TRANSFERRING CLASSROOM INSTRUCTION TO CBT
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ABSTRACT

Many organizations are considering adopting computer-based training and are now investigating the hardware/software market for the tools to create and implement courseware in their training environments. One problem they face is that of altering their course presentations from the traditional classroom format to that of an independent structure centered around a computer-based environment.

At issue are design considerations such as learner control, branching, mastery criteria, remediation, and others. In fact, most of the design must be redone in order to maximize the instructional potential of the technology. It would appear that such an undertaking would be too costly in time, resources, and money. But that is not necessarily the case.

Background

Since the instructional efficiency of computer based training (CBT), with its potential adjunct media including interactive video and audio, has become enthusiastically accepted within much of the military training community, many current training applications are being considered for adaptation into the CBT environment.

This paper will describe the way programs can be restructured from another medium into CBT and highlight the areas that must be converted. As an example we will describe a successful training program that was converted from a traditional classroom presentation to CBT/interactive video. As this topic is explored, five issues will be cited, namely (1) reassessment of the front-end analysis, (2) redefinition of learning and behavioral objectives, (3) media selection, (4) design and development of instruction, and (5) the new and expanded role of the instructor.

The training program cited here as an example was a ten day "survival" Spanish course taught in a traditional classroom format. The ratio of instructors to students was one-to-three. The target student population consisted of professional individuals with no prior experience with the Spanish language.

The training system employed in this case was a computer based training system with interactive videodisc and interactive audiodisc with student recording capabilities. The intent was to supply a totally interactive language learning environment that would guide the student through the Spanish language acquisition process and, at the same time, collect and tabulate student records for the instructor's benefit.

Reassessment of the front-end analysis

The first task to be accomplished in converting any traditional course to CBT is to modify the existing analysis and learning objectives in order to maximize the power and dynamics of the new media. This task is much less complex than that of performing a full front-end analysis.

In the previously mentioned Spanish course conversion, the client and CBT contractor agreed that the topical structure of the course be left intact. In other words, the existing front-end analysis was to stand on its own merit and could not be changed with respect to the course content.

This imposed restriction served two purposes. First, it reaffirmed the client's position that the current program was well planned and that only the media of instruction were subject to revision. Secondly, it was a major cost saver in that the analysis phase was greatly reduced in its complexity.

Redefinition of learning and behavioral objectives

Although the course goals and desired student outcomes can remain relatively constant throughout the conversion process, learning and behavioral objectives have to be modified to allow for new conditions afforded by the dynamics of interactive video and audio. The new objectives must employ more "real life" conditions and require more active responses from the student.

In addition to modifications to the given conditions of an objective, it may be necessary to change the verb of the objective to better define the exact student interaction with the system. For example, an objective that requires a student to "describe" a specific procedure in a classroom setting may be changed to require the student to "perform" the procedure in a simulated environment.

One example of an objective modification in the Spanish program was regarding the grammatical applications of the Spanish verbs "ser" and "estar" (equivalent to the English verb "to be"). The traditional approach involved the students learning the rules of conjugation and verb usage and then applying them in a variety of contextual situations in a passive, classroom setting.

The modified objective was not significantly different from the former objective except for some of the given conditions imposed because of the dynamics of the media. The significant

change was in the approach to the instruction in that the student was first immersed in the applications of the rule without having that rule formally explained. Through repeated, interactive exercises involving listening comprehension, the student would learn the rule through its applications. The formal rule was made available to the student as a resource, but not as the main foundation of the instruction.

Media Selection

The process of selecting media for training applications is generally performed through the use of a media selection algorithm that permits a wide variety of media alternatives. In the case of programs being redesigned for a new medium, the algorithm must be redefined to include only the choices that will be available in the new approach. Existing objectives that are not suitable for any of the new media must be modified so that the given stimuli and required student responses are appropriate to the media.

Media selection for the Spanish program consisted of compiled lists of available media and identified variables such as required stimuli and other constraints. Although it was difficult to assign objective weights to each variable, the fact that they had been identified allowed for a more reliable selection process. The list of media in this case included computer generated character sets, computer graphics, motion video, still video, audio with motion video, audio with still video, audio with computer generated display (text or graphics) and audio (recorded by the student) in playback mode (see Table 1).

Each stimulus must be considered in such a way as to determine which device should be used to present any particular output to the student and what sequencing of that output will be most effective. For example, if a given stimulus requires a still-frame or freeze-frame video image and an audio component, the audio must reside on the audiodisc rather than on one of the two audio tracks on the videodisc (unless compressed audio is used). If video and audio need to be synchronized, motion video with one or both audio tracks should be used. Audio corresponding with computer generated displays can be stored on an unused section of the videodisc's second audio track or on an audiodisc.

Since the dynamics of foreign language acquisition involve multisensorial stimuli, computer-controlled motion video with corresponding audio was selected as the primary medium for the Spanish program, with computer generated text and graphic enhancements. However, if higher resolution or special effects not attainable with standard video were needed, graphics would be the primary source along with audio.

