By William W. Lee

Bridging the Gap With IVD

For many people, "learning" means simply amassing information, rather than developing high-level thinking skills. Interactive videodisc instruction may help bridge that gap.

As an educator, I always believed that I could not "teach" anyone anything. Instead, I wanted to get my education students to think, so that no one could ever prevent them from learning.

I spent a great deal of time trying to do that with the students enrolled in my college courses—get them to think. Although I met with some success, I also felt that something was missing until they began their practice-teaching experience. Once they began interacting with students in classroom situations, concepts they had perceived only superficially became relevant because they were able to apply them.

Universities expect that the bright, young adults who enter their institutions arrive fully equipped with the intellectual skills needed in the new educational environment. Employers expect that entering employees will be able to evaluate situations and make sound decisions; management cannot always look over their shoulders.

Such expectations are often disappointed. Students come to college from highly structured school environments. They have been given few choices and little experience with situations that will be presented to them in higher education. William Perry discussed the problem in *Forms of Intellectual and Ethical Development in the College Years: a Scheme.* Perry reported that many recent high-school graduates are at a level of thought-processing at which they still perceive education as amassing information rather than thinking and making judgments.

That deficiency in thinking and making judgments often persists in adult careers. It results in employees who lack self-direction and initiative and have no solid goals for advancement and improvement. Many of them find themselves dissatisfied in their job situations, but unable to set goals to change their lives. College students either attain higher levels of thinking themselves, or are taught at levels low enough so that they simply amass knowledge. Many never learn to evaluate themselves.

IVD technology

Technology can provide secondary-school students, as well as higher-education students and other adult learners, with instruction tailored to their needs and thinking levels. That technology comes in the form of interactive videodisc (IVD) instruction.

The concept of IVD is not new. In the 1950s and 1960s, teacher-training institutions used laboratories to simulate situations that might happen in the classroom. The laboratories consisted of integrated systems of slide or movie projectors, keyboards, and video screens. Users entered responses through the keyboards, activating particular presentations.

Those early systems were fragile and rudimentary, prone to film breakage and improper coordination of video and software. Consequently, the training laboratories were abandoned.

B.F. Skinner's 1953 book on programmed learning, *Science and Human Behavior,* contributed to present-day knowledge of IVD. Early pioneers of individualized instruction provided today's IVD developers with prototypes of the more sophisticated systems now available.

Hierarchies of thinking

Cognitive psychology has given us the basis for structuring hierarchies of thought processes. Bloom's 1956 taxonomy of thinking published in *Taxonomy of Educational Objectives: Handbook One. Cognitive Domain* purports that thought processes begin with knowledge or recall and move through comprehension, application, analysis, and synthesis, to the pinnacle level of evaluation.

From developmental psychology came Jean Piaget's *The Origins of Intelligence in Children.* In it, Piaget shows that people move through four stages of development, beginning with the sensorimotor stage at birth, going through preoperational and concrete operational stages, and culminating with the formal operational stage.

The stages begin with the gradual integration of reflexes and culminate in the individual's ability to think abstractly. During the preoperational stage, identifiable thought patterns begin to emerge, evidenced by the child's attempts to control his or her environment. Thought patterns that were separate entities begin to make connections.

Concrete operational thinking allows individuals to make certain judgments, but only about what they can actually see and manipulate. Formal operational thinking permits thinking about concepts in a less tangible form.

Not all people have the intellectual capability to reach the higher levels of thinking. Most adult learners have separate sets of facts stored in their memories, but never use them

Lee is senior instructional designer and evaluation coordinator for ISC Educational Systems, 3700 Electronics Way, Box 3040, Lancaster, PA 17604-3040.

because of missing information. Adult learners also operate at a variety of stages within Piaget's construct, depending on the subject being addressed. For example, someone who is skilled at solving complex quantitative formulas may not be able to repair a car.

