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Development of a computerized audio-visual system that uses interactive instructional modules to inform and educate animal and plant health inspection service employees of the United States Department of Agriculture in the fuzzy areas of workforce diversity.

Gary T. Dorr
University of Massachusetts Amherst

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DEVELOPMENT OF A COMPUTERIZED AUDIO-VISUAL SYSTEM THAT USES
INTERACTIVE INSTRUCTIONAL MODULES TO INFORM AND EDUCATE
ANIMAL AND PLANT HEALTH INSPECTION SERVICE EMPLOYEES
OF THE UNITED STATES DEPARTMENT OF AGRICULTURE
IN THE FUZZY AREAS OF WORKFORCE DIVERSITY

A Dissertation Presented

by

GARY T. DORR

Submitted to the Graduate School of the
University of Massachusetts in partial fulfillment
of the requirement for the degree of

DOCTOR OF EDUCATION

May 1993

School of Education

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Approval as to style and content by:

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Robert Wellman, Chair
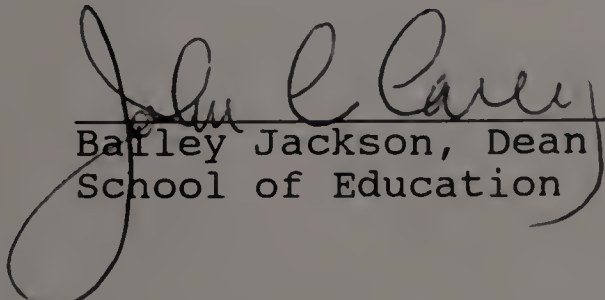
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Robert Maloy, Member

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Kenneth Brown, Member

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John Stacey, Member

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Bailey Jackson, Dean
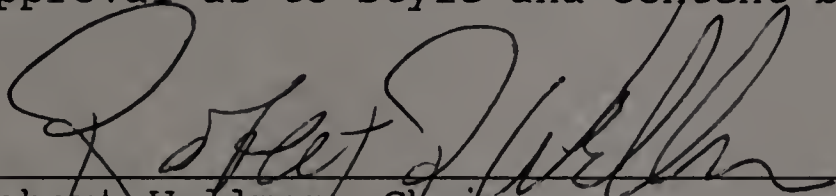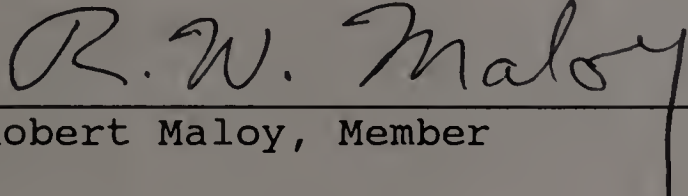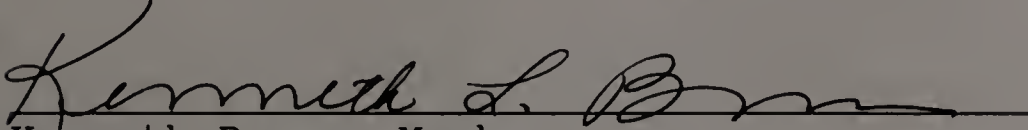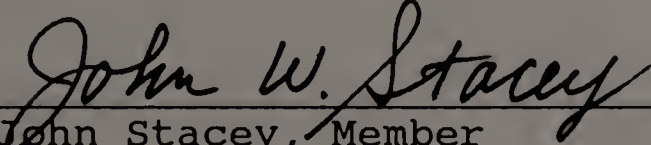School of Education

ACKNOWLEDGEMENTS

ABSTRACT

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OF THE UNITED STATES DEPARTMENT OF AGRICULTURE IN

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MAY 1993

GARY T. DORR, B.A. UNIVERSITY OF MARYLAND

M.S. GALLAUDET COLLEGE

Ed.D. UNIVERSITY OF MASSACHUSETTS

Directed by: Professor Robert Wellman

This dissertation will document the development of a
computerized audio-visual system that uses interactive
instructional modules to inform and educate United States
Department of Agriculture (USDA) employees in the fuzzy
areas of work force diversity (i.e., soft areas that offer
multiple views and options in dealing with a situation).
For example, in text, video and auditory modes, the system
presents several alternative techniques for dealing with a
variety of stereotypes that are generated in the work
environment. The user learns a range of techniques that may
be applied successfully. This includes the established as
well as the more innovative approaches, such as establishing
an agency-wide calendar that marks off all religious
holidays or the development of discussion groups.

The system's operation will be observed in terms of three design features: (1) flexibility to select auditory and/or visual interface, (2) flexibility to select topics and techniques, and (3) appropriateness of the technology for the subject matter. Also, users will be interviewed a few weeks after interacting with the system to assess the degree to which the users' initial requests for instruction (i.e., choices to access particular topics) were satisfied.

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C H A P T E R   I
INTRODUCTION

Background

Modern information technology is dramatically changing the work place. In the early days of the printing press, wax sound drums and glass slides media were utilized. Since then, instructional systems have gone through a variety of "hard and soft media." Part of these changes has been represented by motion media, which started many years ago with motion picture films. This was followed in the late 1950's with videotape, and a little over ten years ago with the introduction of the modern optical laserdisc. The laserdisc allows for the presentation of information in much the same way as a videotape, however, it provides a nearly instantaneous random access ability that allows the user to choose any segment for viewing.

The system I have developed as part of my dissertation uses laserdisc and computer technology to present information simultaneously by voice and text (displayed on the computer screen). The addition of auditory stimuli expands the opportunities for learning beyond only those offered by visual stimuli. For example, the use of voices and sounds to explain separate menu options may help users who find it difficult to read textual information. Although both textual and auditory menus will be shown, each will be independent of the other. This leaves a minimal reliance on

the other modality. (See Appendix B-1 for an example of a standard menu and read the affixed script for the auditory dialogue.)

Reviews and studies have evaluated the use of systems that use a rich technology based in the work setting and the application of these systems to corporate/industrial surroundings where workers have used the systems to develop techniques for performing a variety of manufacturing operations.

Purpose of the Study

This dissertation will document, in a written narrative, the development, pilot, and assessment of a computerized audio-visual system in the work setting. This system uses interactive instructional modules to inform and educate USDA employees in certain "fuzzy" areas of work force diversity (i.e., soft areas that offer multiple views and options in dealing with a situation). The area that I propose to study involves decisions that are "fuzzy" in nature and do not lend themselves to clearly right or wrong answers.

The instructional modules prepared for this study are intended to present alternative techniques of identifying and dealing with work force diversity. The modules are designed explicitly for people who are novices at using the computer. This is one reason for the addition of voice to the usual visual text mode of presentation.

Multi-platform modules (i.e., modules presented in both voice and text) of instruction are intended to be supplementary to the more usual staff training that occurs in the work place; the assumption is that technologies cannot replace the human interaction in staff development. Technologies can considerably augment instruction by increasing the variety of information available. For example, a staff member may select a video segment that presents a technique in a "life-like" skit, or as a taped discussion with an experienced professional, and receive suggestions on several useful approaches. An additional segment may be offered on media, such as work sheets, games, graphs, or other published works that have been helpful in exploring work force diversity. It is hypothesized that the wide variety of computerized audio-visual segments available to the user will provide a greater understanding of work force diversity.

This study is based on a broad multi-platform (variety of modalities) design. The system will use different stimuli (textual and auditory), and a menu driven structure that allows the viewer to decide the information that s/he desires in a non-remediation setting. The research is intended to provide support and guidance to all Animal and Plant Inspection Service Agency employees at the USDA, and may even extend to a more general USDA/Federal Government audience.

Process of the Study

The system that will be developed as part of this study addresses the more "fuzzy" areas of work force diversity that do not offer clearly correct or incorrect solutions to problems. The user, or staff member, must decide how to respond based on professional judgement. The system will offer alternate information, without negating current techniques that the staff member may be successfully using in the workplace. The multi-media system is designed for novice computer users, and consists of a library of recorded segments, scenarios, and related materials that may be accessed via a menu-driven computer program. Specifically, the system will be investigated to see if there are signs that it promotes improvements in staff relationships. The results of the study may provide a basis for future research in other areas of professional staff development.

This study aims to pilot and assess the system in terms of general usability. A multi-media system will be developed, piloted, and assessed in a work setting. The subjects work for the Animal and Plant Health Inspection Service and have agreed to use the system's instructional modules to learn more about workforce diversity. The techniques will be developed by a subject matter expert in the area of work force diversity. As stated earlier, the system focuses on areas that do not offer clearly correct or incorrect techniques for handling a given situation.

The system is designed to be flexible. Staff members may choose among the topics and selectively view an individual series of short presentations. These segments aim to promote useful knowledge and a general awareness of diverse cultures and experiences, types of approaches, and techniques for working together. In addition, the technology allows the user to select among auditory and/or visual (textual) presentations. This flexibility frees the user from limitations of the text-only screen. For example, the text-only screen demands certain prerequisites, such as the ability to comfortably read and understand English. Also, the use of auditory and textual screens addresses varied learning styles of different users, and may initiate a more "humanistic relationship" by using auditory stimuli. The reason is that some people learn better with textual guidance; others prefer guidance from a voice.

Documentation of the Study

This research project is being developed to document the development of the interactive media for the APHIS staff. The documentation will list the steps in the processes of creating the media, and investigating how it works in presenting leading issues of work force diversity. The actual content presented by the multi-media system is being developed with the help of a knowledgeable staff member. The compilation of topics will be created with the SME's assistance, and a final list of topics will be

produced. Based on these topics, a group of individuals recognized as experts in the topic areas identified by the agency convened--including college professors, experienced human relations professionals, general staff members, and others who are able to provide assistance. These individuals are interviewed about the topic areas, and recorded on videotape. The videotape is viewed and analyzed for pertinent statements and findings. These statements are then grouped into related topics. The grouped topics, and the related video segments, are then supplemented with filmed scenarios that give examples of human relations techniques, as well as other graphical materials, such as charts or tables.

A branching matrix is then developed based on the instructional materials. A menu-driven structure is developed--moving from main menu to sub-menu, and then to individual instructional segments. At this point, graphical screens and sound recordings are produced for the menus. The audio/video segments and screen graphics are edited and sent out to be pressed into a videodisc. With all the preliminary components developed, the computer is then programmed to freely execute and guide the user through the program choices. In addition, a computerized database is established in the computer to track the user's progress through the instructional segments.

Use of the System

Users begin interacting with the system by sitting at a special desk, and starting the program by pressing any key on the computer. The program begins by giving an introduction in both text and voice. The introduction includes an acknowledgement, system rights, and introductions on how to use the system. The main menu then appears on the screen with a list of the topics. The user presses a symbol key that corresponds with the desired topics, and then sees a second (sub-) menu that displays a sample of each informational segment. These introductory segments may last only five to ten seconds, but they will give the user an idea of what the modules contain. The user responds by pressing the corresponding key, and views the segment in full length video (or some other format such as text of stills).

The user may go back to the menu and select a different segment and/or topic. As the user is going through the program, the computer tracks the areas that are being viewed. The user may exit the system at any time. Also, the trainee may start the system and decide not to select any of the segments. Once the subject is through using the system, he or she returns to the work setting. Several weeks later, s/he is interviewed to assess the system in the work setting.

The technology also has its own advantages (as outlined in Chapter 3) as compared to the more conventional formats of written documents, stand-up instruction and traditional film and video.

