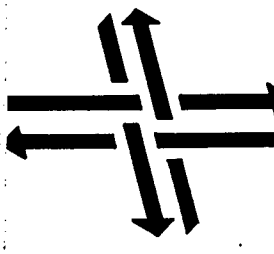
# Reinventing PennDOT Training
# Report of Step I: Distance Education



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PENNDOT PARTNERSHIP

PROJECT TASK 37: REINVENTING PENNDOT TRAINING

# Reinventing PennDOT Training
# Report of Step I: Distance Education

Prepared for

Commonwealth of Pennsylvania
Department of Transportation and
the Mid-Atlantic Universities Transportation Center

by

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October 27, 1997

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# REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188



| 1. AGENCY USE ONLY (Leave blank) | 2. REPORT DATE | 3. REPORT TYPE AND DATES COVERED |
|---|---|---|
| | October 27, 1997 | Final Report |

**4. TITLE AND SUBTITLE**
Reinventing PennDOT Training Report of Step I: Distance Education

**5. FUNDING NUMBERS**

**6. AUTHOR(S)**
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**7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)**
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**8. PERFORMING ORGANIZATION REPORT NUMBER**
PTI 9807

**9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)**
Mid-Atlantic Universities Transportation Center
The Pennsylvania State University
Research Office Building
University Park, PA 16802

**10. SPONSORING/MONITORING AGENCY REPORT NUMBER**
III-9802

**11. SUPPLEMENTARY NOTES**
Sponsored by a grant from the U.S. Department of Transportation, University Transportation Centers Program

**12a. DISTRIBUTION/AVAILABILITY STATEMENT**
National Technical Information Service (NTIS)
5285 Port Royal Road
Springfield, VA 22161
Telephone: (703) 487-4650

**12b. DISTRIBUTION CODE**
N/A

**13. ABSTRACT** *(Maximum 200 words)*

MAUTC researchers have begun working with PennDOT to provide a conceptual framework to reinvent the Pennsylvania Department of Transportation (PennDOT) training function designed to systematically assist in positioning PennDOT for the 21st century. The framework design will address training functions with respect to distance education as a means of training within PennDOT and the upward mobility of managers in response to anticipated PennDOT needs associated with strategic objectives. The project is grouped into Step I: Distance Education; and Step II: PennDOT Manager Certificate Program.

**14. SUBJECT TERMS**
Reinventing PennDOT Training

**15. NUMBER OF PAGES**
30

**16. PRICE CODE**

| 17. SECURITY CLASSIFICATION OF REPORT | 18. SECURITY CLASSIFICATION OF THIS PAGE | 19. SECURITY CLASSIFICATION OF ABSTRACT | 20. LIMITATION OF ABSTRACT |
|---|---|---|---|
| None | None | None | N/A |

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# 1. INTRODUCTION

## PROJECT OBJECTIVES

This portion of MAUTC Project Task 37 entails an exploration into the use of distance education (DE). Initially, this project task included specific emphasis on video desktop conferencing (VDC). However, Ms. Marleen Steele, PennDOT Transportation University MAUTC Project Task 37 Step I Coordinator, has indicated a change in this direction. Ms. Steele requested a reduced focus on VDC with more attention given to DE in general. This report reflects this minor directional change.

The primary objective of Step I involves the development of a conceptual framework outlining essential considerations associated with DE and the provision of a basic set of guidelines for DE deployment within PennDOT. Step I consists of three specified tasks: (1) The identification of major advantages and disadvantages of DE and the development of a conceptual scheme for categorizing DE modes; (2) the generation of guidelines to allow PennDOT personnel to assess the applicability of DE with Transportation University training packages; (3) the generation of basic guidelines to assist PennDOT bureau personnel with effectively designing and conducting DE sessions.

## REPORT STRUCTURE

Although the above project objectives follow a rather neatly organized progression, the nature of DE dictates a product based on a somewhat more integrated than linear approach. Hence, although this report addresses each objective, it does so from a holistic and application-based perspective. The final result depicts a flexible schematic for effectively applying DE activities to PennDOT's diverse training function. In addition, various checklists relating to DE processes were compiled to help guide persons interested in successful DE use.

# 2. DISTANCE EDUCATION OVERVIEW

This section of the report provides an overview of DE by defining DE and identifying its relative importance. This section further addresses the impact of technology on learning effectiveness and student attitude in relation to DE. Finally, this report section highlights the need for a learning model addressing the multiple facets and characteristics of DE.

## DEFINING DISTANCE EDUCATION AND ITS NEW POPULARITY

Due to rapid change and new technological innovation, it remains increasingly difficult to maintain a productive, competitive, and current government work force. This is equally true for nonprofit and private sector organizations. New workers are less skilled than ever before and the training they receive holds for three to five years before obsolescence manifests itself (Chute, et. al., 1991). Research suggests that this situation will continue as qualified workers become more depleted. Training must move beyond traditional approaches and begin to consider these points. The problem becomes exacerbated, however, as the imposition of time, distance, and other constraints factor into the equation (Chute, et. al., 1991). The ability to expose large numbers of persons to large amounts of continuously changing information in a quick, efficient, and effective manner remains crucial to organizational survival, efficiency, and effectiveness. All new dynamic management theories (e.g., TQM, agility, etc.) require a high level and a high degree of training. The overriding goal, given today's training needs and market environment, is to provide "just-in-time" and "just-enough" training to sufficiently elevate a work force while simultaneously avoiding an extraneous use of time, resources, and information overload.

In response to these demands, DE has come into vogue. It offers solutions to education problems previously thought impenetrable. Broadly speaking, "DE represents a variety of educational [modes] that have in common the physical separation of the [instructor] and some or all of the students. [These modes] differ not only in the types of technologies that are used, but also in the locus of control over the pace and place of instruction" (IDE, 1996). Considering "pace" or timing, DE and other computer-mediated communications fall into two main groups:

synchronous or real time delivery; and asynchronous or time shifted delivery (Farquhar, 1996). The actual "place" of instruction remains dependent upon needs for instructional delivery pace, available technology, and the specific learning needs of trainers and trainees. One may choose a distributed classroom format, which mimics traditional classroom instruction for both the trainers and trainees (IDE, 1996). On the other hand, one may choose an independent learning format (IDE, 1996), where the student follows detailed instructions and has some interaction access with an instructor. When appropriate, one may determine to choose some combination of these two formats (IDE, 1996). Nonetheless, distance technology has inherently provided training departments with the luxury of spanning geographical and traditional trainer-learner boundaries. No doubt, DE provides a solution for organizations struggling to determine the best way to train and educate persons unable or unwilling to congregate in traditional learning environments.

