MODELS OF INTERACTIVE VIDEODISC DEVELOPMENT

Harold H. Hendricks, Brigham Young University
Utah, USA

ABSTRACT

Over the last decade, Brigham Young University has developed over a dozen interactive videodisc programs for personalized foreign language instruction. From the early prototyphal projects to the current HyperCard and ToolBook packages, each of these programs has explored a different emphasis in interactivity. This article is a broad description of these different models, their variations and their implementation.

MACARIO: ANNOTATED FILM MODEL

The first interactive videodisc project at BYU was a repurposed Mexican motion picture shown in intermediate Spanish classes for its rich cultural symbolism. One of the first custom videodiscs ever pressed by 3M, it pioneered the concept of "repurposing" existing linear footage to an interactive format and introduced the "annotated" design model. As its name states, this model sought to annotate and amplify the one-dimensional, linear video presentation, by adding multiple dimensions of information such as transcriptions, glossaries, dictionaries, or grammar paradigms, as well as tutorial questions and comments.

The interactivity of the Macario program hinged on student-controlled interruption of the linear video presentation. The motion picture would proceed until stopped by the student. At this point a menu tied directly to the video scene the student was watching would appear on the computer screen, with video control options and resource annotations at the top of the screen, and the thought questions leading to the content annotations below. The video control options allowed the student to return to the video presentation and continue from the point of interruption, return to the beginning of the
current scene, or back up to the beginning of the previous scene. It also provided student-controlled review by allowing the student to specify the review time in seconds. Other options replayed the scene with the English sound track, gave the English and Spanish transcriptions, and gave the student access to the dictionary program.

The content annotations took the form of questions or prompts that were tied to commentary or sometimes to other questions. For example, one question asks the student if there is any symbolism in the falling of a tree during the opening scene. By typing the number of this question the computer would display a response introducing the main motif of the movie, that of the falling tree as a symbol of death. Since the instructional objectives of the Macario program were not only to enhance listening comprehension but to prompt the student to watch for Cultural symbols and metaphors, some of these questions were not answered but were left to the student to decide.

The Macario program was never implemented beyond the research phase due to the limitations of the early hardware. Nevertheless, four separate research groups clearly outperformed the traditional lecture-film groups in both the Comprehension test and the term paper in which each student discussed the cultural themes and metaphors. Two observations were made during the research that would prove useful in later program design. First, the use of small groups proved counter-productive. Students who wanted to stop the program to investigate scenes would defer to others who didn't. Second, the restricting of the English sound track and transcription until after the Spanish version had been seen at least three times made little difference. To summarize
the research results, two factors favored the students who used the videodisc version. First, the increased control over the information flow, and second, the combining of the explanations of symbolism, metaphor, and analogy together with the film itself — elements that were traditionally separated into a lecture followed by an uninterrupted viewing of the film (Gale, 1989).

**MONTEVIDISCO: SIMULATED CONVERSATION MODEL**

Except for student interruption of the presentation, the limited control over the review of the video, and the choice of annotations, the passive nature of the *Macario* presentation barely qualified it as "interactive" — especially if the student never chose to interrupt the video. The second IAV project developed at BYU however, attempted to make a more complete use of the capabilities of interactive videodisc technology. Based on a "simulated conversation" model, *Montevidisco* uses original footage, shot on-location in Mexico to simulate a visit to a Mexican village. Unlike the student-controlled interruption of the *Macario* story line, *Montevidisco*’s interactivity centers on the computer's ability to branch to different situations as determined by the student’s response to a question posed by the video character. Thus the "simulated conversation" model consists of short video sequences which then freeze at a decision point, awaiting the students choice of three or four different responses.

*Montevidisco* consists of 26 major situations, each with several conversation sequences totaling over 1,100 branching possibilities. Of course, the conversation sequences must lead to one of the situations on the disc, so many of the branches will return to previous sequences — which is why there are three different ways to take the same bus ride, four ways to end up at the police station, and three ways to find oneself in the hospital. Still, there are enough possibilities that a student can revisit *Montevidisco* several times and be involved in different situations and interactions.