Assessment of the System

An essentially qualitative method will be used to assess the technology's use in the environment. The qualitative data collection begins when the user displays a desire to attain information on a topic by selecting an instructional segment. The user will then receive material on the topic requested, and the request will be recorded in the computer's internal data base. The data base then provides the researcher with a list of viewed segments. In the design of the study, the user is contacted two to three weeks after viewing the segments. The researcher will interview the subject to assess the degree to which the system helped promote improvement in the work setting. Specifically, the interviewer will ask:

1) how the information received helped in his or her work relationships;

2) how the initial need for instruction (displayed by selecting a topic or segment) was satisfied;

3) details on how information from the instructional segments was transferred for use in workplace interactions; and

4) about usefulness of such a system in the APHIS environment.

The particular findings will be included in a written report of the study. A formal structure for post-assessment collection is more difficult, because the system focuses on an area of education that does not identify a single "correct" technique for use in a particular situation.

This study does not address whether the system definitively works or not; there is no technological "fix" to the staff members in this topic area. Instruction consists of the information that the user selects, and the system presents. Post-assessment data will be obtained by interviewing the user and asking questions about the user's interactions and the information they did or did not learn, such as what went wrong, what went right, how did staff members react, what did they find useful, and/or what did they find less helpful. The role of the researcher/system designer is to administer a survey to assess the staff members' satisfaction with the system, and to document these findings.

Significance of the Study

The study that I am performing examines not only standard computerized video systems, but especially the role of such systems in fuzzy areas of instruction. This system also broadens learning potential by displaying information textually, as well as with sound and voice.

The proposed study will look at the appropriateness of this "multi-media library" for teaching Workforce Diversity

issues at the Animal and Plant Health Inspection Service of
the USDA.   The study expects that the areas currently
addressed may be broadened, and the findings may assist in
future research and design of staff development programs.
The significance of this study relates to the creative
access to information on fuzzy topics through multi-media
technology.

C H A P T E R   II
REVIEW OF THE LITERATURE

There is a need for quality staff development and training that can be implemented at a reasonable cost. While modern computer and video technology is helping to meet this goal, these tools can be enhanced by increasing the interaction between the student, or user, and the material. This dissertation will document the development of such a computerized audio-visual system. This system uses interactive instructional modules to inform and educate United States Department of Agriculture (USDA) employees in the fuzzy areas of work force diversity (these areas are soft, and offer multiple options and viewpoints in dealing with particular situation).

According to Oxford Dictionary (1989), the term fuzzy is defined as, "so as to allow for imprecise criteria and gradations of membership". Thus, the topic of workforce diversity deals with imprecise, or fuzzy, areas.

The presentation which use system is comprised of interactive staff training modules speech (auditory stimuli) and text (retinal stimuli) to allow the user to choose among a variety of short instructional and

informational segments. Research related to the stimulus
use of audio-visual computer technology to teach fuzzy
areas is summarized below.

Research on the application of training technology,
especially in the corporate sector, is often incomplete.
Bosco (1986) found that access to materials relating to
information technology development was often unavailable,
or only partially available to the public. Perhaps,
successful training techniques increase the corporations'
profitability, and the techniques need to be restricted
from competitors.

This project will look at an area of training that
has rarely been addressed by technology applications.
The topic of workforce diversity is, as mentioned before,
fuzzy by nature.

Interactive Videodisc Technology Training Applications

The vehicle which is being developed utilizes an
Interactive Videodisc (IVD) that allows the user to
randomly access and view pre-recorded video and audio
segments--much like a video tape machine that could
access any segment on the tape in a fraction of a second.
This technology would display video segments and
accompanying audio pieces on a range of topic areas, such
as productivity or improvement techniques. (The use of

interactive videodisc (IVD) technology is only a part of the project and will be integrated with other platforms discussed later in the review.)

The desire for the learner to use visual or kinesthetic sensory input and processing was researched by Lowenfeld (1945). It was found that visually oriented learners retained more information when the interaction was based on visual stimuli, because these learners transform information received through other sensory modes (e.g., sound) into visual mental images.

Furthermore, IVD applications have been reviewed and found to be more effective than conventional approaches in a wide variety of instructional environments. In a federal report, Fletcher (1989) reported to Congress that he found the interactive videodisc medium a viable and cost-effective way to train and educate the military. He also found that efficiency and quality of instruction was consistently increased when compared to other techniques, including Computer Based Training (CBT) text systems. Additionally, since that study, new technology has been introduced which decreases the costs that were used in Fletcher's research.

The use of this technology as an alternative to traditional industrial staff training was theorized in a dissertation by Miller (1989). In her work, she

discusses the broad application of these systems, particularly how they have been found useful in industrial settings. Miller asserts that IVD systems are being used to teach in the industrial classroom, and that implementing staff training is a viable application of this technology. In her specific research she found that there was a high instructional success rate among persons being trained "lockwiring technique" by the IVD system, as compared to the success rate using the traditional lecture/demonstration method.

The use of IVD at Ford Motor Company to improve the manufacturing processes of their suppliers was discussed in a paper by Copeland (1988). He found the utilization of the this media (even to the non-computer user) to be very productive according to interviews, as well as, pre and post interviews in the manufacturing setting.

DeLoughry (1987) describes the capability of the IVD to create a "surrogate experience," and to program a simulation of a real-life situation. These simulations are applied in areas where an actual "run through" is not possible. For example, aircraft pilot simulations can be constructed to create emergency situations, and the procedures for handling the crisis can be rehearsed by the user.

DeBloois (1988) found that this new medium of instruction was highly successful, and had unique attributes of its own. Cohen (1984) also reflected this, and noted that "the very nature of this medium will influence how a student learns and force the student to develop new learning strategies that facilitate acquisition, retention, and retrieval of information."

Furthermore, the usefulness of the interactive videodisc was compared to other instructional methods and reviewed by Canter (1989). He created a list of variables that should be assessed for videodisc and other training modes. These criteria were:

1. Is self pacing the proper structure?
2. Is there limited time for training?
3. What is the quality of the training requirement for time spent?
4. What is the cost of IVD vs. other equipment?
5. What is the volume of information required?
6. What are the experiential learning requirements?
7. Is there constant/unchanged content?
8. What are the performance monitoring requirements?

Durocher (1990) found that the development of IVD modules is effective when divided into three stages 1) Analysis: this is determining the delivery system, instructional needs, schedule, and budget; 2) Design: the teaching strategies, program flow chart, visual media and script; 3) Production: the media, editing, generating the final product, and testing the application.

The success of this technology is also dependent upon the limitations of the hardware. A study by Van Horn (1987) found that because of the primarily non-mechanical nature of the laserdisc equipment, the equipment on the average runs over 4,000 hours before needing repair and has a production and distribution cost of less than 10% that of conventional film. The medium itself has a near zero wear rate due to the design of the laser and the disc. Lippke (1987) found that systems cost an average of ten cents per student hour, as compared to twenty five cents per hour for the traditional lecture type instruction.

The types of areas in which Interactive Videodisc is widely used includes second language instruction, marketing, and the commercial broadcast industry. However, these areas have not been outlined, because the focus of this product is staff development and educational methodology.

The Use of Verbal and Textual Statements

Menu and direction statements are the standards for most training applications and instructional modules. However, with new technology, it has become possible to add the dimension of verbal "co-statements." As the direction or statement is written on the screen, the

voice generator reads each line. In this way, the user
would read one line of text while listening to it being
read, then see the second line while hearing it, and so
on.

Verbal and textual statements assist the user in a
variety of ways, the most obvious being that it
facilitates comprehension for users low in reading
literacy. The Digest of Educational Statistics (1990)
reports the U.S. Department of Education's statistics
show that 16.2% of Americans are dysfunctionally
illiterate, to the extent that they lack the skills
required to match money-saving coupons to a shopping
list. These individuals might also lack the skills
needed to use a menu-driven system that is exclusively
textual. This system's use of a voice-generator may
allow dysfunctionally illiterate participants to use the
system since the user would not need to know how to read.

Cognitive processing is improved through
presentations that are both verbal and visual. This was
the finding of Pettersson (1988), who stated that "verbal
and visual messages recombined (to create) verbal-visual
message formats in order to enhance communications."

The use of text without the verbal (auditory)
component has been implemented for a long time. However,
with the implementation of multi-media programs, the

limitations of "text on cards" have become more apparent.
In findings by Goldman and Barron (1990), subjects had
trouble with the use of purely textual media, due to the
limitations of the text in the design of the module.

On the other hand, the use of verbal (auditory)
statements combined with textual screens is supported by
the work of Alexander, Frankiewicz, & Williams (1979).
They found that the integration of written, visual and
oral organizers have been shown to facilitate learning
and retention. The present study incorporates these
findings in that a user's instructional input is
supported by a variety of sensory modes.

The use of audio in multi-media in a project by
Spitz (1991) at the Hewlett-Packard Company, was assessed
and found to create interest and supplement textual and
graphic information. They discovered that "When multiple
senses are stimulated (but) not overloaded, the retention
level is higher". These findings should support the
present system's use of audio.

Integration of the Audio-Visual Interaction into the System Design

In discussing the application of the IVD
(hypermedia) design into a full instructional form, the
Internal Revenue Service (public domain/1989) remarks
that "design issues will be overcome as effective

instructional design methods are employed, and as research on system use reveals optimal learner strategies and access patterns."

In a study by Hooper (1987), many instructional designers were found to believe that it was very important to provide "motivational overviews" and "engaging situations" to gain learners' interest.

The present system has been designed with this finding in mind. The user begins instruction by hearing and seeing a very short introduction ("motivational overview"), followed by the first menu of possible topic areas, in text and verbal form, followed by sub-menus which are made up of a variety of modalities which present scenarios, discussions, interviews or possibly another sub-menu with more materials("engaging situations").

Cohen (1984) found that the nonlinear (branching) format of content promoted learning because the desire and need to learn established an "internal logic-order" of the material to be learned. In other words, users are able to pick out what they want to learn. This means that users will be able to understand and use material in a branching format more quickly than material presented in a linear structure.

In addition, the use of support structures in instructional technology was assessed by Allred and Locatis (1988). They found that low-ability learners were aided by support structures (e.g., a menu of options). These findings give validity to the use of branching to flow (and learn) from one instructional segment to another.

In a report by Sales (1989), it was noted that there is often a conflict in the development of this type of instruction. The conflict is that the instructional designer focuses on techniques that contain too much extemporaneous information resulting from a "group focus" rather than concentrating on the most efficient or individualized structure.

The present system's self-paced design is very different from the traditional "group focused classroom environment". Beausey (1988) notes that, because most instructional developers, as well as students, have grown up in the classroom setting, many may orient their sense of "normality for instruction" to traditional training format. This experience with the classroom often includes emulating established "linear progression techniques", which are very different from branching techniques.

Ganger (1990) found that when a self-paced (IVD) environment is created, where the employee becomes involved in his or her own training, the instruction tends to promote the student's immediate proficiency, because he/she builds new information on previously retained information, and then progresses on to the next topic.

Thus, the move from instructor-led training to technology-based training is on an upswing possibly also because of the reduced costs involved. Vitiello (1990) sees students learning on their own and using a coach to give post-instruction guidance. In this form of instruction, the cost of the instructor, possibly transportation, and the additional costs of classroom instruction are reduced. However, this is not universally accepted. Geber (1989) reported that when questioned, many training professionals were unwilling to use modern technology. This was often due to the possibility that changes in media technology could make present systems outdated in the near future.

