Videotaped Lectures in a Graduate Cytogenetics Course

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ABSTRACT

Effective cytogenetics teaching requires the frequent use of visual aids to depict complex chromosome configurations. Primarily for this reason, videotaping lectures in a graduate-level cytogenetics course was initiated in 1969 and has continued. Student reactions to this approach and other data on student usage were compiled from course evaluations over this 25-yr period and are presented here. Ninety-two percent of the students indicated that videotaping was worthwhile and an average of 8.8 out of 28 lectures per year were viewed by each student who responded. Ideas regarding advantages of using the videotaped cytogenetics lectures as well as additional uses for the videotapes are presented.

THE TEACHING of certain scientific subjects requires a highly visual approach. Cytogenetics is such a subject. Complex diagrams are repeatedly drawn on the blackboard, displayed on the overhead projector, or shown as projection slides. For this reason, a videotape augmentation was instituted in a graduate-level cytogenetics course at the University of Minnesota in 1969. Several of the advantages associated with using instructional videotapes for agriculture courses have been noted previously (Wells and Trinklein, 1983). Reider (1987) predicts that the videocamera is the most significant instructional tool since the textbook. The use of videotapes in place of a live lecture has been generally accepted with apparently little decline in instructional quality (Dutton, 1988). We report herein a very positive student response to offering videotapes for review of live lectures.

MATERIALS AND METHODS

Equipment. The initial videotape deck was a Sony 1″ reel-to-reel type. Only a 2-wk supply of tapes were available; therefore, only the last six lectures could be reviewed at any one time. The original tape deck was replaced in 1978 with a Sony Betamax SLO-320 video cassette recorder. Sufficient tapes were available to record all 28 lectures, as well as certain labs, and these permitted students to review all new lectures given up to the time of viewing during that particular quarter as well as subsequent lectures from the previous year. In 1986, a JVC HR-D180U VHS video cassette recorder and a NEC 19″ PM-1971A color monitor were purchased along with a JVC GX-N80U color camera. Again, sufficient tapes were available to record all 28 lectures as well as several laboratory demonstrations.

Recording was done during the lecture by a teaching assistant who directed the camera to the subject (lecturer or screen) and manipulated the zoom lens. The microphone to the recorder was never worn by the lecturer; it was either placed on the lecture table, or with the newest equipment, merely attached to the camera.

Following each lecture the videotape deck was placed in the laboratory room, where students had access 24 h/d. Students were briefly instructed on how to use the equipment for viewing during the first laboratory period of each quarter.

The data presented herein were obtained from an evaluation form that had the statement "Videotaping of the lectures was worthwhile" and the question "For how many lectures did you utilize the videotape?" We also present various evaluative observations made over the years.

RESULTS AND DISCUSSION

Students taking the graduate-level cytogenetics course (Univ. of Minnesota AGRO 8-230) were surveyed on course evaluation forms regarding their use of the videotaped lectures during the final class period each year. The name of each student was omitted to ensure his or her anonymity. From 1969 to 1973, students responded to the statement, "Videotaping of the lecture was worthwhile," by checking one of three responses: *agree, uncertain*, or *disagree*. In 1975, the responses were changed so as to consist of *strongly agree, agree, disagree*, and *strongly disagree*. In addition, students responded to the question, "For how many lectures did you utilize the videotape?" The results are presented in Table 1.

Overall, 260 out of 284 students, or 92%, agreed that videotaping was worthwhile, with 161 out of 284, or 57%, indicating strong agreement. The students viewed a total of 2499 lectures over the years, an average of 8.8 lectures per student per year (out of 28 lectures per year). In addition, many of the students who did not use the tapes indicated that they believed videotaping the lectures was worthwhile.

Both the proportion of students favoring videotaping and the average videotape usage per student have increased since the practice was initiated. The data in Table 1 indicate that 205 out of 212 students taking the course since 1978, or 97%, agreed that videotaping was worthwhile, compared with 55 out of 72, or 76%, before 1978. Average videotape usage since 1978 is 10.5 lectures per student per year, compared with 6.5 lectures per student per year before 1978. It should be noted that this increase in use of the videotape resource may be attributable to the greater reliability of the newer VCR technology, because the reel-to-reel unit frequently had minor breakdowns. However, this increased usage may also be due in part to the growing familiarity of the students with video cassette recorders (VCRs), since students would logically be more apt to utilize a technology with which they are familiar (Reed and Sautter, 1986).

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Published in J. Nat. Resour. Life Sci. Educ. 23:16-18 (1994).

Table 1. Student response to the availability of videotaped lectures.