The original implementation of *Montevidisco* was very complex (Gale, 1989). First, two separate versions were produced, one each for male and female speakers. Although both were similar in function, the options and scenes were different and the language reflected the appropriate gender differences required both in addressing the student and in the student’s responses. In addition, a separate disc was pressed with a native speaker providing a “surrogate” model of each possible student response. This required an intricate hardware setup of two videodisc players and a custom interface to the computer and a cassette recorder. This cumbersome configuration has since been eliminated in the current HyperCard and ToolBook versions.
As the student begins the program a young Mexican standing in a plaza approaches the camera, saying in Spanish, "Hello, you're an American tourist, aren't you?" At this point the video stops and four responses appear on-screen:

1. Yes I am. Why do you ask?

2. Yes and no. I'm an American but I'm a student from the Center for International Studies.

3. An American tourist? Guess again. I'm a Russian sailor. Can you help me get back to my secret submarine base?

4. What did you say?

In the original "conversation simulation" model the student would then choose one of these responses and speak it, in Spanish, into a cassette tape recorder for later review by the instructor. Since the tape recorder was also interfaced with the computer, the program would prompt the student to speak and would not continue until a recording was made. If the student wanted pronunciation help, a video dip of a native speaker modeling the chosen phrase could then be accessed from the second, surrogate videodisc. The student could re-record the phrase if desired. At this point, the video would branch to a sequence appropriate to the response chosen by the student. In this example the young Mexican responds to option 1 by trying to sell himself as a tour guide, for option 2 he responds by offering tickets to the bull fight, and to the Russian Sailor he suggests a visit to the bar.

Montevidisco Model: Conversation Simulation.
Interactivity: Branching based on student response.
In the ToolBook/HyperCard adaptation of Montevidisco several design changes have been made. First, the separate surrogate disc has been dropped. Second, a dictionary and a simulated "battery-powered" translation device has been added, that allows the student to see English translations and other helps - but not too often, or the battery runs down. Lastly, the focus of the Program has shifted to listening comprehension, which means the student does not produce any recordings, making the current Montevidisco less of a conversation simulation and more of a simulated visit to Mexico with an adventure-game feel to it.

As with Macario, the original version of Montevidisco was only used by small research groups, the observation of which suggested to researchers that second-year students derived much more benefit than the third-year students it was originally intended for. Also, without immediate feedback on their oral production — feedback the students could have received by listening to the surrogate, but rarely requested — the students never noticed their mistakes, but simply repeated their errors.

SPANISH LISTENING COMPREHENSION: SEARCH AND REVIEW MODEL

The next four interactive video projects were undertaken as joint efforts between Brigham Young University and the National Cryptologic School through the Computer-Assisted Language Learning & Instruction Consortium, CALICO, to answer the training needs of military and intelligence personnel. Designed to test the transfer of textual methodology to a video medium, the Spanish Listening Comprehension videodisc program focused on the instructional objectives of predicting, referencing, scanning, sequencing, and summarizing (Webb, 1985). In order to help the student meet
these objectives, a model of interaction I'll call "search and review" was provided. After viewing the opening phrases of a re-purposed news broadcast taken from a Spanish language news broadcast, the student is asked to predict the type of report that is to follow. After having viewed the entire sequence, the student is asked a series of questions based on the remaining objectives. Before and after each question, the program allows the student to review the sequence with audio only, audio and video, a slower version of the audio, or no review. Within the sequence the student may back up or move forward, searching from concept to concept as it is reported in the newscast. At other times, such as after missing a question, the author forces the student to review the sequence, adding the option of asking for a prompt or hint in addition to the options previously given. Thus, the search and review interactions are sometimes student-controlled and at other times controlled by the author.

THE GERMAN VELVET PROGRAM: AUTHENTIC DEMONSTRATION MODEL

The most ambitious of the four CALICO-NCS projects was the German Video Enhanced Learning, Video Enhanced Teaching, or VELVET program which is based on what I will call the "Authentic Demonstration" model. For this program original video recorded Germans conducting essential, everyday interactions such as buying a train ticket, getting gas for the car, or renting an apartment. Unlike Montevidisco, the situations are not linked together, but rather, each scenario represents a separate lesson which combines elements of the annotated model together with computer-responsive study questions. Each lesson begins with the key vocabulary for the scene displayed with still frames from the video followed by the motion video presentation.