## THE IMPACT OF TECHNOLOGY ON LEARNING EFFECTIVENESS AND STUDENT ATTITUDE

Due to its modern technological orientation, many persons have voiced a concern regarding the relationship between high-tech DE technology and learning effectiveness. Reid (1995a) investigated and compiled results from numerous studies on this topic. Four research areas were explored. The first research area involved comparing achievement outcomes between distance learning technologies and the traditional classroom. Reid's underlying conclusion states that "...student achievement is not a function of the mode of instruction" (Reid, 1995a, p.1).

The second research area reviewed "the unique features of each technology medium and its connection to particular skills or abilities... . Most of this research has focused on how the unique features of particular technology... contribute to student's learning. [Slightly higher achievement levels were detected] when interactive computer programs (including e-mail), one- and two-way video, and audio media, were utilized" (Reid, 1995a, p.1).

The third area of "research focused on the context of the learning, ...not on the technology itself, but on how technology fit with all of the other aspects of the classroom... [such as] design of the lesson, peer interaction, and learning style... These studies showed positive gains in

student learning when combinations of teaching media and various methods of instruction were linked" (Reid, 1995a, p.1). In particular, when collaborative training projects involved computer conferencing technology, positive results in student achievement were indicated.

The final concentration of the reviewed research focused on student motivation, a strong work ethic, and intensive student support measures. High levels in all of these areas were shown to exist within distant classroom environments.

Overall, a negative relationship between DE technologies and learning, as compared to the traditional classroom, does not appear to exist. However, trainer-participant and participant-participant interactions, along with participant motivation, were critical factors in successful achievement using DE. In light of this, Reid (1995b) further investigated participant attitudes toward distance learning with respect to technologies, methodologies, interactivity, and remoteness.

Although participants may initially exhibit some apprehension toward technology, no significant relationship exists between technology and learning. At times however, participants have reported frustration due to poor or failing technologies (e.g., poor sound, poor visual connection, etc.).

Some support exists for accepting the notion that DE instructional methods affect learner attitudes. Well-prepared instructors can effectively use DE technology to emit a positive effect on participant attitudes. Also, DE participants prefer small group interaction or question-and-answer interaction over lecture-style instruction. Similarly, participant-instructor interaction relationships affect participant attitude. This includes site visits by the instructor or e-mail and phone contact. As participant-instructor interaction increases, learning attitude increases.

Attitude toward remoteness can affect learning attitude. Older learners tend to be more enthusiastic about DE than younger learners. It is speculated that this is due to some maturity and appreciation for the convenience of reduced travel and time investment.

Using a variety of instructional methods and emphasizing good interaction while decreasing the use of lecture-based training methods increases participant attitudes toward DE learning. Overall, Reid (1995b) concludes "that students believe that they learn as much -- if not more -- via two-way television as they do in a traditionally delivered course [and] those who have taken distance courses have generally responded positively to the experience and would recommend it to other students" (p. 1).

## THE NEED FOR A LEARNING MODEL TO ADDRESS DISTANCE EDUCATION COMPLEXITIES

As with all new technologies, DE is often toted as a panacea and used indiscriminately. To avoid any haphazard application of DE within a training program, the use of a learning model to more systematically assess the proper deployment of DE activities remains desirable. When used appropriately, DE can provide positive learning results. In the following section, a multilayered learning model is presented. This model, provides a training developer with the necessary information to determine the best use of DE within a specified training agenda.

# 3. FRAMEWORK FOR CHARACTERIZING AND USING DISTANCE EDUCATION

This section reviews DE within the context of a multilayered learning model modified and adapted from Chute et al., 1991. The model addresses DE in terms of performance support, knowledge transfer, and instructional technology.

## PERFORMANCE SUPPORT MODEL

The performance support element suggests a process for applying instructional solutions to performance problems. Chute identifies three phases associated with performance support: (1) assessment, (2) prescription, and (3) technology.

During the assessment phase, a person determines if a gap exists between an individual's current abilities and the abilities required to perform. If a lack of knowledge or skill exists, an appropriate performance support intervention must be determined. Any intervention should include the consideration of pertinent psycho-educational requirements based on an association with the learning objective in conjunction with the training delivery system (e.g., Will vision be necessary to model-specific behaviors, such as equipment maintenance procedures?). The process of determining an appropriate intervention comprises the prescription phase. That is, one may prescribe traditional training, independent learning, graduated experience, coaching, guided practice, feedback, and the like. The next phase, technology, involves the determination of alternative delivery options. A number of factors, described in more detail in the following, must be taken into consideration during this phase. The assessment phase is resumed following the delivery of an intervention. This process continues until the identified knowledge or skill gap becomes sufficiently diminished, or the specified performance level becomes acceptable. However, the primary difficulty with this model rests within the complex nature of the technology phase. To better understand and accomplish intervention delivery in this phase, Chute and Hancock (1986, cited by Chute et al., 1991) suggest the use of interactive models, the knowledge transfer model, and the instructional technology model, which form interlayered tiers within the total model.

## Knowledge Transfer Model

In Chute and Hancock's knowledge transfer model, one arrives at an effective learning design based on types of communication media and how they combine to mediate information flow between a source and destination. This infers that some degree of distance between instructor and learner exits. However, given a wide perspective, distance may simply be defined in terms of the front of the room to the rear or, ultimately, from one person's mind to another (Wilson, 1996). A true knowledge transfer model must therefore theoretically address all degrees of mediated information flow distances within a parsimonious framework. For this purpose, Dale's cone (Dwyer, 1978) applies nicely. Figure 1 highlights the initial premise behind the cone with respect to communication media, learner sophistication, and an economy based on educational efficiency and effectiveness. As communication media become more abstract, they also become less expensive and therefore more efficient. Similarly, they become less effective with respect to the sophistication or maturity of the learner. That is, less sophisticated learners (i.e., less experienced learners) learn more effectively at the lower portion of the cone than at the top. Figure 2 provides a guideline depicting the abstraction relationship among various types of communication media Wilson, 1995).

