

Assessing Interactive Videodisc in Extension

S. Kay Rockwell
James W. King
Thomas G. Tate

If Extension is going to use interactive videodisc as a program delivery method in the future, the technology must be explored and systematically evaluated in a variety of learning situations. This paper focuses on questions to consider as one begins to undertake a thorough and systematic analysis of the in-depth instructional programming use of technology. The challenge is to (a) identify evaluation and research issues and phrase them in testable ways; (b) develop an overall research and evaluation strategy for testing the technology; and (c) organize a method for delivering the evaluative information to decision makers.

As interactive video begins to make its presence felt as a viable instructional medium, instructional technology researchers must begin to undertake a thorough, systematic analysis of the instructional potential of this medium. (Brody, 1984, p.1)

Interactive videodisc — the merger of computer and video technologies — is a very exciting medium and potentially a very powerful educational tool. Exploring the possibilities for this technology in Extension

is currently underway. AGRI-COLearn provides training on databases and how to search them; kiosks in 12 states provide information in places such as shopping malls, state capitols, high schools, libraries, and state fairs; and in-depth courses provide all or part of the educational materials for farm financial management, pesticide application training, and cotton pest management training (Butler & Tate, 1989).

Throughout the country, approximately 15 percent of all organi-

S. Kay Rockwell is an evaluation specialist with the Cooperative Extension Service at the University of Nebraska-Lincoln.

James W. King is an extension specialist-special projects with the Cooperative Extension Service at the University of Nebraska-Lincoln.

Thomas G. Tate is a program analysis officer at the Extension Service-USDA.

zations have explored the use of videodisc for training purposes. Lee (1987) notes the percentage of companies and institutions using interactive videodisc remained constant from 1986 to 1987. Gayeski (1989) found a number of these organizations have developed or purchased one videodisc program to test the technology; however, many are not adopting the interactive videodisc as an instructional tool. Cost, complexity, and lack of standardization are cited as impediments to the extensive use of interactive videodisc. If Extension is going to effectively use videodisc as an information delivery in the future, the technology must be examined and systematically evaluated in a variety of learning environments as Brody (1984) suggests.

To assess interactive videodisc, it is important to divide Extension videodisc into two categories: a) those that quickly access facts, and b) those which provide instruction on a given topic (Table 1). The first type which quickly accesses facts includes the very popular kiosk type of videodisc programs. Typically, short content pieces on a particular subject area or several content areas are pieced together on one videodisc. The user is presented a menu of questions from which they select the topic to pursue. Based on the user's choice and selection of responses, the program then branches to a number of possible answers. Generally grades, quizzes, or other responses are not recorded or scored for the participants.

The second application, or the in-depth instructional program, focuses on a broader topic and includes an array of topics related to the content area — somewhat similar to a lesson in an interactive classroom setting. This type of videodisc

draws on educational design elements which include a number of instructional strategies combined with various presentation styles. Many times the videodisc program is aimed at one learner; however, it appears that an instructor might also use the program in class situations or in small working groups.

Because of the highly instructional nature, programs often present users with the educational objectives. Log-on and log-off routines help save records and allow participants to return to particular segments. Instructional videodiscs often track grades or quizzes for scoring purposes; and record keeping may be an important part of the program design. Users are frequently presented a module, or some segment of instructional content, and then tested. As in other types of videodisc programs, user responses determine the future paths through the instructional content. In-depth instructional programs can expose the user to both the instructional content and a process whereby they can apply the information to their own situation.

The purpose of this paper is to focus on the in-depth instructional videodisc applications; and to suggest how Extension might begin to undertake a thorough, systematic analysis of using videodisc as part of its in-depth instructional programming.

Literature Emerging from Other Organizations

Evidence is appearing from other educational and training efforts suggesting that interactive videodisc is an effective instructional tool. Branch et al. (1987), Bunderson et al. (1984), Hannifin and Schaffer (1984), Gibbons et al. (1982),

DeBloois (cited in DeBloois et al., 1984), King and Reeves (1986), Reeves (1988a), Smith (1987) and Vadas (1986) all found greater learning gains for videodisc students when compared with a specific traditional method.

In his review of various videodisc evaluations, Reeves (1988a) reported several situations where there were significant differences in test scores between videodisc and control groups. Reporting on a veterinary science videodisc, Branch et al. (1987) stated that interactive videodisc was as effective as traditional instructional techniques. Bunder-son et al. (1984) and Smith (1985) observed that the educational process with videodisc required less time.

