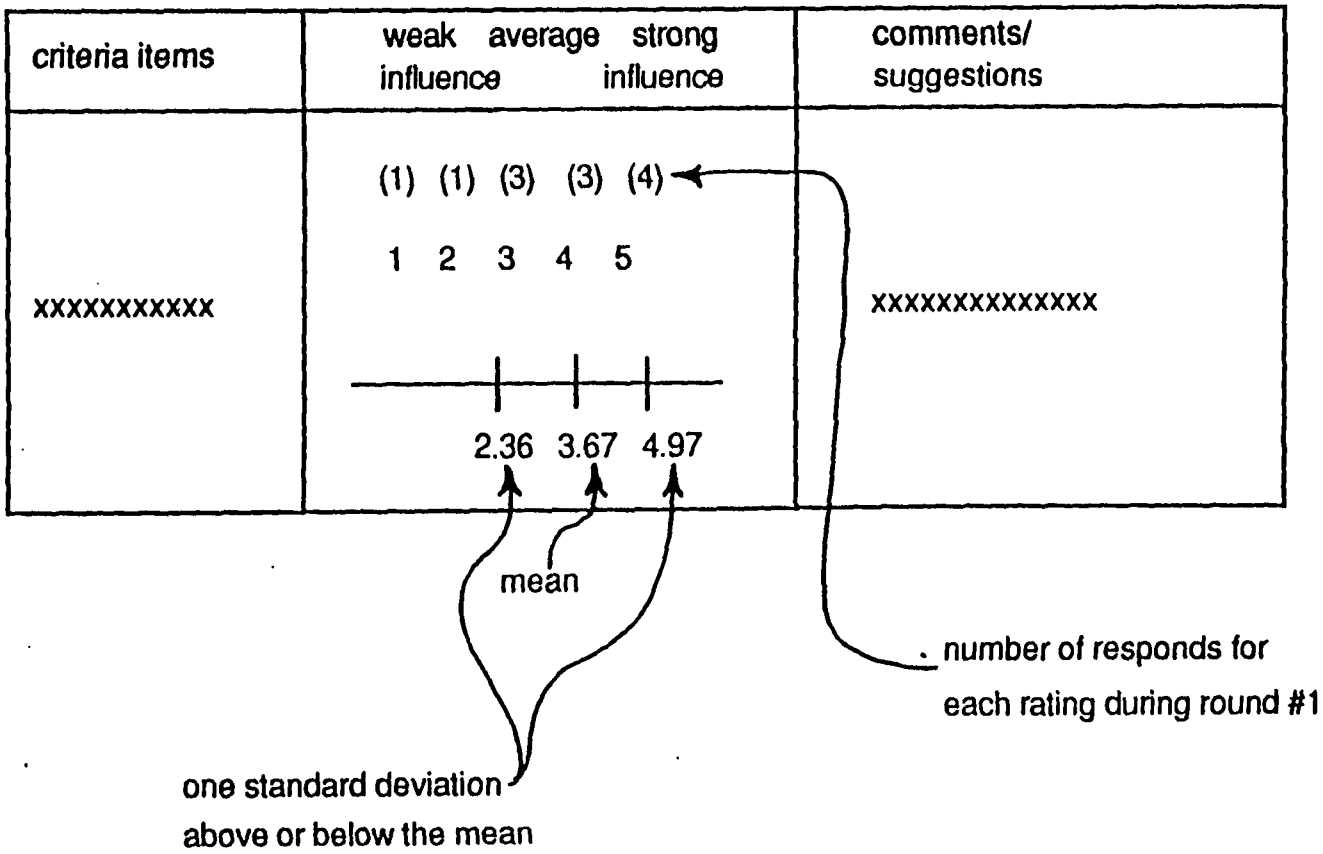
Sofia Lee

9 APPENDIX C: DELPHI ROUND #2 QUESTIONNAIRE

STATISTICAL SUMMARY OF ROUND #1 RESPONSES

The means, the standard deviations, and the frequency of response for each rating category is shown for all criteria items from round #1 part III. as follows:

Example:



ACTOR A: ECONOMIC FACTOR

criteria items	strong influence	average	stronng influence	comments/suggestions
1.cost of purchasing hard-ware devices	(1) (1) (7) (4) (9) 1 2 3 4 5 2.69 3.86 5.03			--considerable inhibitor among our clients. --needs to be considered after doing a cost/benefit analysis. --the reason this is so big, is that its cost expended up front. --this, more than anything has kept us from interactive video. --for our customers who were used to running tapes on VCRs the cost of on IVD system was a major factor. --the hard-ware can be paid for itself very quickly. --large corpora-tions buy PCs by the ton-an IV workstation is not a lot. --smaller footprint needed lower cost & must
2. cost of developing or acquiring courseware	(1) (1) (4) (7) (8) 1 2 3 4 5 2.83 3.95 5.07			--we develop our own. --custom is expensive & generic is hard to preview. --cost of developing courseware is "5", for acquiring, "2". --needs to be considered after doing a cost/benefit analysis. --acquiring is almost a non-issue in our business, there is almost no good genneric material. --this is your high cost driver. --I am averaging over 10 projects. --this required a shift in our instructional techno-logist's way of creating programs,plus major investment in programmers. --we are developing in house a system to drive this cost down. --development and design techniques need to be improved to increase effectiveness and lower development cost.
3. cost of purchasing authoring software	(6) (6) (5) (2) (3) 1 2 3 4 5 1.18 2.55 3.92			--many people have no intention of building their own. --we worked with programmer that had a given program. --there is a wide range of costs to choose from. --flexibility & instructional design sophistication is more important than cost. --software is available at all price levels. --it was difficult to find a good authoring system, so we tried a few and spent tons of money doing some re-converting. --good software would be worth the price, there is no good authoring yet! --most of the authoring software is low cost and low capability

criteria items	weak influence		average		strong influence	comments/ssuggestions
4. maintenannce costs of facilities	(5)	(6)	(7)	(4)	(0)	--workstation equipment is basically trouble free. --most people ignore maintenance until something breaks. --cost/benefit analysis -also these usually lower than traditioned training. --not a problem in well defined stable areas.
	1	2	3	4	5	
	1.40		2.46		3.52	
5. overhead costs	(5)	(5)	(9)	(2)	(1)	--delivery is cheap, development is where the cost lies. --should be less overhead. --cost-benefit anlysis- also these usually lower than traditional training. --amount of space used is a problem due to size of hardware and studio costs.
	1	2	3	4	5	
	1.40		2.50		3.60	
6. cost of instructior's salary	(6)	(4)	(7)	(3)	(1)	--this is a major justification for our development of IVI. not just instructor's salery, but cost of other alternative delivery system, too. --our past programs were new so there was no previous cost basis, our newest planned program shows a live instructor payback in 5 years, IVD 2.5 years. --this is a saving. --can't really answer this. --often considered to be an "internal" cost. --one reason why IVV has an advantage over traditional instruction. --very important because IVD allows for fewer instructors. --depends on whether instructor existed before. --not a problem.
	1	2	3	4	5	
	1.27		2.48		3.79	

FACTOR B: ORGANIZATIONAL ENVIRONMENT

criteria items	weak influence ... average ... strong influence	comments/suggestions
1. management commitment	(0) (1) (5) (4) (12) 1 2 3 4 5 3.26 4.23 5.20	--this is often more important than economics reason. --they have to be educated. --there is a big up front cost. Mgt is not keen on long term investment. --use cost/benefit analysis to increase. --crucial. --you need to have a champion in house to push the project. --need top management support to bridge the many departmental crossover issues. --must come from top management
2. trainer's attitude toward interactive video	(1) (2) (9) (6) (4) 1 2 3 4 5 2.40 3.46 4.52	--too much turnover in companies to be a factor. --he can be end-run. ==helps to have an internal advocate --trainers like look and feel not sure about results.
3. availability of interactive video experts	(2) (5) (9) (4) (2) 1 2 3 4 5 1.87 2.96 4.05	--the issue is sorting out the fakers. --one can learn by doing it! --very little effective IVI is available.
4. organization's policies and traditions	(2) (1) (9) (8) (2) 1 2 3 4 5 2.28 3.32 4.36	--conservative organizations (bank) can slow thing down. --this may be the most important, the first time out , some organizations like to be first with a new technology. --policy toward new deliver systems is a factor.
5. behavior of competitors and other organizations	(3) (1) (6) (9) (3) 1 2 3 4 5 2.14 3.36 4.58	--a strong vendor commitment is needed, if major corp accept IVI it will grow. --good care studies & examples are critical --there is not a band -wagon yet! --want to be leading edge.

criteria items	weak influence	average	strong influence	comments/suggestions
6. clientele pressure for change	(1) (7) (8) (3) (2) 1 2 3 4 5 1.87 2.91 3.95			--most do not know it exists. --not much of this. --if this were a "5", we would have been much more active earlier. 95% of our traditional clients have not responded favorably to our surveys on IVI market demand. only the "GM" sized compinies are hot so far. --not enough pressure from client base.

FACTOR C: INTERACTIVE VIDEO

1. availability of information about interactive video	(2) (4) (10) (6) (0) 1 2 3 4 5 1.99 2.91 3.83			--call IBM. --need results, states, & market information. --lots of hype, little evidence of effectiveness.
2. availability of interactive expertise	(1) (9) (7) (4) (1) 1 2 3 4 5 1.80 2.77 3.74			--very little effective IVI available.
3. high interactivity level of interactive video system	(3) (1) (3) (6) (9) 1 2 3 4 5 2.36 3.77 5.18			--this is the key to student motivation. --product s out there so far usually do not come close to exploiting the potential of the medium. --stop/start is not interactivity. --this is the key to IVI's success. need more.

criteria items	weak influence		average		strong influence	comments/suggestions
	(1)	(3)	(4)	(5)	(9)	--this is less a problem now with sony compatable w/ infowindow. --big problem! lack of standardization. --a big problem until IBM entered the market providing the appearance of stability. --not really relevent, all players have RS 232 comm ports. --a maketing dilemma -particularly with hypercard/ infowindow stand off in the market place. --we went all sony on one program, on#2 we went with a proprietary computer & software, on the newest one we are considering infowindow. --often cited as a major stumbling block. --not much difference between them due to quality of products.
4. comppatability of different hardware systems	1	2	3	4	5	
			2.56	3.82	5.08	

FACTOR D: CHARACTERISTICS OF LEARNING TASK

criteria items	weak influence		average		strong influence	comments/suggestions
	(0)	(0)	(6)	(7)	(9)	
1. objectives of learning task	1	2	3	4	5	--some interpersonal behaviors simply can't be taught without video.-eg. Performance Appraisal Interview. --if the objectives don't require IVI, then it is not needed.
			3.31	4.14	4.97	
	(2)	(8)	(6)	(4)	(2)	
2. extensively variable contents	1	2	3	4	5	
			2.35	3.50	4.65	
	(0)	(0)	(3)	(5)	(14)	
3. self-paced instruction	1	2	3	4	5	--mastery earning (?) can be achieved. --a major requirement for any self-paced INST. is interaction. --this can justify non-video CBT.
			3.76	4.50	5.24	

criteria items	weak influence — average — strong influence	comments/suggestions
4. stability of instructional material	(1) (0) (7) (5) (9) 1 2 3 4 5 2.87 3.96 5.05	--if it is very subtle, it may not be taught well. IVI can help clarity by simplifying. --a good design can deal with it. --becoming less of a factor with CD ROM.
5. flexibility of learning schedule	(0) (4) (4) (8) (6) 1 2 3 4 5 2.65 3.73 4.81	--on demand training is a characteristic of IVI.
6. quality of instruction	(0) (2) (5) (7) (8) 1 2 3 4 5 2.96 3.96 4.96	--trainers are inconsistant and underpaid. --how does this relate to the learning task? --the technology's "glitz" too often overshadows quality. --that is up to the designers. --quality depends on design & delivery system requirements.
7. user-friendly software	(4) (2) (7) (8) (1) 1 2 3 4 5 2.77 3.91 5.05	--users are getting more. --unsure. --that is up to the designer. --an absolute must keep it simple.
8. inherently visual learning material	(0) (1) (5) (8) (7) 1 2 3 4 5 3.11 4.0 4.89	--do'nt understand this. --I see too much use of text --IVI excels in this.