Further research performed by Walter Wagner (Wilson, 1995) supports an interesting twist of events that takes place when the training objective no longer falls in the cognitive domain -- knowledge to achieve competency -- but rests in the affective domain -- knowledge to formulate or change an attitude. When formulating attitudes, the initial relationships depicted figure 1 remain intact. However, when changing attitudes, the cone flips with respect to sophistication (see figure 3). That is, as learners become more sophisticated, concrete communication media become more effective. This particular change of events offers a clue for understanding the adage, "you can't teach an old dog new tricks."

**Figure 1: Dale's Cone and Associated Learning Principles**

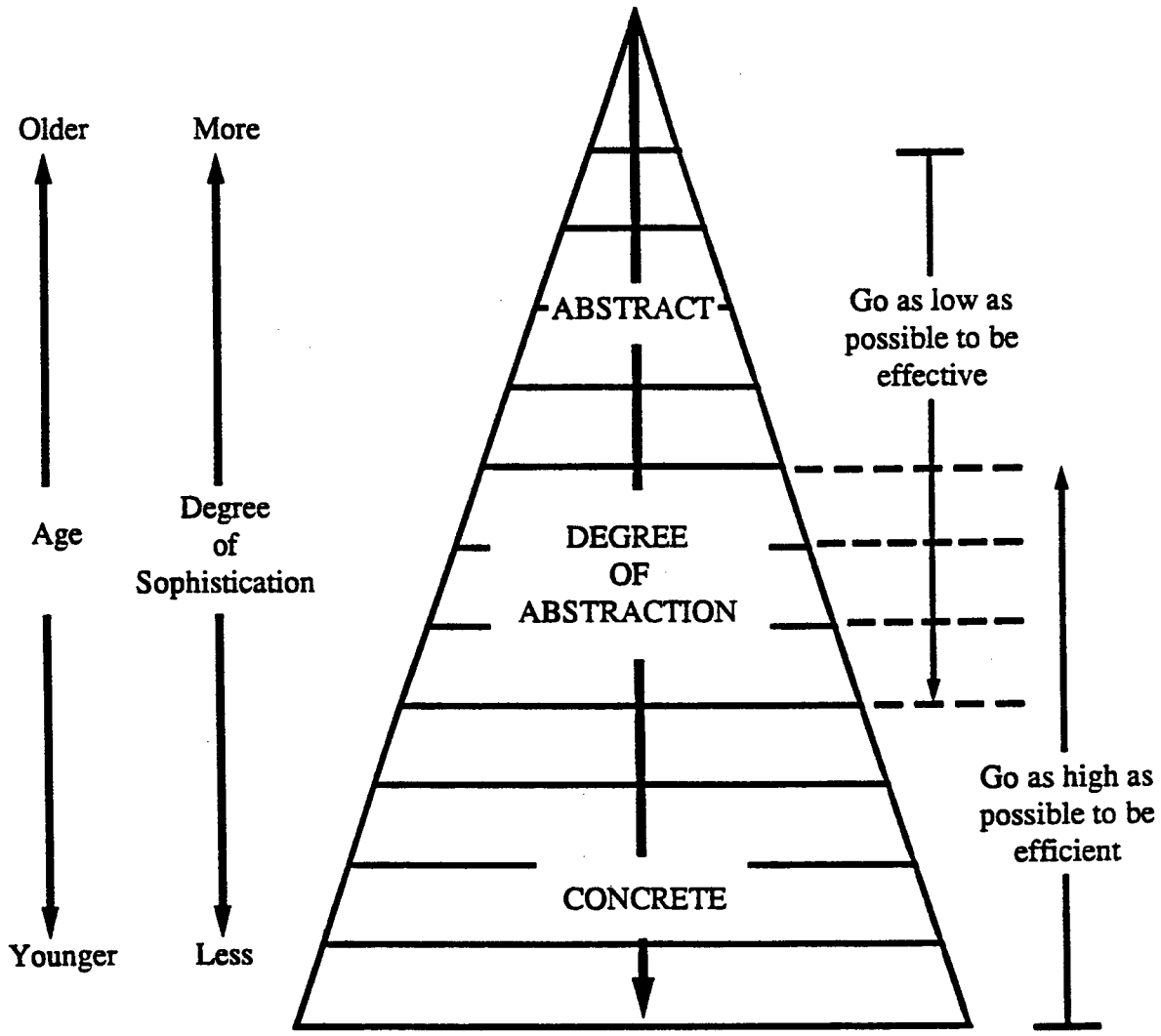


**Figure 2:** **Associated Levels of Abstraction for Various Types of Communication Media**

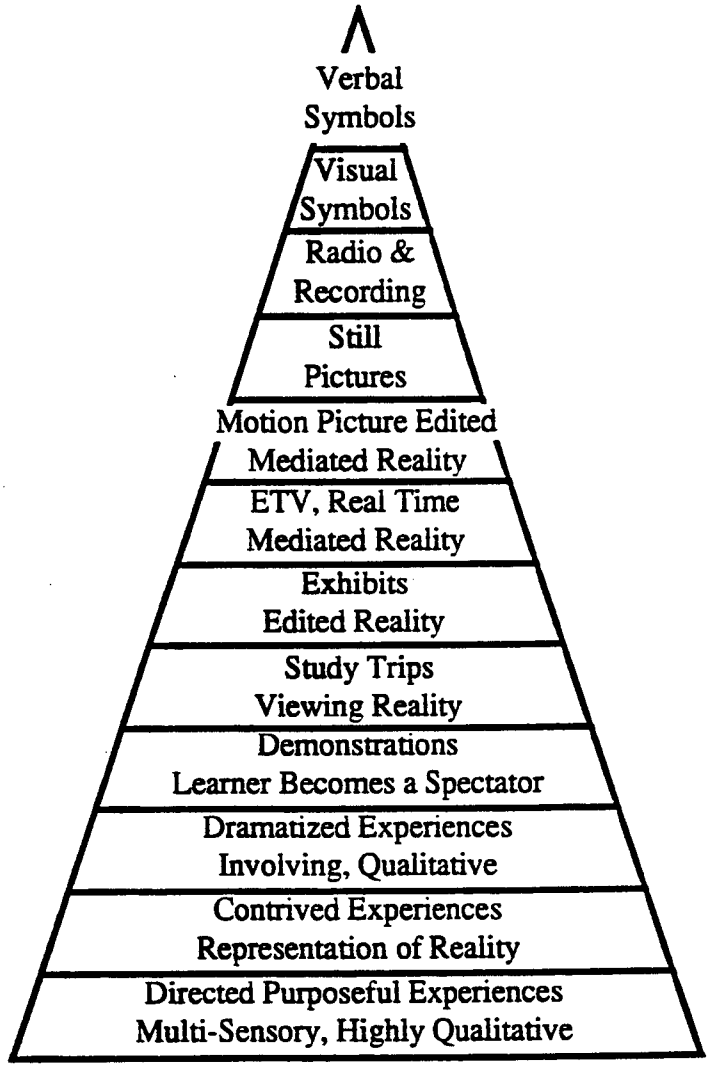
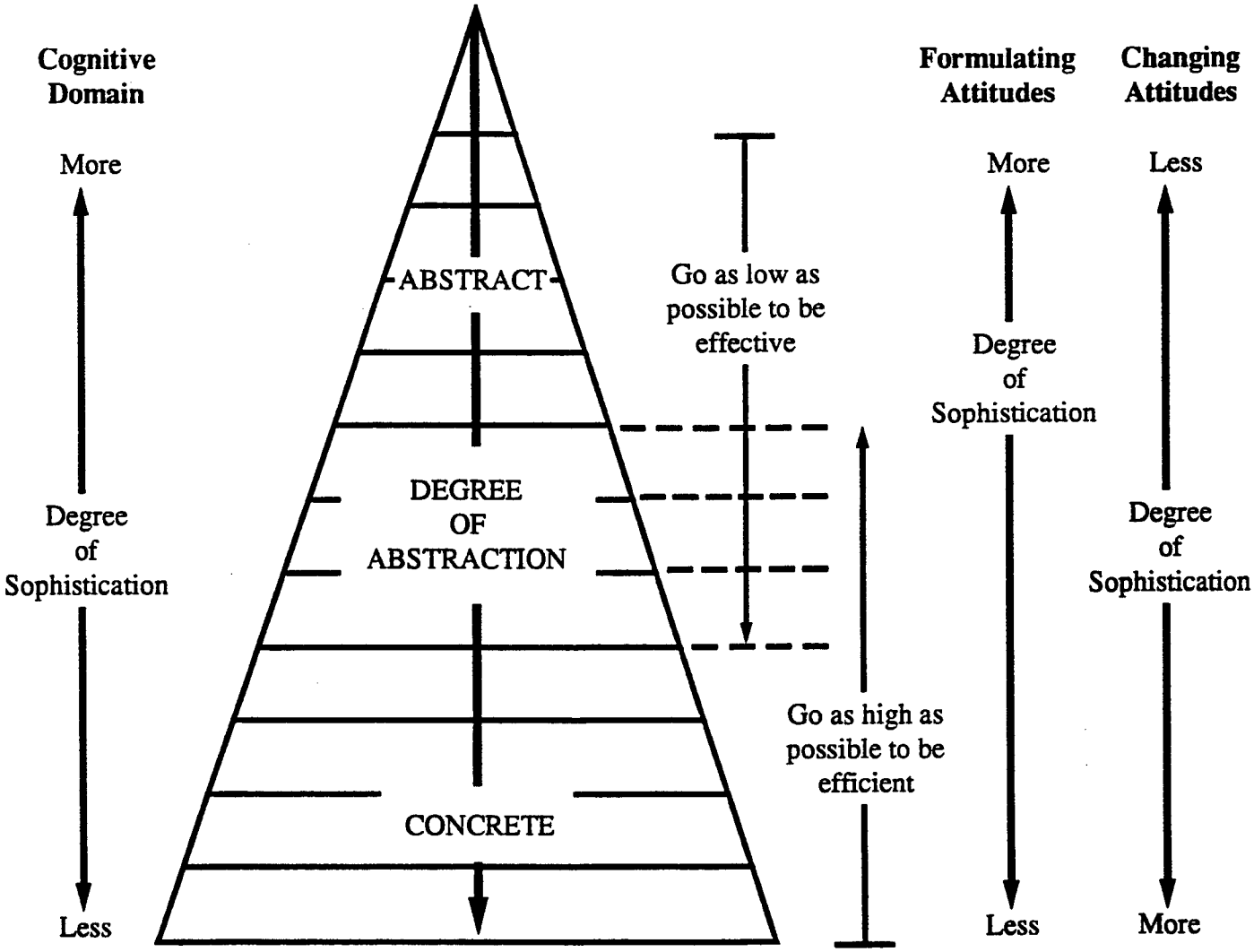


**Figure 3:** **Dale's Cone Depicting Relationships Between Cognitive and Affective Domains**



## Instructional Technology Model

This element of the model involves the identification of available instructional technologies spanning a range from traditional face-to-face instruction through artificial intelligence. Chute and Hancock (1986) offer a hierarchy of technology options arranged according to a technology-stage development approach involving a classification based on technology sophistication level, service role, adoption history, and staffing requirements (Chute et al., 1991). Three stages of technological options emerge as shown in table 1 in the following:

**Table 1: Training technology options**

| | |
|---|---|
| **Stage III.....** | Artificial intelligence |
| **Just-In-Time Performance** | Knowledge Systems |
| **Support** | Hypermedia |
| | Hypertext |
| | Video Disc/DL |
| | CBT/DL |
| | Video Disc |
| | CBT |
| **Stage II.....** | Interactive Video DL |
| **Distance Learning** | Video Broadcast |
| | PC Collaboration |
| | Audiographic DL |
| | Audio DL |
| **Stage I.....** | Videotext |
| **Classroom Learning** | Electronic Mail |
| | Computer Graphics |
| | Voice Mail |
| | Computer |
| | Video |
| | Print |
| | Graphics |
| | Voice |
| | ** DL=Distance Learning* |

In determining what technology to employ, Chute et al. (1991, pp. 2-3) offer the following:

> Stage I comprises the least sophisticated class of technology options ... . Technologies in this class are typically thought of as communication

enhancements or teaching aids. They tend to be readily adopted by organizations and require little or no staffing changes or restructuring to support their operation.