As with Macario, the student can interrupt the video at any time to access content annotations attached to the segment being viewed. Here a menu allows the student to repeat the video, repeat the video with subtitled keywords, see the text while listening to the audio, work with the study questions, or review the entire lesson. If the student chooses to see the text, the content annotations such as vocabulary and grammar notations become available as sub-options. Unlike the process in Macario the study questions in this program are interactive. Typical question types include word order drills, multiple choice, and vocabulary-spelling exercises.
KOREAN AND HEBREW: LEARNER-CONTROL MODEL

The concept of student-controlled interruption, incorporated both in Macario and German VELVET, allows the higher-level learner to pass by unnecessary information, but assumes that the lower-level learner, who could best benefit from the control options and annotative resources, will be motivated and inquisitive enough to take full advantage of them. In practice, this does not always occur. Two other videodiscs developed in conjunction with the National Cryptologic School were designed to address this issue. Both discs contain repurposed television programs. Both programs use the German VELVET design of video segments supported by menu-driven control options and transcript-based help retrieval. However, each program follows a contrasting variation of learner-controlled presentation. Each program begins by providing the student with the option of by-passing the interactive tutorials through mastery testing. The Korean Program allows the greatest disc-level control by allowing the student to take the performance test immediately or watch the entire video without interruption, but then constrains the student from accessing the help options within the lessons until certain intermediate activities have been completed.
For instance, the option to see the keywords displayed with the audio is not available until the student has listened to the normal or slow audio first. The transcript option, in turn, is not made available until the student has first seen the keywords while listening to the audio. In other words, a partial transcript precedes its complete version, again requiring more practice with the video and/or audio (Kim, 1987).

Finally, when the student has demonstrated the need for greater help, the transcript and translations are provided with the sub-options similar to that found in the German VELVET program.

Korean model: learner-controlled presentation; author-constrained helps interactivity; disc and lesson level menu-based options; (variation of Velvet description); transcription-based sub-options; computer-responsive questions. Hebrew variation: additional diagnostic and mastery testing, vocabulary; (no constrained helps).

In contrast with the constrained learner control of the Korean program, the Hebrew program offers high, intermediate, and low-level interactions based on full menu control of all the programs options (Knisbacher, 1991). The Hebrew program also provides multiple levels of testing. Learners at the highest competency level must first view the video program before taking a diagnostic test, followed by a mastery test. If either test is failed, the student must then enter the program at either the lesson or
segment level and complete those lessons indicated by the test results. The lesson level provides the student with the following components: the lesson video, the viewing of the video with culture notes or idioms subtitled, the lesson vocabulary, the option of dropping into the segment level, a lesson word review, and another diagnostic and final test focused on the elements of the particular lesson. The student can still take the tests at any time, but if either are failed, he or she must drop down to the segment level of interaction, which corresponds to the transcript-based help and annotations of the German VELVET model with additional grammar review.