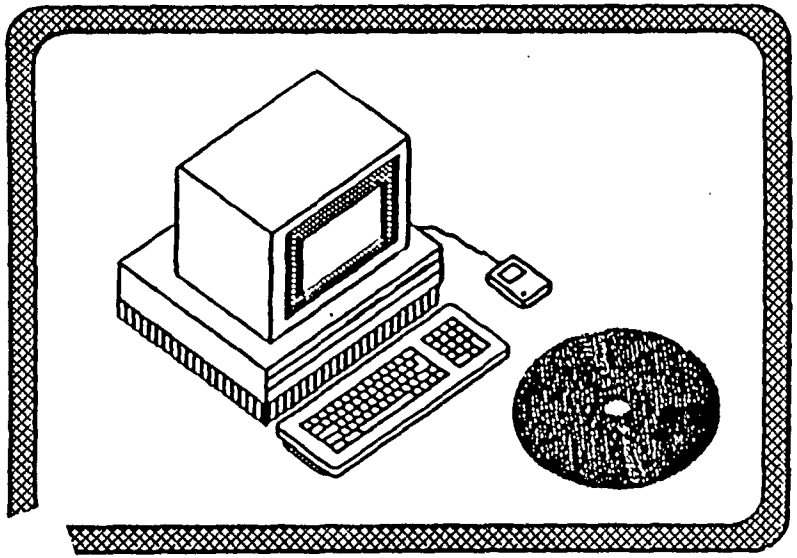
criteria items	weak influence		average		strong influence	comments/suggestions
9. repetitive contents	(3)	(3)	(9)	(5)	(2)	--influence CBT and others, not just interactive video. --can be done with CBT.
	1	2	3	4	5	
		1.84	3.00	4.16		
10. unavailability of subject matter expertise	(3)	(3)	(7)	(8)	(1)	--influence CBT and others, not just interactive video. --you can not develop effective training, IVD or otherwise without SMES! --if you have no SME don't build the course. If you capture rare birb IVI may be important.
	1	2	3	4	5	
		1.92	3.05	4.18		
11. alarge collection of multimedia material	(3)	(3)	(8)	(5)	(3)	--important if budget are low. --in many cases this becoms a liability. existing video is used to produce interrupted video.
	1	2	3	4	5	
		1.86	3.09	4.32		
12. immediate feedback	(1)	(0)	(5)	(8)	(8)	--influence CBT and others, not just interactive video. --a major IVI feature.
	1	2	3	4	5	
			2.98	4.00	5.02	
13. required active participation	(0)	(0)	(4)	(9)	(9)	--influence CBT and others, not just interactive video --a major reason for using any interactive medium.
	1	2	3	4	5	
			3.48	4.23	4.98	

FACTOR E: CHARACTERISTICS OF LEANERS

criteria items	weak influence	average	strong influence	comments/suggestions
1. a large number of learners	(1) (0) (4) (6) (11) 1 2 3 4 5 3.13 4.18 5.23			--cuts per/user cost.
2. various competency levels	(0) (2) (2) (10) (8) 3.17 4.09 5.01			--could justify CBT or printed self-study material as well. --individualization is an IVI feature.
3. dispersed geographic location	(0) (1) (1) (8) (12) 1 2 3 4 5 3.61 4.41 5.21			--could justify CBT or printed self- study materials as well. --in a negative sense I the more diverse, the more expensive to install the system. --can be a disadvantage if there is a shortage of hardware. --would not too many stations required. --saves pn perdiem.
4. required interactivity between trainer & trainee	(0) (5) (5) (7) (5) 1 2 3 4 5 2.45 3.55 4.65			--could justify CBT or printed self-study materials as well. --IVI is student directed, it does not promote instructor & trainee interaction.
5. learner's attitude toward interactive video	(4) (7) (6) (4) (1) 1 2 3 4 5 1.45 2.59 3.73			--vast majority of learners love it. --do'nt need to sell it to the user/learner. --learners do'nt make the decision in most cases. --they can be easily influenced to like it- when the design is good. --before their first IVA or after? --it will be positive if the product, is well designed . the payoff is'nt in the hardware-it is in the courseware.

DELPHI ROUND # 2 QUESTIONNAIRE

The Criteria That Influence the Decisions of Corporate Training Developers Vis-a-Vis Adoption and Diffusion of Interactive Video as Part of an Overall Training System



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PART I.--ROUND #2

This part requires you to evaluate and respond to a series of statements generated by the full delphi panel during round #1. If you wish, please explain or support your position in the comments section.

Indicate your level of agreement or disagreement with each statement by circling the appropriate number in the response column.

A . The selection of appropriate media/delivery systems for a training program should be:

Statement	Strong agreement		Neutral		Strong disagreement	Comments / Support of your position
1. as early as possibile	1	2	3	4	5	
2. as late in production as possible because of the changing technologies	1	2	3	4	5	
3. during the needs analysis phase	1	2	3	4	5	
4. after the need analysis phase	1	2	3	4	5	
5. before the learning objectives have been written	1	2	3	4	5	

Statement	Strong agreement		Neutral		Strong disagreement	Comments/ Support of your position
6. during objectives development	1	2	3	4	5	
7. after objectives development	1	2	3	4	5	
8. during the development of the course content outline	1	2	3	4	5	
9. after the course content have been decided	1	2	3	4	5	
10. after the cost/benefit analysis	1	2	3	4	5	
11. after the trial and testing	1	2	3	4	5	
12. following client's choice	1	2	3	4	5	

Statement	Strong agreement		Netural		Strong disagreement	Comments/ Support of your position
13. based on the market demand	1	2	3	4	5	
14. according to the budget	1	2	3	4	5	

Other : (Add any other item(s) you feel was omitted from this section and rate your suggestion)

15.	1	2	3	4	5	

B. Whether or not to use a certain medium for a training program is usually determined by:

Statement	Strong agreement		Neutral		Strong disagreement	Comments/ Support of your position
1. director of a training program	1	2	3	4	5	
2. customer/ client	1	2	3	4	5	
3. higher level (executive) management	1	2	3	4	5	
4. manager / director of training department	1	2	3	4	5	
5. instructional designer/ technologiest	1	2	3	4	5	
6. instructor	1	2	3	4	5	
7. program team	1	2	3	4	5	

Other: (add any item(s) you feel was omitted from this section and rate your suggestion)

Statement	Strong agreement	Netural	Strong disagreement	comments/support of your position

C. The major prblems/ obstacles you met when developing interactive video training programs are:

Statement	Strong agreement		Netural		Strong disagreement	comments/support of your position
1. the need for teamwork rather than individual efforts	1	2	3	4	5	
2. variety of skills needed	1	2	3	4	5	
3. conviencing client to use it	1	2	3	4	5	
4. selling to those who do not have hardware	1	2	3	4	5	
5. programming skills	1	2	3	4	5	
6. lack of advanced planning	1	2	3	4	5	

Statement	Strong agreement		Neutral		Strong disagreement	Comments/ Support of your position
7. development time	1	2	3	4	5	
8. staying with development budget	1	2	3	4	5	
9. authoring system not standardized	1	2	3	4	5	
10. operation software not compatable	1	2	3	4	5	
11. difficulty in designing "interactive" programs	1	2	3	4	5	
12. non-compatable equipment/ hardware	1	2	3	4	5	
13. scheduling and availability of content expert	1	2	3	4	5	

Statement	Strong agreement		Netural		Strong disagreement	Comments/ Support of your position
14. lack of understanding and knowledge about IVD by client	1	2	3	4	5	
15. lack of understanding and knowledge about IVD by management	1	2	3	4	5	
16. lack of understanding about market/client demand by training developer	1	2	3	4	5	
17. initial hardware costs	1	2	3	4	5	
18. hardware selection	1	2	3	4	5	
19. software selection	1	2	3	4	5	
20. changing of the IVD technology is fast	1	2	3	4	5	

Statement	Strong agreement		Netural		Strong disagreement	Comments/ Support of your position
21. failures of project management	1	2	3	4	5	
22. lack of formative and summative evaluation	1	2	3	4	5	

Other: (add any item(s) you feel was omitted from this section and rate your suggestion)

23.	1	2	3	4	5	

PART II. --ROUND #2

DIRECTION:

This part requires you to review and consider the response of the other panel members to the criteria for IVD selection. In the first column preceding the criteria item contains your previous response regarding the influence to each criteria item. The second column is the mean of responses during round #1 for the influence rating referring to each criteria item.

Please re-evaluate each item listed below. The astria/* means your response for the influence to an item is less/more than one standard deviation from the mean of the panel summary (see enclosed panel summary). Please comment on or support your position if your response is less or more than one standard deviation from the mean of the pannel summary.

FACTOR A: ECONOMIC FACTOR

your response	group mean	criteria items	weak influence		average		strong influence	comments/ support of you position
	3.90	1. cost of purchasing hardware devices.	1	2	3	4	5	
	3.90	2. cost of developing or acquiring courseware	1	2	3	4	5	
		2a. cost of developing courseware	1	2	3	4	5	
		2b. cost of acquiring courseware	1	2	3	4	5	

your response	group mean	criteria items	weak influence		average		strong influence	comments/ support of your position
	2.60	3. cost of purchasing authoring software	1	2	3	4	5	
	2.45	4. maintenance costs for facilities	1	2	3	4	5	
	2.40	5. overhead costs	1	2	3	4	5	
	2.53	6. cost of instructor's salary	1	2	3	4	5	

FACTOR B: ORGANIZATIONAL ENVIRONMENT

your response	group mean	criteria items	weak influence		average		strong influence	comments/ support of your position
	4.20	1.management's commitment	1	2	3	4	5	
	3.45	2. trainer's attitude toward interactive video	1	2	3	4	5	
	2.85	3. availability of interactive video experts	1	2	3	4	5	
	3 35	4. organization's policies and traditions	1	2	3	4	5	
	3.30	5. behavior of competitors and other organizations	1	2	3	4	5	
	2.95	6. clientele pressure for change	1	2	3	4	5	

your response	group mean	criteria items	weak influence		average		strong influence	comments/ support of your position
	3.84	7. user-friendly software	1	2	3	4	5	
	4.00	8. inherently visual learning material	1	2	3	4	5	
	3.00	9. repetitive contents	1	2	3	4	5	
	2.95	10 unavailability of subject matter expertise	1	2	3	4	5	
	3.05	11. a large collection of multi-media material	1	2	3	4	5	
	4.00	12. immediate feedback	1	2	3	4	5	
	4.20	13 active participation required	1	2	3	4	5	

