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DELIVERY OPTIONS IN TRAINING ACTIVITIES:  
COMPUTER-BASED TRAINING, INTERACTIVE VIDEO  
INSTRUCTION, AND TELETRAINING  
A Survey At AT&T National Product Training Center, Illinois

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Introduction &  
Summary

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## INTRODUCTION

In order to find out more about the role of Instructional Technologists in the corporate world, I decided to arrange for an internship with a major corporation. I wanted to find an internship in the Chicago area because I hope to live and work in or near Chicago after graduation. In December of 1987, I sent a copy of my resume, and a letter about myself and my career goals, to Barbara Johnston, Personnel Director at the AT&T National Product Training Center, Hickory Ridge Conference Center, in Lisle, IL.

During January, 1988, I met with Ms. Johnston to discuss my qualifications and goals for an internship. She informed me that Hickory Ridge Centre does not have an established internship program, but she would make my resume and letter available to managers who requested Instructional Technologists for special projects.

On May 6, 1988, I met with Mr. Bill Wardlaw, Product Training Manager, to discuss the possibility of my working as an intern on a special project in his area, telephone switching equipment. At that meeting he presented me with a description of the project (see Tab 2), and we agreed I would work as an intern for six weeks beginning Monday, May 9, 1988.

## BRIEF DESCRIPTION OF PROJECT

In an effort to explore ways of decreasing the cost of training to customers, AT&T Product Training at Hickory Ridge was charged with investigating the feasibility of converting some of its instructor-led courses to alternate delivery methods. In early 1988, an "entry level" course was selected as the pilot course for study for conversion, and a course development/conversion team was selected.

In April, 1988, the Instructional Technologist (IT) who was coordinating the project, took another position within AT&T. The new IT was scheduled to begin work on May 23, 1988. Bill Wardlaw, Project Manager, decided to hire me as an intern to continue work on the project, to meet the conversion decision deadline of late June, 1988.

## INTERNSHIP RESPONSIBILITIES

As an intern, I was responsible for working with members of the project team, with marketing representatives, and with vendors of alternate delivery systems, to help determine the feasibility of converting an entry level course to an alternate delivery method (see Tab 2 for full job description). Specific job responsibilities included:

- with AT&T Marketing Representative Jeanne Hites, determine and initiate data gathering procedures designed to determine customer opinions and concerns regarding the use of alternate delivery methods;
- with AT&T Subject Matter Experts, help determine what course materials are most conducive to conversion;
- through information obtained from Product Line Management, help determine how alternate delivery strategies will interact with future product plans;
- with information from internal AT&T resources and outside vendors, help determine which delivery system best fits the needs of customers;
- present a written report of the findings of these studies to the Project Manager and the project team on June 17, 1988.

I began my internship on Monday, May 9, 1988, and concluded on Friday, June 17, 1988.

## SPECIFIC ACTIVITIES

During my internship, I kept a daily log of the activities in which I engaged and the information I learned. The following pages contain a summary of that information.

### MONDAY, MAY 9

After a tour of the facilities and brief introductions to members of the project team, I attended the introduction/overview of the target course for this project, ES5010: 5ESS SWITCH ELEMENTS . This is a technical course, whose target population is internal personnel and external customers who have at least 2 years of experience in telephony, and are newly appointed to a switch administration position. The course lasts five days, culminating in a lab exercise which requires the students work through a series of exercises using the switching equipment.

From the questions that some students asked, I realized that not all of the students in the class had the necessary background knowledge to understand the material. I wondered if that is true most of the time this course is taught.

The phones are out in much of the Chicago area because of the fire in the Hinsdale switching office. We are unable to make local and long distance calls. It is ironic to be working for the phone company and not be able to make phone calls.

#### TUESDAY, MAY 10

This morning I met with Jeanne Hites, the Instructional Technologist (IT) who is responsible for marketing research at Hickory Ridge. She asked me to review and make improvements on a draft of the Training Delivery Survey she had put together (see Tab 3 for final draft). The survey is to be sent to customers selected by the Customer Advisory Committee. The purposes of the survey are to explore the needs of customers for training on switching products, and to explore customers' reaction to and desire for alternate delivery strategies. I made a few suggestions for improvement of the format and grammar.

Jeanne asked me to participate in two customer focus groups she is planning. I have never seen or participated in a focus group and am eager to do so.

Later in the morning I met with two of the Subject Matter Experts to discuss their ideas about alternate delivery strategies. I had developed a list of questions to ask them, including which parts of the course they felt were most conducive to conversion to another form of delivery. The SMEs were very helpful and cooperative. They agreed to write their suggestions and get back to me. These meetings made me realize how important it is for an IT to have well-developed interpersonal and consulting skills. The SMEs can make our jobs as easy or difficult as they like, by giving or taking away their cooperation. However, the people on this project team are eager to use whatever delivery strategy best meets the needs of the customer, and everyone is highly cooperative.

The afternoon was spent reading some of the literature on alternate delivery alternatives that Bill Wardlaw had given me. I began my outline of the advantages, disadvantages, cost, and development time of the various alternatives.

#### WEDNESDAY, MAY 11

I spent most of the day meeting with Tom Piekarczyk, the IT who started the project and then took another job within the company. Tom gave me the "history" of the project, and explained the interaction between the AT&T training groups at Dublin, OH, Cincinnati, and HRCC. Tom believed that because Cincinnati had success using computers to train craft personnel, management was pushing other training facilities to try CBT. The nature of the course at HRCC is different,

as are the audiences. Our job is to look for the best alternate delivery method, regardless of subtle pressure we may get to recommend conversion to CBT. Tom's comments were quite helpful. He gave me insights into some of the politics of the project.

This evening, I attended the first of two focus groups that Jeanne organized. I listened as Jeanne demonstrated one of AT&T's CBT products and asked the audience questions about their desire to use CBT or other electronic, self-paced methods of delivery. After the demonstration, most of the students said they would use CBT, but said they would miss the live interaction with the instructor and other students.

#### THURSDAY, MAY 12

I spent most of the day reading research on the delivery methods, and making notes for my final presentation and report. I met the librarian who works at HRCC. She explained the AT&T library system, and helped me track down some of the resources I wanted. I was surprised that there are not many books about instructional development in the system. Articles that have been written by AT&T personnel are available, but there are few others.

Jean Airey, one of the SMEs, gave me her ideas about the course and conversion. At this point I have met with all of the SMEs. They believe that the course could be taught in self-paced modules, using some type of video or graphics to help explain some concepts.

#### FRIDAY, MAY 13

This morning I attended the 5010 lab exercises. There isn't any actual manipulation of components. The exercises require the learners to locate and identify parts of the equipment, and explain some concepts. It seems to me that actually being in the lab is a "nice to have" experience, but not necessary to master the course content. The students really seemed to enjoy it.

I spent most of the afternoon reading AT&T research on CBT, and began outlining my report. One of the other ITs gave me a copy of the AT&T guidelines for writing reports.

#### MONDAY, MAY 16

Long distance phone service is still out, and probably won't be up for another week or two. I need to talk with people from Corporate in New Jersey about the future of the product line, and their vision of training in the future. I wrote letters to these people requesting information for our project.

Jeanne and I met to review the marketing survey before it goes out. It is ready to be printed, but the mailing list can't be sent to our computers until the phones are up. If the phone aren't working by

Friday, we are going to have hard copies of the mailing list sent to us, and we will have to go through the lists manually to get the names we want. We have really come to rely on technology.

In the afternoon I met with one of the computer experts, Robert Hamann (see summary of meetings and interviews, Tab 4). He is an expert on the 3B20D computer and has evaluated the ACE system for AT&T. The ACE stands for Automatic Courseware Expert, an integrated work station developed by Elron Technologies. The system uses artificial intelligence to develop and produce CBT in about half the normal time. AT&T is evaluating the system for possible purchase. Hamann suggested I contact Mike Puscas to see the ACE system in action.

#### TUESDAY, MAY 17

Met with Mike Puscas for demonstration of the ACE system (see summary of meetings and interviews, Tab 4). Mike demonstrated the ease with which screens can be created and linked, but said the system has several problems that indicate it is not ready for commercial use. He is going to recommend that AT&T not invest in the system at this time. In my opinion, the two main drawbacks of the system are: 1) it isn't able to do complex branching; and, 2) the system is not designed to be interactive. This system would not be appropriate for the purposes of our current project.

Had a focus group planning meeting with Jeanne Hites. During the next focus group I will take a more active role in helping to elicit and clarify customer's comments. Also spent some time reading AT&T's booklet on the capabilities and uses of CBT.

#### WEDNESDAY, MAY 18

Today's project was to gather information about the cost of delivery strategies and develop cost projections. I used AT&T guidelines and industry averages to draw up the draft. I am amazed at the amount of time and money that go into the development stage of the project. I thought implementation would be the most costly part of the project, but it is not, and some of these costs are absorbed by the customer.