A study by Grabowski (1988) found that a major focus in Interactive Video needed to be in identifying the characteristics for which message design can have a major impact. Variations in learner characteristics should be

matched with a variety of message forms in the developmental process.

The increased learning and reduced costs associated with high-tech training as reported in these studies may not be all together conclusive. For one thing, an IVD research and analysis may be flawed. This point was brought up in the doctoral study of Marlino (1989) who stated that there is a much larger number of variables affecting final outcomes and findings. These influences, such as aptitude and motivation, should be considered, and were often not accounted for in much of the previous research. It is not unusual for self-paced multi-media forms of instruction to be in question. Mascioni (1988) found that, because companies often delegate lower priority to training, they allocate fewer dollars to the media development that supports training.

On the positive side, in a report by Fritz (1991), it was found that this state of the art technology can also present the learner with more up-to-date information. A team can update the application, without the need for extensive "train the trainer" sessions. In a discussion that Fritz documented with Eric Parks, President of Ask International, an interesting point is made: "Training is seen as a perk by most people. It gives them a chance to get away from their desks, go off-

site, see their colleagues, get free coffee and doughnuts." The self-paced instructional unit does not give these perks to the user.

Conclusion

The use of modern technology in staff development is an expanding area. Specifically, use of the Interactive Videodisc to present short audio-visual-textual segments can simulate the experience of seeing a producer technique being performed by a skilled professional. Applying this technology to the fuzzy areas of training, such as workforce diversity, the use of voice, graphics, and text would provide a broader range of sensory input, and thereby assist a larger audience of trainees (e.g., visually-oriented, low-level readers). Also, the use of a system that is easy to interact with (e.g., few buttons for easy input of choices) is an advantage. These, as well as other design features make the documentation of the present system's development a useful study and source for enhancing staff development through technological means.

C H A P T E R   III

METHODOLOGY

In a study entitled <u>Workforce 2000</u>, Hudson Institute (1987) reported, that the workforce of the United States (and the world) is adapting to an increasingly technical, service-oriented society that requires its employees to have a strong educational base. This project documents the development of a methodology that may help employees adapt to their changing workforce demands.

Specifically, this study details the development of a computerized audio-visual technology. The system uses interactive instructional modules to inform and educate Animal and Plant Health Inspection Service (APHIS) employees at the United States Department of Agriculture (USDA) in the fuzzy areas of work force diversity (i.e., soft areas that offer multiple views and options to deal with a given situation). For example, the system presents, in text, video and auditory modes, several alternative techniques for dealing with a variety of cultural stereotypes that are generated in the diverse work environment. The user learns a range of techniques that may be successfully applied. This study aims to pilot and assess the system in terms of general usability.

Design of the Study

As part of this study, a multi-media system was developed, piloted, and assessed in a work setting. Subjects for this study are staff members who are working for the USDA Animal and Plant Health Inspection Service. Subjects agreed to use the system's instructional modules to learn more about techniques for exploring work force diversity. The material for the content and techniques was developed by a subject matter expert in the area of work force diversity. As stated earlier, this system focuses on areas of work force diversity that do not clearly offer correct or incorrect techniques for handling a given situation.

This project has evolved from developing an initial pilot audience. The medium was then refined as a result of research and discussion. The initial pilot was developed at the School of Education, University of Massachusetts. This initial work served as a basis for discussion, and modifications were made to realign the direction of this work. These modifications involved changes such as: modification of the design structure from question and remediation to a structure in which the user may choose from a menu of items; and alterations of the voice quality from "mechanical" and synthesized to a more human and digitized

voice. These modifications resulted in the present system design.

The present system is flexible. Staff members choose from among various menu topics, (see Appendix A) and selectively view individual series of short presentations. These segments on workforce diversity provide practical knowledge, and promote general awareness (e.g.,existence of cultural differences). The technology also allows users to select auditory and/or visual (textual) presentations. This flexibility frees users from limitations of the text-only screen, addresses the specific learning styles of different users, and initiates a more "humanistic relationship." This research project documents the development of this system for the APHIS staff. The documentation lists the steps involved in creating the system, and investigates how it works in the content area of work force diversity.

As stated earlier, the system's actual content is developed with the help of a subject matter expert (SME). The SME helps compile and produce a final list of topics. Based on these topics, a group of experts is convened-- including, a college professor, experienced human relations professionals, general staff members, and others who were able to give productive input. These individuals are interviewed about the topic areas, and the interviews are edited and recorded on videotape. The videotape is viewed

and analyzed for pertinent statements and findings, which
are then grouped into related topics, such as video segments
and graphical materials.

A branching matrix is constructed (see appendix A-1): A
menu-driven structure that moves from main menu to sub-menu,
and then to individual instructional segments. At this
point, graphical screens and sound recordings are produced
for the menus. The audio/video segments and on-screen
graphics are edited and sent out to be pressed into a
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that displays a sample of each informational segment or
module. These introductory segments may only last five to

ten seconds, but they give the user an idea of what the modules contain. If participants want to see the full-length version of an introductory segment, they press the corresponding key.

The user may go back to the sub-menu or main menu and select a different segment or topic, respectively. As users go through the program, the computer tracks the areas that are being viewed. Participants may exit the system at any time. Also, users may start the system, and then decide not to elect any of the segments. Once finished with the system, the users return to their jobs. Several weeks later, participants are interviewed to assess the system in the work setting.

A qualitative method is applied to assess this technology's use in the work environment. The qualitative data collection begins when an individual participant, the user, displays a desire to attain information on a topic by selecting an instructional segment. The user then receives material on the topic requested, and the request is statistically recorded in the computer's internal data base. The data base then provides the researcher with a list of segments that were viewed.

The user is contacted two to three weeks after viewing the segments, and the researcher interviews the participants to assess the degree to which the system helped promote

improvement in the work setting. These statements are coded
and the frequency of comments are reported in the
dissertation conclusion.

Instrument

Documentation is based on the evolution of the system's
interactive modules, and use of the system by APHIS
employees in the Washington D.C. area.

These users were later contacted, questioned, and their
responses coded by two coders. The responses were compiled,
based on the three areas below.

(1) flexibility to select modality-auditory and/or visual
    interface

(2) flexibility to select topics and techniques

(3) appropriateness of the technology for the subject
    matter.

The results of this study will contribute to the
further development and application stages of this system.

Use of Technology in the Study

The system will be designed to allow for the use of
technology that provides special advantages over other
conventional forms of learning. Some of these advantages
are the ability to randomly access (in less than a second)
any segment from any location in the presentation medium
(video). This is a capability not available in videotape.

The technology also presents people or situations that are normally difficult to present, such as experts and/or authors that are difficult to acquire for a normal class. The technology also requires little or no reading ability, so the user may learn without the requirement of literacy. With the use of technology, the media can be developed for visual and auditory delivery. The user is able to visually receive and hear the information, giving more modalities for the learning to take place. The advantage of the medium over "stand-up" lecture is that it gives such a wide variety of information. Examples of possible segments are filmed interviews, videos of observations, text information such as lists of source materials, musical segments and much more.

One of the most substantial capabilities of the technology is that the visual medium is able to maintain a relaxed structure that allows both the person on the screen and the user to establish a relationship. While filming the on-screen participant, the interviewer can stay intimate with the interviewee in comparison to giving a presentation in a classroom where opinions would be spoken out, possibly creating an intimidating environment. The user can also stay autonomous to the environment, individually viewing whichever material he or she wants to see at whatever time the media is available.

C H A P T E R   IV

DOCUMENTATION OF SYSTEM DEVELOPMENT

This chapter documents the development of a computerized audio-visual system that uses instructional modules to inform and educate United States Department of Agriculture (USDA) employees in fuzzy areas of workforce diversity. This chapter documents the early stages of design, progressive refinements, and the product's field application.

Initially, the system design explored various points, including how to use media to explore staff training in methods and approaches, such as, how to train persons who do not know English, or do not know how to read English at a satisfactory level. One solution to this problem that was not explored was a system that could jump across the restrictions of a single language. Another problem area considered during the initial design stage was the need for a system that could be used in a variety of environments (this is how most systems are designed today), such as, conducting word processing training effectively in both the university and the lumber yard.

While the alternatives were reviewed the use of an audio-visual system was considered, and a list of

variables from Canter (1989) were used. These review

criteria were:

1. Is self-pacing the proper structure?
2. Is there limited time for training?
3. What is the quality of the training requirement for time spent?
4. What is the cost of this technology vs. other equipment?
5. What is the volume of information required?
6. What are the experiential learning requirements?
7. Is there constant/unchanged content?
8. What are the performance monitoring requirements?

Following the exploratory design stages the initial ideas were redefined and the focus of the study narrowed to the utilization of an interactive audio-visual system to instruct staff. In an effort to focus the broader original areas, the decision was made to drop the cross-language capability, but to keep the option to assist the non-reader. The concept was also redesigned to center on a specific training environment. The choice of one central audience was not important until the instructional subject matter was determined, because it was not until that point that users' comments and feelings would become relevant. However, the possibility of using the TEAMS tutoring program in the School of Education at the University of Massachusetts was introduced as a possible audience for the initial pilot of this system.

This initial tutoring program audience proved to be a viable group for this application. The process began by making contact with a director/professor of the TEAMS program. He was agreeable to the idea of instructing the new tutoring staff and directed me to work with the "coordinating committee of team leaders". A contact meeting was established and the idea of developing instructional material was presented. The committee seemed positive; however, some of the members were uncomfortable with the idea of using "technology" to teach tutors. One reason for this apprehension may have been that the project was being introduced into a group that had been established, and was introducing a deviation from standard training methodology. The group did agree to support the study.

The development of the project was left somewhat open, but a large amount of direction was given in the topic of tutoring from the TEAMS staff. The first step was to determine what the tutors wanted to learn.

The initial assessment was performed by distributing survey forms (see appendix C-1) to the students in the tutoring program and having them voluntarily fill out the forms. This was not done universally throughout the classes. Some coordinators/team leaders who showed initial resistance when the project was introduced to

their committee meeting also seemed hesitant to have

students fill out the surveys during class sessions.

This reduced the number of forms received, however sixty-

eight (68) responses were submitted, and provided the

basis to establish a list of issues that might be of

interest to new tutors. A tabulated list of topic areas

was distributed in a later class session of tutors. The

tutors were asked to prioritize the topics from most, to

least important. There were seventy-three responses to

this exercise, and there was a wide separation between

the top eight topics and all others. These top eight

responses were:

* how to motivate students (when the student "just
  doesn't want to learn")

* ways to "communicate" and "relate" with students

* ESL (English as a Second Language) bilingual education
  techniques for tutors

* what are some techniques for a tutor's "bag of tricks"
  (deleted later)

* how to discipline while tutoring

* how to create a rapport between student and <u>teacher</u>

* techniques for obtaining information about a site
  prior to arriving

* how to deal with emotional/personal problems of the
  students

     Upon review of the above list, the idea of

presenting techniques for a tutors "bag of tricks" was

eliminated because it would have taken too much space in the system. The first topic on "motivation" was split into two separate areas; 1) unmotivated due to language difficulties, and 2) unmotivated due to emotional difficulties. Thus, the total number of topics remained at eight.