× FACTOR C: INTERACTIVE VIDEO

your response	group mean	criteria items	weak influence		average		strong influence	comments/ support of your position
	2.80	1 availability of information about interactive video	1	2	3	4	5	
	2.70	2. availability of interactive video experts	1	2	3	4	5	
	3.80	3. high interactivity level of interactive video system	1	2	3	4	5	
	3.85	4. compatability of different hardware systems	1	2	3	4	5	

FACTOR D: CHARACTERISTICS OF LEARNING TASK

your response	group mean	criteria items	weak influence		average		strong influence	comments/ support of your position
	4.10	1. objectives of learning task	1	2	3	4	5	
	3.53	2. extensively variable contents	1	2	3	4	5	
	4.45	3. self-paced instruction	1	2	3	4	5	
	4.05	4. stability of instructional material	1	2	3	4	5	
	3.70	5. flexibility of learning schedule	1	2	3	4	5	
	3.95	6. quality of instruction	1	2	3	4	5	

your response	group mean	criteria items	weak influence		average		strong influence	comments/ support of your position
	3.84	7. user-friendly software	1	2	3	4	5	
	4.00	8. inherently visual learning material	1	2	3	4	5	
	3.00	9. repetitive contents	1	2	3	4	5	
	2.95	10 unavailability of subject matter expertise	1	2	3	4	5	
	3.05	11. a large collection of multi-media material	1	2	3	4	5	
	4.00	12. immediate feedback	1	2	3	4	5	
	4.20	13 active participation required	1	2	3	4	5	

FACTOR E: CHARACTERISTICS OF LEARNERS

your response	group mean	criteria items	weak influence		average		strong influence	comments/ support of your position
	4.10	1. a large number of learners	1	2	3	4	5	
	4.05	2. various competency levels	1	2	3	4	5	
	4.40	3. dispersed geographic locations	1	2	3	4	5	
	3.65	4. required interactivity between trainer and trainee	1	2	3	4	5	
	2.55	5. learners' attitude toward interactive video	1	2	3	4	5	

The following items were suggested by panel members as additional criteria during round #1 questionnaire. Respond below as to how you view the influence of these criteria as according to use interactive video system for a corporate training program.

criteria items	weak influence		average		strong influence	comments/suggestions
1. development time	1	2	3	4	5	
2. whether any current training material already exist	1	2	3	4	5	
3. standardization of authoring system	1	2	3	4	5	
4. learner is in control during learning	1	2	3	4	5	

criteria items	weak influence		average		strong influence	comments/suggestions
5. level of remediation	1	2	3	4	5	
6.required lots of simulations	1	2	3	4	5	
7. training time	1	2	3	4	5	
8. health hazard and safty of learning task	1	2	3	4	5	
9. difficulty of learning task	1	2	3	4	5	
10 quality of software products	1	2	3	4	5	
11. reliability of hardware equipment	1	2	3	4	5	

Are there any additional criteria you wish to suggest ?

(1) _____

(2) _____

(3) _____

Iowa State University of Science and Technology Ames, Iowa 50011

April 22, 1989

Dear Delphi Panel Member:

As of this date I have not received your responses to the delphi round #2 questionnaire. If you have not yet completed the questionnaire, would you do so now and return it to me at your earliest convenience.

If you did not receive the mailed instrument or need another copy, please notify me as soon as possible. Call me at (515) 296-8080.

If you have already mailed it, accept my thanks for your cooperation and disregard this reminder.

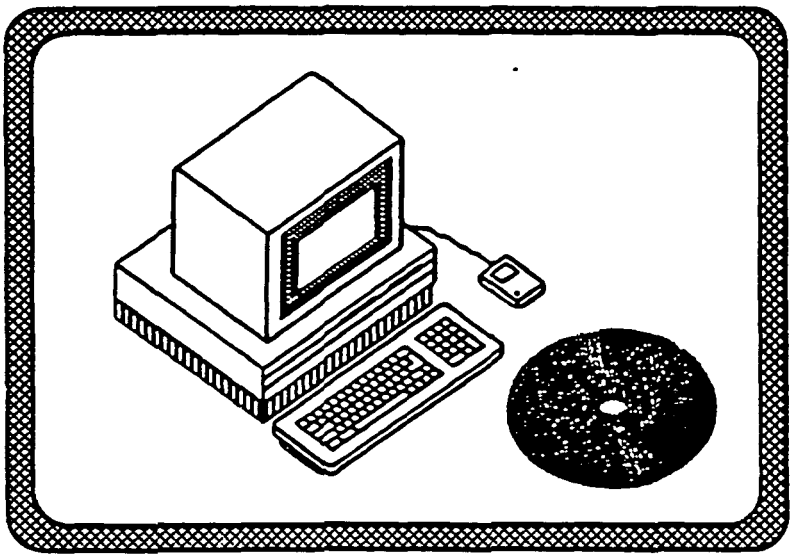
Sincerely,

Sofia Lee

10 APPENDIX D: DELPHI ROUND #3 QUESTIONNAIRE

DELPHI ROUND# 3 QUESTIONNAIRE

The Criteria That Influence the Decisions of Corporate Training Developers Vis-a-Vis Adoption and Diffusion of Interactive Video as Part of an Overall Training System



INSTRUCTIONAL RESOURCES CENTER

N-157 Lagomarcino Hall

Iowa State University

Ames, Iowa 50011

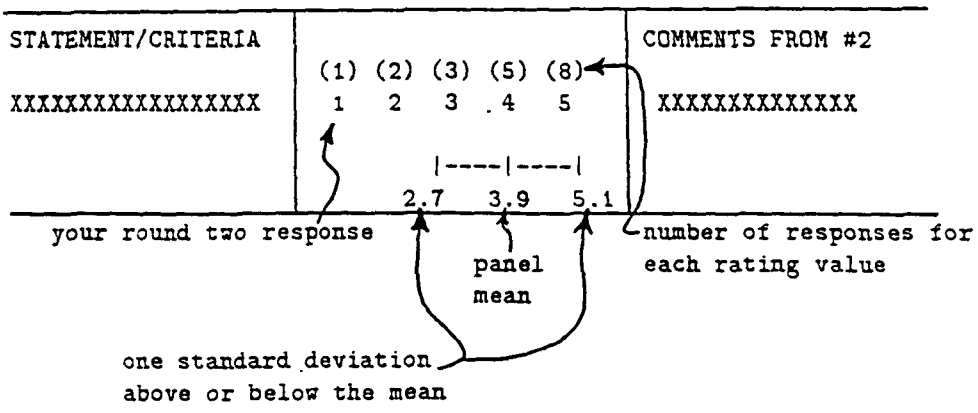
515-294-2183

INSTRUCTIONS:

Please REVIEW your responses to all the statements and items concerning the criteria that influence training developers' decisions to use interactive video systems for corporate training. Read and follow the specific instructions for each part of this ROUND #3 instrument.

Re-evaluate and respond, as needed, to the items on this form. Be sure to review to your response (circle in red) from round #2 and to the composite summary of the full Delphi panel rating included in this form. The mean, frequency count, standard deviation and comments are included in each item on this response form from round #2. Mark any change in position with another color of ink on this form.

The summary of round two panel responses are show as follows:



Be sure to comment on or support your position on each item that you feel needs clarification or in which your position is outside of one standard deviation of the mean of the panel.

Thanks for your assistance.

RETURN ON OR BEFORE SATURDAY, MAY 20, 1989.

PART I.--ROUND #3

INSTRUCTION:

Based on your responses during Round #2 (circled in red) and the summary statistics and comments of the Delphi panel, how do you now view these statements? What is your level of agreement or disagreement with each statement with this additional information from your fellow panel members?

REVIEW your responses during Round #2 to each statement listed below Mark only those statements which you wish to change during this round with another color of ink.

AGAIN, please explain or support your position in the comments section, if you mark your position outside of one standard deviation on either side of the panel's mean.

A. THE SELECTION OF APPROPRIATE MEDIA/DELIVERY SYSTEM FOR A TRAINING PROGRAM SHOULD BE:

STATEMENT	STRONG AGREE NEUTRAL STRONG DISAGREE	COMMENTS FROM #2	COMMENTS OR SUPPORT OF YOUR POSITION
1.as early as possible	(6)(4)(6)(1)(3) 1 2 3 4 5 |---|---| 1.2 2.6 4.0	--You should'nt decide on the delivery until you know the objectives and target audience. --This option seems meaningless unless "possible" is defined first. --Because this will influence your learning design and budget. --Until the program is fleshed out, what is appropriate? --Of course as early as possible, but dumb statement, when is that? Should be done after needs analysis, audience analysis,and objectives and testing determined. --Selection of media must not drive the process, it must be an outcome of careful analysis. Then as early as possible.	

STATEMENT	SA NEUTRAL SDA	COMMENTS FROM #2	COMMENTS OR SUPPORT OF YOUR POSITION
2.as late in production as possible, because of the changing technology	(0)(0)(1)(10)(9) 1 2 3 4 5 |--|--| 3.8 4.4 5.0	--Make your decision in what is available.The new technology will have "lugs". --A functioning technology does not appear over night. Go with a technology you can make work. --I do'nt see how production can occur without media selection in place. --Technology is'nt changing that quickly.	
3.during the needs analysis phase	(2)(3)(2)(7)(6) 1 2 3 4 5 |---|---| 2.3 3.6 5	--Too early. --Should be done after needs analysis,audience analysis, objectives and testing determined. Read magic- and if you have not tried, try it-it works. --Objectives guide the selection of media and delivery systems. --This is closer.	
4.after needs analysis phase	(8)(4)(3)(2)(3) 1 2 3 4 5 |----|----| 0.9 2.4 3.9	--Should be done after---try it it works (same as above). --Objectives guide the selection of media and delivery systems. --Yes. --too early.	
5.before learning objectives have been written	(3)(2)(2)(6)(7) 1 2 3 4 5 |----|----| 2.1 3.6 5.1	--Let the learning objectives be part of the criteria for selection. --Too early. --Should be done---try it, it works (same as above). --Objectives guide the selection of media and delivery systems. --Never!	

STATEMENT	SA NEUTRAL SDA	COMMENTS FROM #2	COMMENTS OR SUPPORT OF YOUR POSITION
6.during objectives development	(0)(3)(6)(8)(3) 1 2 3 4 5 |--|--| 2.6 3.6 4.5	--Too early. --Objectives guide the selection of media and delivery systems.	
7.after objectives development	(6)(5)(6)(2)(1) 1 2 3 4 5 |---|---| 1.2 2.4 3.5	--Too early. --Objectives guide the selection of media and delivery systems.	
8.during the development of the course content outline	(0)(3)(11)(4)(2) 1 2 3 4 5 |---|--| 2.4 3.3 4.1	--not necessarily.	
9.after the course content have been decided	(2)(5)(9)(2)(2) 1 2 3 4 5 |--|--| 1.8 2.9 3.9	--Now you know what is to be trained and learned. Now you can decide what is the best way. --High level	
10.after cost/benefit analysis	(5)(8)(4)(0)(2) 1 2 3 4 5 |---|---| 1.1 2.3 3.5	--Should be part of the cost benefit analysis. --Depends how you define this step. --The best way is the one with the best cost/benefit analysis. --Objectives determine delivery system candidates. Cost/benefit determines final selection. --This is never done in a military or industrial IVD program, always after the fact.	
11.after trial and testing	(1)(2)(6)(3)(7) 1 2 3 4 5 |---|---| 2.4 3.7 5.0	--This may be an opportunity to admit the mistake and start again.	

