VIDEODISC
COMES TO SCHOOL
When enough high-quality interactive programming becomes available, the videodisc will be a powerful tool for learning.

A new audiovisual technology, the videodisc, is beginning to make its presence felt in education. Because it has a radial surface like a phonograph record, rather than a ribbon surface like a film or videotape, the disc makes information more accessible and thus usable. Film and videotape present programs in a linear fashion; they play from start to finish without interruption. The videodisc is a nonlinear medium; the user may view any of the material in any order. Thus, depending on the needs of the user, a program can have many beginnings, middles, and ends.

Four major videodisc formats are currently available or scheduled for introduction before the end of 1981. They use different techniques to record and read the information on the disc and, consequently, are noncompatible. We will concentrate on the capabilities of one format—the reflective optical videodisc system—introduced in 1978. In terms of program design and production, research has concentrated on this format.

The basic videodisc system consists of three elements: the player, a television set, and the disc itself. About the size of a phonograph record, the videodisc contains all the information necessary to reproduce 30 minutes of color video with two channels of audio. The information is contained in a series of micropits of various lengths and spacings encoded onto a reflective surface. Because the micropits are very delicate, the reflective layer is encased in plastic to protect the program information from damage due to fingerprints, dust, scratches—even peanut butter.

The disc surface can be wiped clean with a soft cloth and can be played thousands of times without losing the quality of picture or audio. Commercially available discs retail for $5.95 for short subjects to $29.95 for feature length films such as Coal Miner's Daughter.

The Player

There are two categories of players available: the Consumer and the Educational/Industrial (E/I). Pioneer and Magnavox currently market consumer players which sell for approximately $750. E/I players are presently being sold by DiscoVision Associates (DVA) and Sony. The prices range from $1,725 to $2,800 with price affected by the quantity ordered. The E/I player is more rugged than the Consumer player and because of its programmable microprocessor it is also more flexible. The microprocessor enables the user to more easily access the contents on the disc and makes the player easier to interface to an external computer, vastly expanding the system capabilities.

The output of the disc player can be displayed on a standard television receiver, either color or black-and-white, but since the videodisc plays color television pictures, a color television is recommended.

Capabilities

Unlike the video recorder, the videodisc is a “play only” medium. While it cannot be used to make a recording, it has other features useful to students and teachers: (1) the disc is read by a noncontact, low-powered laser; (2) each frame, or picture, on the disc has a unique address or frame number; and (3) the information is contained on a radial surface.

In a 30-minute television program there are 54,000 frames of information. Each frame on the disc is contained on a separate spiral track and given a frame number from 1 to 54,000. Since the information is read by a noncontact laser, a variety of display modes are possible, including still visuals such as text and slides or motion. The rate of speed can be selected by the user from slow motion to fast scan forward or reverse. Any time the disc plays at “normal” speed...
bilingual audio tracks, or to present commentary at two different levels of comprehension. With the disc the user can monitor either or both audio channels.

Because any program segment on the disc can be randomly accessed in a matter of seconds, the contents of a videodisc can be arranged much like the contents of a book. The information can be organized into discrete chapters, indexed by a table of contents (using the frame numbers), and supported by optional appendix material such as tests, teacher’s aids, or a visual data base that can be used as a reference library.

Levels of Interaction
Depending on the capability of the videodisc system and ability of disc producers to organize programs in non-linear fashion, four distinct styles or levels of programs can be presented. The four levels refer to player/disc “intelligence” or the ability of the videodisc system to process information input by the user. A higher level of player “intelligence” results in more interaction between the program and user and better adaptation to individual needs.

At its most basic level, Level Zero, the videodisc is used to present material linearly—in real time. For example, a movie plays from the beginning to the end with no user interaction.

At Level One, unique features of the videodisc can be used. The program can consist of a mixture of still and motion sequences, using whichever medium is most appropriate. The user selects the portion of the program to be viewed and controls the pace of the presentation. Single frame material can include simple quizzes, for example. If the student gets the answer wrong, he/she can immediately review the portion containing the correct information.