#### THURSDAY, MAY 19

Applied Learning International is giving a demonstration of their interactive video programs next week. I gathered information about IVI and spent the morning reading and developing questions for the ALI representative. I listened to the audio tape of the focus group meeting I was unable to attend and took notes. Also, met with two of the SMEs to update them on my research, the vendor, and hear their comments about the project to date.



FRIDAY, MAY 20

The phones are still down, and the project is at a standstill as we wait for responses to our letters requesting information and our mailing list.

Beth Phillips, one of the ITs who designs CBT at the Dublin training facility, was in town. The Dublin facility may be doing the production of our course if we decide on CBT. Beth met with me and Jeanne to discuss the appropriateness of the content of the course for conversion to CBT. One of the problems with converting our course to CBT is that about half the content changes every 9 months. The cost of development could be too great. However, Beth seemed to think that it could be done in a cost efficient manner. Tom P. had warned me that the people in Dublin would be quite eager to try to convert this course - they would get the experience and the glory if it worked. We would get the blame if it didn't. We arranged for a conference call next week between designers at Dublin and members of our project team.

Jeanne and I went to the afternoon meeting of the Chicago Chapter of NSPI. The topic was evaluating project management software. This was my first exposure to project management. It was interesting to see the variety of software packages and listen to the audience ask questions. People were from all types and sizes of businesses, with a variety of needs. Project management is an area I need to understand better.

MONDAY, MAY 23

ALI gave their demonstration and pitch for using IVI and their people to develop it (see summary of meetings and interviews, Tab 4). We set the IVI system up in one of the offices so that instructors and ITs at HRCC could test it and comment on it during the coming week. I spent the morning evaluating the packages they brought, to get an idea of the type of programming they do. It seemed to me to be a lot of "talking head", with very little interaction. Most of the "interaction" was in selecting the next branch of the program to view. I was not impressed by the programs they left us to view, but the medium seems to have a lot of potential. The trick will be to get a good fit between the content and the medium.

The new IT started today. I spent the afternoon sharing information about the project with him. It is nice to have on board the IT who will be doing the design work for this project. Dave had been working at ALI, as a computer program designer and developer.

TUESDAY, MAY 24

This morning we had our conference call with the programmers from the AT&T training group in Dublin, OH (see summaries of meetings and interviews, Tab 4). Bob and Beth discussed the nature of the course into which they recently incorporated CBT. They still use paper and have instructors on site to help students solve problems and answer

questions. They gave us valuable information, but their situation is different from ours. First our audiences are the very different, our content is more volatile, and we are seriously considering removing the necessity of an instructor. Overall, the student evaluations have been positive. A formal evaluation is planned for later in the summer.

Also, Bob gave us a summary of information they have received from the Customer Advisory Group. First, customers like CBT, but want to have it at their location. Second, they want it to run on the equipment they already have (3B20Ds, AT&T 6300's and compatibles with 640K). Third, customers want a modular curriculum, so they can take it in segments, as their schedule allows. Finally, customers want to know the bottom line cost for the training package - not the pieces of information.

In the afternoon, I met with Dave to discuss where we go from here. He needs some time to catch-up on what has gone on to date. Next week he is going to begin the content analysis, to give us more information and insights on what to do. I am going to continue researching alternate deliveries, and working with Jeanne Hites.

In the evening, Jeanne and I conducted the last focus group. This group confirmed what the other groups said: they would like CBT but would miss coming to HRCC and interacting with the instructor and other students. Another concern that has arisen is that if the training were on CBT, and could be taken at their office, they might never get to it. Other concerns and problems would interrupt them while they were trying to get through the training package.

#### WEDNESDAY, MAY 25

Spent the morning with Tom and Dave, filling in Dave on what has been happening with the project in the last six months. Composed summary of meetings with SMEs (see summaries of meetings and interviews, Tab 4).

#### THURSDAY, MAY 26

In the morning Jeanne, Dave, Bill, and I met to review what had been done to date. We have set-up a visit to the computer teletraining facility in Downer's Grove for tomorrow. We want to see an example of the computer teletraining that is being done and talk with instructors about it.

I spent the afternoon reading teletraining surveys from Cincinnati.

#### FRIDAY, MAY 27

Jeanne, Dave, and I went to Downer's Grove to visit the AT&T teletraining facility (see summaries of meetings and interviews, Tab 4). This facility transmits and receives audiographic

teleconferences. One of the instructors demonstrated the system. At present there are 58 locations hooked up to the Alliance network through which the courses are transmitted. At this point, all of the graphics transmitted are still life, movement hasn't been perfected yet. If the instructor creates a graphic during the instruction, it takes about 90 seconds to send the picture to the other sites. However, the quality of the transmission has been very good.

The instructor with whom we talked said that the feedback they have received on this medium is mixed. Students get bored after 2-3 hours. Many students have said they would rather travel to the instructor to get the information face-to-face. In it's current format the system does seem to work well for short, "information-dump" type presentations.

Dave and I met in the afternoon to discuss the project. He wants me to begin to research computer authoring systems. I don't know much about authoring systems. He seems to think that we will recommend putting part of the course of CBT and want to have as much information about which authoring system to recommend.

#### MONDAY, MAY 31

Dave, Bill, and I met to discuss the final report that Bill would like for us to have ready on June 17. We will be presenting the information to the project team and other instructors. Then the group will discuss the options and come up with a recommendation to Present to Product Management (our funding group). Typed notes on visit to teletraining facility, and reviewed marketing survey. The phones are in better shape. Some calls are going through. Later in the week we hope to be able to talk with AT&T people at other locations.

#### TUESDAY, JUNE 1

I compiled the first draft of the delivery strategies chart, and outlined my comments for the final report and presentation. I read the documentation on the Customer Advisory Groups. These groups help AT&T gather information about customers of AT&T products so that AT&T can better meet the needs of customers. These groups are a great source of information, however, it takes a few weeks to get information from them. You really have to plan ahead if you want input from them.

#### WEDNESDAY, JUNE 2

Spent the day updating the delivery strategies documents and outlining recommendations for which medium to choose.

THURSDAY, JUNE 3

Today I got a copy of Gagne and Reiser's book on media selection. Read through it for insights into our selection case. The basic information is helpful, but we still have questions that are unanswered, such as: 1) Do we want a central broadcast?; and, 2) Do we want the course to be totally self-instruction? Our most important criteria for selecting the medium are that the training should be less expensive to the customer than it is now, and customers should be able to receive the training in a timely fashion. Currently, a customer may have to wait up to six months to get into the course.

We finally got our mailing lists for the marketing survey. I helped get the packets ready to be mailed. We are two weeks behind in getting this out.

MONDAY, JUNE 6

ALI sent us more information about IVI. I read this and pulled out information for the final report.

Began working on estimating the costs of each delivery method. Read several articles, and called internal and external sources to get current price quotes.

Talked with a man named Travis Piper. He owns a company called Creative Approaches, INC., based in East Bloomfield, NY. They have developed a program called Creative Course Writer which takes word processed text, questions, and application simulations into IIPS and PHEONIX presentation system code. They can also convert word processor images of on-line application screens to mainframe executable formats. Piper says it takes less than half the normal time to develop CBT using this system, and updates are quite easy. He is sending us some information.

TUESDAY, JUNE 7

Spent most of the day reading articles on IVI, and computers. Updated delivery strategies document.

WEDNESDAY, JUNE 8

While reading AT&T newsletters, I decided to call Linda Shatzer. Linda has put together several satellite teletraining sessions for AT&T. Satellite teletraining sounds like it might be an option for some of the courses here, but perhaps not for our current target course. Met with Bill Wardlaw to tell him what I had found out about satellite teletraining, and he told me to continue to research it.

THURSDAY, JUNE 9

Today I called several external vendors to get information about equipment needed and costs associated with satellite transmission of a course. This is very costly, but allows users to reach a great number of people at one time. Found out that AT&T has three main broadcast facilities. The cost of using the facilities and the personnel varies, but the basic cost of the satellite transponder is constant. The least costly, and most flexible facilities seem to be those in Golden, CO.

FRIDAY, JUNE 10

For the next few days, my job is to gather as much information as I can about satellite teletraining. Bill thinks this is a viable option for some of the courses with an extremely high demand and only two instructors. I talked with Carl and Rose Wruck who run the VBS facility in Golden. They are sending us information about the facilities and what they need to broadcast, including guidelines for instructional materials that will be used during the broadcast.

Joe Harris has been appointed to head the satellite transmission project team. He asked me if I would be a part of the team, even after my internship is over. I told him I would like to, if I could work part-time from Bloomington.

MONDAY, JUNE 13

Today I prepared part of the CBT for the presentation on Friday. Met with Joe and Bill to discuss plans for the first satellite transmission. Helped Joe develop the project plan. Reviewed some videotapes of VBS broadcasts. Not much will have to be done to some of our courses to make them ready for satellite transmission. Some of the overheads may need to be redone, and a few wall-charts should be enlarged.