STATEMENT	SA NEUTRAL SDA	COMMENTS FROM #2	COMMENTS OR SUPPORT OF YOUR POSITION
12.following client's choice	(4)(2)(7)(5)(2) 1 2 3 4 5 |---|---| 1.7 3.0 4.2	--Not blinding. Must give recommendation to client. --When necessary, client needs and attitudes drive the --Has to be considered. --Sometimes there is no alternatives. Agree if client has gone through analysis phase and has goals and objectives. Disagree if the client wants to do a (disc,tape) on (tapes) just because its the "in" thing. --But "politics" is everything. --But may have to. --They are not the expert- that is what they are paying you for.	
13.based on market demand	(1)(5)(9)(1)(4) 1 2 3 4 5 |--|--| 1.9 3.1 4.3	--If you are market-driven. --Are we training or following fashion? --Depends on whether your goal is income or effective training. --has to be considered.	
14.according to the budget	(4)(8)(6)(2)(0) 1 2 3 4 5 |--|--| 1.4 2.3 3.2	--This is, of course,a consideration. --The budget should be influenced by the cost benefit analysis. --But a compelling argument can always be taken to management. --That reality. --You are going to pay for training one way or another. Formally in the budget or informally through poor performance and waste! --Budget determines final choice among candidate media/delivery systems.	
15.after audience demographics and learning styles have been determined.	(1)( )( )( )( ) 1 2 3 4 5		
16.during the training device analysis process.	(1)( )( )( )( ) 1 2 3 4 5	--This is the methodology I've used.	

B. WHETHER OR NOT TO USE A CERTAIN MEDIUM FOR A TRAINING PROGRAM IS USUALLY DETERMINED BY:

COMMENTS OR SUPPORT OF YOUR POSITION

STATEMENT	SA NEUTRAL SDA	COMMENTS FROM #2
1.director of a training program	(2)(13)(3)(2)(0) 1 2 3 4 5 |--|--| 1.5 2.3 3.0	--Depends on the company. --Sometimes. --Depends on program,visibility, time to develop, last 1/4 earn up, etc.
2.customer/ client	(5)(10)(2)(3)(0) 1 2 3 4 5 |---|---| 1.2 2.1 3.1	--Sometimes. --Director of a training program and customer/client are working together.
3.high level (executive) management	(4)(6)(6)(4)(0) 1 2 3 4 5 |-|-| 2.4 2.5 2.6	--Sometimes. --This person influences the director of training.
4.manager/ director of training dept.	(3)(7)(7)(2)(1) 1 2 3 4 5 |--|--| 1.5 2.6 3.6	--same as #1 in my mind.
5.instructional designer/ technologist	(4)(6)(5)(5)(0) 1 2 3 4 5 |--|--| 1.5 2.6 3.6	--Ideally, this would/should be the case;often reality is "4". --There are no "all round" instructional designer, each has a bias. --Unfortunately, the ones who know most often have the least to say. --Should be this person, but in reality is customer or executive management. --Instructional design people should recommend media and delivery systems.

STATEMENT	SA NEUTRAL SDA	COMMENTS FROM #2	COMMENTS OR SUPPORT OF YOUR POSITION
6.instructor	(1)(5)(5)(6)(3) 1 2 3 4 5 |---|---| 2.1 3.3 4.4	--At the college level-Yes! --Not invented here syndrome keeps himself in the circle.	
7.program team	(1)(7)(8)(3)(1) 1 2 3 4 5 |--|--| 1.9 2.8 3.8	--This is optimum, but they are usually empowered to recommend. --Sometimes.	
8.should the trainee choose	(1)( )( )( )( ) 1 2 3 4 5		

OTHER: ADD ANY ITEM YOU FEEL WAS OMITTED FROM THIS SECTION AND RATE YOUR SUGGESTION.

C. THE MAJOR PROBLEMS/OBSTACLES YOU MET WHEN DEVELOPING INTERACTIVE VIDEO TRAINING PROGRAMS ARE:

COMMENTS OR SUPPORT OF YOUR POSITION

STATEMENT	SA NEUTRAL SDA	COMMENTS FROM #2
1.the need for teamwork rather than individual efforts	(3)(5)(5)(6)(1) 1 2 3 4 5 |---|---| 1.7 2.9 4.0	--This was an advantage, because I had team players. --There fortunate and have a good in house team; sometimes have major probs with those outside field. --It is not an obstacle unless people make it so. --hard to change old habits.
2.variety of skills needed	(5)(8)(4)(3)(0) 1 2 3 4 5 |--|--| 1.2 2.3 3.3	--These are not always available. -- Oh, so many.
3.convincing client to use it	(3)(3)(8)(4)(1) 1 2 3 4 5 |--|--| 1.7 2.8 4.0	--Once developed it is easy. Getting an adequate budget requires a lot of convincing. --There is sufficient to do without making the waiting list longer. --Cost. --Our clients are receptive and flexible.
4.selling to those who do not have hardware	(8)(3)(8)(1)(0) 1 2 3 4 5 |--|--| 1.1 2.1 3.1	--They wo'nt buy until there are more programs. -Not part of my responsibility. --It is obviously a package! Hardware + Software --Cost. --Infrequent problem.
5.programming skills	(2)(4)(6)(6)(2) 1 2 3 4 5 |--|--| 1.9 3.1 4.3	--Seldom in our organization. --This is the cruncher. Not necessarily "c" headies(?) but DOS competency too.

STATEMENT	SA NEUTRAL SDA	COMMENTS FROM #2	COMMENTS OR SUPPORT OF YOUR POSITION
6.lack of advanced planning	(2)(4)(8)(5)(1) 1 2 3 4 5 |--|--| 1.9 3.0 4.0	--It is very difficult to anticipate all of the problems and variables. --At this stage of development of the technology, there are still too many unknows to play effectively. --Seldom in our organization.	
7.development time	(6)(5)(6)(3)(0) 1 2 3 4 5 |--|--| 1.2 2.3 3.4	--This is a problem when the client keeps changing requirements. --It takes too long. Our tools are not productive enough. --Often eliminates interactive video as an alternative.	
8.staying with budget	(4)(8)(6)(1)(1) 1 2 3 4 5 |--|--| 1.3 2.4 3.4	--If budget was done without correct information. --Do'nt promise a silk purse on a pig's ear budget. --This is a problem when client keeps changing requirements, and difficulty in estimating actual development time (production). --Budget is fairly predictable. --At first.	
9.authoring system not standardized	(2)(2)(8)(4)(4) 1 2 3 4 5 |--|----| 2.1 3.3 4.5	--That is not the problem! It is lousy authoring packages that are the problem. --I have not used authoring system. They do not provide enough flexibility to support instructional design. --not sure what you mean. --We've standardized on one authoring sys.	
10.operation software not compatable	(3)(2)(9)(4)(2) 1 2 3 4 5 |---|---| 1.8 3.0 4.2	--You go with a system and take your lumps. --We've standardized on one authoring system.	

STATEMENT	SA NEUTRAL SDA	COMMENTS FROM #2	COMMENTS OR SUPPORT OF YOUR POSITION
11.difficulty in designing "interactive" programs	(0)(7)(3)(5)(5) 1 2 3 4 5 |---|---| 2.2 3.4 4.6	--Designing not a problem, implementing the design a huge problem. --Similar to item #2. --Just need a realistic schedule.	
12.non-compatible equipment/hardware	(3)(4)(7)(4)(2) 1 2 3 4 5 |--|--| 1.7 2.9 4.1	--This limits the market for IVD. --You go with a system, and live with its deficiencies. --We've standardized.	
13.scheduling and availability of content expert	(2)(5)(6)(3)(3) 1 2 3 4 5 |---|---| 1.6 2.9 4.2	--You can make him available. --For any course.	
14.lack of understanding and knowledge about IVD by client	(1)(7)(11)(1)(0) 1 2 3 4 5 |-|-| 1.9 2.6 3.3	--He needs to see it, to feel it, to "understand" it. That comes by exposure. --We have a team to assist project groups.	
15.lack of understanding and knowledge about IVD by management	(1)(8)(8)(3)(0) 1 2 3 4 5 |--|--| 1.8 2.7 3.5	--Only because you have not impacted the bottom line! You have a head turning project, once you gets their attention, you'll get all the management you need.	
16.lack of understanding about market/client demand by training developer	(0)(2)(12)(4)(2) 1 2 3 4 5 |---|--| 2.5 3.3 4.1	--No one has a real good "read" on the market yet!	
17.initial hardware costs	(5)(7)(7)(0)(1) 1 2 3 4 5 |--|---| 1.2 2.3 3.3	--Costs have became reasonable. --You can get your costs back very quickly, if you understand "hidden" training costs.	
18.hardware selection	(2)(5)(10)(1)(2) 1 2 3 4 5 |--|--| 1.7 2.8 3.9	--Difficult to match market when no one knows what the market will buy. --Until DVI and CDI is available, your hardware selection is going to be wrong. --Our company makes the hardware.	

STATEMENT	SA NEUTRAL SDA	COMMENTS FROM #2	COMMENTS OR SUPPORT OF YOUR POSITION
19.software selection	(1)(4)(12)(1)(2) 1 2 3 4 5	--We need system and application SW specific to IAV. It does not exist yet! --Our company makes the software.	
20.changing of of IVD technology is too fast	(2)(6)(8)(2)(2) 1 2 3 4 5 |---|---| 1.7 2.8 3.9	--This is a problem in the mind of customer, not necessary in the mind of producers of IV. --Not true. It is TV, it is audio, it is computer,there is no change there. This technology will continue to change. That is why the course must be organized, one step removed from current SW and HW!	
21.failures of project management	(2)(3)(9)(4)(2) 1 2 3 4 5 |--|--| 2.0 3.1 4.2	--Could have been better. --It is a moving target with constant by changing HW + SW. It is an immensely challenging management task. But not a major obstacle.	
22.lack of formative and summative evaluation	(3)(6)(5)(3)(3) 1 2 3 4 5 |---|---| 1.5 2.9 4.2	--This hurts for subsequent pro jects, because bottom line impact is rarely substantiated. --This was done well for one project, but it never got to market, because no one could decide what the market looked like. --You can evaluate staff to death. Does it work? Yes/No. Do IVA graduates like it? Yes/No. Would an IVA graduate recommend the course to a friend? Yes/No. Do IVA graduates show a better performance or learn in a shorter time, the answer is YES! It is people putting off a decision of because of the bucks involved!	

The following items were suggested by panel members as additional problems/obstacles during round #2 questionnaire. Respond below as to how you view these statements.

STATEMENT	SA NEUTRAL SDA	COMMENTS FROM #2	COMMENTS OR SUPPORT OF YOUR POSITION
23.to create 1" video tape masters	(1)( )( )( )( ) 1 2 3 4 5	--We need an alternative to 1" video tape. How about 8 mm tape? I need to stay out of the EDITING SUITE and I Do Not Need super deeper video fidelity!! I need effective training visuals.	
24.no way to do audio easily	(1)( )( )( )( ) 1 2 3 4 5	--We need a rerecordable audio media with instant retreive, i.e., a recordable audidisk that plays back through its own speaker. Digitised audio board in the PC are not the solution. They tack up a slot, and they take up huge amounts og disk space. About an hour's worth of time would be a good beginning.	

OTHER: ADD ANY ITEM YOU FEEL WAS OMITTED FROM THIS SECTION AND RATE YOUR SUGGESTION.

PART II.--ROUND #3

INSTRUCTIONS:

Review and respond, again, to the following items. How important do you feel these criteria items will be in influencing the decision of using Interactive Video for corporate training.