**TICCIT IAV PROGRAMS:**
**MODIFIED ANNOTATED FILM MODEL**

In the mid 80's, when Brigham Young University upgraded its Time-shared, Interactive, Computer-Controlled, Information Television (TICCIT) laboratory with equipment capable of delivering interactive video, the opportunity arose to take advantage of many of the lessons learned in the preceding projects and deliver IAV courseware to a large number of students. Dr. Junius Bennion, one of the principal developers of both the Macario and Montevidisco programs, together with Dr. Glen Probst of BYU’s English Language Center, had independently created a Program for the APPLE II based on Raiders of the Lost Ark using a variation of the “annotated film” model. This program abandoned the student-controlled interruption of Macario and instead, divided the movie into distinct scenes that would form the basis of an instructional segment.
Each segment of the APPLE II version began with a menu that allowed the student to choose to see the video, look at the vocabulary used in the scene, look at a list of phrases, look at a transcription of the dialog, or go to a series of study questions. After having been reprogrammed for the TICCIT system, the program begins with the straight-through viewing of the scene, usually about 2 to 5 minutes. At the end of the scene the Options menu automatically appears with the choice of repeating the video, seeing the transcription, or going to the study questions, which are required to pass the segment. Using the transcript-based help concept from the German VELVET program, TICCIT was able to improve upon the interface by eliminating the keyboard and using a light pen for immediate display of the annotations, which consisted almost entirely of vocabulary glosses. Also like VELVET, the TICCIT Raiders converted the passive thought questions of the original APPLE II program into computer responsive exercises. Using the Raiders Programming as a template, programs using Black Orpheus, We All Loved Each Other So Much, and The Seventh Seat were developed for Portuguese, Italian and Swedish. A fifth program based on the BBC's Buon Giorno Italia, created for second semester Italian students, used a much simpler "Video Drill" model because of the simplicity of the content. This model eliminated the transcript and simply provided a menu giving the student the option of previewing the video, looking at a vocabulary list, or going directly to the video-based study questions.

The TICCIT Seventh Seal program, like the Korean and Hebrew projects, attempts to deal with the different competency levels of the students using the Program. Unlike those two programs, however, no by-pass exams are offered, nor is the student able to watch the entire movie, but rather the student declares his or her level of competency and the content is then presented differently based on the level declared. For example, a first year student has no choice but to watch the video, work through the interactive

---

**Buon Giorno Italia Model: Video drill. Interactivity: Menu options**
transcription, and then see the video repeated for reinforcement before being allowed to see the menu options. In addition the glosses in the interactive transcription are all in English and the primarily multiple-choice study questions emphasize comprehension and vocabulary. For the second-year student, greater freedom is allowed, but if the number of requests for help is too high, the program intervenes and forces a repeated viewing of the video. Also, the glosses are now in simple Swedish rather than English and the study questions require more translation, typing, and dictation-style responses. Finally, the fluent student has no access to English at all and is presented the most difficult level of study questions.

**HUMANITIES TUTORIALS: EXPOSITORY MODEL**

Another model in use at BYU that I will briefly mention, is the "Expository" model used to introduce beginning Humanities students to the visual and performing arts. This model is used to explain and illustrate text screens discussing basic ballet steps, elements of opera, or camera and editing techniques. These HyperCard stacks are used by over a thousand students each year.

**CURRENT PROJECTS**

Current interactive video projects at BYU are exploring the graphical user interfaces and the development environments of HyperCard, QuickTime and ToolBook to provide smoother implementation for both developer and student. HyperCard and ToolBook versions of Montevideo are now being used by intermediate and advanced conversation classes, as is a revised portion of the German VELVET program, now
called DiscoDeutsch. This program and a similar Spanish Language and Culture package, use a variation of the menu format of TICCIT and the transcript-based helps of VELVET. Unlike in TICCIT, the student is shown the menu first, making the video presentation just one of the options the student may choose in preparation for the mastery test. In addition to the standard video presentation, the video is also shown without audio to point out non-verbal language. Other menu options access the script, study questions, language games, and the mastery test. Like that of VELVET, the script is the launch-point for the glossary, vocabulary, grammar and Cultural annotations. The study questions have been divided into categories that the student may choose from a sub-menu, and the type and nature of the activities have been expanded. The addition of language games provides a more stimulating interaction than the drill-and-practice format of TICCIT. The end goal of each lesson is the successful completion of the mastery test.

Another project, just now beginning, makes use of the "Multimedia" model of interactive video. Under this model the video presentation changes roles, one time being the primary presentation, another time taking an illustrative role as in the expository model, and yet another time becoming one of the optional annotations to a
text Or graphic. This project is based on the First Emperor of China videodisc, published by the Voyager company and is unusual in that it is re-purposing a product that was originally developed as an interactive video program. Whereas the original purpose of the disc was to provide a video tour and still-frame library of the spectacular tomb of Qin Shi Huang Di, it is now being used as a resource for a multi-media course on the Qin Dynasty. When completed, the program will exist in two forms: an English-only version for history students, and a bilingual version for fourth-year Chinese students studying both the language and history of China.