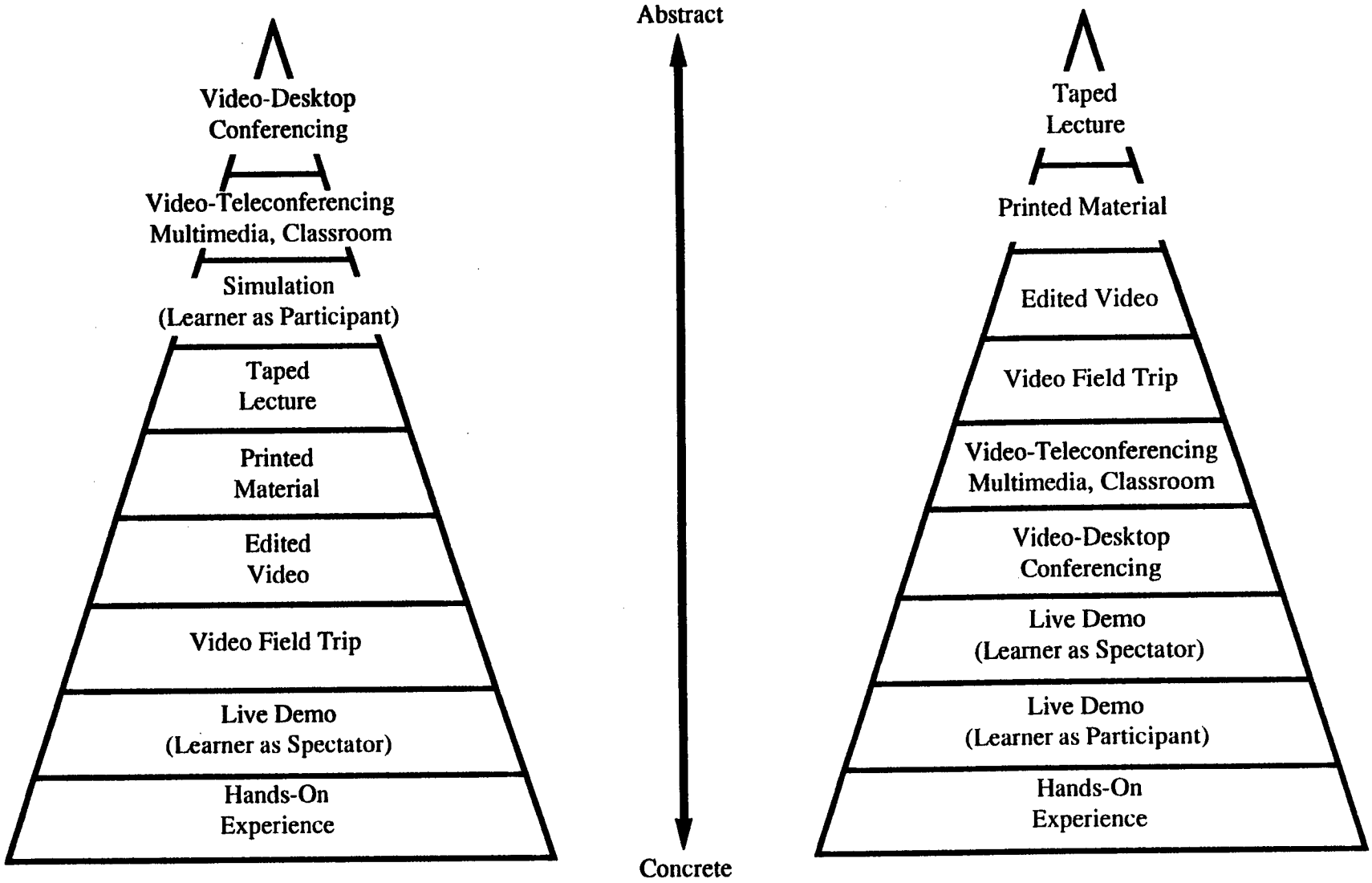
Stage II comprises a slightly more sophisticated class of technology options ... . Technologies in this class are regarded as complete systems of instruction. They also tend to be adopted readily by organizations, although initially there is some resistance due to their nontraditional delivery modes. Once fully integrated, however, these technologies tend to generate high levels of acceptance among users ... . They may require some staffing changes and restructuring so that a flexible support structure can be established and maintained. Typically, teams of specialists are behind the deployment of these technologies.

Stage III comprises the most sophisticated class of technology options ... . [These technologies] possess attributes that are characteristically on the cutting edge of technology .. .. But like Stage II technologies, some staffing changes and restructuring may be necessary to support their development and operation ... . Certain technologies, such as artificial intelligence, hypertext, CBT, and interactive video, require sophisticated design and development skills since little instructor intervention is called for once the technologies are deployed.

Using Dale's cone as a theoretical guide, one can begin to rank specified technological options. The advantage of doing this is that it helps to zero in on a range of technologies based on pertinent characteristics of the learner (i.e., sophistication) and of the learning objective (i.e., competency achievement, attitude formulation, or attitude altering). However, a direct time-based relationship between technology, learner sophistication, and abstraction within the cone exists and must be understood (see figure 4). Essentially, from the time a new technology is introduced to the time it is mastered, its relationship to abstraction moves from more abstract to more concrete. For example: When introducing video teleconferencing, which mimics traditional classroom training, it occupies a high abstract learning position within the cone.

However, upon the participants' and instructors' mastering the video teleconferencing technology, this DE methodology begins to mimic traditional classroom training as it moves down the cone toward a more concrete position. Nonetheless, a DE technology will always remain somewhat more abstract than any traditional pedagogical approach that it may mimic. An organization anticipating a large-scale deployment of DE technologies may therefore wish to take initial actions to train both the instructors and the participants on how to use and work with the DE technology. Such approach will help to ensure increased education and training effectiveness.

**Figure 4: Relationship Between Technology Familiarity and Position of Abstraction**




Learner and Instructor Unfamiliar with Technology

Learner and Instructor Familiar with Technology

# 4. SYSTEMATICALLY TARGETING DISTANCE EDUCATION MODES FOR USE

Although a learning model will assist in determining whether DE remains a viable approach to achieve specific training and educational objectives given specific learner characteristics, it falls somewhat short in depicting and sorting out the many interacting variables impinging upon the final selection of a specific DE mode or technology. For this purpose, a flexible scheme for systematically analyzing and targeting DE modes based on pertinent learning factors and a relative scale of economy is introduced (see table 2).

Table 2 offers an approach for determining the best DE mode to employ for a specific task. This task may be an entire training program or a single module within a program. The table should be used only as a tool to guide decision-making. To begin, list all DE technologies available for use by the organization. Order each technology according to basic implementation costs relative to characteristics of the anticipated learning task (i.e., length, number of desired sites according to instructor availability and participant availability, and instructor and participant familiarity with technology). Then consider the learning task objective and learner characteristics as determined in the above learning models. Next, address primary and secondary factors related to the use of distance education technologies. Highlight or circle all desirable factors according to their relationship with each technology. Finally, determine the most appropriate technology based upon all available information.