The second level of interaction uses the programmability of the E/I player's microprocessor. Following a programmed sequence, the player presents a section of the program, halts at a decision frame, and allows the user to select where the program will go from the choices presented. The user can redirect the path of the program with the press of one or two digits on a hand-held keypad. For example, a typical program might begin with a table of contents. The student selects and views a content segment, then answers several multiple choice questions. If he/she gives the correct answer, the program continues. If the answer is wrong, the player automatically replays the segment containing the answer, then branches back to the original question for a re-test. Some simple forms of scorekeeping are also possible with a Level Two program.

The highest level of program interaction is a Level Three program. Here, the E/I player is connected to an external microcomputer. Disc content can be designed to be given at several levels of comprehension. The computer then evaluates the user’s response to decision frames and guides the user through the program at the appropriate level. The computer can be used to generate graphics and text information which can be overlaid on the picture from the disc. Questions and answers contained in the computer are easily edited without changing the disc, and the computer keeps a detailed record of the student’s progress, if desirable.

Pilot Programs
To test the ability of the videodisc to provide effective and responsive programming, the Nebraska Videodisc Design/Production Group has produced several pilot programs. Two discs, Basic Tumbling Skills and Mejore Su Pronunciación, were evaluated. The evaluation was designed to test the usability of the discs in classroom and individualized instruction.

Basic Tumbling Skills
Basic Tumbling Skills is designed as a Level Two program to be used by elementary physical education teachers in a classroom situation. The classes averaged 20 students. The contents were organized into chapters with each basic tumbling skill having a separate chapter. Also included are chapters containing teacher’s aids, warm-ups, flexibility skills, circuit gymnastics, motivational material, and a detailed teacher’s guide.

The typical teacher played an entire tumbling skill, the backward roll for example, to model the skill which she expected the students to perform. Next, she replayed the skill, occasionally freezing a frame to highlight a particular position or movement. The skill was then shown in slow motion, and on occasion was played backwards. As the students performed the skill, the teacher walked among the pupils, using the hand held keypad to repeat segments on the disc if a student had a problem.

Teachers find these features most attractive: the ability to freeze a frame for detailed study, the ability to vary the speed of the motion, the random access capability which en-
ables the teacher to select and display material, and the ease of using the equipment.

Because the gym classes took place in large rooms, it was found that an auxiliary sound system was needed to amplify the audio. Other concerns centered on the cost and availability of videodisc equipment.

**Mejore Su Pronunciación**
The second disc, *Mejore Su Pronunciación*, is designed as an individual study aid to help American university students overcome common Spanish pronunciation problems. The disc was organized into chapters. Chapter One concentrated on the use of the Spanish “A” sound, and Chapter Two the Spanish “D” sound. Each chapter is divided into subsections: basic pronunciation rules, bilingual vignettes, practice segments, and a self-test. A user’s guide completes the disc package.

From the Spanish evaluation we developed two composite student profiles with neither type of student having any experience with the videodisc. The first student did quite a bit of “hunting and pecking” when using the disc; the second student used the table of contents and the decision frames to select material for viewing.

Both types of students were impressed with the overall potential of the videodisc. The most attractive features were: the ease of handling the equipment and its flexibility which enabled them to work at an individual pace and repeat program segments as many times as necessary.

The students suggested that the segments be shorter, allowing more entry points into and out of various segments. Although some students found the equipment difficult to operate and were never comfortable with it, they still saw great potential for the videodisc.

As an audiovisual aid the videodisc technology has a lot to offer. The players are simple to use, and as one teacher reported, relatively “grunch proof.” The software (program) is durable and inexpensive when compared to film or videotape, and the disc is more capable of responding to the needs of the classroom teacher or student than conventional media. The technology has been developed to allow the user to easily customize a prepackaged audiovisual program to respond to a specific classroom need.

The only thing currently missing is the development of a large base of quality interactive software for the players. Although there are many research and development projects studying the videodisc, available software is limited. And since the videodisc is a play only medium, the worth of the technology to education will be ultimately defined by the quantity and quality of interactive software available in the marketplace.

**References**