TUESDAY, JUNE 14

All morning meeting with Jeanne and Dave to prepare for Friday's presentation. All afternoon meeting with Joe Harris to finalize satellite project plan.

WEDNESDAY, JUNE 15

Spent the day reading the VBS information sent to us by the Wrucks. They sent 15+ articles on the uses of satellite transmission in business and industry.

THURSDAY, JUNE 16

Put finishing touches on the CBT presentation for tomorrow.  
Reviewed video tapes of VBS broadcasts.

FRIDAY, JUNE 17

Presented delivery methods information and report in the team meeting (see Tab 5). After hearing the marketing research, content analysis information, and delivery methods, the team decided to recommend the course be restructured into modules, and converted to self-paced text, with a CBT diagnostic (to run on a PC) to help the learner determine which modules s/he should use. Having the diagnostic on floppy disk will allow several people to use it, and help a company keep track of who needs what training.

FRIDAY, JULY 15

Because Bill Wardlaw was either out-of-town or in a meeting most of the last week I was at HRCC, we were unable to complete my final evaluation until July. Bill and I met for an hour to discuss my experience, and the possibility of my continued employment with AT&T. Bill Wardlaw's formal evaluation of my performance is located under Tab 6.

SUMMARY

This internship provided me with more information and experience than I had imagined it would. First, I learned that the process of instructional development does not follow the neat, linear chart presented by Dick and Carey. We were working on several part of this project at once, sometimes alone, sometimes in groups. Personal and professional schedules, unexpected circumstances (such as the phone being out for three weeks), and other considerations, make a nice linear approach to problem solving impossible.

One of the best things about the project was actively participating in a Corporate Education and Training project team. Bill Wardlaw, the Project Training Manager, brought me into the project as a full professional member. It was an ideal situation, as the team worked together smoothly, with no sign of personal or professional super-egos. Everyone worked together to find the best possible solution to the problem before us. A great deal of the credit goes to Bill Wardlaw, as he values the input of every member of his department.

Of particular value to me was the experience of working with a content that was totally foreign to me - digital telephone switching equipment. The SMEs helped me learn some of the basic information, so that I could converse semi-intelligently with them and others who need information about the course. I realized that I could become comfortable with a variety of content in a short period of time and do my job well without understanding everything about the content. This experience put me back in touch with the feelings that many students have when they encounter new material.

One area in which I did not expect to become involved was the audience analysis/needs assessment. Helping put together the survey and participating in the focus groups was fun and interesting. I realize now that the audience analysis can be very difficult, especially in situations where detailed information about past and future students is difficult, if not impossible to get. The Customer Advisory Groups provided important information to us, and I would certainly look for this type of group in other settings in which I might work.

Researching and working with technologies that I had not seen before was terrific. I had the chance to try first-hand, and evaluate, the Automatic Courseware Expert system, interactive video instruction, PC teletraining, and satellite teletraining. Researching the development time and production costs of media was a great eye-opener. I did not know this information before I began.

Our mission of reducing the cost to the customer, and getting the information to the customer in a timely fashion, drove the project. However, many people with whom I talked, got caught up in wanting to use CBT or IVI because it was "new and slick". The vendors with whom I talked did a great job of selling their products, they seemed to truly believe in their products, and wanted me to recommend we buy into them. We had to be careful not to fall into the trap of recommending a medium because it was new and interesting.

One of the extra benefits of this internship was attending a meeting of the Chicago chapter of NSPI. Up to this point, I had attended mostly "student" chapter meetings. This meeting was all professionals. The AT&T person I was with introduced me as the intern from Indiana University, and several people came up to me afterward to ask me how several professors were doing, and to tell me that I was getting a great education (which I knew!). The project management software presentation was valuable to me as I was not familiar with project management had never seen any project management software.

During my exit interview with Bill Wardlaw, he graciously provided me with information about Instructional Technologist positions within AT&T. I had noticed that there really wasn't much of a career path for ITs within the company. It seemed to me that an IT has to be really motivated, willing to change geographic locations, and get in on research and development to climb within the company. Many ITs seem to stay in one location for 5 or so years and then move on to another location within the company. Most of the managers and instructors with whom I had contact came from technical background, not from education. This might be different in other parts of the company, but in Chicago, where I hope to locate, this seems to be the case.

Overall, my experience with AT&T was outstanding. The people with whom I worked were true professionals. I had the opportunity to use my talents and skills, and to provide the team with valuable information. I strongly recommend that all students find an opportunity to intern in an area of interest to them. The experience is invaluable, and can lead to unexpected and pleasant outcomes. I am happy to say that AT&T has hired me as a part-time consultant to help develop satellite teletraining courses.



Job Description

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May 6, 1989

## Job Description - CBT Project Front End Analysis

### Background:

In 1988, AT&T Product Training at Hickory Ridge was funded by the product line to investigate and implement if feasible, some form of "alternate delivery" for one of the offered courses. This is in response to customer concerns regarding cost of travel and living, and to better position AT&T product training in the marketplace.

An "entry" course, SESS Switch Elements, was selected as a possible candidate for conversion to "CBT". A course development team was identified consisting of Subject Matter Experts, an Instructional Technologist (new hire) and support clerical staff. The Product Training Manager is identified as the Project Manager, although the day-to-day direction of the project is the job of the Instructional Technologist.

A large amount of "up-front" market and technical analysis has been identified.

This position will be responsible for working with members of the project team, with marketing representatives, with product line representatives, with CBT internal (AT&T) suppliers, and with vendors of other alternate delivery systems to help determine the feasibility of conversion to some alternate delivery method, and which method best fits the needs of our customers.

The output of this position will be a written report to the Project Manager and the project team.

Specifically, the job responsibilities are:

Determine and initiate, with AT&T Marketing Representatives, data gathering procedures designed to determine customer opinions and concerns regarding use of CBT delivered training.

Help determine, with AT&T Subject Matter Experts, what course or course materials appears to be conducive to conversion to CBT.

Help determine, through information from Product Management, how CBT delivered training will interact with future product plans.

Help determine, with information from internal AT&T resources as well as possible outside CBT vendors, which delivery system best fits the needs of our customer.

Present a written report of the findings of these studies to the Project Manager and to the project team.

Training Delivery Survey

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### TRAINING DELIVERY SURVEY

The intent of this survey is to explore your needs and the needs of your company for training on AT&T switching products delivered using alternative technologies such as computer-based training (CBT), interactive video instruction (IVI) or teletraining. A few minutes of your time will help us serve you better. Thank You.

1. Please describe yourself:

A. Job Function: (Please check one)

- |  |   |
|--|---|
| <input type="checkbox"/> Maintenance Technician                                | <input type="checkbox"/> Electrical Engineering       |
| <input type="checkbox"/> Management - Operations<br>and/or Maintenance Support | <input type="checkbox"/> Long Range Planning          |
| <input type="checkbox"/> Equipment Engineering                                 | <input type="checkbox"/> Current/Operations Planning  |
| <input type="checkbox"/> Building Engineering                                  | <input type="checkbox"/> Sales or Marketing           |
|  | <input type="checkbox"/> Other (Please Specify) _____ |

B. Management Level: (Please check one)

- Craft
- Management - First or second level
- Management - Third level or above

C. Location:

- |                                    |  |
|------------------------------------|--|
| <input type="checkbox"/> Midwest   | <input type="checkbox"/> Pacific Northwest |
| <input type="checkbox"/> South     | <input type="checkbox"/> East              |
| <input type="checkbox"/> Southwest | <input type="checkbox"/> Outside the U.S.  |
| <input type="checkbox"/> West      |  |

D. Company:

- Bell Operating Company
- Independent Telephone Company
- Government
- Other (Please Specify) \_\_\_\_\_

E. Please list your past AT&T training courses:

\_\_\_\_\_

F. Do you plan to take additional AT&T courses? (Circle one) YES NO  
What area? \_\_\_\_\_

G. Please describe your training decisions: (Please check one)

- Someone else decides what training I will take
- I decide what training I will take
- I decide what training I will take and what training my subordinates will take

Comment: \_\_\_\_\_

H. Other switching systems with which you have experience: (Please check as many as apply).

- NTI
- Ericsson
- Siemens
- AT&T (Please specify) \_\_\_\_\_
- Other (Please specify) \_\_\_\_\_

I. Experience with other vendor training:

- A. NTI
  - 1-3 courses
  - 4-6 courses
  - 7 or more courses
- B. Ericsson
  - 1-3 courses
  - 4-6 courses
  - 7 or more courses
- C. Siemens
  - 1-3 courses
  - 4-6 courses
  - 7 or more courses
- D. Other (Please specify) \_\_\_\_\_
  - 1-3 courses
  - 4-6 courses
  - 7 or more courses

2.