Designing and Developing Instruction

With the objectives redefined and the instructional media selected, attention can be focused on conceptualizing the courseware with its vast potential of presentations and

interactions. As student interaction scenarios are considered for implementation, attention must be given to key issues such as learner control, user friendliness, remediation, embedded helps, and scoring, to name a few. Many of these instructional techniques are not available in lecture classrooms or in textbooks. But they should be considered in the design plans when media are used that can employ them.

The design phase of the Spanish program incorporated innovations in interactive courseware design and language acquisition theory in an effort to maximize the comprehensibility of the Spanish messages while simultaneously introducing new vocabulary to the student. Although the original course topics did not change during this conversion process, the presentation of the instruction was designed with many opportunities for student interaction. All interactions were based on student comprehension of the presented material. Therefore, branching within the course was geared to remediate when necessary or to introduce new material to the student.

The process of creating a CBT course introduces a new type of training professional in this particular environment--the instructional programmer, or CBT author. This is the individual whose skills are necessary to integrate the instruction into the high tech environment and to make the media components come together in a cohesive delivery.

The skills necessary for courseware development include familiarity with the authoring system being used, a thorough understanding of the branching requirements of the instruction, and knowledge of student data collection and retrieval requirements of the course.

The developer takes material designed by the instructional designer and, using the media selected earlier, produces the product the student will use in his instruction. It is at this stage that the traditional instruction is truly converted to the new media.

The new and expanded role of the instructor

Although it is clear that good CBT does not eliminate the need for instructor support in any particular program, the instructor's role in a CBT environment is very different from that in a classroom situation. The instructor becomes a resource to the student for progress assessment and for specific course content review. In other words, the instructor is a facilitator of instruction rather than simply the primary dispenser of the instruction. The instructor's tools include progress reports and other student and course usage data collected by the CBT system itself. The instructor aids the student as a one-on-one resource when the student encounters problems.

As mentioned previously, the instructor-to-student ratio before the Spanish course was converted was 1 to 3. The course in CBT format allows students to work on-line for about four or

five hours daily with at least one hour of one-on-one conversation practice with an instructor. Assuming that an instructor works with six separate students throughout the day, the instructor/student ratio has now doubled. If further research reveals that the intensive *conversation practice can be just as effective* with a higher ratio than one-to-one, the efficiency of this change will be further evident.

The instructor will also have immediately accessible reports of each student's progress with the interactive courseware and will be able to listen during non-class hours to the student's pronunciation practice previously recorded on the audiodisc. All of these features will enable the *instructor to customize his approach with* individual students.

Conclusion

The conversion of classroom instruction to CBT is a manageable task that is justifiable for increased training success within an organization. As well-planned courseware is implemented, the short-term benefits of higher efficiency in training delivery and the long-term *training cost benefits will be self-evident.*

As this type of course conversion proceeds, it may become evident that considerable instructor loyalty to the course in its classroom-oriented form exists. Therefore, being involved in the conversion process may be a rewarding activity

for the instructors and very effective in reaching the student-outcome goals of the organization. The high level of participation of the instructors as subject matter experts and advisors to instructional designers can be a major factor in their acceptance of such a drastic change in both the instructional methodology and their modified roles in the computer-based training environment.

In participating in the course design, the Spanish language training staff was very attentive to the anticipated changes in the instructional approach. They were particularly concerned with the degree of learner control to be embedded in the system. The subject matter experts indicated key points where various levels of optional helps would be needed. As each instructional component was designed, potential student interactions and difficulties were considered. This was done to assure that at any point of this Spanish course the student would (1) know his location within the course and (2) know the valid interactive options (key presses, screen touches, etc.).

Implementation of the converted Spanish materials begain in late summer, 1986. This program has not been specifically created to outdo the classroom approach to teaching. It should, however, demonstrate that interactive computer-controlled media in a holistic, well-designed training program can be extremely *efficient in* meeting organizational training needs.

TABLE 1
Media Usage for Objective: 2.1.4

Given (1) a pool of *Spanish sentences* with audio and video context, (2) an option to see each English translation, and (3) a choice between the correctly conjugated forms of the verbs "ser" and "estar," the student will select the contextually correct verb with a minimum success rate of 80%.

Media	Yes	No	As needed
Computer based system			
English Text	X		
Spanish Text	X		
Graphics			X
Videodisc			
Motion Video	X		
Normal speed	X		
Slow speed		X	
Fast speed		X	
Still/Freeze frame video			X
Audio Track 1	X		
Audio Track II			X
Audiodisc			X

About the Author
Mr. Bryan D. Bradley is a Senior Instructional Designer at Hazeltine's Training Systems Center. He is currently managing an interactive video courseware development program. He was previously Courseware Coordinator at Brigham Young University where he managed the design and development of CBT for both university and industry programs in subjects including foreign languages, electronics, and psychology. He is a graduate of Brigham Young University.