The development phase required the accumulation of data to develop a consensus on appropriate techniques for instructing new tutors. The first step was to interview a variety of tutors and record on videotape their comments about the eight topic areas. The discussions revealed what these experienced tutors felt was important for new tutors to know (as it relates to the eight topics). The interviews and other verbal discussions provided a strong basis for developing the instructional content. The instructional media needed to be considered and reviewed for this application. The correct medium seemed to be a computer that uses either Interactive Video Disc (IVD) or Digital Video Image (DVI), because these systems would be able to present information in an interactive, audio-visual format, with random access to all the information. However, implementing auditory instructions did require use of additional equipment inside the computer. The decision was made to use the IVD with the primary consideration being the much lower

cost (approximately $3,000 for the IVD and $10,000 for DVI).

The issue of cost is especially important in a study such as this, because there can be a drive among the external financiers to justify the system, rather than to objectively evaluate its success. Therefore the production costs for this project was kept low enough so that external funds were not needed.

With the data collected through the interviews, and the medium chosen, additional interviews were conducted with an expert in the field of tutoring. The techniques and methods presented by the expert would be combined with illustrative scenarios that were enacted by classroom teachers and youths, and videotaped.

The tape was sent to the faculty and student leaders in the TEAMS tutoring project. The assessment of the tape took a considerable amount of time, and it was decided that some of the scenario segments needed to be replaced because the leaders felt they did not represent the true tutoring environment. These segments were replaced by a tutor presenting the technique and high school students portraying the recipients. All the changes were reviewed and approved by the tutoring specialists.

With the individual response statements and scenarios completed, the design of the instruction for each of the topics had been established. The next step was to design the structure of menus and questions that would direct the viewer to the instructional segments. One focus of the study was to present the instruction without the need to read text. This was done by using an artificial voice that read through the menus.

Navigating through the menus and instructional segments required the user to respond to a series of questions. The use of correct/incorrect responses and remediation was selected based on research by Lookatch (1990) who found that questions, "tell the trainees what to look for."

User input (keyboard) requirements remained very simple in that the user had a choice of four input buttons (multiple choice) and two additional buttons for repeating and entering responses. Input was simplified to limit user resistance and confusion.

The system that had been planned was ready to be built. The next concern was that there was no cost effective software flexible enough for the staff development and training environment. As a result, it was necessary to create transferable (executable) software in "C" programming language. By adapting a

"SOUND BLASTER" game computer card and its software along
with "COMM.LIB," a programming system used to control
MODEMs, it was possible to give the system the needed
standards. At this stage, the videotape was ready to be
pressed into a laserdisc.

With the instructional material outlined and the
software structure developed, work could begin on the
system itself. Initially, the system design began with a
pre-test of all eight areas, then instruction, followed
by a post-test. This created a long and laborious series
of questions, followed by a short video presentation, and
then another bank of questions. A better method was to
question on one topic, show the segment, and then move on
to the next segment. Each of the questions, if answered
incorrectly, would internally require the user to watch
the short instructional segment and simulation. If the
user answered correctly, he/she would be given an option
to watch the instructional segment. The "correct opinion
screen" would appear for both correct and incorrect
responses. So that the demoralizing "you are wrong"
response would be avoided.

The system was then established as a developmental
pilot intending only to give information that would be
helpful in designing the full program. With the help of
the TEAMS program members it was possible to contact and

arrange for eight new tutors to utilize the program. This did not start out as an easy endeavor. It was expected that a list of the participants would have been provided by the TEAMS tutoring program, but instead, a list of new tutors was given and the participants still needed to be contacted. Although only five students actually used the system, the input received was very helpful. The students came into the small testing room, sat down, and started working through the program on their own. They went through each question and the corresponding video segment taught the technique.

Approximately two weeks after using the system, the participants were contacted and interviewed about the system and its transference, if any, to their jobs.

It was found that the users had limited experience with computers, ranging from no contact to only word processing. Although their time on a computer may have been minimal, all the users said that the system was not intimidating and that it was good use of the technology. One of the respondents, however, said that she felt the entire class should not be replaced by this technology, and that personal interaction would be important.

When asked about the synthesized computer voice, the users said that the voice was a good idea but the "rough" sounds made it difficult to comprehend. Many of the

participants said they were not used to the nonstandard

method of using a synthesized voice to ask questions.

However, most users found the method was positive, and if

the voice was "more clear" the system would have been

much better.

The participants were asked about the questioning

structure, and the users indicated they liked this way of

presenting the information. When questioned as to

whether or not a menu/choice option might have been

better, participants said that, because of the option

"not to watch," they felt the present question-based

structure was good, and gave more direction than a menu-

driven system.

The participants especially liked the short video

segments. This positive response was due to the fact

that, after the questions gave direction and focus, the

viewer was ready for the short length video (three to

eight minutes). Two users said they wished that, after

starting the video vignette, they could have the option

to jump out of the video and move to the next question.

Finally, users said transference of the system to

their jobs was very positive; the information which the

system supplied was being implemented in their

classrooms. The tutors also said that the system

reinforced techniques that they were presently using,

giving them a feeling of satisfaction. The participants additionally commented they wished that the system was fully "setup" so they could access this resource again.

After the application was presented, an evaluation of the project was performed and some concerns were presented. The first of these issues was that there were too many topics addressed. The eight topics were covered with brief instruction because the medium can only present thirty minutes of full motion video. If the number of topics could be reduced, then the length of the instruction can be expanded. Other refinements were transferred to the advanced application study. The voice generating format was transferred to the digitizing format. This means that the quality of the voice "reading" the menus was improved, resulting in a greater use of computer memory. The other change to the system was to design the technology so that it could abort while viewing a single segment. This option was implemented by adding a button that allowed viewers to exit from a given segment.

Faculty/Committee advisement was a vital part of this project. The first comment that was made was that many areas of "programmed instructional modules" dealt with harder, more established, step by step instruction. Two examples of this type of instruction are the

procedure for "repairing a device" and "how to secure an office." The advisors said that the areas where instruction was being targeted concentrated on softer, more fuzzy areas. In these areas, the techniques are not as specific. The advisors also said that using questions to decide whether a student may see an instructional segment tends to establish a structured correct/incorrect rather than a more nonstructured. This correct/incorrect structure is not appropriate in a softer area of instruction where their are no clearly defined right and wrong techniques to apply in a given situation. Also, the idea of remediation may be seen as a punishment for a wrong answer, further promoting a correct/incorrect structure. The alternative is to allow the viewer to choose each instructional segment. The participant knows what he or she wants to view and when placed in front of the screen, may select whatever is desired. It was thought that the participant might come out with a feeling of being able to direct the instruction on his or her own, by choosing, avoiding, or aborting each of the instructional segments. Furthermore, because this subject matter often has a wide range of acceptable techniques to apply in a situation, this form of instruction will present the information without

attempting to diminish acceptable techniques that the viewer has already found successful.

The availability of an audience group was a difficult venture. As stated previously, the medium that was being created needed to be presented to an audience that was able to receive the information in a fuzzy area. The obvious answer was to instruct a tutoring audience similar to the pilot system's audience. This was a possibility and the director/coordinators of the program said the they would be willing to conduct a second instructional session at the TEAMS program at the University of Massachusetts. The schedule of the tutors did seem to be a problem. In order to use new tutors the program needed to be established so that the instruction could take place only twice a year. The need for the exact timing seemed to be a small problem but was by no means insurmountable. The other difficulty was that the tutoring staff was resistant to the first use of the medium, and development was intended to take place in both Washington D.C. and Amherst, Massachusetts. This difference in location might have further obstructed the relationship with the tutors in Amherst. The idea of developing the instruction in Amherst was not eliminated, but the idea of conducting the instruction in Washington became a stronger possibility.

Many tutoring programs in the Washington, DC. area were contacted. One of the serious possibilities was the use of a program at The American University in the District of Columbia. The program was not as large as TEAMS at the University of Massachusetts, but access to the tutors seemed easier. The availability of the staff seemed to be a problem, because they maintained a strong relationship with the D.C. Public Schools. Consent from the school system was necessary and very difficult to obtain. The D.C. public schools seemed worried that an incident might occur, possibly ending in litigation. It was for this issue the school system was hesitant to use their schools or personnel.

The next contact made was throughout the suburbs of Washington. Montgomery County Public Schools responded favorably to the project and pulled together a team of educators, production personnel, and staffing specialists. The discussions went very well. The plans were to develop tutoring instruction for parent/tutors to work in math programs in the schools. This seemed like a viable application, but a problem arose when it was realized that all the coordination and control was in the hands of the school system. In addition, it was stated that if the project was not accepted by an administrator, then the system would be taken out of the

school. This level of control by the school system seemed problematic. At this point, members of the doctoral committee where contacted and they agreed that the situation could be troublesome; this prompted a polite refusal.

Other literacy groups were contacted. Many felt that their limited time and resources could be better spent "concentrating on the student", and no group was willing to approve the study. The TEAMS Tutoring Program at the University of Massachusetts was recontacted. The coordinator of the program still seemed positive, but the time to develop the system would need to be delayed approximately three months due to scheduling problems in the tutoring program. This seemed acceptable. The delay was considerable, but after the waiting period a meeting was established. The meeting took place with a variety of staff members, all associated with the tutoring program or the dissertation study itself.

When the first meeting took place, the possibility of this dissertation project taking place in the TEAMS program seemed less likely than was originally thought. The first meeting was with the chairperson of the dissertation project. During the discussion, one of the coordinators of the TEAMS tutoring program entered and the discussion focussed on the possibility of changing

the topic to one outside the tutoring area. Part of the rationale behind this change was that the audience for the instruction was important, but primarily after its establishment. In fact, the study focused on a type of instruction, not the audience alone. Although the audience is important in receiving information on the methods, most soft areas would be applicable. The two alternative audiences considered were the Internal Revenue Service (IRS) and the Department of Agriculture. In choosing these audiences, it was realized the system might be very useful in such a setting, and that there were many applications for a fuzzy topic. The meeting finished with the idea of researching these possible applications.

The second meeting of the day was with two professors and some students who were familiar with the project. During the discussions, the issue of using questions to assess whether a person should watch the instructional segments was debated. The main problem that one professor presented was that, whether by giving correct or incorrect responses, the system would, in fact, be evaluating and considering perfectly viable techniques and opinions to be incorrect. The issue was presented that if the viewer had a choice to choose (or not to choose), then the segments would be open and not

as authoritative (presenting the "correct" way). This open format is very important in fuzzy areas, where the correct answer or technique is unclear. The other advantage in the ability to select viewing is that the system does not conduct a "needs assessment", but rather the viewer determines their own need. This means that the viewer wants (needs) to see information on a subject, so he/she sees it, and it satisfies their need.

At this point, a fuzzy topic and appropriate audience were still needed. The search went in two directions; the first contact was with the IRS. The idea of obtaining a study and instructional module at no cost was appealing to the agency, however, it seemed difficult to find a topic that was fuzzy. Much of the instruction they were looking for was very "linear," with straight-forward determinations and responses.

The next contact was the Animal and Plant Health Inspection Service (APHIS) of the United States Department of Agriculture. After calling, and discussing the possibility of developing a module with APHIS a first meeting took place. The meeting was with persons from the training division. They seemed positive, understood the idea of fuzzy (soft) topics, and presented two possible areas for the application. The first idea was understanding Mexican culture, and the other was

understanding workforce diversity. The latter seemed to
be most appropriate because the interviewees could come
from the central offices and the topic had a strong match
with the study's design. The discussions lead to some
possibly difficult areas. The first area was the use of
qualitative rather than the statistical exactness of
qualitative data. The other area stemmed from their
initial hesitance with the "non-linear" design. They
stated fears that the staff members would be disoriented
when proceeding through the media.