Reasons you attended the ES5010 course:

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3. What are the three most important reasons you attend training?

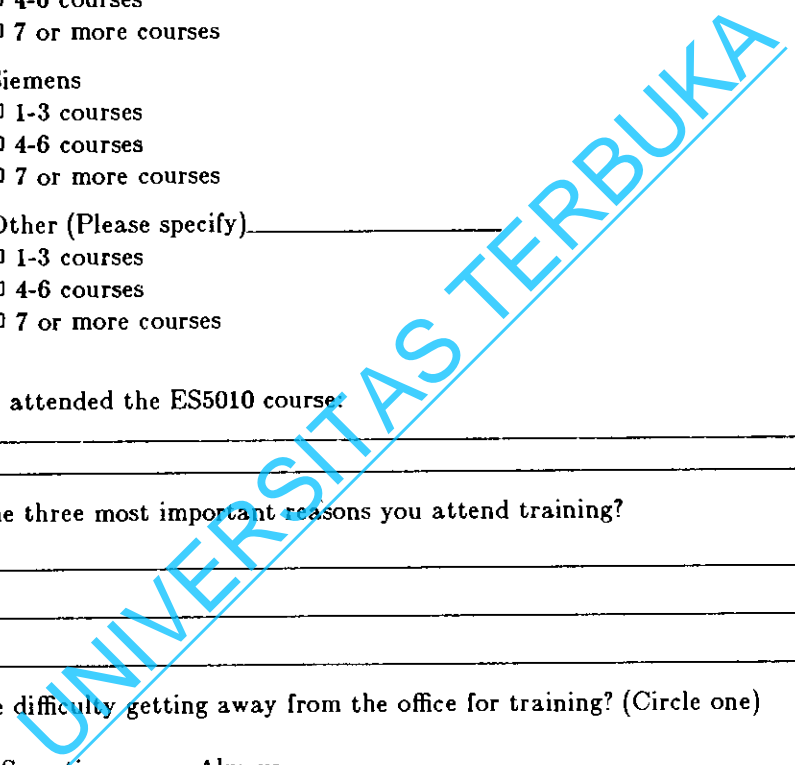
- A. \_\_\_\_\_
- B. \_\_\_\_\_
- C. \_\_\_\_\_

4. Do you have difficulty getting away from the office for training? (Circle one)

Not at all	Sometimes	Always			
1	2	3	4	5	

5. If you took training at your location, would you have difficulty getting the time for training? (Circle one)

Not at all	Sometimes	Always	Don't Know
1	2 3	4 5	6



6. Would you prefer to take training all at once, or in segments as your schedule allows? (Circle one)

All at once    Segments    Doesn't matter  
1                    2                    3

7. Who are your major suppliers of training on switching subjects?

\_\_\_\_\_

\_\_\_\_\_

8. Please check the box that best describes your experiences with training media:

	Tried, would like to try again	Tried, would not try again	Never tried, but would like to try	Never tried, not interested in trying
Computer-Based Training (CBT)				
Interactive Video (IVI)				
Teletraining				

In your opinion, what is best and worst about CBT, IVI or teletraining?

- A. CBT: \_\_\_\_\_
- B. IVI: \_\_\_\_\_
- C. Teletraining: \_\_\_\_\_

9. What factors (such as travel and living expenses) would influence your decision to try training delivered in alternative forms (such as CBT, Teletraining, Interactive Video Instruction)?

\_\_\_\_\_

10. Using alternative training delivery technologies would solve a problem or fill a need for me or my company. (Circle one)

Strongly disagree                      Strongly agree  
1    2    3    4    5

If you agreed, please describe the problem it would solve:

\_\_\_\_\_

\_\_\_\_\_

11. Do you see the need for use of alternative training technologies growing or declining? (Circle one)

Declining            Stable            Growing  
1    2                    3    4                    5

Comment: \_\_\_\_\_



18. Do you presently use a computer on the job? (Circle one)

Never			sometimes	frequently
1	2	3	4	5

19. Is computer equipment available to you at your location or another location for training use? (Circle one)

YES NO Don't Know

20. If so, what type?

- AT&T PC or IBM XT/AT or compatible systems
- AT&T UNIX PC
- AT&T 3B2, etc.
- Terminal with modem (please specify type) \_\_\_\_\_
- Other (please specify) \_\_\_\_\_

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Summaries of  
Meetings and Interviews

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## Summary of discussions of ACE System Beta Test

May, 1988

## I. Overview of the ACE System: Automatic Courseware Expert

A. Developed by: Elron Technologies (a diversified hi-tech holding company)

## B. Description

1. Is an integrated work station
2. Uses artificial intelligence to develop and produce CBT in about half the normal time
3. Components of the system:

- \* DEC VAX Supermini (for artificial intell.)
- \* IBM PC/AT input/output computer (for images input and disk production)
- \* Input video sensor (for automatic entering of screens)
- \* Optical scanner (for automatic entering of line drawings, text, and photographs)

## II. Meeting with Robert Hamann, AT&amp;T 3B2 Computer Subject Matter Expert, HRCC

Date: May 16, 1988

## A. Basic creation procedure using the ACE System:

1. Capture the screens as you want them to look
2. Sequence the screens in proper order
3. Produce the floppy

## B. Disadvantages of ACE System:

1. Only creates floppy disks and can't transfer this to another system (example - mainframe)
2. Is not a fully developed system
  - a. doesn't have the capability to produce IF conditions to students' responses (Bob sees this as a big problem)
  - b. only proceeds on a positive answer, that is, the student has to get the correct answer to continue in the program
3. Must have an IBM compatible system
4. Seems to produce mostly page turning software at this stage
5. Can only put 15 - 20 images (screens) per floppy disk

## C. Advantages:

1. programs can be developed in a relatively short period of time

2. it is easy to add and delete information because the programmer is really building a large data base of material from which to draw
3. Can capture excellent graphics
4. Bob sees that CBT developed with the ACE System might best fit into a classroom situation for review exercises

D. General comments from Bob:

1. At this time the ACE System is not complete enough or interactive enough to be useful to us here
2. We are better off at this time to make video presentations in the classroom

III. Meeting with Mike Puscas, Product Planner, NSC

Date: May 17, 1988

A. Demonstration of the system

B. Some general comments about the system:

1. The system has several problems that indicate to Mike it is not ready for commercial use. These include:
  - a. the system isn't able to do complex branching, it is very linear
  - b. there is "screen flashing" when the screens change, this is very distracting to the user
  - c. the best application at this time would be with procedural information
  - d. the system is not designed to be interactive
2. Mike indicated he would not recommend buying the system at this time even though Elron (the developer) has been very responsive to suggestions. With the plans Elron has outlined for future development, the system could be very good and worth purchasing.

C. Comments on the use of CBT in general

1. Comparison of UNIX and MSDOS

UNIX	MSDOS
multi-user	single user
multi-task	single task
graphics not very good at this time but are being developed	better graphics at this time

\*\* The two systems aren't compatible

2. After looking at our student manual, Mike's recommendation for our course is to take a part of the course that is stable, program it, and pilot test it with the audience.

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NOTES ON APPLIED LEARNING INTERNATIONAL'S PRESENTATION OF IVI  
MAIN PRESENTER: SUSAN WEXLER  
DATE OF PRESENTATION: MAY 23, 1988

#### ON THE VALUE OF IVI:

We remember 25% of what we see  
45% of what we see and hear  
70% of what we see, hear, and do

IVI is designed so that we see, hear, and do.

#### COST OF EQUIPMENT:

Because of corporate discounts, they were hesitant to quote any cost figures. They did, however, quote a price of \$7500 per touch screen for the average single unit buyer.

Also, they would not quote a figure on pressing a master laser disk.

#### GENERAL COMMENTS:

##### Lesson design -

1. placement test for each unit
2. 5-6 minutes of instruction
3. interactive activities

Volatile information is put on floppy disks used in the computer  
Stable information is put on the laser disks

The ALI project website (1988) states that ALI is expanding its instructor-led courses to accommodate a growing demand. When asked about this, Susan said that customers were demanding live instructors for many courses because students like the live interaction.

Susan indicated that in most cases, a multi-media approach to training was most beneficial.