Based on your responses during Round #2 (circled in red) and the summary statistics and comments of your fellow delphi panel members, how did you now view these criteria's importance regarding their effect on the selection of IVD training system. Mark only those you wish to change during this round with another color of ink.

Again in this round you are asked to comment and support your position if you rate the influence of an item to be more/less than one standard deviation from the mean of the panel.

FACTOR A: ECONOMIC FACTOR

CRITERIA	WEAK AVERAGE STRONG INFLUENCE	COMMENTS FROM #2	COMMENTS OR SUPPORT OF YOUR POSITION
1.cost of purchasing hardware devices	(1)(1)(6)(7)(5) 1 2 3 4 5 |--|---| 2.6 3.7 4.8	--Since October,I've work for Intellimation, an educational publisher which also markets and distributes software developed by other organizations. The cost of the hardware is always the first concern of potential clients. The marketing staff spends a great deal of time alleviating the financial duress of high cost hard ware--financing, etc. --You are surveying too many "hardware" hackers. --Obviously other panel members need education in cost/benefit and "hidden costs"! --Hardware costs have not been a major issue with our clients (IBM Fed X, Chrysler,GM, etc.). --We have multiple locations (400) One station per @ 10,000 is 4.000,000-	
2.cost of developing courseware	(0)(0)(3)(5)(7) 1 2 3 4 5 |--|--| 3.5 4.3 5.1	--In my case, courseware must be developed, it is not possible to use pre-caned courseware. --This is where we have to work to get costs down. --Costs of development is not as high compared to delivery hardware. --Most would have to be developed.	

CRITERIA	WEAK AVERAGE STRONG INFLUENCE	COMMENTS FROM #2	COMMENTS OR SUPPORT OF YOUR POSITION
3.cost of acquiring courseware	(0)(4)(5)(6)(0) 1 2 3 4 5 |--|--| 2.3 3.1 4.0	--For what it is we are being over charged! But I can bury the cost with all the benefit. --Very few of our clients ever consider acquiring existing courseware. --Not generally available.	
4.cost of purchasing authoring software	(3)(5)(9)(1)(2) 1 2 3 4 5 |---|---| 1.6 2.7 3.8	--As a program developer, the cost to use authoring software was expensive, especially because it took us a few tries before we found the right software. --We do'nt use authoring system- they constrain design too much. --I can't keep buying authoring systems a $ 4,000 a copy. $400 each I can afford to experiment. --Many of our clients already have CBT authoring systems appropriate for IVD. Software typically costs less than one delivery station. --Good authouing languages like PC-pilot are under $200.00! Or many people program in "C" or BASIC.	
5.maintenance costs for facilities	(4)(5)(8)(3)(0) 1 2 3 4 5 |---|--| 1.5 2.5 3.5	--Has to be done. --Facilities with uncomplicated hardware need not be extravagant. --Obviously other panel members are not good purchasers of services. --Very expensive but often a hidden cost. --Setting up technological classroom vs. traditional.	

CRITERIA	WEAK AVERAGE STRONG INFLUENCE	COMMENTS FROM #2	COMMENTS OR SUPPORT OF YOUR POSITION
6.overhead costs	(5)(3)(10)(2)(0) 1 2 3 4 5 |--|---| 1.5 2.5 3.5	--I feel it should be weak, if more training director performed thorough cost/benefit analysis. --Do I hire to maintain the staff? Do I have enough work? --The system absorbs it. --Facilities with uncomplicated hardware need not be extravagant --That is internal accounting problem. Variable costs are the the important ones. --Frequently never accounted for but significant when it is.	
7.cost of instructor's salary	(4)(3)(8)(3)(1) 1 2 3 4 5 |--|--| 1.5 2.7 3.8	--If multiplied by the number of classes that might be needed, this could be a significant amount (thus justifying IVI). --I feel a realistic assessment of the high cost of instructors should be considered when choosing IVD. --Minor part of any IVD program, less than 5%. --a necessity. --Management sees that the cost of trainers can be reduced W/IVD --Do'nt need instructor with our programs. --This is what makes IVD and CBT viable. If instructor costs were not high, small classes and one-on-one training would be much better.	

FACTOR B: ORGANIZATIONAL ENVIRONMENT

CRITERIA	WEAK AVERAGE STRONG INFLUENCE	COMMENTS FROM #2	COMMENTS OR SUPPORT OF YOUR POSITION
1.management commitment	(0)(0)(6)(4)(10) 1 2 3 4 5 |--|---| 3.3 4.2 5.1	--I believe that management's commitment does influence selection, however I think proponents of IVD should influence management's decisions.	
2.trainer's attitude toward IVD	(1)(2)(7)(7)(3) 1 2 3 4 5 |---|---| 2.3 3.5 4.5	--Trainer is never make these decisions, often viewed as excess baggage on an IVD program. --Trainers should not be making these decisions. They should be decided by performance technologists. --The typical trainer is against technology in training. This ASTD is a good example. They still do not give any recognition to the use of technology in training. This SALT and IICS and their growth. --Individuals can be persuaded. --Many industrial trainers resent the use of IVD and fear that it may replace them.	
3.availability of IVD experts	(1)(5)(11)(1)(2) 1 2 3 4 5 |---|---| 1.9 2.9 3.9	--You do'nt need them, learn by doing. --Few people really have expertise in in-house depts. Many organizations can not afford a use vendor. --Lot of people and companies around now. --The few I have met are more like used car salesman.	

CRITERIA	WEAK AVERAGE STRONG INFLUENCE	COMMENTS FROM #2	COMMENTS OR SUPPORT OF YOUR POSITION
4.organization's policies and traditions	(1)(1)(7)(9)(2) 1 2 3 4 5 |--|--| 2.6 3.5 4.6	--It does influence, but it should not be limiting the consideration of IVD as an alternative. --Innovation. --There is a big culture out there, and you have to sell people on this new technology.	
5.behavior of competitor and other organizations	(2)(1)(7)(7)(3) 1 2 3 4 5 |--|---| 2.3 3.4 4.5	--Irrelevant --In the early day of IVD development, it often looked like the tale was waging the dog. --The "me-too" attitude is often a strong motivation in various industries, with a flagship company paving the way for others. --Not the issue.	
6.clientele pressure for change	(0)(4)(13)(1)(1) 1 2 3 4 5 |---|--| 2.2 3.0 3.7	--Not sure what this item means. --I think this will be a strong influence in the not-too-distant future.	

FACTOR C: INTERACTIVE VIDEO

CRITERIA	WI AVERAGE SI	COMMENTS FROM #2	COMMENTS OR SUPPORT OF YOUR POSITION
1.availability of information about interactive video	(2)(3)(12)(3)(0) 1 2 3 4 5 |---|---| 2.0 2.8 3.6	--I believe this is not a influence, there is a "ton" of information available. May be people are not looking for infomation. --The availability of IVD information has led to an incease in use. --Most information is provided by manufactures and vendors and is biased if not incorrect. --Hundreds of articles, workshops, conferences dealing with issues. --This applies especially to evaluation studies, we receive several requests each week for info. on evaluation studies from people considering IVD training.	
2.availability of IVD experts	(1)(5)(10)(3)(1) 1 2 3 4 5 |---|---| 2.0 2.9 3.8	--In essence, these people are "cultural change" experts. --Army had 115 vendors at one pre-proposal conference for IVD. --The few I have met are more like used car salesman.	
3.high interactivity level of IVD programs	(1)(2)(3)(5)(8) 1 2 3 4 5 |---|---| 2.7 3.9 5.1	--Stop/Go, Yes/No is not interactive! See page 46 and p.47, "The Media Lab" (Stewart Brand). --The system does not make a program interactive, program design does.	
4.compatibility of different hardware systems	(1)(2)(5)(6)(6) 1 2 3 4 5 |--|---| 2.5 3.7 4.9	--I did not think this is any longer a factor. Now that IBM has entered the market. --In the early day we developed for a closed system. Today the U.S. army has the EIDS as a baseline. --You create a course to deliver on a set of hardware. You can demonstrate getting your money back on that. You do not have to have hardware compatibility. People drive Fords, Chevrolet, Toyota, they do not demand total compatibility between the brands. A ford will get you from A to B just as well as a Toyota! We are still looking at the parts, not at the results.	

FACTOR D:CHARACTERISTICS OF LEARNING TASK

CRITERIA	WEAK AVERAGE STRONG	COMMENTS FROM #2	COMMENTS OR SUPPORT OF YOUR POSITION
1.objectives of learning task	(0)(0)(5)(7)(8) 1 2 3 4 5 |--|-- 3.4 4.2 5.0	--Many things can be taught by IVD but if the hardware base is not there,people choose another medium. --The objectives determine the best training method.	
2.extensively variable contents	(0)(1)(8)(6)(5) 1 2 3 4 5 |--|--| 2.8 3.8 4.7	--If you mean the content varies or changes frequently, then I would rate it a "4". --It should have more influence. --Volatile content rules out IVI as a candidate system. --Determines delivery or rules out others. --IVD not always cost effective when content changes rapidly.	
3.self-paced instruction	(0)(0)(3)(7)(10) 1 2 3 4 5 |--|--| 3.6 4.4 5.1		
4.stability of instructional material	(1)(0)(5)(5)(9) 1 2 3 4 5 |--|---| 3.3 4.1 5.5	--Easy to modify programs with new IVD systems.	
5.flexibility of learning schedule	(3)(5)(5)(6)(1) 1 2 3 4 5 |--|--| 2.6 3.7 4.8	--If this means that the learners have a flexible schedule, then I would rate it a "3". --From my experience do'nt feel many consider this, although I feel it should be a strong selling point. --If on-demand training is a requirement, then IVD is a strong candidate. --How flexible can you get? IVD is available anytime, anywhere. There is a system-no traveling and being worries and no downtime necessary. --This is a factor in almost every IVD project I have done. --How many of your panel members have learned a foreign language by self-study? Have completed a correspondence degree? Flexibility is for others, not for ourselves. Availability but under disciplined circumstances is the strong influence. ie. Any time today! Not some time in the next 5 months.	

CRITERIA	WEAK AVERAGE STRONG INFLUENCE	COMMENTS FROM #2	COMMENTS OR SUPPORT OF YOUR POSITION
6.user-friendly software	(0)(2)(4)(6)(7) 1 2 3 4 5 |---|---| 2.9 4.0 5.0	--If you can'nt learn programming, you should not be in the business. --Unsure what you mean. --Good developers should have no problems with the variety of systems and languages available. --People can and do learn to use almost any system.	
7.inherently visual learning material	(0)(0)(4)(8)(8) 1 2 3 4 5 |--|--| 3.4 4.2 5.0	--If this means the material is more visual than text based, I would rate this "4". --It should be an influence, but it is not especially. --Visual learning material is best taught by video, IVD enable the learner to not only see, but also do.	
8.repetitive contents	(2)(3)(8)(4)(3) 1 2 3 4 5 |--|--| 2.0 3.1 4.3	--I do not believe repetitive contents are any better suited to IVID than other media. --Drill and practice are important. --The same as any other medium.	
9.unavailability of subject expertise	(1)(1)(9)(7)(2) 1 2 3 4 5 |---|--| 2.5 3.4 4.3	--Without experts can not get state of art programs or programming. --May be it's because I am in New York, but this is never a problem.	
10.a large collection of multimedia material	(0)(3)(10)(4)(3) 1 2 3 4 5 |--|--| 2.4 3.4 4.3	--David Hon called this the "critical mass". Firms want access to more than one program. --Achieves best learning for all types of learners. --I bet you have CBT people on the panel. Will no one admit to being an audio-visual learner? --Again, this may not justify hardware cost for yet another system. --Should be obvious. --Think this is becoming stronger especially in the education market.	