The APHIS staff preliminarily (pending full
approval) agreed that they would provide the subject
matter, and give direction on interviews and other
related materials. This was very promising and in a few
weeks approval on the project was given.

This topic of dealing with workforce diversity
seemed appropriate as a fuzzy topic because it deals with
how people work together. Workforce diversity is loosely
referred to as a "by product of Affirmative Action",
however, this basically involves learning to get along
well with other employees, and adopt to their own work
situations. Many people come to the work setting with
fixed expectations of other workers. These expectations
might be based on age, religion, national origin, or
marital status, to name a few. This module would provide

information to possibly elevate diversity awareness,
specifically in APHIS.

After the approval from the Animal and Plant Health
Inspection Service (APHIS), a meeting was set so that the
group could map out the design of the project, and some
of the personnel at APHIS could become familiar with the
technology. These persons could see the module by
viewing part of the previous "tutoring" module. The
staff saw some of the instructional segments, viewed the
original branching diagram, and obtained an idea of how
such a system is structured. The discussion progressed,
and the initial topic areas were defined. The topics
were:

1) What is workforce diversity?

2) How does workforce diversity affect APHIS
   productivity?

3) How might the APHIS staff improve their work
   relationships?

With the general topics outlined and some of the
instructional segments roughly worked out, the meeting
ended. The participants were asked to develop ideas for
the sub-areas.

The sub-areas were developed by each participant, on
their own, and a rough list of possible presenters,
interviews and scenarios was compiled. A variety of

presentation types were considered; many of these were used in the final project. These different scenarios needed to be developed.

A subject matter specialist was needed for the project. Instead of having only one person performing this activity, a series of people helped to give information on this subject. One specialist was an administrator in APHIS's office of Equal Opportunity and Civil Rights (EOCR). Through his office, a listing of materials on understanding workforce diversity was made available. In addition, support information for background (videos and books) came from EOCR and Mr. Lemon was interviewed for a segment on how APHIS staff might improve their work relationships.

The idea of using Dr. Roosevelt Thomas, who is a well-known expert, author, professor and advisor to many government and private institutions was highly supported by the APHIS staff. Dr. Thomas was an excellent resource for the segment but difficult to contact. The initial contact with his office started with a simple phone call. Dr. Thomas would be in Washington D.C. two days following the phone contact, and the personnel at his office did not know when he would be coming to D.C. again. Although it was believed that he would be arriving the night before, it turned out that he would be arriving

approximately two hours before the appointment time, and

leaving as soon as the meeting was finished.

Arrangements had to be made, and although it was

difficult, we were able to meet in a conference room at

the Hyatt Hotel. The interview was very important, and,

because of its importance, two cameras were used. The

first camera was intended to take the main shot of Dr.

Thomas's comments and the second camera (a much lower

quality unit) was intended to shoot the back-up from the

other side of his body. Dr. Thomas was asked to

elaborate on the three main topic areas (stated above).

Although very limited on time, he was able to comment on

all three topics. The interview session went very well

and was a valuable part of the project, however, the main

filming camera malfunctioned and the only useable footage

was on the backup camera. Although this footage was not

high grade it was agreed that the segments were still

useable.

Interviewing the APHIS staff made up some of the

most interesting segments. The idea was to show the

diversity of the staff by having them discuss their

experiences, meaning both their upbringing and their

experiences in the work setting. To obtain these

individuals, the APHIS personnel developed a letter of

introduction. The letter introduced the fact that such a

study was being performed and that the prospective interviewees might be called. The group that was contacted for the interview was known by the APHIS staff and were believed to have pertinent statements to make. Upon contact the interviewees were very positive, and the regular staff videotapings took place over three days. The statements related to the three project topic areas, but when the material was evaluated, the staff interviews were only used in topics 1) what is workforce diversity and 2) effect of diversity on productivity.

The use of scenarios is often useful when implementing a media such as this, but they were not used because the topic of workforce diversity at APHIS is broad, and the focus of this project was not on small singular techniques, but on workforce diversity in general. The idea of a short film (slides) was used to talk about APHIS goals in workforce diversity and to give a general overview.

The idea of instructing APHIS employees on how to proceed if they feel their personal situation is not being dealt with properly, was one information segment that was considered. However, there was no procedure (that could be found) establishing ways to progress in these instances and situations.

There were also filmed segments of staff members talking about the APHIS Diversity Task Force, historic and present day application of workforce diversity programs, and the Platinum Rule (rule for getting along with co-workers).

After all these segments were completed, the realization was made that there were no European-American (white) males in the film. Thus, a few replacement segments were made in the historic and present day segments, and another person was used from the Workforce Diversity Task Force.

The video segments were now finished and the videotape was edited and sent to be pressed into a laser disc. The computerized branching system still needed to be constructed. With the designs used in the first project a menu system was prepared (see Appendix D).

The technology-user interface was changed from the first project in this module. The first change was the "voice" that reads the menus, which was now digitized. This means that the sound is a recording. Also, an abort button on a special keyboard that only shows the keys with symbols was added to give the user directed commands. An internal database was used so that the computer system would be able to track the user's choices and record which segments were watched. The database was

built to avoid recording segments that were aborted within ten seconds of their beginning.

Once the laser disc was pressed at the lab and all the systems were tested and operating properly, it was time to start contacting staff members. Seventy-two employees were picked randomly from the central offices. All of these staff members received a letter of introduction. This letter told the employee that he or she was randomly selected to be a part of this study which included interacting with an instructional system and a post interview. Attempts to contact all of the recipients were made, and after many tries, a total of twenty-seven agreed to use the module. On the first day, the first person did not arrive at her appointment time. This prompted a phone call and she said she had forgotten, and that she would come down immediately. This user arrived quickly, and it became clear that, even though appointments were scheduled with the participants only a few days earlier, phone calls would be needed to be made to remind participants. Of the twenty-seven participants that were scheduled twenty-two actually came for the study.

The appointments were set up to give the user forty-five minutes to one hour to use the system. They were given only a short, personable introduction, asked to

sign a consent form (release of liability), and told
about the symbol keys, abort key, and volume adjustment.
Participants were also told that they were not
evaluating, but using this system, and to feel free to
view or not view segments as they liked. Each
participant was left alone in the room while using the
system.

After finishing interaction with the module, the
user came to the door to exit. They were thanked,
reminded about the post interview, asked if they were
planning to take leave during that time, and asked not to
talk about this session with anyone prior to the post
interview.

The Final List of Topics and Segments

The interactive system used as a study at the Animal
and Plant Health Inspection Service (APHIS) was divided
into three topic and twelve information segments. The
section below outlines the topics and segments used in
the module:

Topic 1--Reflections on Workforce Diversity

This topic informs the viewer on the topic of
understanding workforce diversity and how APHIS is made
up of a group of diverse persons, with varying
backgrounds and home lives.

A. APHIS Staff Talk About Their Backgrounds. In this segment, five "regular" staff members each tell the viewer a little about their backgrounds; the idea being that the user might obtain a sample of the different experiences of some of the people working within APHIS. An example of the presentations that were given was a Peruvian woman who discusses her love for the U.S. and her decision to move here. Another woman talks about coming and living here with her parents. A third generation Japanese American discusses the difficulties that his parents had during internment in World War II. Still another woman tells about her striving for a college degree in her later years.

B. Dr. Roosevelt Thomas Discusses Workforce Diversity. Dr. Roosevelt Thomas, a well-known scholar in Work Force Diversity, talks briefly about the issues and direction of the study of diversity. He discusses the wide range of issues and people that are classified as influencing the work diversity issue.

C. A Short Film on Workforce Diversity. A series of still pictures shows staff members working within the APHIS environment. Text is presented over the images and states the APHIS focus as it relates to the issue of diversity. This focus gives the APHIS plan of direction

for dealing with workforce diversity in the years to
come.

Topic 2--The Impact of Workforce Diversity on APHIS

This topic discusses the effect of diversity on the
APHIS workforce. It looks at people within APHIS and how
productivity and the general work environment is
influenced.

A. APHIS Staff Talk About Their Work Environment.
This total segment is made up of five short segments in
which regular staff members explain how they have been
effected by a lack of understanding within APHIS. One of
the staff members explains that he feels that many of the
people working at APHIS know the issues, but "they just
don't want to accept different cultures". A male office
clerk talks about how, when receiving calls for the
department, people often become disoriented hearing a
male voice as a receptionist. A woman tells about the
feeling of being "placed in a box" by the limitations
that are placed upon her. Another woman says that
because she is the only female scientist in her group,
that often she is some times treated as an outsider and
not included in activities within the office.

B. Dr. Roosevelt Thomas Discusses the Impact on
Productivity. Dr. Thomas explains how productivity can
be impacted by issues of diversity. He refers to the

fact that when you have a diverse group, they must learn to work together or you will have a negative effect on productivity.

C. Information on APHIS Workforce Diversity Task Force. This segment explains the purpose of the APHIS Workforce diversity Task Force; what it does, who are the members, and what they hope to achieve.

D. Workforce Diversity as a Cultural Change. (subgroup) This choice takes the topic on the Impact of Workforce Diversity on APHIS and divides it into three presentations given by members of the Work Diversity Task Force.

a. Historical perspective--This is the first of two parts in which a member of the Workforce Diversity Task Force explains the history of workforce diversity issues. The presentation is a "broad philosophical view" and discusses the transition of Workforce Diversity over the last 100 years.

b. Where we are today--This is the second part of the presentation in which the information is extended to the present day and how a lack of understanding became a problem in the modern work environment and how it should diminish in the future.

c. The platinum rule--One of the diversity task force members talks briefly about good work

relationships, followed by a presentation of the platinum rule. The rule says to "Do unto others as they would have you do unto them".

Topic 3--Improving APHIS Work Relations

This topic looks at some issues, that if dealt with might increase understanding in the APHIS environment. This is not a list of techniques, instead it is a presentation on the work relationships within APHIS, as well as a list of outside materials that are available.

A. Aspects of Work Relationships. A coordinator within the office of Equal Opportunity and Civil Rights discusses the changes that have or should happen, within APHIS as it relates to Workforce Diversity. He says that your home life cannot be "left at the door" when you come in to work, and that you must develop good teams and create good environments to retain good people.

B. Dr. Roosevelt Thomas Discusses Improving Work Relationships. Dr. Thomas gives some general viewpoints on how to relate to the workforce diversity issues and accept differences between cultures and people.

C. List of Related Materials. This is a printed list of outside books, videotapes, and audio tapes that are available in the APHIS library.

CHAPTER V

ANALYSIS, RESPONSES AND CONCLUSION

Introduction

This chapter highlights statements of the participants who used the interactive module. The chapter is split into three sections: 1) deductive and analytical responses to technical issues, 2) summary of participant responses to the system's application in the Animal and Plant Health Inspection Service (APHIS), and 3) conclusion of the findings and possible future applications.

The results of the study reflect opinions of the participants and do not examine the transference of any possible effects of unexplored variables, such as, the time of day that the instruction is presented, the actual video segments presented, and the way in which verbal instruction is delivered. This study specifically looks at the system's application for the APHIS employees to use in the fuzzy area of workforce diversity. The study presents the outcome of participants' interaction with the instructional material, with an attempt to avoid unsupported assumptions.

The "Hawthorne effect" as coined by Snow (1927) may also be a variable in the outcome of this project in that the users are aware that they are being studied and may react to give a positive effect on the outcome.