Andriessen and Kroon (1986),

Gibbons et al. (1982), DeBloois and Woolley (cited in DeBloois et al., 1984), and Rizzolo (1988) all found the self-pacing qualities of videodisc tended to be a popular feature. Gibbons et al. also noted that videodisc users liked the realism of sample problems. Albanese and Huntley (1988); Branch et al. (1987); Bunderson et al (1981); and Rizzolo reported participants had very positive attitudes toward videodisc instruction. In an initial study on the implementation of an in-depth educational interactive videodisc in Extension, agents and farmers used an instructional type of videodisc program. They encountered few problems and reacted positively to both the technology and the program content (Rockwell & King,

Table 1
Videodisc delivery modes

Quick Access to Delivery of Facts	In-depth Instructional Delivery
Content: Short segments or modules; several subjects can be grouped together.	Lesson oriented; usually only one subject is presented, but several instructional levels may be used.
Participants: Usually one person; can be a small group.	Usually one person; may be teacher led with a class.
Objectives: Often not overtly evident; not always presented to participant.	Often overtly evident; usually presented to participant.
Methods: Primarily question and answer; some direct content presentation.	Instructional segments followed by questions and answers; based on the responses, participants are then branched to other areas of the videodisc.
Tracking: Not usually done, except for administrative record keeping.	Usually done to record participant records and scores for certification of completion; records participant location in program for re-entry after termination of an instructional segment.
Example: Kiosks providing a public service or providing information such as horticultural facts.	Pesticide applicator training; Farm financial management.

1988). As Extension continues to explore using videodisc, evaluation efforts must explore the economical, strategic, and /or social benefits and advantages of the medium.

Models are beginning to emerge which provide overall guidelines for meaningful videodisc evaluation. Reeves' (1988b) model identifies six evaluation areas for interactive videodisc which include:

1. Documenting the project — the record-keeping portion.
2. Assessing objectives — the analysis and examination of program objectives.
3. Pretesting — the structured, formative evaluation of the program.
4. Determining effectiveness — the measures of instructional success and competency.
5. Determining impact — the measures of transferring program learning to workplace performance.
6. Analyzing cost effectiveness — the appraisal of the program in terms of expenses and specific outcomes.

The Reeves' model provides some general guidelines upon which Extension can focus in planning how to adequately and systematically assess in-depth instructional videodisc technology. There are a number of immediate, short-term needs as well as more complicated, long-term needs which must be considered. In addition, unique features of the medium also provide opportunities for new research strategies which may have profound implications for instruction.

Short-term Needs

Short-term needs can be divided into three assessment categories: a) the cost of using interactive videodisc as a delivery mode, b) staff

training needs for utilization of the medium, and c) acceptance, utilization, and educational value of the technology for both staff and clientele. And, there are a number of questions associated with each of these assessment categories.

Cost of using interactive video.

How does interactive videodisc compare to other alternative delivery system investments? Assessing the size of the potential audience provides the basis for starting to identify cost/effectiveness. To decide if utilization of the technology is economically feasible, consideration must be given to the cost per lesson per person based on development and production costs of a given lesson. Extension faces an immediate need to assess how the cost of delivering a lesson on interactive videodisc compares with the cost of delivering comparable information through other methods.

Bitney, Lanpher, and Blanck (1986) used figures from "Cash Flow Planning" and compared dollars required for Extension Agents' time when the agent conducted a workshop, when the agent combined videodisc with follow-up coaching, and when the agent instructed the client to use the videodisc program (Table 2). This comparison assumes the "Cash Flow Program" is the only instructional program being used on the hardware.

Roden (1987) presented a cost modeling system for videodisc production. A very complete and exhaustive model, it covers five steps in the development of an instructional videodisc including costs for: a) courseware development, b) courseware maintenance, c) training support, d) training delivery, and e) hardware maintenance. Each stage has a series of sub-components.

When summed, these five areas provide an entire cost figure for instructional videodisc production. Roden incorporates the time factor and has organized his model to spread costs over a five-year life cycle.

Specific questions in Extension which relate to Roden's model include the initial amount of money needed to purchase the videodisc equipment. How many disc stations would be required to make interactive videodisc economically feasible at current costs and at projected costs for the next five years? One needs to consider how this equipment would be managed and scheduled within an Extension office, or, if utilization of the technology would require additional equipment which is located at sites more convenient for clientele use. Even though we are beginning to find and develop models to assess development costs, the economics of implementing instructional videodisc technology are not yet understood.

What are the costs of repurposing videodiscs (the reprogramming of the computer software allowing for

a "new" educational program without changing the videodisc itself)? Or, what are the costs of adapting the content to a particular location and updating materials? The costs associated with adapting the program to different hardware and different formats also need to be addressed. Finally, we will have to ask how will the programs be updated as videodisc technology moves into more easily accessible forms, such as CD-I (Compact Disk - Interactive) and DV-I (Digital Video - Interactive)?