This systematic approach allows for a person somewhat less versed in DE to assess the basic application of DE to a specific learning task. The approach is also flexible enough to accommodate new DE modes as technology advances and other educational factors become pertinent.

## Table 2: Distance education technology decision work table

| Primary and secondary factors related to the use of distance education technologies | Available Distance Education Technologies Ranked by Cost | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Current Cost of Technology Application to Organization<br>$$----------$$$----------$$$$----------$$$$$ | | | | | | | | |
| | Paper & Pencil | Audio Tape | E-mail | Video Tape | VDC | Video TelConf | CBT | Satellite TelConf | AI |
| **Primary Factors: Learning Objectives, Learner Characteristics, Timing, Place** | | | | | | | | | |
| Abstraction: High, Med, Low * | H | H | H | L | M | M | L | M | L |
| Synchronous | | | | | Y | Y | | Y | |
| One-on-One | Y | Y | Y | Y | Y | | Y | | Y |
| One-to-Many | Y | Y | Y | Y | Y | Y | Y | Y | |
| Many-to-Many | | | Y | | Y | Y | | | |
| **Secondary Factors** | | | | | | | | | |
| Audience Size: Big, Med, Small | B, M, S | B, M, S | B, M, S | B, M, S | S | M | M, S | B, M | S |
| Interaction Required: High, Med, Low | L | L | M | L | H | H | M | L | M |
| Required Motivation: High, Med, Low | H | H | M | H | L | L | H | M | H |
| Location: Multiple, Single, Home | M, S, H | M, S, H | M, S | M, S, H | M, S | M, S | M, S | M | S |
| Development Time: High, Med, Low | L | L | L | H | M | M | H | H | H |
| Media: Graphic, Audio, Video, Print | P | A | P | V | G, A, P | G, A, P | G, A, V, P | G, A, V, P | G, A, V, P |
| Repetition Needed: High, Med, Low | H | H | M | H | L | M | H | M | H |

** Using the knowledge transfer and instructional technology models, rank each technology based on relative position in Dale's cone (the above is an example only)*

# 5. PERTINENT CHECKLISTS FOR GUIDING DISTANCE EDUCATION INITIATIVES

The following checklists provide some basic tips and hints for those persons deciding to employ DE as a solution for training or education. The checklists address aspects of development, preparation, delivery, participant support, instructor support, and evaluation. Although not every item listed applies universally to all DE initiatives, the lists do offer important insights for those interested in successful DE deployment.

## CHECKLIST A: FACTORS INFLUENCING THE SELECTION OF A TRAINING TECHNOLOGY (FARQUHAR, 1996)

### Factors of the Audience

- Size
  - Large
  - Medium
  - Small
  - Individual
- Distribution
  - Single location
  - Multiple locations
- Availability
  - Single time slot
  - Multiple time slots
- Predominant learning style
  - Uniform
  - Mixed
- Attitude (Perceived Attributes)
  - Toward subject matter
  - Toward media

- Experience
  - With subject matter
  - With media

## Factors of the Objective(s)

- Domain
  - Cognitive
  - Affective
  - Motor Skill
  - Interpersonal
- Mode
  - aural
  - visual
  - tactile
  - olfactory
- Amount
  - Single objective
  - Single task
  - Multiple Tasks
- Life-span
  - Quickly dated
  - Stable
- Frequency of use
  - Frequent
  - Infrequent
- Error acceptance
  - High
  - Low
- Necessity of interaction/practice
  - High
  - Low

## Factors of the Context of Implementation (Organization)

- Availability (if/when) of Distribution Site(s)
  - Classrooms
  - Learning centers
  - Office computers
  - Homes
- Accessibility (where) of Distribution Site(s)
  - Classrooms
  - Learning centers
- Equipment/Facilities of Distribution Site(s)
  - Classrooms
  - Learning centers
  - Office computers
  - Homes
- Implementation experience with media
  - Selection experience with media
  - Attitude (perceived attributes) with media
  - Criticality for successful training
  - Importance for backup media
  - Ability to test media on audience

## Factors of Design & Development

- Cost
- Time
- Expertise
- Resources

## CHECKLIST B:
## COURSE DEVELOPMENT (FETTERMAN, 1996, P. 9)

- Divide long lecture periods into shorter segments interspersed with discussions, question and answer periods, audio/visual aids, and student activities (Cuffman and MacRae, 1994 cited by Fetterman, 1996, p.9).
- [Interactive video is] ideal for small group discussions and activities.
- Include case studies, questions, or structured activities to require student involvement.
- At the conclusion of group activities, a report by team members adds interaction, ...and... accountability for learning.
- In-class assignments should be highly structured and have short time limits.

## CHECKLIST C:
## PLANNING AND PREPARING INSTRUCTIONAL MEDIA (MOSHINSKIE, 1994 AS CITED BY FETTERMAN, 1996, P. 9-10)

- Think visually, consider how things will look and what contribution they will make to the class.
- Make the technology as transparent as possible to class members. The focus should remain on the transmitted image and message.
- Use a large plain font (such as Times New Roman, Courier, or Arial), at least 24 point.
- Use landscape format with a width to height ratio of 3:2.
- Keep large margins on graphics or text screens to ensure the full graphic can be seen.
- Keep headings or titles to no more than five words.
- Use a 6 x 6 rule for text screens, that is, no more than six lines of text with no more than six words in any one line.
- Keep line spacing even. Text is more difficult to read if it is too close or too far apart.
- Special video effects, such as fancy computer screen transitions, do not work well with the compressed video transmission used in video conferencing. Simple top to bottom or side to side wipes work best.
- Keep colors simple with strong contrasts. Light blue background with black lettering works well. Subtle colors and shading may be lost.

- Use no more than five different types of screen formats in a computer-generated presentation (Goodman, 1994).
- Use flip charts rather than whiteboards. Flip charts can be prepared ahead of time and neatly organized. Whiteboards glare and many colors do not show brightly enough to give a readable video conference image.
- Basic rules for distance learning media are to keep it clear, clean, concise, and consistent.