Application Group

The participants consist of a random sampling of the staff members in the Animal and Plant Health Inspection Service of the United States Department of Agriculture in Hyattsville, Maryland, and Washington, DC. After being randomly selected, participants were contacted regarding their availability. The staff in this agency is made up of science oriented persons, many of them having advanced degrees in biological and veterinary sciences. Twenty-two employees used the instructional system and twenty people were administered the post-instruction interview (two were unavailable). Participants were assigned numbers for identification. The reports presented in this chapter originated from two person coding using a deductive qualitative research of themes that were commonly stated by the interviewees, the data generated by the database during system operation, or the statements made by participants during interviews.

The following sections are split into the two areas reflected in the proposal. The first, Technical Issues, addresses usability of the technology. The second, Application of this Type of Instruction, considers use of the system in the APHIS work setting.

Technical Issues

The technical issues that arose from the database used in the original application, and during the post-application interviews are detailed below.

1. Flexibility to Select Auditory and/or Visual Interface

The option to choose between seeing and hearing, and/or simply reading the menus was a vital part of the system. A button was installed on the keyboard that allowed the user to disable the function that reads through the menus. This capability to choose between two options seemed to be enhanced by the research of Alexander, Frankiewitz and Williams (1979), whose research indicates that oral organizers have practical implications in instruction. The research of Lowenfeld (1945), who supports use of visual stimuli, is also represented by the use of the on-screen material.

In the interviews with participants, the responses affirmed that the use of the audio (speech) and visual (text) for the menus was advantageous. Eighty-five percent of the participants were in favor of the audio-visual interface; and fifteen percent were against it. Among those against the use of this component, a predominant view was that the voice was a "pain" to shut off. This inconvenience probably arose because a vital part of the audio-visual component was the newly installed "abort" button, which gives the user an ability to abort both during the

instructional segments and to cut off the voice that reads through the selection menus. The users access the button and thus reduce the length of time that it takes to navigate through the menus. The participants unwilling to hear the material seemed to prefer only the visual menu and found it inconvenient to use the abort option.

2. Flexibility to Select Topics and Techniques

This option gave the user the ability to select the segment that he or she might want to view. Participants' overall response to this component was positive, obtaining a ninety percent support for the use of a non-linear design. However, one participant felt that the wide range of choices was a problem and that many members of the APHIS staff might be intimidated by a need to consider so many of the options. Another person said the only problem was that this component did not have enough choices (See Appendix for list); this participant felt that a wider range of alternatives should have been presented. This contrast in the size and scope of the APHIS training tool was also emphasized by one participant who made a comment that there should have been more control buttons while another participant said that fellow employees might have a problem with the large number of button choices.

Many of the users also liked the ability to select (or not select) the segments that they desired. Among the ten percent that were against the use of this design, the

rationale given was that the selections became confusing and they did not know what to do next.

The use of a randomly selected group of participants was seen in the results of the database (see appendix E-1). Of the twenty-two people viewing the segments, only seven initiated use of the system by viewing the first segment. Also, only two of the participants viewed all of the segments. Seven of the users saw no more than one half of the segments, and the second half of one of the segments was only viewed by five participants.

This interface with the system seemed to reflect a wide spectrum of desirability for greater control over the material; a few participants showed resistance toward a sophisticated series of commands and media.

This shows that a predominance of participants liked the flexibility to select topics and segments. However, there did not seem to be a consensus on the level of flexibility.

Some of the resistance to the technology was described by Beausey (1988), who says that "We grew up in an educational system that prevented students from having that kind of control and bestowed it instead on the teacher."

3. Appropriateness of the Technology for the Subject Matter

The participants all stated that they thought the use of this type of technology was appropriate for the subject material. There was a predominance of statements that the

technology was not the only viable choice in all instances of training. Some of the statements supporting the use of the system related to the short time it would take for an APHIS employee to see the material. In addition, participants said that the system was able to give useful information to a wide audience, something that seminars are not easily able to achieve. One of the main disadvantages stated was the lack of human interaction. Many participants felt that the segments were more time-efficient, but would not replace stimulating human interactions. The issues of human interaction and time-effectiveness are also seen in that the system progressed through a long series of evaluations of the material and the end product. Many of the interview segments with the staff members were not used. The system allows users the opportunity to view otherwise inaccessable experts' presentations. DeLoughry (1987) supported this type of instruction saying that the media brings a "surrogate experience" to the viewer. This same view was supported by many of the users' experiences.

Some of the most desired segments of the instructional system were those in which staff members presented personal stories, either about their own cultural uniqueness or experiences on the job that relate to workforce diversity. An example of such a segment was made by a Japanese American man who explained that his family was put in internment camps during World War II, leaving the others to still farm

the land for the produce. Another example was the minority woman who had felt that after so many years of being "put in a box" of limitations, that she has begun to submit herself to the parameters set upon her. These are only a couple of examples that were greatly supported by the viewers.

Application of this Type of Instruction

The application of this type of instruction and its utilization in the Animal and Plant Health Inspection Service is reviewed in the next section. The responses that are stated were generated from the post interview that was performed approximately two weeks after interacting with the system. Participants were questioned on the following areas:

(1) The participants were asked how they thought the initial need for instruction (displayed by selecting a topic or segment) was satisfied: Out of the twenty interviewees, seventeen said that the use of the technology was helpful in satisfying their personal need to know (about workforce diversity), and found that the instruction was generally useful. Many of these participants said that the instruction gave them a great amount of information in a short time. There was some hesitance due to the fact that the system was designed to "enlighten" the user, and was not directed toward specific techniques for specific situations. The design of the instruction was developed to address APHIS Workforce Diversity issues, without giving a wide variety of

general methods. Comments were made that the instruction did not deal with specific situations (such as male bias). This seemed to be an area that was not dealt with by the material and the viewers still had a desire to continue the information into these specific areas.

Three of the twenty participants said that the instruction was not found useful because of their own extensive knowledge in this subject area. Therefore, these participants did not have the desire to satisfy a need that was based on a lack of personal knowledge of the topic.

2. The usefulness of the system in the APHIS environment: The interviewer asked the users about the applicability of this technology in the work setting at APHIS. The participants had only used the system a few weeks earlier, but many of them could relate their experiences to the ability for use of the information in other fuzzy (soft) topic areas within their agency. Eighty-five percent of the users thought that this type of instruction could be useful in other APHIS soft topic areas. The other fifteen percent was split into a ten percent group that felt the instruction required an application into specific training areas and that it would depend upon the area toward which the technology was directed; the other five percent had no opinion on the application.

These statements were made along with the other criticisms stated throughout this section. This means that

although the users may feel that this instructional system is applicable to other areas of APHIS, the actual situation should be considered before approval.

3. How the information received from the system use was transferred to workplace interactions, and facilitated work relationships: Ganger (1990) reported that "The program's progress is invariably caused by something the CBT (Computer-Based Training) user does or fails to do. Training can't proceed without the active involvement of the trainee."

The post-application interview statements (outlined below) present some of the reactions of the persons receiving the instruction. These statements represented some of the users' choices and experiences in applying what was learned to their workplace. Statements from participants 3 and 6 were not obtained.

Participant 1

As this participant went back to the work setting she/he seemed to be able to apply the material received to his/her environment. This participant stated: "I found that very interesting. I also found out that there are a lot of us who certainly don't understand why some people do things some ways and why they don't."

Participant 2

The use of the staff presentations showing the personal feelings of workers at APHIS were appreciated by Participant

2. It was stated that: "I was mainly focusing because I never really realized that people from different backgrounds and ethnic groups or whatever... how that affected them in the workforce. You kind of take it for granted that everybody perceives everything the same way."

Participant 4

Participant 4 also went on to say that the staff presentations were of interest and that the information in those segments brought a higher level of enlightenment. This participant stated that: "I didn't know...I mean I talked to them, but I didn't know they were from other countries, you know. And it makes them feel that there are more than just certain types of people. Wakes you up a little bit."

Participant 5

Those participants that were familiar with workforce diversity also gave a positive response to the material and "fuzzy" topic information presented. Participant 5 said: "I guess I found it enlightening. I was kind of, pretty much, familiar with Work Force Diversity anyway, but I found it more interesting and took it on a new, as far as more personable, approach." This participant did seem to have his/her own perception on how workforce diversity should be addressed; what this system tried to do is enhance and enlighten without diminishing the beliefs already held by the user.

Participant 7

This participant stated a possible reason for
resistance to the technology (as stated in an earlier
section):

> Most of the people are going to be able to handle
> it real well, but you're gonna have that element
> that don't work with computers that it's going to
> be confusing for, in my opinion.

But Participant 7 went on to further support the use of
the staff interview segments:

> . . . even though I knew a lot about their
> backgrounds,   particularly Estella, I found her
> segment particularly interesting because I know
> her. It just, I think, is going to be a greater
> appreciation of some of the backgrounds of these
> people and their reasons for doing things that
> they do and what not.

Participant 8

The allocation of time is an area that also affects use
of the material. This unit takes less than an hour and that
issue is supported by Participant 8:

> I would rather take an hour and sit down and view
> something like I did for you than I would to take
> a whole day; you know, work just gets too far
> behind.

This instruction was designed to "enlighten" the user.
When Participant 8 was asked about the utilization of the of
such a unit, he/she responded: "Well, it made me aware of
some of the problems that I didn't know really existed."

Participant 9

As stated earlier, DeLoughry (1987) supported this type
of instruction saying that the media brings a "surrogate

experience" to the viewer. However, the instruction that was given does fall short of the actual experience of interacting with the person themselves. Participant 9 stated: "In terms of the Work Force Diversity issue, it's the kind of thing that sort of the human touch is missing when you get it by machine, and that's [the human touch] one of the really good things."

Participant 10

The persons presented on the video segments and narratives offered diverse attitudes to the viewer. This attempt at presenting others' opinions was addressed by this statement from Participant 10:

> I guess me, being a minority myself, I have to
> work within parameters of trying not to - how
> should I put this--trying not to be offensive and
> be offended in the workplace. And Work Force
> Diversity also indicated to me that all the
> trainings that I've taken, that the way I feel
> about things and perceive things, are not
> necessarily my own perceptions.

Participant 11

The material presented was designed to have a general overview of information. The design did not tell the participant specific rules that he/she should follow. This softer design was used to try and enhance rather than redirect attitudes and options that the user might maintain. This softer way of presenting the material was responded to in these two statements by Participant 11: "I guess I sort of saw it as more of an esoteric, classroom type experience

. . . It was more like just an exercise than something practical."

Participant 12

Participant 12 responded to the use of the material in this project after receiving information from another (outside) instructional unit. His/her response to use of this system as supplemental instruction was:
"I still think that repetition of the material is very important, especially when we're going into a period of time where there will be major changes in the work force. So, I felt that it was a very positive thing."

Participant 13

As stated previously, the focus of much of this material is "enlightenment" of the participant. Participant 13 responded to the personal staff interviews by saying:

> One of the people that they interviewed said that
> he had worked in an office for many years and
> still felt that people shied away from him, which
> means that everybody is gonna have to overlook
> this and work as a team to make this work.

Participant 15

This participant saw the material and used his/her own orientation to direct opinions about the instruction. Participant 15 stated:

> I don't think it's changed the way I've operated.
> Well, first of all, I pride myself on I think
> being very open, and one of the problems I have
> with the term cultural diversity is that by doing
> cultural diversity I almost feel that we're
> putting people, stereotyping people automatically
> by their culture. I'd like to think of individual

diversity and look at each individual and what
skills or talents or attitudes they have and work
with that rather than sometimes working with
cultural diversity, if they're Oriental-looking
you expect them to work one way or have certain
ethnic or cultural habits and norms. And, again,
I think that's stereotyping a group. So, as I say
I prefer not to use cultural diversity and just
use individual diversity.