Year	Response†			No. of lectures viewed	
	Agree	Uncertain	Disagree	Total	Avg/student
Video Type 1 (reel-to-reel)					
1969	4	1	1	67	11.2
1970	4	2	0	37	6.2
1971	6	0	0	44	7.3
1972	9	4	2	102	7.3
1973	3	2	0	33	6.6
1974	NA‡				
	Strongly agree	Agree	Disagree	Strongly disagree	
VCR 2					
1975	2	4	3	0	58	6.4
1976	5	7	2	0	94	7.2
1977	3	8	0	0	36	3.3
1978	13	3	0	0	145	9.1
1979	9	7	1	0	155	9.1
1980	11	1	1	0	NA	
1981	12	7	1	0	133	6.7
1982	11	4	0	1	192	12.0
1983	7	2	0	0	128	14.1
1984	12	1	0	0	176	13.5
1985	10	9	1	0	138	6.9
VCR 3						
1986	13	1	0	0	176	12.6
1987	10	2	0	0	116	9.7
1988	5	2	0	0	95	13.6
1989	8	2	0	0	98	9.8
1990	7	4	0	0	130	11.8
1991	9	2	2	0	105	8.1
1992	10	4	0	0	171	12.2
1993	4	3	0	0	71	8.9

† The question was "Videotaping the lecture was worthwhile."
‡ NA = not available.

One important advantage of the videotaped cytogenetics lectures is that they provide a means for improving long-term recall of the course material. Because of the rapid instructional pace of the cytogenetics course, it may be difficult for some students to incorporate, and thus comprehend adequately, the basic cytogenetics concepts presented early in the quarter. Educational psychologists have shown that these basic concepts, or *schemas* (McKeachie, 1980), are necessary not only for cognition of more advanced concepts but also for long-term memorization of the initially presented information (Helsel and Hughes, 1983). The videotapes of the early lectures thus provide a resource for students to enhance their understanding of basic cytogenetic principles through repetition so that they will be able to more thoroughly comprehend and remember more advanced concepts that are presented in later lectures.

Several other observations have been made concerning the advantages of videotaping in this cytogenetics course. Students tended to view the tapes before coming to the instructor to answer various questions that arose, thus saving the instructor's time. They usually added information to their notes while watching the tapes, making their notes more complete. Many students, particularly foreign students having native languages other than English, indicated that taking notes during the lecture was less stressful because they knew the tapes were available if a point was missed.

In some courses where large amounts of detailed information need to be presented, instructors provide photocopies of their notes for students to follow along during the lectures. Although this relieves much of the stress from taking notes, the case can be made that students don't learn as well when they don't have to process the lecture in their own words by taking notes. Videotaping the class lectures addresses this dilemma by providing the repeated access to a lecture that permits detailed note-taking and processing.

Additional uses for the videotapes have emerged. The tapes are extremely useful for the instructor in reviewing and critiquing the teaching style. Use of the blackboard, excessive movement, voice inflections, and distracting mannerisms can be scrutinized when reviewing the tapes. Thus, appropriate alterations in teaching style can usually be made once these areas for improvement are recognized. The videotaped lectures provide the means for instructors to view their teaching style from the student's perspective. Such perspective is clearly valuable in any teaching improvement effort.

Another use of the tapes is for the regular instructor to review the lectures of a substitute. Occasionally, when the instructor must miss a lecture, he or she either tapes the lecture in advance for viewing during the normal lecture period or asks another professor to present a substitute lecture. Reviewing the tape of the substitute lecturer precisely informs the instructor as to the content of the lecture and gives confidence in developing appropriate questions to cover that material on the examination.

An additional use is for students who miss class. The student who adds a course after the first few lectures can still view the appropriate tapes and obtain exactly the same information as the other students. This is especially useful for the important procedural discussions in the first few class periods of a term (e.g., course expectations, testing, and grading procedures). Due to scheduling problems, students may occasionally have to arrive at class a few minutes late or leave a few minutes early; they can view the tape later, at their leisure, and not miss any information.

Another use of the videotapes is for students who cannot take the course but who, for one reason or another, desire them as a resource. Since the taped lectures are not erased during the year following the end of the quarter, they are available to students who may need an in-depth review of the subject for doctoral preliminary examinations. Other students may watch the videotapes if they feel the information will help them understand principles being taught in related courses. In addition, older graduate students who may not have taken prerequisite classes for a long time but plan to take the course can view the videotapes, particularly the first few lectures. Then they can get an idea about topics and concepts to review before taking the course. The videotapes also provide a useful format for providing "distance" education to nontraditional students who cannot access the campus to attend the course in person. In addition, the opportunity exists to share such tapes with other institutions that do not provide a comparable course or with instructors of comparable courses at other institutions who desire to augment their courses.

SUMMARY

The practice of videotaping lectures in a graduate-level cytogenetics course has been overwhelmingly accepted by students as being a valuable and utilized resource. In addition to their educational value to the students, the videotapes can be used to improve the instructor's teaching style, prepare examinations, provide an outreach to students who cannot access the classroom, and share the course content with other educational institutions.

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