## Conference call notes

RE: 5010 CBT PROJECT - INFORMATION FROM DUBLIN

Date: May 24, 1988

Participants: J. Hites, HRCC  
D. Mendalski, HRCC  
J. Simmons, Intern, HRCC  
Bob Fratini, Dublin (614) 764-5441  
B. Phillips, Dublin

## Information from Bob and Beth:

- Converting part of 5551 to CBT was done when redesigning the curriculum, not adding to what was already there. They were taking a fresh look at course.
- The course incorporates CBT, video, print. It is approximately 60% CBT. 5551 has been on line in this form for about 14 months.
- An instructor is on site as a problem solver and tutor. This is a different role for the instructors. This also allows for more individualized help than instructor-led courses do.
- They use paper as a reference and for volatile material. Students indicated they dislike not having a student guide so they still have a student guide for the course.
- They are not positive that the addition of CBT has reduced training time.
- The development process:
  1. Product Training develops the objectives
  2. CBT designer and Product Training sit down together and develop interactive instruction
- Bob has 3 full-time graphics people working form him and 3 additional people he can bring in.
- They used the UNIX WORKBENCH to create their programs. Graphics are created with a frame creation system that meets NAPLPS graphics standards.
  - Spinoffs are easy to create - approx. 20 - 40 hours of development time needed to create a spinoff

\* ERIC RUMBALSKY IS THE PROJECT MANAGER FOR THE 5E TRAINING GROUP AT DUBLIN. HE CAN ANSWER OTHER QUESTIONS WE MAY HAVE.

Outcomes of CBT training:

- Actual number of training days increased (they believe this is because they have decreased costs and customers can afford to send more people)
- Overall student reaction has been positive to the course. A formal evaluation is planned for this summer.

Information Dublin received from Customer Advisory Groups (meet with them about every 6 months):

1. Customers want CBT delivery but want it to run on the equipment they have: 3B2 and 6300's or PC with computer graphic capabilities 640K
2. Customers like CBT and want it at their location
3. Customers prefer to know the total cost of the training package (including the cost of any equipment they need to purchase) rather than each of the separate costs
4. Customers want a modular curriculum

## NOTES FROM MEETINGS WITH INSTRUCTORS

FINAL DRAFT - JUNE 3, 1988

THE FOLLOWING PARTS OF THE COURSE CONTENT HAVE BEEN IDENTIFIED AS RELATIVELY STABLE BY THE COURSE INSTRUCTORS WHO WERE INTERVIEWED. AN ASTERISK (\*) DENOTES THE MOST STABLE INFORMATION.

- \*1. FUNDAMENTAL DIGITAL CONCEPTS
- \*2. DESIGN PHILOSOPHY OF SWITCH
- \*3. BASIC TERMINOLOGY
- \*4. DATABASE INFORMATION
5. AM LESSON
6. CM LESSON
7. LINE UNIT (RECENTLY CHANGED SO MAY NOT CHANGE AGAIN SOON)
8. DCLU
9. SOFTWARE
10. THE FABRIC OF THE SWITCH
11. DATA AND CONTROL PATHS THROUGH SWITCH
12. PIDB's, PICB's, NCT LINKS

WHEN ASKED WHICH CONCEPTS OR PARTS OF THE COURSE THEY WOULD LIKE TO SEE ANIMATED (EITHER ON VIDEO OR CBT), THE INSTRUCTORS IDENTIFIED FOLLOWING:

1. NCT LINKS
2. CONNECTION OF CALL BETWEEN SWITCHING MODULES
3. FROM THE CM LESSON
  - FOLLOWING CONTROL TIME SLOTS
  - TIME SLOT MOVING THROUGH FABRIC
  - SPACE DIVISION SWITCHING
4. FROM THE SWITCHING MODULE OVERVIEW
  - MOVEMENT OF TIME SLOTS THROUGH MODULE



5. CONTROL UNIT
  - HOW A CALL ACTUALLY MOVES THROUGH
6. REMOTE SWITCHING MODULE
  - FOLLOWING TIME SLOTS THROUGH RSM OVER TI FACILITY, INTO HSM
7. ISDN
  - FOLLOWING TIME SLOT A CONVERSATION BETWEEN 2BRI CUSTOMERS AND PACKET SWITCHED DATA LINK
8. CALL PROCESSING: PULLING ALL OF THE PIECES TOGETHER
9. CONVERSION FROM ANALOG TO DIGITAL
10. TIME SLOT INTERCHANGE
11. AM AND CM SWITCHING MODULES
  - THE GENERAL PHILOSOPHY OF DRIVING CALLS THROUGH
12. CIRCUIT PACKS (MAYBE ACTUAL FOOTAGE OF THE SWITCH AND CIRCUIT PACKS)
13. STANDARD CONCEPTS OF PIDB's AND PICB's
14. A MASTER GRAPHIC WHICH RELATES AM/CM/SM TIME SLOTS, PICBS, PIDBS, TO CALL PROCESSING, USING ANIMATION (INSTRUCTOR SHOULD BE ABLE TO MANIPULATE AND CONTROL THIS GRAPHIC)

#### ON UPDATING THE MATERIALS

Currently, the lead instructor spends about 10 weeks each year, working full-time on updating the course. A little more than half of the material changes with each new GENERIC. We receive a new generic every year.

#### ON PREREQUISITE MATERIALS

At one time there were prerequisite materials, but people didn't do them and they were incorporated back into the course. The prerequisite materials were the equivalent to about 2 hours of instructor led instruction.

### MAJOR PROBLEMS FORESEEN WITH CONVERSION TO CBT

1. The technology in the course is in constant flux.
2. The in-depth information given in the course now, changes about every 3 months.

### IN BREAKING THE COURSE INTO MODULES

1. There is a need for a broad overview version of the course. At least 20% of the people in the course do not need the level of detail taught in 5010 now. However, engineers going on to 5020 and 5030 need the detailed information.

### QUESTIONS ABOUT CONVERSION TO ALTERNATE DELIVERY STRATEGY

1. Who will have continuing responsibility for keeping the program updated?
2. What/who will dictate how and when changes in delivery will be made?
3. How long will it take to update the materials?

### CONCERNS ABOUT CONVERSION TO ALTERNATE DELIVERY STRATEGY

1. We need to keep outdated materials off of the shelf. Example - the CBT project we saw from Dublin is still in use yet it contains outdated information.
2. With teletraining, students might be more reluctant to ask questions than they are in the classroom, because more people will hear and/or see them.
3. We should also offer the course instructor-led for those students who learn best in the traditional classroom environment. Maybe only offer it a few times a year but still keep this as an option for the customer.

## SUGGESTIONS

1. "Let's shorten the course with advanced technology but maintain a 2-3 day instructor-led (not lectured!) offering."
2. "I would love to have videographics for use in the classroom". They would show movement and other information that is essential to understanding how the switch works. This would also decrease the amount of time spent in the classroom because it takes more time to explain some of the concepts than it would take to show them.
3. The lab assignment could be adapted for CBT or video and sent to those people who can't come to HRCC to see the switch (use with suitcase courses).
4. Including an audio component (example: Talking Tutor) with CBT would make the lessons even more effective as students would be hearing the information also. The more senses we use the faster we learn.
5. Troubleshooting could be adapted easily for video.
6. "We should salt the course with WHY we designed the 5ESS this way and HOW its design BENEFITS can best be applied. Perhaps even a module on area planning and general marketing and sales advantages for Telco users."

tes from visit to AT&T's PC Teletraining site in Downer's Grove

*Ed Fromhagen.  
Staff Supervisor*

Date of visit: Friday, May 27, 1988

\* Type of teletraining: PC Teletraining or audiographic teleconferencing

\* Uses Alliance

- can train at all 58 locations that are hooked up to the network

\* Hardware required at each remote site

- PC 6300 with hard disk

- graphics tablet and pen

- a floppy disk containing the program of instruction

- microphone ("hockey puck", number depends on size of group, usually need 2)

Procedures for use

- Hook-up at the time of presentation is handled out of Dublin

- Either the instructor or site coordinator gives instructions on how to use the equipment and guidelines for interaction

\* Nature of instruction

- Instructor does the prompting (instructor-led)

- Tablet is used as a chalkboard (used by both instructor and students)

- If the instructor creates a graphic during the instruction, it takes about 90 seconds to send the picture to the other sites

- At this point in time, all of the graphics are still life. Movement hasn't been perfected yet.

\* Comments from one instructor (Advantages and disadvantages of system)

- The maximum number of sites that Downer's Grove has telecast to at one time is 4 (four).

- ( - Works best with small groups of students at each location so that all students have access to the graphics tablet and keyboard
- ( ( - Students get bored/restless after 2-3 hours of this type of instruction. Would not recommend using it for more than 3 hours at a time.
- It is rather difficult to instruct in this mode as people can leave without the instructor knowing.
- The instructor must develop a system for keeping straight the names and locations of the students
- (( - The quality of transmission has been very good.
- "Students don't like it (PC Teletraining)." They say they would rather go to the instructor or have the instructor come to them.
- "Scheduling can be a nightmare." Have to narrow your audience to those residing in one or two time zones.
- Cuts down on instructor's travel time.
- The system seems to be good for "information dumps", not showing processes.
- ( - Basically Downer's Grove has been using it to convey generic update changes on the 4ESS<sup>m</sup> to audiences within AT&T.

copies: B. Wardlaw  
J. Hites  
D. Mendalski

Corporate's vision for training

Training Resource Council's 4th level Mgrs. are chairing the development of strategy.