Participant 16

Awareness was a vital part of these instructional

segments. Participant 16 reflected on what she/he learned

by saying: ". . . there were things that you were learning

that you're not aware of: the way people feel about working

in an environment where there is a mixed group of people."

Participant 17

Participant 17 responded to the "freeflow" design by

stating: "I think somebody could have said "what do I want

the audience to see" and just had more straightforward

[training techniques]."

Participant 18

Transference of the material to the work setting takes

time, and Participant 18 said that: "Well, it's really too

soon to really say, overall, that it's had an effect, or

that it's being used subconsciously, consciously, or

something like that."

Participant 19

Statements by Participant 19 related the material to

the work relationship. She/he stated that:

Okay, some of the information that was presented,
such as how it is sometimes difficult for groups
to come together as a team, because they're just
sort of focusing on themselves as individuals, and
they're just interested in themselves as a race or
a different culture, not being aware of
differences in race and gender and age and
culture. They seem not to gel together as a team.
So with this type of information, as it was
presented, I can see how that could drag down the
organization.

Participant 20

The APHIS specific personal interviews were possible

only because of the non-generic design of the module. This

ability of the employees to relate to the program was

presented in this statement by Participant 20:

People did not really talk about what problems
exist in APHIS, what areas or problems need to be
corrected, or any specific actions or possible
solutions. The closest anyone came to that was
the tapes, which I really liked, of interviews
with specific employees, with different employees
talking about their own feelings and experiences.
But even there, most of those were too general, I
felt.

Participant 21

Statements by Participant 21 reflected on the

application of the material to the APHIS work environment.

She/he stated that: "It kind of opens up the thing of

letting you know that diversity is more than just racial,

more than just sexual, you know, it's issues, period, that

are not dealt with in a manner as fairly as others, in

trying to get rid of the problem."

Participant 22

    This module was designed so that the participant was able to learn about workforce diversity at APHIS. The limitations of this unit were reflected in the comments of Participant 22: "I mean, this is limited in its capabilities from the standpoint that it is, just serves as, an introduction. Maybe down the line people can come back and use the same methodology to talk about how things are different now that we're implementing, or I don't know."

SUMMARY AND FINDINGS

Summary of the Study

This study was designed to document the development of a computerized audio-visual system that uses interactive instructional modules to inform and educate United States Department of Agriculture (USDA) employees in the "fuzzy" areas of work force diversity (i.e., soft areas that offer multiple views and options in dealing with a situation).

The instructional modules prepared for this study were intended to present alternative techniques of identifying and dealing with work force diversity. The modules were designed explicitly for people who are novices at using the computer.

This study was based on a broad multi-platform (variety of modalities) design. The system used different stimuli (textual and auditory), and a menu driven structure that allows the viewer to decide the information that s/he desires in a non-remediation setting.

This study aimed to pilot and assess the system in terms of general usability. The multi-media system was developed, piloted, and assessed in a work setting. An initial pilot was performed in the TEAMS tutoring program at the University of Massachusetts' School of Education. The pilot was then followed by an application at the Animal and Plant Health Inspection Service, who agreed to use the

system's instructional modules to learn more about workforce diversity. The techniques were developed by a subject matter expert in the area of work force diversity.

The system focused on areas that do not offer clearly correct or incorrect techniques for handling a given situation and was designed to be flexible. Staff members were allowed to choose among the topics and selectively viewed an individual series of short presentations. These segments aimed to promote useful knowledge and a general awareness of diverse cultures and experiences, types of approaches, and techniques for working together. In addition, the technology allowed the user to select among auditory and/or visual (textual) presentations. This flexibility freed the user from the limitations of the text-only screen. For example, the text-only screen demands certain prerequisites, such as the ability to comfortably read and understand English.

The media system was an expanded Interactive Videodisc (IVD) and a computer. This system was accessed by users sitting and working through the main menu, a second (sub-) menu, and segments in full length video (or some other format such as text or stills). As the user went through the program, the computer tracked the areas that were viewed. Once the subject was through using the system, he or she returned to the work setting. Several weeks later, s/he was interviewed to assess the system in the work setting.

These segments on workforce diversity were designed to provide practical knowledge, and promote general awareness (e.g.,existence of cultural differences).

Documentation of the assessment is based on the evolution of the interactive modules, and use of the system by APHIS employees in the Washington, D.C. area. These users were later contacted, questioned, and their responses coded by two coders.

Findings and Future Applications

This project intended to document the development of this media-media system, which was piloted with a specific audience. Future researchers may use this documentation to hypothesize about how to extend the system development and assessments to a more general application. The information received throughout this study seems to identify possible applications and utilizations of the system in the staff training environment.

Great caution has been made during the development of this review not to imply that the results of this study at the Animal and Plant Heath Inspection Service (APHIS) is universal to all other applications. The effect of a wide array of variables impacted this study, and it was the intention of this chapter only to present alternative services in which the system might be useful and that the procedures of scientific research might be employed.

Influence for Success

The module content was contained by deliberately limiting the development costs. This was done to keep the financiers from putting undue pressure on getting positive responses. In an actual applications the developer might spend a greater amount of money on the development of the material. The expenditure of large amounts of money should be made with caution in a research environment. If an assessment of the product needs to be made by someone benefiting from a positive outcome (i.e., a producer needing to justify expenditures), then a strong consideration of this variable should be made when considering the results. Should an assessment need to be made, it might be performed by an outside unit that is not influenced by the expenditure of funds or by taking a professional position, since the intention is to document and explore generating results and effects and not to justify the expenditure of funds already used.

Due to the desire to maintain the integrity of the research, the project did not receive funding from APHIS or any other source. Instead, the cost was carried exclusively by the researcher, with some supplemental equipment from the University of Massachusetts' School of Education. This gave the material the appearance of a less than broadcast quality video and basic graphics screens, but did not require the funds of an outside financier.

Viewing of the Segments

The viewing of each of the segments was monitored by a
database. The response of the participants in their viewing
of each segment was listed in the appendix. When reviewing
this response data, the users did not choose all of the
available segments. The segments that were most heavily
watched and commented upon were the personal interviews.
The development of this media was constructed to bring out
the perspectives presented by staff members being effected.
Interviews were performed in which the employee was asked
about both their background (growing up and their
experiences at APHIS), and how they have experienced the
effects of workforce diversity at APHIS. These interviews
presented a variety opinions and emotions. By editing these
statements into a series, the viewer was able to see a
person, possibly one they knew, presenting their feelings
about growing up or presently working in an environment
which personally effects their relationships within the
APHIS environment. This style of presentation was designed
to attempt to present the feelings of the employee as they
relate to some of the personal emotions and effects of other
cultural experiences within APHIS. The material in the
staff segments attempted to help employees look at each
other in a different way, presenting views and opinions that
had not been brought up previously. The use of employees
from within APHIS was designed to present the materials in a

form that would give validity to the statements. Since this was performed by the employee giving a presentation that was not orchestrated or acted, it gave a feeling that the material was true to the feelings of that person and from within the APHIS community. This form of presenting the material was not designed to tell the viewer how to act or respond, instead it was intended to make employees look at each other differently and obtain a broader enlightenment of workforce diversity.

The vantage point of seeing other employees that the viewer either knew or could relate to was designed to give a "peer" value to the material. This design gave a perspective that was intended to associate with the person using the instructional module. This relationship would hopefully give a closer feeling between the employee in the presentation and the viewer. This design of seeing other peers deviated from other segments in this module, in which "authorities" told the viewer about workforce diversity. These other "authority" segments stayed within the fuzzy enlightenment design of the study, but the form in which the material was presented told the viewer about the viewpoints of workforce diversity. This lack of peer level association may have influenced the way in which the material was accepted by the viewer.

One of the observations made during the interviews is that many of the participant felt that the personal

relationships with the other members of the APHIS staff that were among the most revealing parts of the material. The questions relating to the use of segments featuring "peer" staff members were not directly asked during the standard interview questions. The participant interviewees volunteered the statements while being asked about their general feelings on the use of the system. Below are excerpts of the statements made by some (not all) of the users during their interviews;

Participant 1

> I liked it. I liked seeing the person. I liked
> to see the person that was speaking. And from the
> information that the people were giving on
> themselves, the personal information, I found that
> very interesting. I also found out that there are
> a lot of us who certainly don't understand why
> some people do things some ways and why they
> don't. I thought that came across on the way
> people explained the different nationalities and
> what had happened to them in the past.

Participant 2

"I thought the system was very knowledgeable especially the one which had APHIS employees being interviewed and their personal experiences."

Participant 4

"I found out things about people that work in the building that have come from other countries that work here."

Participant 5

I guess I found it enlightening. I was kind of,
pretty much, familiar with Work Force Diversity
anyway but I found it more interesting and took it
on a new, as far as more personable approach, I
enjoyed seeing the particular focus on APHIS
employees and how they, kind of what their work
experience is and their background I found real
interesting.

Participant 5 then went on to say:

The employees walking around seeing them kind of
their viewpoint and how, seeing it from my side
instead and what they have to deal with, I guess,
and I guess it was more of an informational. I
probably . . . use it here, it just made me more
aware.

Participant 7

I think it gave me some of the folks that I
recognized as people that I worked around here
with and even though I knew a lot about their
backgrounds, particularly Estella, I found her
segment particularly interesting because I know
her. It just, I think, is going to be a greater
appreciation of some of the backgrounds of these
people and their reasons for things that they do
and whatnot.

Participant 8

"Well it was good but I find myself more interested in

wanting to hear from the people."

Participant 10

I learned some things from the little talks that
the actual employees gave that are of distinct and
different backgrounds. Things about their
background, in so far as their personal background
and their culture. Things that I did not know
necessarily and would not know unless, you know,
they had participated in the program that I
participated in and heard them speak.

Participant 11

"Part that I found useful and that was where I saw

other people at APHIS talking about their experiences."

Participant 13

> One of the people that they interviewed said that
> he had worked in an office for many years and
> still felt that people shied away from him. Which
> means that everybody is gonna have to overlook
> this and work as a team to make this work.

Participant 16

> I think probably when they were doing the
> interviewing, in the beginning, of the various
> people here in APHIS, how their feelings were in
> that they felt they had not changed since all of
> this instruction had started, I don't know, three,
> four, six months ago. He felt (I'm trying to
> think of the one particular man that spoke) that
> he felt that there was still a great deal of
> feelings about them being different than say the
> white caucasian male or female. And I was not
> aware of that because I had thought, you know,
> with all of the civil rights and everything that
> had gone on years ago that I thought everybody
> felt like, you know, everybody was treated pretty
> equally. But evidently he felt that they were
> not.

Participant 16 went on to say:

> You're not aware of what actually is going on
> inside their head and when they have these
> meetings and you see these responses from these
> people, you think wow, I never stopped to think
> about that.

Participant 18

"I mean I liked that, you know, the people presented

their feelings or their views, the cultural aspect."

Participant 19

"I think it was helpful, to me at least, to know some
of the people that were featured in the segments and hear
their stories."