Clark (1983) feels that determining costs of the new technologies is perhaps the most important evaluation issue. However, most evaluations avoid cost issues. Yet in times of very limited financial budgets and expanding technological delivery methods, administrators need cost information to make decisions. The administrators' decisions to support or not support future development of the technology will include the cost factor along with the educational value.

Staff training needs. As with any new technology, staff need op-

Table 2

A cost comparison of alternative instructional methods

	Extension Agent	Ext.Agent/ Videodisc	Videodisc
Teaching farmer how to develop a cash flow plan	4 hr @ \$15 = \$60	2 hr @ \$15 = \$30	-0-
Coaching farmer in developing his own cash flow plan	\$4 hr @ \$15 = \$60	2 hr @ \$15 = \$30	1 hr @ \$15 = \$15
Cost of videodisc equipment <u>a/</u>	-0-	\$10	\$10
Cost per farmer	<u>\$120</u>	<u>\$70</u>	<u>\$25</u>

a/ \$3,800 Investment in equipment
200 Cost of disc and software
 \$4,000 (Used 4 years, 100 users per year)

(Bitney et al., 1986)

portunities to learn about interactive instructional videodisc, its potential, and its continuing application in Extension as well as in other nonformal educational systems. Specific staff training is required for those who might be developing and producing videodiscs. The type, amount, and focus of the training required is yet to be determined.

Positive staff training is also needed for effective use of the interactive videodisc in Extension's delivery system. Scherer and Masiel (1988) report that Extension agents feel a need for communication training in both computer and video use. Since videodisc application is the combination of both computer and video, one might assume that staff will feel a need for training with the technical equipment used to deliver videodisc programs.

What type of instruction do agents and specialists need to effectively use instructional programs and maintain the equipment? What kind of support should be provided within the system for management of the technology? What effective marketing approaches will assist agents and specialists to maximize use of the educational materials?

To assess a model for videodisc training, one might begin to examine the growing research on video conferencing in Extension. The widespread use and acceptance of video conferencing might offer suggestions of staff training approaches and marketing strategies which may apply to instructional videodisc.

Acceptance, utilization, and educational value. Evaluation questions need to address how both staff and clientele accept and use the technology. In regard to the staff, what are the positive feelings about the interactive videodisc programs?

What are the barriers which inhibit maximum use?

What are the pros and cons of using interactive videodisc for individualized or group instruction? How, and in what settings, can a videodisc program be used most effectively to reach the target audience? Does the program need to be changed or adapted for various instructional situations?

Extension audiences are not homogeneous groups. Current agricultural videodisc programs already focus on quite different audiences like pesticide applicators and financial managers. Evaluation needs to address learning, retention, and application of the subject matter to the audience's personal situation. How does the knowledge clientele gain, retain, and apply from an instructional videodisc program compare with other learning situations? How do clientele feel about the educational experience? Program designs and selection of media need to be based on questions focusing on the appropriateness of the technology for a distinctive audience and for a given subject matter.

Long-term Needs

If the interactive videodisc is indeed a viable delivery mode to use in Extension, long-term evaluation needs must be considered and addressed. Initial development costs for programs can be considerable. Therefore, processes need to be explored on both a national and regional level which will prioritize program needs and allow for an order in developing programs which are applicable across county and state lines.

Related issues focus on identifying budgetary needs. How much money is needed for program pro-

duction and implementation and where does this money come from? What kind of cooperative arrangements between states might be cost effective for production or repurposing instructional videodiscs?

Research on the application of interactive video in adult learning will continue on a long-term basis. Questions relating to instructional design that need to be more fully addressed include:

1. How much and what kind of interactivity are most appropriate to build into different instructional designs in various programs?
2. Is this interactivity used as a checking mechanism for branching?
3. Can (or should) the interactivity serve as an information-gathering device?
4. Does the interactivity allow for adults to practice applying knowledge to a personal situation? If so, what designs are most appropriate to help adults apply the information to their own situations?
5. How much and what kind of feedback are most effective for adults?

Research with Videodisc

The unique attributes of interactive videodisc — realistic audio and visual features from television technology along with the text, graphic and management capabilities from computer technology — make the medium very attractive for research related to adult learning.

The ability to track specific information on a computer disk provides new opportunities to follow learners, learning styles, and educational processes. Research designs can be developed which call for a user's response to a given set of

materials as one progresses through an instructional videodisc program. The ability to record the path a user might follow allows for other study designs which utilize the branching capability of interactive videodisc. Together, these features provide a research tool to scrutinize adult learning styles in processing and applying new information.

The capacity to collect data in an unobtrusive manner by recording or tracking responses raises ethical issues, particularly if the participant is being asked to enter personal information. At what point does this process violate individuals rights of confidentiality? Perhaps regional or national groups may need to address these ethical issues. However, Extension must consider defining and creating protocols that would be employed in the developmental phases of Extension instructional videodiscs.