All training orgs. will make courses commitments to electronic training - CBT, teletraining, IVI

Every major training org. will work on IVI projects this year, we have internal video production facilities and vendors will be used to help with design.

CBT and IVI are hot

Expert systems such as the intelligent sales system done at Cincinnati Sales and Marketing Ed. Center by Gerry Puterbaugh and Bert Hancock are a new direction.

We are mechanizing training and knowledge support systems for people back on the job. We may be spending as much as three times the cost of training for informal support of untrained people.

IVD - study produced by videodisk company, collected info on competitors and customer training contact STEVE FOREMAN 201-953-6187; he may know more about the study.

CBT - 200-500 hours of development per hour of instruction; IVI \$125,000 - \$150,000 per side of videodisc; 1/2 hour linear IVI instruction can equal 1 afternoon to 1 week of classroom instruction.

Development costs are usually less than 5% of training costs - the rest of the cost is in facilities, administration, so scrimping on development is not wise

CBT: TESS is UNIX BASED, can be networked, changes sent electronically. Updating PC stand-alone training is more of an administrative problem. Contact Tom Musselman, DC, CET MF quality training 609-8960-4011; he delivers stand-alone PC based training - ask him about ease of administration, etc.

TESS can collect data easily, but is not a mainstream technology. Bob Fratinin can give more information about this system.

IVI - Level 3 IVD has a computer. Put parts of course that are most likely to change on CBT diskette or paper.

FUTURE

Digitized Video was developed by Bell Labs (DM Dick Harglit of Whippany, NJ)

Interactive television - started with EPCOT project and used a lot by PR doesn't support a commercial project

Network Operations Center Bedminister: 201-386-4330 , Created a video center - risky for other than PR and one time applications.

Individualized work station specifications - IBM Infowindow  
End-user computing group says it runs fine on the AT&T PC.

The training organization is now decentralized, and there is no indication that it will change. Resources such as support, production, consulting or train-the-trainer may be centralized.

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Final Report for AT&T

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## SUMMARY OF DELIVERY OPTIONS

The best delivery option for any course is determined in part by the nature of the course material, by the needs of the audience, and by the characteristics of the delivery options available. This report focuses on the characteristics of the delivery options available for the ES5010 course and others. Information for this report is taken from a review of literature on delivery options, and from interviews with subject matter experts.

The report is written in an easy to read format, with each delivery option listed separately. In each section, the advantages of the delivery option, or strategy, are listed, then the disadvantages. Next, industry standard guidelines for amount of time needed for development are listed. Fourth and fifth are some production and other cost factors that might play a role in the decision about which delivery option to use. Last are remarks about the medium and it's potential use for the ES5010 case.

Attached to this first report are a summary of the conditions for use of delivery options, notes from meetings with subject matter experts, and a bibliography of the major print resources used to produce this report.

**BRIEF-SUMMARY OF EACH DELIVERY OPTION****PRINT**

Print is the most portable and easily updated delivery option. Although the type and amount of feedback it can provide are limited, it's ease of use as a review or reference guide is a great advantage. A well designed, "user-friendly", print manual can be updated easily and used anywhere.

**INSTRUCTOR-LED**

This delivery option offers the greatest opportunity for interaction between instructors and students. It is the first choice of the students interviewed in the focus groups. This is the quickest way to provide training and make course content updates. The greatest disadvantage of this delivery strategy is that the course continues only at the pace the instructor sets.

**VIDEO-TAPE**

Video tape has the ability to show motion and sound, make abstract concepts concrete with the use of graphics, and is moderately portable. Video-tape can be used in the classroom or as part of a self-study program. Video-tape is not an interactive medium and cannot provide interactive feedback.

## TELETRAINING

There are three types of teletraining: 1. two-way audio (conference calls); 2. PC or audiographic; and, 3. full-motion, one-way video with two-way audio (also called Ku band, or satellite teletraining). Each of these provides immediate interaction between instructor and students. One of the greatest advantages of teletraining is the ability to reach a large number of students at a variety of locations, thus saving travel expenses. The disadvantages of instructor-led delivery apply here.

## COMPUTER-BASED TRAINING

CBT can be delivered in one of two forms - on a PC using floppy discs or on a terminal connected to a mainframe computer. Both have the advantages of being highly interactive, student-paced, and having great branching capabilities, if well designed. One of the greatest disadvantages of CBT is that there is no interaction with a live instructor or other students unless CBT is incorporated into the traditional classroom environment. There is an abundance of poorly designed CBT on the market, and students who have seen some of it may be wary of trying CBT, especially for complex courses such as ES5010.

## INTERACTIVE VIDEO

Interactive video combines sound, touch, and sight to create a very stimulating and appealing approach to learning. Research shows that people are more likely to learn and remember when they involve many senses in the learning process. IVI is self-paced and requires active participation from the learner. Disadvantages include loss of interaction with live instructor and the cost of producing discs.

Several studies that have been conducted using IVI and CBT as delivery strategies, claim great increases in the amount students' learn and retain. Most of these studies take existing instructor-led courses, redesign them (making them highly interactive; including much branching) and then compare students' learning in CBT/IVI courses with learning in instructor-led courses. This is an unfair comparison unless the instructor-led course has been designed to be more interactive also. Otherwise, some of the advantages attributed to the medium are really the advantages of good, interactive design.

## SUMMARY-OF THE CORPORATE PERSPECITVE OF TRAINING

The training organization is currently decentralized and there is no indication that this will change. There is a growing commitment to training via electronic media, primarily teletraining, CBT, and IVI.

## PRELIMINARY CONCLUSIONS

No one delivery option is the answer to all instructional needs. Each has its own strengths and weaknesses, and needs to be considered in light of the type of material to be presented and the audience for whom the course is intended. To meet the need of both the content and the audience, a mixed media approach is recommended.

No matter which delivery option is chosen, the key to success is excellent design of the instruction. The more interactive the design, whether the medium is print or IVI, the better the learning and retention rates will be.

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## SUMMARY OF DELIVERY STRATEGIES

PRINT

- Advantages:
- \* Can be thorough
  - \* Portable
  - \* Easy to review
  - \* Self-paced
  - \* Easily updated
  - \* No equipment required for use
  - \* Easy random access
- Disadvantages:
- \* Limited feedback on performance
  - \* Can't show motion or sound
- Time to produce: \* 80 - 100 hours per hour of instruction
- Cost to produce: \* Low (\$7.50 per page approx.)
- REMARKS: One of the greatest advantages of print is it's ease of use as a review or reference guide. A well designed, "user friendly", manual can be updated easily and used anywhere.

INSTRUCTOR-LED TRAINING

- Advantages:
- \* Live interaction between instructor(s) and students
  - \* Immediate feedback
  - \* Course content can be updated quickly
  - \* Can be used in conjunction with other forms of media
  - \* Can encourage student participation
  - \* Quickest way to provide training
  - \* Many forms of media can be incorporated in the classroom
- Disadvantages:
- \* Course continues at one pace
  - \* To provide courses at remote sites, must send an instructor (unless course is televised - see teletraining section below)
  - \* Shortage of instructors for popular courses

- Conditions for use:           \* Several instructors must be available  
                                   \* Students must be located at the training site
- Development time:       \* 20 - 60 hours of development for every hour of delivery
- Development cost:       Depends on number of hours being delivered.
- REMARKS:                 Focus groups revealed that, in general, students prefer to have a live instructor available to answer questions and provide feedback rather than relying solely on some form media for instruction and feedback. Students like to hear other students' questions and they learn from interaction with each other.

#### VIDEO-TAPE

- Advantages:             \* Motion can be illustrated  
                                   \* Can make abstract concepts concrete through pictures and motion  
                                   \* Can alter time and distance (close-ups, slow-motion)  
                                   \* Moderately portable  
                                   \* Can be used in the classroom or as self-study  
                                   \* Easy to review
- Disadvantages:         \* Limited feedback  
                                   \* Requires a tape player for use
- Conditions for use:     \* Competent video specialists available for production
- Time to produce:       \* Approximately 100 hours for every hour of delivery

Cost to produce: Bell Labs quoted a figure of approximately \$500 - \$1000 per finished minute. Industry prices are double that in the Chicago area.

Remarks: The instructors of 5010 indicated that several parts of this course would be easier and quicker to learn and teach if they could be shown on video (see notes from discussions with instructors). This includes showing concepts that are invisible to the eye but could be more easily understood if seen.

### TELETRAINING

Advantages:

- \* Provides immediate interaction between instructor(s) and students
- \* Can train students in many locations at once
- \* Course content can be updated quickly
- \* Can use other media (video, CBT) in conjunction with teletraining
- \* Only a few SMEs need to be available

Disadvantages:

- \* Hardware and technical support must be available (in accordance with type of teletraining used)
- \* Need on site coordination and support
- \* Instructor controls the pace

Conditions for use:

- \* Hardware and technical support must be available at each remote site
- \* Instructors need to be trained in use of teletraining

Development time: \* 40 - 80 hours for every hour of delivery

Development cost: Depends on number of hours being delivered

Related costs: \$1500 total cost per hour of satellite transmission (using AT&T facilities in Golden, CO)

REMARKS: Several types of teletraining are available including two-way audio, audiographic, and two-way audio with one-way video.