Participant 20

> I very much liked the tapes with the individual
> employees talking about their experiences, what
> they felt. I thought that was extremely
> effective; being able to sit there and view it
> like that kind of gave you a one-on-one feeling
> even though they weren't there in person, it gave
> you a one-on-one feeling. I thought there was
> more of a...you felt more of a relationship to the
> material and to the individuals than you would
> sitting in a large audience listening to them talk
> up on a stage.

Participant 22

> It was a little different. I suspect I was
> somewhat more sensitive to people really
> articulating the differences that they see. I
> think the segment where employees talked about
> their experiences within the agency was real
> helpful. I think I probably was not aware of the
> extent to which some people feel as though they
> are treated differently.

Expanding the Finding

This study showed some interesting results, one of them
being the possible redefinition of who is the expert. This
brings a more level focus to the training, away from the
academic or lofty leader to a more peer-oriented level.
This lower level of instruction has been performed in other
training such as peer or mentor student teaching.

This focus on the peer level of the technology could also be expanded to other subject areas. This study only looked at one department within one institution. The study could be expanded and applications could be assessed in a variety of other environments. As stated before, this type of technology is greatly effected by the existence of a variety of variables, but the use of this type of system, with a focus on the peer association, could be very useful. Its application could be taken to the private sector of industry, such as the training of engineers in how to deal with fatigue, or in schools where students can talk about peer pressure. This form of instruction is not acted or falsely created, so it may give a more parallel level to the viewer. It may give them something they can relate their own feelings to.

Final Personnel Comments

In this section a few of the developmental issues will be addressed. This process was not easy. The conflict of not allowing outside funds made the project personally costly. The technology is sophisticated and often difficult to find and borrow. In developing this study the University of Massachusetts had equipment that was unique and the ability to connect the computer to the laser disc player. It also took many late nights and long distance calls to the engineering department (not technical support) at Pioneer Electronics for assistance. After the pilot with the TEAMS

program, a personal laserdisc was purchased for the study

(another cost) so that the machine was always available.

The use of an audience was also not easy to obtain. The use

of the TEAMS project was arranged through a professor at the

University of Massachusetts, but when this audience was not

available for the application study, it was difficult to

find someone willing to allow the research. This was a

problem for a variety of reasons(i.e., fear of litigation,

lack of time). The cost of developing a laser disc by a

firm specializing in this type of work would cost about

$50,000.00. Although this production was not on the same

level as a professional firm, it was amazing how difficult

it was to find someone willing to allow me to do it for

free. This study was indeed a learning experience. It will

allow others in the emerging area of multi-media training to

develop additional applications and expand what has already

been done.

The successful use of the system was additionally

commented on when at was presented to the APHIS WorkForce

Diversity Task Force meeting. The system was setup and

designed to be presented at the end of that days' schedule.

The members watched the sections and after viewing the part

where the regular staff members made their personal

statements, many of the Task Force members applauded and

affirmed that the media effectively conveyed the issues that

they had been trying to present.

APPENDIX A

EXAMPLE OF BRANCHING

APPENDIX B

EXAMPLE OF NARRATION

$ SCENARIO

% TEACHER

+ RESOURCES

```
=   REVIEW
Q   QUIT
->  ENTER REQUEST
```
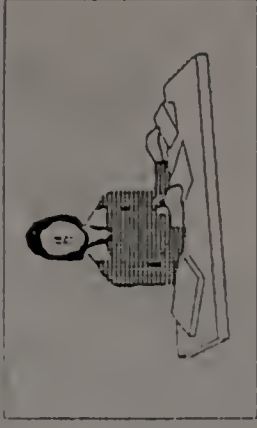
EXAMPLE OF NARRATION:

You may choose any of these segments for information on student motivation.

By pressing the dollar sign you will view a scenario on the topic from a tutor and student.

When you press the percent sign you will be presented with a topical segment from an experienced teacher.

If you press the plus sign you will receive additional information on resources in the topic area.

APPENDIX C

TUTORING AUTOMATION SURVEY

Tutoring Automation Survey

The TEAMS Project is exploring how an automated tutoring system might better prepare our tutors to work with students in schools and other educational settings. Your response to this brief survey will be greatly appreciated.

1) What specific preparation did you receive that was essential in your success as a tutor?

2) What instruction do you feel you should have received at the beginning of the semester that would have better prepared you to become a better tutor?

3) What problems have you incurred in tutoring that you could have been better prepared to handle?

4) What have you done on your own to make yourself a better tutor?
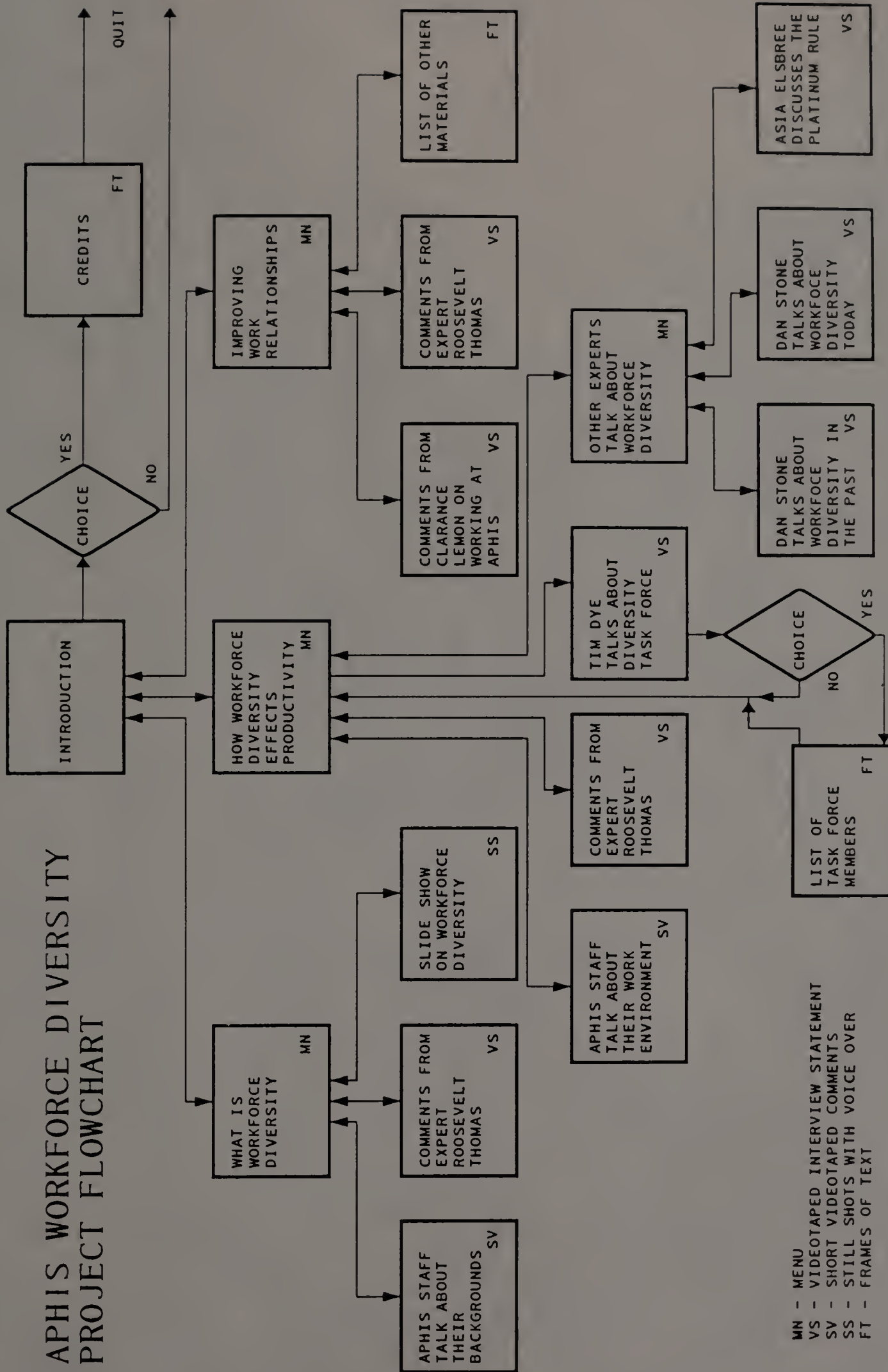

5) How is tutoring different from your expectations?

--------------- use the back as needed ---------------

APPENDIX D

APHIS WORKFORCE DIVERSITY PROJECT FLOWCHART

APHIS WORKFORCE DIVERSITY PROJECT FLOWCHART

MN – MENU
VS – VIDEOTAPED INTERVIEW STATEMENT
SV – SHORT VIDEOTAPED COMMENTS
SS – STILL SHOTS WITH VOICE OVER
FT – FRAMES OF TEXT

APPENDIX E

APHIS VIEWING SEQUENCE TABLE

APHIS Viewing Sequence Table

PN	DIVERSITY			IMPACT OF DIVERSITY			cultural			RELATIONSHIPS		
	1	2	3	1	2	3	1	2	3	1	2	3
1	4									2	1	3
2	1	2	3	5	4	6	7			8	10	9
3	1	6	5		3	2	4					
4	2		3	5					4,6	1		
5	1	3	2	4	5	6	7			8	9	10
6	5	7	6	1	3	4	2					
7	2		1		3	4	5		6			
8	1	2	3	4	5,8	6	7	9	10			
9	1	2	3			7	5		6			4
10	7	6	5	3	2				4		1	
11		6		4		5	7			2	1	3
12		6		7	5	3	2	4	1			8
13	9	10	11	4	5	6	7		8	1	2	3
14	1	2	3	4	5	6,9	7	8	10	11	12	13
15				1	3	2	4		5			
16	3	2	1	4	6	5	7		8	9	10	11
17	6	7	8	1	2	3	4		5	-		
18	1	2		3		4				5		
19	3	1	2	4	5	6	7	9	8	10	11	12
20	6	7	8	1	2	3	4		5	9	10	11
21			6	4			5			3	1	2
22	1	2	3	4	5	6	7	8	9	10	12	11

VIEWING SEQUENCE

PN - PARTICIPANT NUMBER

APPENDIX F

THE FINAL LIST OF APHIS TOPICS AND SEGMENTS

The Final List of APHIS Topics and Segments

TOPIC 1 - Reflections on Workforce Diversity

A) APHIS Staff Talk About Their Backgrounds

B) Dr. Roosevelt Thomas Discusses Workforce Diversity

C) A Short Film on Workforce Diversity

TOPIC 2 - The Impact of Workforce Diversity on APHIS

A) APHIS Staff Talk About Their Work Environment

B) Dr. Roosevelt Thomas Discusses the Impact on Productivity

C) Information on APHIS Workforce Diversity Task Force

D) Workforce Diversity as a Cultural Change (subgroup)

    a) Historical Perspective

    b) Where We Are Today

    c) The Platinum Rule

TOPIC 3 - Improving APHIS Work Relations

A) Aspects of Work Relationships

B) Dr. Roosevelt Thomas Discusses Improving Work Relationships

C) List of Related Materials

APPENDIX G

QUESTIONS ASKED DURING APHIS INTERVIEW

Questions Asked During APHIS Interview

1) Do I have permission to tape this?

2) Did you come to the instructional session expecting to learn about Workforce Diversity at APHIS?

3) Did you find this type of technology helpful in learning about Workforce Diversity?

4) What are your opinions regarding the use of the voice and the text with the menus?

5) How did you find the information you received useful in your work relationships and interactions?

6) What did you think about the format of selecting the segments you wanted to view?

7) How useful would such a system be in teaching Workforce Diversity in general?

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