FACTOR E: CHARACTERISTICS OF LEARNERS

CRITERIA	WEAK AVERAGE STRONG INFLUENCE	COMMENTS FROM #2	COMMENTS OR SUPPORT OF YOUR POSITION
1.a large number of learners	(1)(0)(2)(8)(9) 1 2 3 4 5 |--|--| 3.2 4.2 5.2	--content is the criteria, not # of users.	
2.various competence level	(0)(1)(3)(9)(7) 1 2 3 4 5 |--|--| 3.3 4.1 5.0	--IVD allows ability to reach 80% (realistically) of competence level.	
3.dispersed geographic locations	(0)(1)(2)(7)(10) 1 2 3 4 5 |--|--| 3.4 4.3 5.2	--Rate "2"-Makes it too costly. Rate"5"-make it desirable if not for costly. --My rating was too low, I chose "2" because I feel dispersed locations is a negative influence. It is a major factor in the decision.	
4.required interactivity between trainer and trainee	(0)(1)(7)(8)(4) 1 2 3 4 5 |--|--| 3.0 3.8 4.6	--I believe this is a strong influence in deciding not to use IVD. --IVD is interactive.	
5.learner's attitude toward interactive video	(2)(7)(5)(5)(1) 1 2 3 4 5 |--|--| 1.7 2.8 3.9	--This must be taken into account in developing any program. --I believe learners will adapt to any effective and valuable learning media. Do'nt worry about what they think at first. When they try it,they will like it if it's designed well. --They generally prefer it to all other delivery systems, hence they learn better from it. That translates to dollar savings in the long run. --Learners will play major roles in subsequent IVD purchases. --You can change behaviors, you can create circumstances (rewards/punishments) that change attitude. Plus you build a proven better mouse trap and people will adopt. So far I have only see 3 really good IVD courses.	

The following items were suggested by panel members as additional criteria during round #1 questionnaire. Respond below as to how you view the influence of these criteria as according to select interactive video for corporate training.

CRITERIA	WEAK AVERAGE STRONG INFLUENCE	COMMENTS FROM #2	COMMENTS OR SUPPORT OF YOUR POSITION
1.development time	(1)(1)(5)(7)(6) 1 2 3 4 5 |--|--| 2.7 3.8 4.9	--Should be a strong influence. --You have a lot to do and the shorter time the better. --If you need training immediately, forget IVI. --Would prevent in most cases.	
2.whether any current training material exist	(0)(3)(6)(6)(5) 1 2 3 4 5 |---|---| 2.6 3.7 4.7	--It will go faster if material exists. --If you have something in place already, you can afford more time to use IVI later. --This can cut the cost of development.	
3.standardization of authoring system	(2)(7)(6)(3)(1) 1 2 3 4 5 |--|--| 1.6 2.7 3.7	--I just need one good authoring system. --This is a problem, but not one that eliminates IVI as a candidate delivery system.	
4.learner is in control during learning	(0)(2)(5)(6)(7) 1 2 3 4 5 |--|--| 2.9 4.0 5.0	--Learners want to be self-directing. --Should be a strong influence. --Yes, yes, yes. --Learners like to be in control.	
5. level of remediation	(1)(0)(8)(8)(3) 1 2 3 4 5 |--|--| 2.7 3.6 4.5	--That is part of good design. --This is a design issue, not a characteristics of IVI per se.	
6.required lots of simulations	(0)(1)(6)(5)(8) 1 2 3 4 5 |--|--| 3.0 4.0 5.0	--It is the future. --If realistic simulation is a requirement, IVI is a strong candidate.	

CRITERIA	WEAK AVERAGE STRONG INFLUENCE	COMMENTS FROM #2	COMMENTS OR SUPPORT OF YOUR POSITION
7. training time	(0)(1)(4)(10)(5) 1 2 3 4 5 |---|--| 3.1 4.0 4.8	--This usually can be reduced with IVD. --The trainee should get as long a time as he/she needs. --IVI reduces training time more than any other delivery system.	
8.health hazard and safety of learning task	(2)(0)(3)(9)(6) 1 2 3 4 5 |---|---| 2.7 3.9 5.0	--Obviously in some circumstances it is the only way. --(same as realistic simulation--# 6)	
9.difficulty of learning task	(0)(0)(11)(9)(0) 1 2 3 4 5 |-|-| 3.0 3.5 4.0	--"Difficulty" needs to be defined.	
10.quality of software products	(0)(2)(8)(7)(2) 1 2 3 4 5 |--|--| 2.6 3.5 4.3	--and training in the use of that software.	
11.reliability of hardware equipment	(0)(1)(7)(8)(4) 1 2 3 4 5 |--|--| 2.9 3.8 4.6	--Most are reliable now. --Influence 2nd project. --It kills reputations quickly.	

The following items were suggested by panel members as additional criteria during round #2 questionnaire. Respond below as to how you view the influence of these criteria as according to select interactive video for corporate training.

CRITERIA	WEAK AVERAGE STRONG INFLUENCE	COMMENTS	COMMENTS OR SUPPORT OF YOUR POSITION
12.ability to compile student scores	( )( )( )( )( ) 1 2 3 4 5		
13.ability to compile student "time on task"	( )( )( )( )( ) 1 2 3 4 5		
14.ability to compile group statistics of "mastery"scores	( )( )( )( )( ) 1 2 3 4 5		

ARE THERE ANY ADDITIONAL CRITERIA YOU WISH TO SUGGEST?

(1) _____

(2) _____

(3) _____

Iowa State University of Science and Technology Ames, Iowa 50011

May 19, 1989

Dear Delphi Panel Member:

As of this date I have not received your responses to the delphi round =3 questionnaire. It will be the last round of Delphi process for my research project. Your input is needed before I can tabulate the group's responses and develop the final result. A full summary of the Delphi study will be provided to all panel members when consensus is obtained.

If you have not yet completed the questionnaire, would you do so now and return it to me at your earliest convenience.

If you did not receive the mailed instrument or need another copy, please notify me as soon as possible. Call me at (515) 296-8080.

If you have already mailed it, accept my thanks for your cooperation and disregard this reminder.

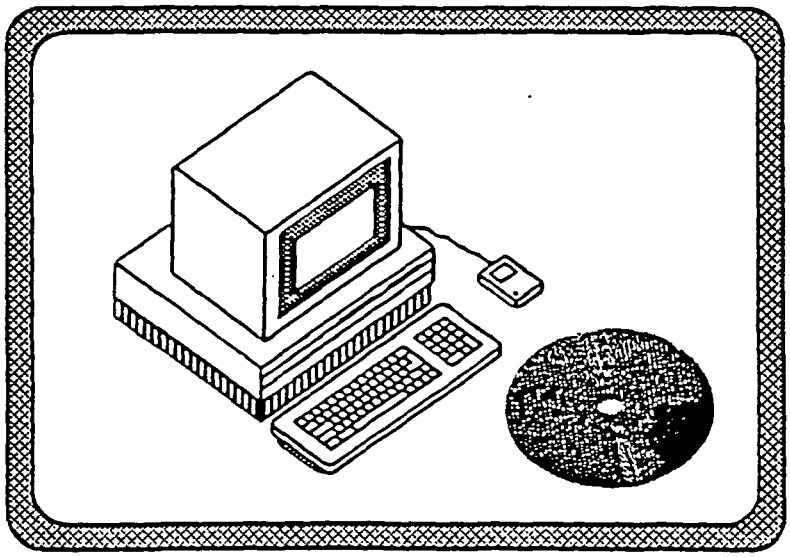
Sincerely,

Sofia Lee

11 APPENDIX E: FINAL STATISTICAL RESULTS OF THE DELPHI PROCESS

Statistical Results of Delphi Questionnaires

The Criteria That Influence the Decisions of Corporate Training Developers Vis-a-Vis Adoption and Diffusion of Interactive Video as Part of an Overall Training System



INSTRUCTIONAL RESOURCES CENTER

N-157 Lagomarcino Hall

Iowa State University

Ames, Iowa 50011

515-294-2183

Iowa State University of Science and Technology Ames, Iowa 50011

Dear Delphi Panel Member:

Find enclosed the final statistics from the Delphi process you participated in during my research study of the past two months. Twenty of the twenty two round one panelists completed the process for a 91% return rate. Please accept my sincere thanks for your commitment and input.

This final statistics summary included the following tables:

1. Frequency distribution of the Delphi panel responses on demographic /information items.

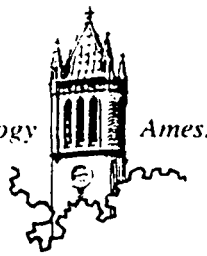
2. Final Delphi panel rankings by mean of the statements regarding the question that in the process of instructional development you follow in your work, when do you decide which medium/delivery system to use?

3. Final Delphi panel rankings by mean of the statements regarding who is responsible for making decisions about whether or not to use a certain medium/delivery system for a training program?

4. List of the Delphi panel responses on the question of "Where and how did you first get the idea about using interactive video systems for training?"

5. Frequency distribution of the Delphi panel responses on the question of "Where
and how did you obtain more, in-depth information about interactive video?".

Iowa State University of Science and Technology Ames, Iowa 50011



6. Final Delphi panel rankings by mean of the statements on the major problems/obstacles of developing an IVD training program.

7. Final Delphi panel rankings by mean of the criteria that influence corporate training developer's decision to use interactive video for training.

If you have any question or need any information regarding my study, please contact me at (515)296-8080. Thank you again for your assistance.

Sincerely,

Sofia Lee
Graduate student

Michael R. Simonson
Professor

Table 1 : Frequency distribution of the Delphi Panel's responses on demographic information items

Item	Possible response	Frequency
1.How many years of experiences do you have using interactive video learning system.	1.none	1
	2.1 to 3 years	3
	3.4 to 6 years	7
	4.7 to 9 years	6
	5.10+ years	3
2.Have you ever been involved with the process of selecting an interactive video system for corporate training?	1.yes	19
	2.no	1
3.What is your gender?	1.female	8
	2.male	12
4.What is your level of education?	1.some college	0
	2.B.A.	3
	3.M.A.	3
	4.above M.A.	12
	5.B.S	1
	6.two master degrees	1
5.In what geographic region of the United States do you work?	1.northeastern	5
	2.southeastern	3
	3.north center	4
	4.south center	2
	5.northwestern	3
	6.far west	3

Table 1 (continued)

Item	Possible response	Frequency
6.With what type of institution are you employed?	1.educational organization	2
	2.industrial/corporate	10
	3.training company	5
	4.Independent writer	1
	5.videotape/videodisc producer	2
7.What is the field in which you obtained your most advanced degree?	1.educational psychology	2
	2.psychology	4
	3.education	2
	4.instructional technology	4
	5.computer science	2
	6.adult education	2
	7.business	2
	8.other	2
8.What is the title of your job position?	1.president/vice president	4
	2.supervisor/director of the training department	9
	3.instructional designer	2
	4.trainer	2
	5.other	3
9.Please summarize the experiences you have in the use of interactive video.	1.developing, designing,or producing IV programs	7
	2.using IV for training	9
	3.IVD consultants	3
	4.other	1

Table 2: Final Delphi rankings, by mean, of statements regarding the question of "In the process of instructional development you follow in your work when do you decide which medium/delivery system to use?