## CHECKLIST D: COURSE PREPARATION (FETTERMAN, 1996, P. 10)

- Hold a practice teaching session... or ...a pilot class. It is imperative that key players at each site manipulate the controls of the equipment in their location prior to the actual class .... [This helps to] reduce instructors' stage fright.
- The agenda should include logistics issues for physical emergencies and contingency plans for what to do if the electronic connection fails (Cremeens, 1994, cited by Fetterman, 1996, p. 10). Always have a back-up instructional technology, such as audio conferencing, electronic mail, fax, or at least a phone connection.
- A rule of thumb is that distance learning courses typically move slower than classroom instruction (Cuffman and MacRae, 1994, cited by Fetterman, 1996, p. 10). Contributing to this fact are the amount of time to hear and respond to ... other sites; distant sites diverting instructor's attention; and amount of time occupied with hardware .... Employ some of the following techniques to overcome the anticipated slower pace:
    1. Design modules of instruction, such as small group activities, questioning, lecture, discussion, and assignments, to cover specific objectives and prevent getting side-tracked.
    2. Structure modules to fit within given time limits.
    3. Prepare questions to determine students' previous knowledge of subject matter. You may be able to skip or condense sections of the presentation based on existing knowledge.
- Planning questions, discussion and activity formats requires special attention (Cuffman and MacRae, 1994, cited by Fetterman, 1996, p. 10). Suggestions for conducting questions, discussion, or activity periods:

1. Summarize following questioning and discussion periods.
2. Address students by name throughout discussions.
3. Ensure all students have heard questions or discussion points.
4. Maintain frequent eye contact with the camera. Sending a close-up shot of the instructor serves as a link to distant sites.
5. Endure periods of silence while waiting for answers to questions, especially from distant sites.
6. Send a positive, personable image. Let students know that you are interested by your tone and enthusiasm.
7. Encourage students to ask questions.
8. Redirect student questions to individuals at other sites.
9. Direct your own questions to individuals at each site.
10. When asking a rhetorical question such as, "Are there any questions or comments," address it to specific sites, one at a time.

- Training handouts serve a significant role as a communication tool .... [A] graphic image, table or chart [must be seen clearly and close up at all sites]. This is best accomplished if students have it in hard copy .... The handout materials help make up for the limitations of video conferencing media. Detailed diagrams, prints and fine print do not show up well on a video screen.

## CHECKLIST E: COURSE DELIVERY (FETTERMAN, 1996, P.10-11)

- Early agenda items for first class
    1. The instructor and all participants should introduce themselves.
    2. Thoroughly review the course agenda.
    3. Introduce students to the technology that you'll be using to deliver the course.
    4. Let students know how they will be able and expected to interact.
    5. Conduct an introductory activity providing all students hands-on experience with any technology they will be expected to use, such as microphones or cameras.

- Plan certain activities or discussions to draw students from different locations into projects or dialog together.
- Instructors must be congenial. The tone of messages transmitted through technology can more easily be misinterpreted. [...] Comments, ... funny or lively, can be interpreted as sarcastic or demeaning.
- Instructors should focus on non-verbal cues from students, ... be attentive [to the time needed] for note taking. Zoom in on individuals, even not speaking, to monitor facial expressions for confusion, boredom, or dissatisfaction.
- Use ... a moveable camera to ... maintain student interest[and avoid a] "Talking Head" style presentation. Move around the classroom to give students at all locations a change of scenery .... Use the graphics or document camera ... for objects too .... One caution though, too much camera [may] make participants "motion sick."
- Review and evaluate your own performance. If videotaped, ... see what [worked and what] did not. Solicit feedback from students, peers, and facilitators.

## CHECK LIST F: GENERAL PLANNING CONSIDERATIONS (IDE, 1996)

This list raises issues that may relate to any training regardless of the type of DE adopted. The list items were developed for a university setting and may not always fit an organization's training operation. However, with little modification, the items presented provide useful tips and considerations.

### Logistical Support

- When setting up a system for distributing materials, it is critical that all students are treated equally. Students must have the materials they need to complete assignments, to participate in group or class sessions ..., and to benefit from instructor feedback. Students who are not at the origination location should not be disadvantaged.
- This support may be achieved with one or a combination of the following: Courier, overnight delivery (FedEx, UPS, Express Mail), priority mail, electronic file transfer, and fax. With a long lead time, regular mail service may be an alternative. Students should

always keep a copy of any significant assignments they complete, such as papers or projects.

- If faculty choose to give written examinations, students will need access to a proctored examination site. Proctors may be provided by the originating institution or by the receive site. Proctors check student photo IDs to verify the identity of the test-taker and monitor the process to ensure that the same conditions apply in all locations.
- In some cases, the student may be given the opportunity to propose a proctor for institutional approval. This requires especially careful institutional guidelines and checks.
- Security of examinations is an issue from the time each examination leaves the instructor's hands until it is delivered back to the instructor for grading. Before and after the examinations are administered, they should be handled only by authorized personnel and stored in a locked desk or cabinet. It may be prudent to make copies of completed examinations before they are sent back to the instructor for grading.
- Faculty may incur expenses directly related to their distance education activities. These might include long-distance charges (telephone and computer/modem), postage, and mileage for travel to off-campus locations. The institutional policy on reimbursement for such expenses should be clearly stated and procedures should be set up to facilitate the reimbursement.

## Student Support

- Students who do not come to the campus need access to academic advising services. Student contact with trained academic advisors is crucial because both the students and the credit-granting institution need to be confident that information given to students is appropriate and accurate. Advising can be accomplished by telephone, e-mail, or by providing periodic on-site advising at off-campus locations.
- There must be easily accessible, authoritative sources of information about nonacademic matters. Students should be informed as to whom to contact about specific types of questions or concerns. This is often best accomplished through printed materials that are written specifically for distance education students.

- Faculty members typically have office hours during which time they deal with questions and concerns of individual students. A mechanism must be identified so that off-campus students can easily contact a faculty member. Instructors might provide students with their telephone number and hours during which they can be reached or with their Internet or e-mail address for individual, private discussions. In cases where there are class sessions, faculty might designate a period of time before or after class or during the break to use the telecommunications technology to discuss more general issues and concerns with off-campus students.
- Much of the planning for traditional course delivery assumes easy access to campus-based resources, such as library holdings, science laboratories, and computer software and hardware. In distance education, it is essential that faculty and administrators work together to think creatively about how to accomplish the educational objectives when students may not have ready access to all the campus-based resources. Solutions to particular problems may involve altered assignments, interinstitutional resource-sharing, special services at off-campus sites, and greater use of computer technologies and networks. (See also section entitled "Laboratory Experiences.")