One AT&T instructor, who has delivered audio-graphic (PC) teletraining from Downer's Grove, said that students have told him that they do not like it - they would rather go to the instructor's location or have the instructor come to them.

Satellite teletraining (one-way video, two-way audio) can have all of the advantages of live instruction, plus, it enables the instructor to deliver instruction to students at several locations. This reduces the cost to the student, by eliminating travel costs and reducing time away from the job.

### COMPUTER BASED TRAINING

#### Advantages:

- \* Requires active participation
- \* Student-paced
- \* Provides standardized training to large audiences
- \* Can provide feedback and branching
- \* Can keep student achievement record
- \* Motion can be illustrated
- \* Sound is available
- \* Can be delivered to students in different locations
- \* Record keeping available

#### Disadvantages:

- \* Not recommended for use with content material that is likely to change in the near future (See development time)
- \* Can become "automatic page turning if not well designed
- \* Special equipment required for use
- \* Can be extremely costly to develop and update
- \* Requires much time to develop
- \* Feedback is limited
- \* Lose group interaction

#### Conditions for use:

- \* Competent CBT specialists available for production
- \* Adequate development time is available
- \* Computer hardware is available in different locations

- Time to produce: \* High (Approx. 150-300 hours for every hour of delivery)
- Cost to produce: \* High (depends on number of hours being delivered)
- Related costs: \* Cost of PC's or Mainframe system

## REMARKS:

CBT takes a lot time to develop, thus is costly. Therefore, it is not recommended for use with material that changes quickly. However, several new developments in computer usage are making development quicker and easier. For example, Creative Approaches, INC. in NY (716-657-7578) has developed a system that takes a word processed file and converts it to CBT. The resulting CBT lesson is as interactive and capable of branching as the write of the file made it. This can be done for either mainframe or PC application.

The AT&T training facility in Dublin, OH has had success with the courses into which they have incorporated CBT. The nature of the courses taught at Dublin is different from those taught at HRCC as is the audience. Dublin has incorporated CBT into the classroom, with a live instructor on site acting as a tutor and troubleshooter. In addition to CBT, print and video materials are used in these classes. Classes are held at regional training centers which have the necessary hardware in place.

CBT can be designed for either PC or mainframe use. Each has its own advantages and disadvantages. For instance, PCs are common in offices of all sizes, while mainframe systems are not often found in smaller businesses. Floppy discs are portable and give the user 24 hour access to the material (as long as a PC is available 24 hours a day). Mainframe instruction is easier to administer in many ways, especially when up-dating material. The new program is simply loaded into the mainframe and the old program is erased. Out of date floppy discs are often difficult to collect. Mainframe instruction offers the distributor greater control over who has access to the information.



INTERACTIVE VIDEO

- Advantages:
- \* Requires active participation
  - \* Student-paced
  - \* Provides feedback and branching
  - \* Motion can be illustrated
  - \* Provides sound
  - \* Can keep student records
  - \* Can include actual pictures
  - \* Record keeping available
- Disadvantages:
- \* Not recommended for course material that changes quickly (see development time)
  - \* Special equipment required for use
  - \* Costly to develop and update
  - \* Requires much time to develop
- Conditions for use:
- \* Adequate budget and development time must be available
  - \* IVI equipment must be available
- Development time: High (150 - 300+ hours for every hour of delivery)
- Development cost: High (depends on number of hours being delivered)
- Related Costs: Cost of testing and pressing one master disc ranges from \$2100 - \$2600 (price quoted by member of IICS - International Interactive Communications Society). Cost of each user disc (pressed from the master disc) ranges from \$50 - \$25 depending on the number of user discs pressed.
- Applied Learning International quoted a price of a complete IVI system (PC, laser discplayer, and special PC board) at \$9950. The price of upgrading a PC to an IVI system was \$4700. Corporate discounts and other "special deals" are available.
- REMARKS:
- Some of the same reservations that exist with CBT exist here. Course materials that are highly interactive make the most efficient and effective use of this medium.
- A major drawback to IVI is the cost. One side of one video disc can hold between 15 and 60 minutes worth of instruction. The rest of the space on the disc is devoted to menus, practice questions, test questions, and record

keeping functions. Because the amount of time equipment takes to read a disc increases if both sides of the disc are used, one vendor, ALI, recommended only using one side of each disc.

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## CONCLUSIONS AND RECOMMENDATIONS:

Information about delivery options must be combined with information about the needs and wants of the audience and the nature of the content of the course. Preliminary information from customers indicates a preference for delivery options that offer interaction with instructors and other students, and a desire to have the option of taking the course as self-paced study. A combination of self-paced and instructor-led was the preference indicated in the focus groups.

The content of ES5010 falls into the category of intellectual skill. That is, it requires the learner to perform unique cognitive activities (discriminations, learning concepts, applying rules, problem solving) as opposed to performing a physical activity, changing an attitude, or engaging in specific activities in response to specific stimuli. For learning intellectual skills, interactive instruction is recommended (Dick & Carey, 1985).

However, roughly half of the content of ES5010 changes every year. This would make development and production time quite high for interactive media such as IVI and CBT. In its present form, the course is not highly interactive.

No one delivery strategy is the answer to all instructional needs. Each has its own strengths and weaknesses depending on the type of information presented and the audience. To meet the needs of both the material and the audience, a combination of delivery options is recommended.

For example, the most stable concepts, the overview, and some of the terminology could be adapted for CBT (floppy disks) or self-paced print.

These could be sent to students for completion at work or at home, as the first part of the course or the "first course" in the 5ESS Switching System Curriculum. A self-administered post test could be given on CBT. When mastery level had been reached, the students would call AT&T and register for the "second course" in the curriculum.

The "second course" would include the volatile information about the Switch. The number of days the course runs would be reduced in accordance with the amount of information provided to the student in the "first course" (self-paced section). Sections of the instructor-led course that discuss movement could be animated using CBT or video, as recommended by the instructors. Attending this course would give the students the interaction they want with the instructor and other students. Also, it would provide students with the opportunity to get answers to their questions about real life problems and situations.

This "second course" could be televised (recommend two-way audio with one or two-way video) to reach the students close to their place of work and home, thus further reducing the cost to the customer.

TRAINING DELIVERY STRATEGIES:  
 CONDITIONS FOR USE AND ESTIMATED DEVELOPMENT TIME

## STRATEGY

## CONDITIONS FOR USE

INSTRUCTOR-LED  
TRAINING

- + SEVERAL INSTRUCTORS ARE AVAILABLE
- + COURSE CONTENT IS LIKELY TO CHANGE
- + TRAINING IS NEEDED URGENTLY
- ? BUDGET IS LIMITED
- ONLY A LIMITED NUMBER OF STUDENTS TO BE TRAINED
- STUDENTS ARE LOCATED AT THE TRAINING SITE
- \*\* 20 - 60 HOURS OF DEVELOPMENT TIME FOR EVERY HOUR OF DELIVERY.

## ELETRAINING

- + SEVERAL STUDENTS NEED TO BE TRAINED
- + STUDENTS ARE LOCATED IN DIFFERENT REMOTE AREAS
- + COURSE CONTENT IS LIKELY TO CHANGE IN NEAR FUTURE
- + OBSERVATION OF STUDENT PERFORMANCE IS NOT REQUIRED
- + ONLY A FEW SMEs ARE AVAILABLE
- ? HARDWARE AND TECHNICAL PERSONNEL ARE AVAILABLE
- ? LOCAL LOGISTIC AND INSTRUCTIONAL SUPPORT ARE AVAILABLE
- \*\* 40 - 80 HOURS OF DEVELOPMENT TIME FOR EVERY HOUR OF DELIVERY

COMPUTER-BASED  
TRAINING

- + COMPETENT CBT SPECIALISTS AND OTHER PERSONNEL ARE AVAILABLE
- + STUDENTS ARE LOCATED IN DIFFERENT AREAS
- + ADEQUATE DEVELOPMENT TIME IS AVAILABLE
- ? COMPUTER HARDWARE IS AVAILABLE IN DIFFERENT LOCATIONS

## CBT (CONT.)

- CONTENT IS NOT LIKELY TO CHANGE IN NEAR FUTURE
  - JOB IS CRITICAL, REQUIRES MASTERY BEFORE PERFORMANCE IN LIVE ENVIRONMENT
  - JOB IS DANGEROUS TO LEARN IN LIVE ENVIRONMENT
- \*\* 100 - 300 HOURS OF DEVELOPMENT TIME FOR ONE HOUR OF DELIVERY

## INTERACTIVE VIDEO

- + COMPETENT IV SPECIALISTS AND OTHER PRODUCTION SPECIALISTS ARE AVAILABLE
  - + STUDENTS ARE LOCATED IN DIFFERENT GEOGRAPHICAL AREAS
  - ? ADEQUATE BUDGET IS AVAILABLE
  - ? ADEQUATE DEVELOPMENT TIME IS AVAILABLE
  - CONTENT IS NOT LIKELY TO CHANGE IN NEAR FUTURE
  - INTERACTIVE VIDEO EQUIPMENT IS AVAILABLE AT DIFFERENT LOCATIONS
  - JOB IS CRITICAL, REQUIRING MASTERY BEFORE PERFORMANCE IN A LIVE ENVIRONMENT
  - JOB IS DANGEROUS TO LEARN IN A LIVE ENVIRONMENT
- \*\* 150 - 300+ HOURS OF DEVELOPMENT TIME FOR ONE HOUR OF DELIVERY

The symbols (+), (-), and (?), indicate factors that are plusses, minusses, and questions in the 5010 CBT case.