As adult educators expand their awareness of the extraordinary strengths of instructional videodisc technology and use it for adult programming, more research questions will emerge. At the same time, original and innovative research strategies will have to be identified to deal with the questions.

Summary

Studying the adoption of interactive, instructional videodisc technology in Extension challenges us to: a) identify evaluation and research issues and phrase them in testable ways, b) develop an overall research and evaluation strategy for testing the technology, and c) organize a method for delivering the evaluative information to decision makers.

There are a considerable number of questions to be addressed as interactive, instructional videodisc

is scrutinized for its application in transferring information in Extension. More questions will arise as the medium is evaluated in various settings and situations in the Extension System.

References

- Albanese, M. and Huntley, J. (1988). Letter. The Videodisc Monitor, 5(8), 26-27.
- Andriessen, J. J., and Kroon, D. J. (1980). Individualized learning by videodisc. Educational Technology, 20(3), 21-25.
- Bitney, L., Lanpher, B. and Blankenau, G. (1986, July). Managing cost flow using an interactive videodisc/computer program. Paper presented at the American Agricultural Economics Association. Reno, Nevada.
- Branch, D. C., Ledford, B. R., Robertson, B. T., and Robison, L. (1987). The validation of an interaction videodisc as an alternative to traditional teaching techniques: Auscultation of the heart. Educational Technology, 27(3), 16-22.
- Brody, P. J. (1984, April). Research on and research with interactive video. Paper presented at the annual meeting of the American Educational Research Association. New Orleans, LA.
- Bunderson, C. V., Baillio, B., and Olsen, J. B. (1984). Instructional effectiveness of an intelligent videodisc in biology. Machine Mediated Learning, 1(2), 175-215.
- Bunderson, C. V., Olsen, J. B., and Baillio, B. (1981, January). Proof-of-concept demonstration and comparative evaluation of a prototype intelligent videodisc system. Learning Design Laboratories, WICAT, Inc., Orem, Utah: Author.
- Butler, B. & Tate, T. (1989). New technologies for training (Accomplishments Report, Joint Council). Washington, DC: ES-USDA.
- Clark, R. E. (1983). Reconsidering research on learning from the media. Review of Educational Research, 53(4), 445-459.
- DeBloois, M., Jaki, K. C. and Hall, A. F. (1984). Effectiveness of interactive videodisc training: A comprehensive review. The Videodisc Monitor. Falls Church, VA: Future Systems Incorporated.
- Gayeski, D. M. (1989). Why information technologies fail. Educational Technology, 29(2), 9-17.
- Gibbons, A. S., Olsen, J. B., and Cavagnol, R. M. (1982, May). Hawk Training System: Evaluation Report WICAT Systems, Inc. Orem, Utah: Author.
- Hannifin, M. J. and Schaffer, L. (1984, April). The effects of systematically varied interactivity on learning from interactive video. Paper presented at the annual meeting of the American Educational Research Association. New Orleans, LA.
- King, J. M. and Reeves, T. C. (1986, January). Evaluation of a group-based interactive videodisc system for military training. Paper presented at the annual meeting of the Association for Educational Communications and Technology. Las Vegas, Nevada.
- Lee, C. (1987). Where the training dollars go. Training, 24(10), 51-65.
- Reeves, T. C. (1988a). Assessment of neuromotor dysfunction in infants. The Videodisc Monitor, 5(4), 26-27.
- Reeves, T. C. (1988b). Evaluation reviews: guidelines, introduction, and overview to a new regular series of articles. The Videodisc Monitor, 5(4), 24-25.
- Rizzolo, M. A. (1988, September). Factors influencing the development and use of interactive video in nursing education: A delphi study. Paper presented at the Nebraska Videodisc Symposium. Lincoln, NE.
- Rockwell, S. K. and King, J. W. (1988). Reactions to an initial attempt at implementing interactive videodisc in Extension. ACE Quarterly, 71(3), 3-9.

- Roden, S. (1987). Training cost-analysis work sheet for five-year life cycle costing. The Videodisc Monitor, 4(3), 18-19.
- Scherer, C. W. and Masielat, S. (1988). Conceptual, traditional and new media training needs: A study of county extension agent perceptions. ACE Quarterly, 71(4), 15-19.
- Smith, E. E. (1987). Interactive video: An examination of use and effectiveness. Journal of Instructional Development, 10(2), 2-10.
- Smith, R. C. (1985, September). Full-scale pilot testing of Florida's videodisc training project. Pensacola, FL: University of West Florida, Office for Interactive Technology and Training.
- Vadas, J. E. (1986, August). Interactive videodisc for management training in a classroom environment. Paper presented at the Eighth Annual Conference in Educational Education and Training. Society for Applied Learning Technology. Washington, DC.