Perry's findings support the notion of stages within the abstract level of adult thinking patterns. Perry outlined four typical hierarchical stages of thinking among adults:

- **Stage One.** Everything is right or wrong. Knowledge is a collection of facts to be memorized; authority figures have all the answers.
- **Stage Two.** There can be a variety of opinions and viewpoints on an issue.
- **Stage Three.** It is possible to evaluate different perspectives through reasoning and judgment.
- **Stage Four.** Decisions and commitments can be made, based on a value system.

Perry concluded that most new college students are at Stage One. That presents problems for college instructors who are prepared and prefer to teach at Stage Four. In "Freshmen Can Be Taught to Think: Not Just Amass Knowledge," in *The Chronicle of Higher Education,* July 13, 1988, David Finster reports that professors react in one of three ways when they encounter discrepancies between the actual and expected capabilities of their students:

- They continue to teach at Stage Four; it is the students' responsibility to grasp the material.
- They reduce the complexity of the course to match the thinking skills of the students and simply present facts, reinforcing student perceptions that education is the accumulation of knowledge.
- They restructure their courses to begin at the ability level of the students and attempt to lead them to Stage Four thinking.

Finster advocates the third course of action as the most appropriate, but says that it is the least often implemented. His solution seems logical at a time when colleges and universities are trying to retain more students. But many colleges structure introductory classes in a way that is not conducive to the instructional needs of students.

Typically, first-year classes are taught in lecture halls or auditoriums, and have large enrollments. Students read assigned materials, take notes, and take tests. Meaningful interaction with teachers is limited. As students progress through their undergraduate programs, select majors, and become more specialized, class size diminishes and time for interaction increases. As the student-to-teacher ratio drops, students begin to develop higher-level thinking skills, but some students leave school before they reach that point. Many of them probably could be kept in school if they received more customized instruction.

For adults who enter the workforce without going on to higher education, the junior and senior years of high school are critical periods to learn to evaluate situations and make judgments. If uninstructed, some students will never reach the higher levels of thought processing. Others will reach the upper levels, but at a much later time. Either way, they may never realize their full potential in earnings or self-actualization.

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Bridging the gap

Computer-based training in the form of IVD can be effectively used to develop adult thinking abilities. It can help lead high-school students, college students, and workers to Stage Four of Perry's adult thought-processing hierarchy.

The goals of IVD programs are easier to understand if you compare Perry's perceptions of adult-thinking processes with Piaget's abstract thinking and Bloom's taxonomy. Adult educators and trainers must remember that most learners who have the capacity to reach the highest levels of thinking—in either Perry's, Piaget's, or Bloom's taxonomic hierarchy—will not do so unless they are "taught."

Adults may reach the abstract level of thinking outlined by Piaget, but they still collect pieces of information from earlier developmental stages or connect two abstract thoughts to reach higher-order conclusions. Age and higher-level thinking abilities are not directly associated. Only a small percentage of those with abstract-thinking capabilities use them even minimally.

Much human potential is lost through assumptions that are not based on sound principles of learning. The dichotomy that exists between expectations and reality can be effectively bridged by providing instruction that better matches learning styles and levels.

Workers must be continually trained to operate efficiently and effectively. Many types of jobs encourage automatic levels of thinking. They range from assembly-line workers who fall into routines created by the monotony of their jobs, to teachers who fail to reflect on the effectiveness of their teaching and repeat the same lesson plans year after year. In factories, lack of training leads to lower productivity and more injuries. In education, it causes the curriculum to fall further and further behind current innovations.

A growing body of research looks at the effectiveness of IVD in improving the problem-solving abilities of adult learners. Research reports include D. Hon's "The Promise of Interactive Video," P.M. Levenson's "Interactive Video: a New Dimension in Health Education," and M.J. Hannafin and M.E. Colamaio's "The Effects of Variations in Lesson Control and Practice on Learning From Interactive Video."

IVD is effective because of its ability to simulate situations and possible results. Branching to scenarios that reflect particular decisions can show learners the possible short and long-term effects of their decisions. The possibilities are limited only by disc space and designer creativity.