## Faculty Support

- The institution must determine what training the faculty will be provided on 1) the particular model of distance education in which they will be involved and 2) the technologies they will be using. Faculty are likely to be more confident and effective if they understand what they are being asked to do and why. They need to know the capabilities of the technologies available to them so that they can use these tools effectively to meet their instructional objectives. Orientation and training should be scheduled well in advance of the beginning of the semester to give faculty sufficient time to redesign, modify, or adapt their course and assignments specifically for the new delivery mode.
- Traditional higher education institutions have few built-in incentives to encourage faculty to become involved in distance education activities. The traditional reward structure, with its emphasis on research and publication, may actually discourage faculty who might

otherwise be interested. Institutions should establish some faculty incentives that recognize the additional time faculty may spend in training and in planning an effective distance education course.

- To adapt their courses to new modes of delivery, faculty may benefit from having access to a variety of resources. Types of support might include instructional design, video production, graphics production, access to authoring tools, and other computer-based resources.
- The recruitment and selection of good distance education faculty is critical to the success of the program. Faculty who volunteer to participate in new modes of delivery are usually more successful and experience greater satisfaction than those who are assigned to participate. However, there are not always volunteers willing to teach the needed subjects. Using experienced and successful distance education faculty to recruit others is generally effective.

## Evaluation

- Typically, the faculty evaluation form that students complete for traditional classroom courses needs to be modified to yield useful information about faculty effectiveness in a distance education environment. Information about personal characteristics of successful instructors should be factored into future planning and hiring decisions. Information about effective instructional strategies should be included in faculty training and support materials.
- The technical systems and administrative support systems should be evaluated by the students, the faculty, and, if appropriate, the technical support staff. In designing the evaluation instruments, every effort should be made to separate issues related to the technical and administrative systems from those related to individual faculty performance; faculty evaluation typically rests with academic units, whereas systems evaluation is the purview of non-academic units.
- Evaluation of the faculty orientation and training process should be done each time the sessions are offered, and the results should be factored into the ongoing refinement of the sessions and materials.

## Laboratory Experiences

- One of the most challenging aspects of distance education is to provide students who are not on campus with experiences that are equivalent to those of other students in fully equipped laboratories. A critical initial step is for faculty to determine how crucial a hands-on experience in a laboratory setting is in ensuring that students achieve the desired learning. For example, it is possible to design activities that teach students the skills of close observation without conducting lab-based experiments. When alternative activities to lab experiences are not suitable, one or more of the following solutions might be appropriate.
- Some institutions develop lab kits that contain the special equipment and supplies students need to complete one or more lab experiences, as well as written directions that outline the assignments and list the other materials students will need to complete the assignments. For example, the University of Maine sends out a kit containing a fetal pig for dissection.
- Another option is to conduct lab experiments at one location on an interactive video network. Students at all sites actively participate by conferring on the steps to be followed and by observing, interpreting data, and suggesting follow-up activities.
- Videotape the experiments and edit them, using graphics to pose questions of the viewer as the experiment progresses: What do you think will happen next? Why did such-and-such happen? Which of the following explanations are consistent with the data?
- Off-the-shelf computer simulations are increasingly available. Depending on the cost and the hardware requirements, students might either purchase simulations as part of their instructional materials or travel -- either alone or in groups -- to a library or off-campus location to work with computer simulations.
- Students are sometimes required to travel to a central location with laboratory facilities to complete an intensive lab module over several days or weeks. Similarly, they might travel to decentralized locations -- study centers or regional campuses -- to do lab assignments over a week or several weekends.

## Planning issues unique to the distributed classroom models

Institutional policies and practices frequently need to be reexamined when two or more institutions are involved in distance education course delivery. Following is a list of issues that cooperating institutions are likely to face. It is not intended to be exhaustive; rather, its purpose is to stimulate thinking and encourage discussion.

- Will courses originating at one institution be included in other institutions' class schedules?
- Do faculty get a single class list that includes students registered from all participating institutions or separate lists from each institution?
- When the students register, whom do they pay? How is it handled if there is a difference in tuition? How is it handled if the student is registered full-time and at the top limit?
- Which institution pays the financial aid?
- Which institution gets credit for the student for reporting purposes? If students are receiving credit from the sending institution, is it transfer credit or residency credit?
- How will scheduling of rooms be coordinated among campuses?
- Do all institutions have the same semester start and end dates as well as the same time block for classes?
- Will institutions be charged for rooms and equipment at other institutions? If so, will the charges be consistent?
- Will support services be the same at each location (i.e., site coordinator, technical support, fax, photocopy machine, and telephone)?
- Who is responsible for hiring and training site coordinators and technical support staff?
- Who pays for the cost of distributing materials (via courier, UPS, FedEx)?
- How will equipment repair and maintenance costs be handled?
- Who ensures that appropriate computer software and hardware is available at each site; who pays for licenses?
- How do students get access to electronic information?

# 6. SUMMARY AND RECOMMENDATIONS

The primary objective of Step-I involved the development of a conceptual framework outlining essential considerations associated with DE and provision of a basic set of guidelines for DE deployment within PennDOT. Three specified tasks were set forth: (1) the identification of major advantages and disadvantages of DE and the development of a conceptual scheme for categorizing DE modes; (2) the generation of guidelines to allow PennDOT personnel to assess the applicability of DE with Transportation University training packages; (3) the generation of basic guidelines to assist PennDOT bureau personnel effectively design and conduct DE sessions. Each of these specific tasks was addressed, and a final schematic was prepared to assist in the determination of DE technology given specified learning objectives and learner characteristics. Similarly, pertinent checklists were presented to address the many facets of DE training design and execution. The use of these tools will substantially increase the effective and efficient use of DE technology and the success of DE deployment within the PennDOT training function.

Upon review of information and considerations pertaining to DE, it is recommended that DE be thought of in a somewhat broad sense and be applied to training based on learning objectives, learner characteristics, and economy. It is also recommended that the PennDOT Transportation University seriously consider two areas of training prior to engaging in DE activities: (1) Provide DE "just-in-time" training to instructors and course developers; and (2) provide training to DE recipients that may be required to use and/or manipulate DE hardware and software, such as may be required in VDC circumstances. This training will serve the purpose of increasing instructor and learner confidence levels as well as reducing instructional media abstraction, which can significantly intervene in learning situations that require the use of new or unfamiliar technology.

# 7. THE PENNSYLVANIA STATE UNIVERSITY RESOURCES

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