Rank	Mean	Statement	Comments from \#2	Comments from #3
			Neutral	
1	2.06	after cost/ benefit analysis	--Should be part of the cost benefit analysis. --Depends how you define this step. --The best way is the one with the best cost/benefit analysis. --Objectives determine delivery system candidates. Cost/benefit determines final selection. --This is never done in a military or industrial IVD program, always after the fact.	--You can list pros and cons of each delivery system as you work through the planning stages.
2	2.12	after needs analysis phase	--Should be done after---try it it works (same as above). --Objectives guide the selection of media and delivery systems. --Yes. --too early.	--Yes, after-but not right after needs analysis. Needs analysis-->objectives -->testing-->media selection -->design. --I still think it is too early.

Table 2 (continued)

Rank	Mean	Statement	Comments from \#2	Comments from #3
3	2.15	after audience demographics and learning styles have been determined.		--This should be done during needs analysis. --I think IAV can deliver the same material in a variety of ways (to all demographics and learning styles) not possible in other systems. --This is an important consideration. --Yes.
4	2.29	after objectives have developed	--Too early. --Objectives guide the selection of media and delivery systems.	--and after setting testing criteria. --As objectives are being formed it is important to look at (delivery contraints --not enough qualified instructor, geographically dispersed learners, equipment availability, etc.) to determine what instructional objectives can be achieved with a cost effective delivery system.

Table 2 (continued)

Rank	Mean	Statement	Comments from \#2	Comments from #3
5	2.35	according to the budget	--This is, of course,a consideration. --The budget should be influenced by the cost benefit analysis. --But a compelling argument can always be taken to management. --That reality. --You are going to pay for training one way or another. Formally in the budget or informally through poor performance and waste! --Budget determines final choice among candidate media/delivery systems.	--Budget is always #1. --So formalize it and emphasize the hidden costs.
6	2.50	during the training device analysis process	--This is the methodology I've used.	--IVA may be a perfect fit for some and totally inappropriate for others. --Obviously, but most people do'nt have a formal training device analysis process.

Table 2 (continued)

Rank	Mean	Statement	Comments from \#2	Comments from #3
7	2.53	as early as possible	--You should'nt decide on the delivery until you know the objectives and target audience. --This option seems meaningless unless "possible" is defined first. --Because this will influence your learning design and budget. --Until the program is fleshed out, what is appropriate? --Of course as early as possible, but dumb statement, when is that? Should be done after needs analysis, audience analysis,and objectives and testing determined. --Selection of media must not drive the process, it must be an outcome of careful analysis. Then as early as possible.	--It is too ambiguous. Yes, you need to decide on the delivery system early on so that you can best utilize its capabilities when developing the program, but, you still can'nt decide on the system until you've developed objects and audience analysis. --If you have already made the investment in a delivery system that will dictate the program format. --It takes a long time to develop a videodisc. The earlier you decide the better. --I construed "as early as possible" to mean prior to analysis. You should not select delivery/system until ALL analysis has been completed
8	2.71	after the course content have been decided	--Now you know what is to be trained and learned. Now you can decide what is the best way.	--Ideally you identify medium now and alter delivery of content to fit. --Too late. --Along with it, it is possible --When all is said and done. If you work in a corporate or military training environment, the delivery system is determined at project initiation. The software is designed around the functionality of the delivery platform.

Table 2 (continued)

Rank	Mean	Statement	Comments from \#2	Comments From #3
9	3.06	following client's choice	--Not blinding. Must give recommendation to client. -When necessary, client needs and attitudes drive the selection. --Has to be considered. --Sometimes there is no alternatives. Agree if client has gone through analysis phase and has goals and objectives. Disagree if the client wants to do a (disc,tape) on (tapes) just because its the "in" thing. --But "politics" is everything. --But may have to. --They are not the expert- that is what they are paying you for.	--In our business,realisticall clients make the decision. If they are wrong, you can push somewhat, however.... --The customer is always right if not you are rapidly out of customers.
10	3.24	based on market demand	--If you are market-driven. --Are we training or following fashion? --Depends on whether your goal is income or effective training. --has to be considered.	--Market demand is important because it drives development and enhancement of delivery technologies. --Example, the corporate would want MS-DOS based IVD programs, try SELLING something with hypercard and see how long you can survive. --Too expensive for anyone to buy that.
11	3.29	during the development of course content outline	--not necessarily.	--Content must come first, a mistake made by many is to assure objectives totally cover content. --Too late. --Along with it, it is possible

Table 2 (continued)

Rank	Mean	Statement	Comments from \#2	Comments from #3
12	3.65	during development of training objectives	--Too early. --Objectives guide the selection of media and delivery systems.	--Definitely too early. --This is an interactive process. --"Brainstorming" potential media often occurs during objectives development.
13	3.77	before objectives have been developed	--Let the learning objectives be part of the criteria for selection. --Too early. --Should be done---try it, it works (same as above). --Objectives guide the selection of media and delivery systems. --Never!	--I agree that objectives guide media selection,however, media selection is also guided by delivery constraints such as a remote audience or no-travel budget. If IV is your only delivery system then the learning objectives will change.
14	3.82	after trial and testing	--This may be an opportunity to admit the mistake and start again.	--Final decision is made at this point. Initial selection must be made before trial. --This is an interactive process. --You are right, it is too early

Table 2 (continued)

Rank	Mean	Statement	Comments from \#2	Comments from #3
			disagree	
15	4.06	during the needs analysis phase	--Too early. --Should be done after needs analysis,audience analysis, objectives and testing determined. Read mager- and if you have not tried, try it-it works. --Objectives guide the selection of media and delivery systems. --This is closer.	
16	4.53	as late in production as possible (because technology changes so fast)	--Make your decision in what is available.The new technology will have "lugs". --A functioning technology does not appear over night. Go with a technology you can make work. -I do'nt see how production can occur without media selection in place. --Technology is'nt changing that quickly.	

Table 3: Final Delphi Panels' rankings, by mean, of statements regarding the question "who is responsible for making decisions about whether or not to use a certain medium/delivery system for a training program?'

Rank	Mean	Statement	Comments from #2	Comments from #3
			(neutral response)	
1.5	2.1	director of a training program	--Depends on the company. --Sometimes. --Depends on program, visibility, time to develop, last 1/4 earn up, etc.	--In my case, the director is a highly skilled instructional systems designer, and responsible for inte-pretation of all front end analysis. --All comments refer to "what is" as "what should be".
1.5	2.1	manager/ director of training department	--Same as #1 in my mind.	--The manager/director should have extensive experience in ISD methodology. --Training directors only implement policy. --Director of training usually dose not fully control the budget required for this.
3	2.2	customer/ client	--Sometimes. --Director of a training program and customer are working together.	--Should be a team approach -final decision is the clients. --This is reality.

Table 3 (continued)

Rank	Mean	Statement	Comments from #2	Comments from #3
4	2.4	high level (executive) management	--Sometimes. --This person influence the director of training.	--This person pays the director of training. --This is reality. --Executives have the vision and access to the budget process to bring in "futuristic" staff. Some one has to be leading edge. Some one has to be first.
5	2.5	instructional designer/ technologist	--Ideally this should be the case; often the reality is "4". --There are no "all round" instructional designer, each has a bias. --Unfortunately, the one who knows most often have the least to say. --Should be this person, but in reality is customer or executive management. --Instructional design people should recommend media.	--At this stage of development, no one is without bias. It will be according to the prejudices of the instructional design, not the of the technology. --Instructional designers create courseware and may decide on features within the delivery system. They are not concerned with cost-benefits and are not qualified to make 6 figure hardware decisions. --Unfortunate, but true. --They know best!

Table 3 (continued)

Rank	Mean	Statement	Comments from #2	Comments from #3
6	2.6	program team	--This is optimum, but they are usually empowered to recommend. --Sometimes.	--Unfortunate, but true.
7	3.0	instructor	--At college level, Yes! --not invented here syndrome keeps himself in the circle.	--Unfortunate, but true. --We are training media selection, in my business the instructor is not in the selection loop. --Usually the last one to know.
		(strong disagree)		
8	4.0	trainee		--They may like IVD, but it may not be the best way to gain. --If learner can be part of the decision, they're more likely to take a positive attitude toward the instruction. --Input during trial. --Not enough information for them to choose. --Do'nt be silly. --If you have resources to supply the training in a variety of alternatives.

TAble 4 : List of Delphi panel responses to the question of "When and how did you first get the idea about using interactive video systems for training?"

Response
--1984 when I was first exposed to such a system and asked to help design authoring software for it.
--About 10 years ago working with the American Medical Associ. Telefunken had a simple system that we never used, but the idea was planted.
--When I was at RCA in training and they had CED videodisc technology for consumer viewing.
--A meeting where someone described the technology.
--During the late 70's. I was peripherally involved in developing and evaluating discs for use with the hearing impaired.
--Graduate school.
--Reading literature 1970.
--ASTD National Conference (Boston).
--In the process of using interactive video for reference purposes. A consultant told me about the medium in 1979.
--In discussion with clients.

Table 4 (continued)

Response
--ASTD National Boston. 1980 saw a presentation of CPR training by David Hon.
--Approached by CAVRI, an early player in the interactive videotape area when I was with Arthur Anderson Co's consulting group.
--Saw early articles in 1979.
--Dr. Gordon and ASTD advised me in 1983 to take a look at IVD.
--Literature, probably 4 years ago in Chicago.
--From industry contacts.
--1973 University Wisconsin, school of nursing.
--We had heard about the Nebraska Group and spent a year investigating the feasibility of IVD, then we converted many of our tape programs to IVD.
--At University of Akron 1974. I was asked to prepare a white paper for education that dealt with the computer and the camera. Presentation given at EDUCOM 10th annual meeting fall 1974.
--When I took a job with a vendor organization which developed IVD.
--WICAT.

TAble 5 : Frequency distribution of the Delphi panel's responses to the question of " Where and how did you obtain in-depth information about interactive video?"

Response	Number of responses
1.Literature/Journals/Articles	16
2.Professional conferences/Seminars	10
3.Trade shows	9
4.Fellow professionals/colleagues	7
5.Trial and error	5
6.Consultants	4
7.On the job training	3
8.Workshops	2
9.5 Participating in user groups	1
9.5 attending Nebraska and Sony Videodisc courses	1
9.5 Investigated throughout United States.	1

Table 6: Final Delphi-panel rankings, by mean, of statements concerning the major problems/obstacles to develop an IVD training program

Rank	Mean	Statement	Comments from #2	Comments from #3
			(neutral response)	
1	1.7	development time	--This is a problem when the client keeps changing requirements. --It takes too long. Our tools are not productive enough. --Often eliminates interactive video as an alternative.	--We find development equal to and often less than equivalent CBT. --I have believed this is the major problem after cost!
2	1.9	staying with budget	--If budget was done without correct information. --Do'nt promise a silk purse on a pig's ear budget. --This is a problem when client keeps changing requirements, and difficulty in estimating actual development time (production). --Budget is fairly predictable. --At first.	--Build to your budget! Have a sample "book" this is what "this" costs. Plan, plan, plan.