High-school students could be better prepared for college and adult life if presented with simulations of situations they may face along their career paths. Such topics as successful study skills and positive work habits would also be good candidates for IVD courses.

Hard and soft skills

Interactive videodisc instructional delivery systems are equally adaptable for delivering hard skills (such as mathematics, as well as biology and other sciences) and soft skills (such as

interpersonal skills, sales and marketing techniques, and attitudes toward drugs).

In *T.H.E. Journal* ("Study Confirms Teaching With Videodisc Beats Textbook Methods") Frank Blatnik compared two matched groups of high-school biology students. One group used IVD; the control group used textbook instruction. Blatnik showed that IVD instruction in this hard-skill area resulted in more teacher preparation time and significantly higher student comprehension.

Blatnik's study translates well to the college and university level. IVD could provide the individualized instruction needed by first-year students enrolled in large classes that do not normally permit meaningful interaction with professors. Any course with stable content could be supplemented with IVD and would remain current for many years. IVD would permit students to use information presented in class to solve problems and make decisions in computer interactions.

The simulation and interaction capabilities of IVD are well suited to teaching soft skills. Simulations permit viewing the natural or logical consequences of actions and choices.

The trend toward computer-based training is increasing and represents a diverse body of soft skills. IBM Corporation is investigating ways to present training through the use of technology, says Patricia Galagan in "IBM Gets Its Arms Around Education" (*Training & Development Journal,* January 1989). Ferranti Educational Systems recently developed two courses for IBM on Managing in a Team Environment and Working in a Team Environment.

Several reports included in the 1989 *Proceedings of the Seventh International SALT Conference on Interactive Instructional Design* discussed research on different uses of IVD for soft-skills instruction:

- Patrick Garder outlined the project, "Teaching Corporate Culture Using IVD." The project content is designed to improve decision making about safety, security, and quality standards.
- "Sales Challenge Videodisc Series," developed by Learning International and Mirror Systems and reported on by J. Steele and S. Casper, gives marketing representatives a chance to practice their selling skills.
- Virginia Samuelsson reported on how IVD was used in sales training to allow salespeople to practice interpersonal skills.

Ferranti Educational Systems has released a course in Essential Teaching Skills that includes components to help develop effective teaching, classroom management, and discipline strategies.

David Dalton's paper, "Using Interactive Video to Foster Cooperative Learning: Research Findings," presented at the 30th ADCIS Conference and published in the 1988 proceedings, reported a positive aspect of IVD training that is incidental to the actual content of a course. Dalton found significantly increased cooperative learning among students involved in computer-assisted instruction.

Training & Development Journal published "How and Why (and Why Not) We Use Computer-Based Training," Greg Kearsley and Michael J. Hillelsohn's survey of 63 companies who use CBT (January 1984). Respondents listed the following expected benefits of CBT:

- improved job performance;
- reduced training time and cost;
- increased control and standardization of training;
- decentralization of training.

An investment in learning

Interactive videodisc instruction could effectively bridge the gap between the actual conceptual levels of adult thinking and the desired levels described by Perry.

In college courses and employee-training programs with stable content and large enrollments, IVD could provide meaningful interaction that students need with instructors. It could also provide the individualized instruction toward which education always strives. Attitude development could be enhanced through the power of simulation, allowing students to view consequences of their choices that they might not have considered on their own. Common sense, principles of learning, and recent research all support that assumption.

In a time of increased recruitment and retention efforts by universities and organizations, the initial investment in IVD courses could be a cost-effective way to supplement instruction. In business and industry, employees are a company's most important resource and must be trained to maintain high productivity and efficiency. IVD can help people develop thinking skills.

The use of IVD for adult training has many advantages. Adults tend to respond better to instruction they can access at their convenience than they do to stand-up, classroom instruction. The increase of soft-skill development represents a considerable investment by business and industry. Although hard data are difficult to find on the true effectiveness of such instruction, the positive response from employees who are trained by IVD should convince large corporations to invest in it.

For Further Reading

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