\*\* AMOUNT OF TIME NEEDED FOR MAJOR UPDATES IS APPROXIMATELY HALF THE TIME NEEDED FOR ORIGINAL DEVELOPMENT.

Based in part on information presented in:

AT&T TRAINING DEVELOPMENT PLANNING AND QUALITY CONTROL GUIDE. ISSUE 1, JANUARY 1988.

	VIDEOTAPE	COMPUTER-BASED TRAINING
ADVANTAGES	<ul style="list-style-type: none"> <li>- Motion and sound</li> <li>- Can alter time and distance (slow motion)</li> <li>- Can be used in classroom or self-study</li> <li>- Portable</li> </ul>	<ul style="list-style-type: none"> <li>- Requires active participation</li> <li>- Student-paced</li> <li>- Can provide feedback and branching</li> <li>- Motion and sound</li> <li>- Mainframe or PC</li> <li>- Standardizes training for large audience</li> </ul>
DISADVANTAGES	<ul style="list-style-type: none"> <li>- Limited feedback</li> <li>- Requires tape player</li> </ul>	<ul style="list-style-type: none"> <li>- Special equipment requ.</li> <li>- Lose group interaction</li> <li>- Requires much time to develop and update</li> <li>- NOT RECOMMENDED FOR USE WITH VOLATILE CONTENT MATERIAL</li> <li>- CAN BECOME "AUTOMATIC PAGE" TURNING IF NOT WELL DESIGNED</li> </ul>
DEVELOPMENT TIME	100 hours per hour of delivery	150 - 300 per hour of delivery
COST FACTORS	\$300/hour production (using AT&T production in Golden, CO) \$50/min to \$100,000/min depending on use of professional actors, music, graphics, etc.	Cost of PCs or Mainframe system

	INTERACTIVE VIDEO	TELETRAINING
ADVANTAGES	<ul style="list-style-type: none"> <li>- Student-paced</li> <li>- Feedback and branching</li> <li>- Motion and sound</li> <li>- Active participation required from student</li> </ul>	<ul style="list-style-type: none"> <li>- Interaction with live instructor</li> <li>- Interaction with other students</li> <li>- Content can be quickly updated</li> <li>- Can increase number of student days</li> <li>- Can broadcast to several sites at once</li> </ul>
DISADVANTAGES	<ul style="list-style-type: none"> <li>- NOT RECOMMENDED FOR VOLATILE CONTENT</li> <li>- Special equipment required</li> <li>- Requires much time to develop</li> <li>- Lose student/instructor interaction</li> <li>- Can only put a few minutes worth of instruction on each disc*</li> </ul>	<ul style="list-style-type: none"> <li>- Hardware and technical support must be avail. at each remote site</li> <li>- Instructor controls pace</li> </ul>
DEVELOPMENT TIME	150 - 300+hours/hour of delivery	40 - 80 hours/hour of delivery
COST FACTORS	<ul style="list-style-type: none"> <li>*\$2,100 - \$2,600 for one clean master disk</li> <li>\$9,500 for complete play-back system</li> <li>\$4,700 for upgrade equip.</li> </ul>	\$1,500 total cost per hour of transmission (using AT&T facilities in Golden, CO)

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AT&Ts Evaluation

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This is the final evaluation of me who worked for AT&T as Summer Intern during the summer of 1988. Ario was asked to assist with a project involving conversion of an existing instructor-led course to some alternative delivery strategy.

Ario quickly immersed himself in the the project. Although working in a strange environment, he rapidly established a network of research, and organized his work in a manner that made maximum use of the short time he would be with us.

The project came to resolution before he left. In addition, he became involved in an offspring of the original project which was the decision to sattelite deliver closed circuit TV presentation of one of our courses to customers on the East Coast. This involved a whole new set of inputs and research. Ario bought into this project with much enthusiasm and energy.

Ario was a welcome addition to my staff this summer. Following were the objectives I set out for Ario, and the results of each objective. Overall, Ario performed in a very professional manner, her work was complete and objective, completed on time and well presented to the team.

#### OBJECTIVES

Determine and initiative, with AT&T Marketing Representatives, data gathering procedures designed to determine customer opinions and concern regarding use of CBT delivered training.

Ario assisted with two "focus group" interviews conducted at Hickory Ridge. The purpose of the focus group interviews was to identify and clarify issues that should be included in a customer survey. Upon Ario's arrival at Hickory Ridge, the Marketing Specialist had already begun to establish the basis parameters of both the focus groups, and the customer surveys. Ario's participation in this particular activity was essentially that of reviewing customer feedback, summarizing, and refocusing the groups efforts on their objectives

Feedback from the Marketing Specialist was very supportive of Ario's effort. He was easy to work with, through, and provided a sense of direction that kept this group from wandering from it's primary goal. The marketing specialist, himself with an Educational Technology background, recommended that if future Instructional Technologist openings occur at Hickory Ridge, strong consideration should be given to hiring Ario.

Help determine, with information from internal AT&T resources as well as possible outside CBT vendors, which delivery system best fits the needs of our customer.

Ario surveyed the spectrum of delivery options through researching available literature and interviewing subject matter experts. His survey included :

- Instructor-led training
- Teletraining
- Computer-based training
- Interactive video
- Self-paced paper

For each strategy, Ario outlined :

- Conditions for its use
- Advantages
- Disadvantages
- Development time
- Cost factors
- Other related remarks and factors

In pulling this information, Ario was severely hampered during the first two weeks by the telephone system failure (Hilsdale fire), that prevented all incoming and outgoing phone calls. Ario effectively used mail, internal subject matter experts, and assorted technical reports to gather this information, and as the phone system became operational, direct phone calls. He communicated with AT&T Corporate Training regarding the corporations long range plans in the area of alternate delivery strategies. Ario also personally visited the AT&T PC Teletraining site in Downers Grove, Illinois.

Through all of these investigations, Ario's reports remained unbiased and factual, identifying the advantages as well as disadvantages of each system.

Help determine, through information from Product Management, how CBT delivered training will interact with future product plans.

Information in this area was rather skimpy, as AT&T is still formulating Corporate strategy. However, he was able to determine that all AT&T training organizations are committed to electronic training delivery (CBT, IVI, teletraining, etc.). There was little help from Product Management.

Help determine, with AT&T Subject Matter Experts, what course or course materials appears to be conducive to conversion to BT.

Ario met with the instructors associated with the two course that were identified as candidates for conversion to some alternative delivery methodology. He also attended the "System Overview" lesson in order to understand population taking the training.

Ario's report outlined :

- stable portions of courseware
- concepts or course portions that would be enhanced through animation (video/CBT)
- length of time spent annually by instructor to update course materials
- inclusion of prerequisite materials
- major problems associated with CBT delivery
- modularization of course materials
- conversion of materials to alternate delivery strategy
- suggestion regarding course strategy and design

This began to form the basis for eventual decisions regarding which way to go with alternate delivery with this course. Ario established an excellent relationship with the instructors associated with this course, and quickly earned their trust. This was essential, as the instructors are deeply invested in the course as an instructor-led course.

Present a written report of the findings of these studies to the Project Manager and to the project team.

Ario prepare a series of written reports that covered the above topics. These findings were presented at a project team meeting on June 14, 1988. Ario presented his information verbally as well as providing copies of his report to all team members.

Written reports were clear and well organized. They remained clear of bias towards any particular delivery strategy, and were accepted as factual by the report team.

The final decision by the project team was to develop a paper self-paced version of the course, modular by design, with branching options, computer aided testing, and to enhance the courseware with video tapes at selected points. This decision was later approved by Product Management.

#### SUMMARY

Ario was very helpful, a welcome addition to my staff, and performed his job professionally and with enthusiasm. His skills as an Instructional Technologist are of high caliber, and were effectively used.

*W.R. Wardlaw*

W.R. Wardlaw

7/13/88

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