Rank	Mean	Statement	Comments from#2	Comments from #3
3.5	2.0	initial hardware costs	-- Costs have became reasonable. --You can get your cost back very quickly, if you understand "hidden" training costs.	--You spend $500 per week per trainee for 5 days training. IAV=2 and 1/2 day a saving of $500 each week for 2 trainees. You train just 40 people you have saved $10,000. One station is using $10,000 you pay for "no training" in lack of performance, poor quality waste etc. Initially, before IBM stepped in.
3.5	2.0	variety of skills needed	--These are not always available. --Oh, so many.	--not a problem here. --A major, major obstacles. --In my area this has not been a problem. --Fortunate in having a stayed in-house team.
5	2.1	selling to those who do not have hardware	--They wo'nt buy until there are more programs. --Not part of my responsibility. --It is obviously a package! hardware + software. --Infrequent problem.	--If they can't afford the hardware, you do'nt waste time trying to sell software. --Costs.

Table 6 (continued)

Rank	Mean	Statement	Comments from#2	Comments from #3
6	2.5	the need for team work rather than individual efforts	--This was an advantage, because I had team players. --We're fortunate and have a good in house team; sometime have major probs with those outside field. --It is not an obstacle unless people make it so. --Hard to change old habits.	--The need for team work is not an obstacle. It is an advantage when the team works collaboratively.
7.5	2.6	lack of understanding and knowledge about IVD by clients	--He needs to see it, to feel it, to "understand" it. That comes by exposure. --We have a team to assist project group.	--The military was the first to extensively use IVD.
7.5	2.6	scheduling and availability of content expert	--You can make him available. --For any course. --Not a problem in New York.	--True, this is always a problem, no matter the delivery system. --I have little problem with content experts. I develop military training. --Varies with clients, but most often this leads to delays, usually is not the subject-matter expert's only or top priority.

Table 6 (continued)

rank	mean	statement	comments from #2	comments from #3
7.5	2.6	lack of formative and summative evaluation	--This hurts for subsequent project, because bottom line impact is rarely substantiated. --this was done well for one project, but it never got to market, because no one could decide what the market looked like. --You can evaluate staff to death. Does it work? Yes/No. Do IVA graduates like it? Yes/No. Would an IVA graduate recommend the course to a friend? Yes/No. Do IVA graduates show a better performance or learn in a shorter time? The answer is YES. It is people putting off a decision of because of the bucks involved.	--Costly-but essential both for new users and to improve products. Many unwilling to invest. --There is never time or budget. You take your best shot based on experience. --The lack is not an obstacle. It is an excuse for people who will not make a decision involving bucks over and beyond their usual limits.

Table 6 (continued)

rank	mean	statement	comments from #2	comments from #3
10.5	2.7	IVD technology changing too fast	--This is a problem in the mind of customers, not necessary in the mind of producer of IAV. --Not true. It is TV, It is audio, it is computer, there is no change there. This technology will continue to change. That is why the course must be organized, one step removed from current software and hardware.	--The hardware is yes. But learning and seeing is not. --Basic technology has remained the same since 1978.
10.5	2.7	lack of understanding and knowledge about IVD by management	--Only because you have not impacted the bottom line! You have a head turning project, once you gets their attention, you'll get all the management you need.	--General lack of understanding by management of value of "big-ticket" training.

Table 6 (continued)

rank	mean	statement	comments from #2	comments from #3
10.5	2.7	non-compatible equipment\ hardware	--This limits the market for IVD. --You go with a system and live with its deficiencies. --We've standardized.	--You can get a system to work. It may not be all you want, but you can get a system to work. --Not really an obstacle. --A problem for those who wish to use both custom and generic software.
13.5	2.8	difficulty in designing "interactive"	--Designing not a problem, implementing the design a huge problem. --Just need a realistic schedule.	--Designing not a problem. --Need creative thinking, not the same old staff.
13.5	2.8	convincing clients to use IVD	--Once developed, it is easy. Getting an adequate budget requires a lot of convincing. --There is sufficient to do without making the waiting list longer. --Costs. --Our clients are receptive and flexible.	--At first. --Since we only customize, we have not found clients who will precete(?) the up front development costs.

Table 6 (continued)

rank	mean	statement	comments from #2	comments from #3
13.5	2.8	operation software not compatible	--You go with a system, and take your lumps. --We've standardized on one authoring system.	--In our world, DOS is still king.
16.5	2.9	failure of project management	--Could have been better. --It is a moving target with constant by changing hardware and software. It is an immensely challenging management task. But not a major obstacle.	
16.5	2.9	hardware selection	--Difficult to match market when no one knows what the market will buy. --Until DVI and CDI is available, your hardware selection is going to be wrong. --Our company makes the hardware.	--This is a problem, but not perceived by client. --Is it MAC or IBM? Laservision or DVI? Pioneer 8000 or Sony?

rank	mean	statement	comments from #2	comments from #3
16.5	2.9	lack of advanced planning	--It is very difficult to anticipate all of the problems and variables.	--At this stage of development of the technology, there are still too many unows to play effectively.
19	3.0	software selection	--We had system and application SW specific to IAV. It does not exist yet! --Our company makes the software.	--The software does not have the power needed yet!
20	3.1	Programing ing skills	--Seldom in our organization. --This is the cruncher. Not necessarily "C" heavies but DOS competency too.	--We started back in 82-83 before authoring systems were formalized--very difficult. --Instructional designers who can not program or at least author should not be in the business. --IAV needs computer skills. Particularly when you move into digital video and are creating images from a variety of sub-images. Good programmmers are logical,good trouble shooters & understand branching. You NEED programming skills.

Table 6 (continued)

rank	mean	statement	comments from #2	comments from #3
21	3.2	authoring system not standardized	--That is not a problem! It is lousy authoring packages that are the problem. --I have not used authoring system. They do not provide enough flexibility to support instructional design. --We have standardized on one authoring system.	--Systems and languages available for those willing to learn. --Depanding on the design, it's often more cost effective to use a programming language. --Again, we started way back--things are much simpler now.
22	3.3	lack of understanding about market /client demand by training developers	--No one has a real good "read" on the market yet!	--This is way there are not enough prepackaged programs available.

Table 6 (continued)

rank	mean	statement	comments from #2	comments from #3
			(strong disagree)	
23	4.0	no way to do audio easily	--We need a recordable audio media with instant retrieve, i.e., a record-able audiodisk that plays back through its own speaker. Digitized audio boards in the PC are not the solution. They take up a slot, and they take up huge amount of disc space. About an hour's worth of time would be a good beginning.	--New generation of digital audio boards over high quality, and selectable sampling rates, combined with CD-ROM offer hours of audio support. --A nice-to-have, but certainly not a show-stopper.
24	4.38	to create 1" video tape masters	--We need an alternative to 1" video tape. How about 8 mm tape? I need to stay out of the Editing Suite and I do NOT need super duper video fidelity. I need effective training visuals.	--You can tape an 3/4" if you are not picky about final visuals. --3 M is not about to change its million dollar mastering facility! --Alternatives exit, you can produce on any video format. --Quality, Quality, Quality.

Table 7: Final Delphi panel rankings, by mean, of the criteria that influence corporate training developers' decisions to use interactive video for training

Rank	Criteria	Mean
	(strong influence)	
1	cost of developing courseware	4.8
2	dispersed geographic locations	4.6
3.5	self-paced instruction	4.5
3.5	stability of instructional material	4.5
3.5	a large number of learners	4.5
6	user-friendly software	4.44
7	various competence levels of learners	4.4
8	management commitment	4.3
9	high interactivity level of IVD program	4.22
10.5	extensively variable contents	4.2
10.5	flexibility of learning schedule	4.2
10.5	inherently visual learning material	4.2
13.5	learner is in control during learning	4.1
13.5	required lots of simulations	4.1
15.5	required interactivity between trainer and trainee	4.0
15.5	extensively variable contents	4.0
15.5	costs of purchasing hardware devices	4.0
	(average)	
18.5	training time	3.9
18.5	whether any current training material exist	3.9
20	compatibility of different hardware systems	3.8
21.5	unavailability of subject expertise	3.6
21.5	development time	3.6
21.5	trainer's attitude toward IVD	3.6

Table 7 (continued)

Rank	Criteria	Mean
	(average)	
24	quality of software products	3.56
25.5	health hazard and safety of learning task	3.5
25.5	reliability of hardware equipment	3.5
25.5	repetitive contents	3.5
28.5	organization's policies and traditions	3.4
28.5	difficulty of learning task	3.4
30	level of remediation	3.3
31.5	learner's attitude toward interactive video	3.1
31.5	a large collection of multimedia material	3.1
31.5	behavior of competitor and other organizations	3.1
31.5	availability of IVD experts	3.1
31.5	cost of acquiring courseware	3.1
36.5	availability of information about interactive video	3.0
36.5	ability to compile group statistics of "mastery" scores	3.0
38.5	availability of IVD experts	2.9
38.5	cost of purchasing authoring software	2.9
40	clientele pressure for changing	
41	maintenance costs for facilities	2.8
42.5	standardization of authoring system	2.6
42.5	ability to compile student "time on task"	2.6
44	cost of instructor's salary	2.5
45.5	ability to compile student scores	2.4
45.5	overhead costs	2.4

12 APPENDIX F: HUMAN SUBJECTS APPROVAL

INFORMATION ON THE USE OF HUMAN SUBJECTS IN RESEARCH
IOWA STATE UNIVERSITY
(Please follow the accompanying in 217 tions for completing this form.)

1. Title of project (please type): The Criteria that Influence the Decisions of Corporate Training Developers vis-a-vis Adoption and Diffusion of Interactive Video as Part of an Overall Training System.

2. I agree to provide the proper surveillance of this project to insure that the rights and welfare of the human subjects are properly protected. Additions to or changes in procedures affecting the subjects after the project has been approved will be submitted to the committee for review.

Szu-Yun Sofia Lee	2-27-1989	
Typed Named of Principal Investigator	Date	Signature of Principal Investigator

9171 Buchanan Hall	294-2183
Campus Address	Campus Telephone

3. Si | Date | Relationship to Principal Investigator

Si	Date	Relationship to Principal Investigator
Michael R. Simonson	2-27-1989	Major Professor

4. ATTACH an additional page(s) (A) describing your proposed research and (B) the subjects to be used, (C) indicating any risks or discomforts to the subjects, and (D) covering any topics checked below. CHECK all boxes applicable.

- [ ] Medical clearance necessary before subjects can participate
- [ ] Samples (blood, tissue, etc.) from subjects
- [ ] Administration of substances (foods, drugs, etc.) to subjects
- [ ] Physical exercise or conditioning for subjects
- [ ] Deception of subjects
- [ ] Subjects under 14 years of age and(or) [ ] Subjects 14-17 years of age
- [ ] Subjects in institutions
- [ ] Research must be approved by another institution or agency

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5. ATTACH an example of the material to be used to obtain informed consent and CHECK which type will be used.

- [ ] Signed informed consent will be obtained.
- [X] Modified informed consent will be obtained.

6. Anticipated date on which subjects will be first contacted:

	Month	Day	Year
Anticipated date on which subjects will be first contacted:	3	10	1989
Anticipated date for last contact with subjects:	5	15	1989

7. If Applicable: Anticipated date on which audio or visual tapes will be erased and(or) identifiers will be removed from completed survey instruments:

Month Day Year

8. Signature of Head or Chairperson | Date | Department or Administrative Unit

2/27/89

9. Decision of the University Committee on the Use of Human Subjects in Research:

- [X] Project Approved
- [ ] Project not approved
- [ ] No action required

George G. Karas	3-6-89	
Name of Committee Chairperson	Date	Signature of Committee Chairperson