SUMMARY AND CONCLUSION

To conclude I will summarize each of the models discussed and indicate what I perceive to be the strengths and weaknesses of each.

Annotated film model

As implemented in the Macario and TICCIT programs, this model provides the motivated and inquisitive learner the opportunity to control what was once a continuous, linear presentation and explore the areas of language, culture and symbolism as desired. Without some external motivation, however, the typical student will tend to simply let the movie run, as in the case of Macario, or skip directly to the study questions, the only required portion of the TICCIT model. This model, then, lends itself best to the 'interested investigator' — those with the time and inclination to make use of the annotations, and to the curriculum that requires only a general exposure to authentic language. More specific objectives would require the addition of control mechanisms such as those implemented in the TICCIT Swedish and the CALICO-NCS Hebrew programs.

Simulated Conversation Model

The promise held by this model will only be fully realized with voice recognition capabilities. Nevertheless, this model provides an excellent vehicle for the reinforcement of listening and speaking skills. The adventure inherent in a program simulating a visit to a foreign place with unknown and surprising turns provides the motivation and interest needed for the student to take advantage of whatever resources necessary to maintain progress through the program. The major disadvantage, of course, is the cost in money, time and resources necessary to produce such a program. Given this fact, the benefits derived from a program such as Montevidisco may not justify the cost except in special cases or when it can be amortized through wide distribution.
Authentic Demonstration Model

The use of original footage as the basis of any interactive video program focuses the vocabulary, cultural interactions, and the authentic nuances of the setting on the specific learning objectives the interactive Program is attempting to meet. The Authentic Demonstration model, as implemented in the German VELVET program and its condensed form, DiscoDeutsch, provides the learner with specific skills necessary to accomplish the task or other language interaction demonstrated, but it also contains a major weakness since there is no attempt to have the student duplicate these skills. Although the study questions and mastery test exercise the student’s listening comprehension, vocabulary, and understanding Of grammar, the major point of the video sequence seems to be missed. Perhaps this model should be coupled with a version of the simulated conversation model to round out the program. At the very least, implementation of this model should be followed up with live role-playing of the tasks demonstrated on the video, which in fact is encouraged in the printed supplements.

The Search and Review Model

The ability to scan forward or backward from concept to concept through the video presentation is this model’s strongest interactivity feature, but constant repetition of the review menu produces a sense of tedium in the Spanish Listening Comprehension implementation. The methodology successfully tested in this program would be greatly enhanced by a more streamlined presentation design.

The Expository Model

This model provides the illustrative power of videodisc technology to enhance text-based presentations. It is the simplest of all models for language development, but is also the weakest without any other interaction besides reading the text and viewing a video selection.

The Multimedia model

This model is still being defined, but the ability to integrate text, audio, video, graphics, animation, and computer-responsive exercises seamlessly has been the goal of computer-based instruction for over three decades. In this model emphasis is not given to one presentation medium over another by default, due to the hardware capabilities, but rather may be emphasized completely by content design and the instructional objective. This strength is also its greatest weakness, since the success of courseware
produced under this model will depend on the quality of the design, the appropriateness of the instructional objectives, the manipulation of the lesson components to achieve those objectives, and the focused implementation of the program within the curriculum. It is possible that a mature version of this model, coupled with global television communication and computer technology, may make many of the language-learning and decoding resources discussed at the Bridges Symposium common components of future international communications.

REFERENCES


AUTHOR'S BIODATA

Harold H. Hendricks is Supervisor of the Humanities Learning Resource Center at Brigham Young University. He has been involved with computer-assisted instruction and interactive video development over the past 18 years.

AUTHOR'S ADDRESS

Humanities Research Center
3060 JKHB
Brigham Young University
Provo, UT USA 84602

Phone:(801) 378-6448
Fax:(801) 378-4649
E-mail: Harold@jkhbhrc.byu.edu