VIDEOTAPE-LABORATORIES SHOULD NOT BE COPYWORK

Presented at
Educational Research Methods Workshop (ERM)
Session Number 2220 of
1975 ASEE Conference
Fort Collins, Colorado
June 16 - 19 1975

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CEP-74-75-RNM-58

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Introduction

The advent of inexpensive television equipment such as the small, portable 1/2 inch video black and white taping machines has made television instruction possible in all classrooms. No longer is a professional producer-director needed to make television available for classroom or laboratory instruction. There can now be a new breed of amateur producer-director who can use the inexpensive television equipment very effectively. His studio may be the conventional undergraduate laboratory, his plot may be the excitement of students expressing what they have learned, and his actors the students themselves.

In video tape sequences the events and programs are electronically placed on magnetic tape. Such video taping allows prior scheduling and timing of laboratory experiments to fit the teaching needs of the instructor. The telecasting of this material can be done at anytime and can offer repetitive instruction. Video tape can be edited, erased, reused and duplicated for exchange use.

Video taping is a simple process; however, there are serious pitfalls for the amateur. Taped programs can be boring. The laboratory experiment offers exceptionally fine use for the video taping system. In almost any laboratory situation the television screen may come into action. During any portion of lecture associated with such a laboratory experiment one must be sure to have motivating and easily read visuals. Arrange to have shots of people present on video tape laboratory experiments. Thus you have visual and factual support for the scale of the

experiment studied. Video taping of course shortens time and distance; events can be covered which normally would take long periods of time and great distances. In replay, however, they may only take a few minutes. Real life situations brought to the classroom in taped programs can demonstrate machinery under actual field conditions when the equipment would not normally be used. Field trips can be taken with the student in the classroom. Travel time is eliminated. In the laboratory television may be effectively used to demonstrate laboratory techniques before the student tries them. In a typical undergraduate laboratory the graduate teaching assistant must spend a great deal of time transforming instructions from the professor to the students; however, by the use of the television equipment the instructor may be sure that nuances of the experiment are explained in advance and the use of the equipment can be made quite clear. Even a complete laboratory session can be put on video tape with the students taking data from the presentation. From such data the students could write up a complete laboratory report. Part of a laboratory session may be placed on video tape and the remainder of the period devoted to hands on experience.

As has been the case with digital computers and most laboratory equipment in the past, one has found that during the initial introduction of new equipment into the academic arena there has been an understandable reluctance to permit ham-handed undergraduate students to experiment directly with expensive television equipment. But the most effective learning experience seems to arrive when the students themselves interact with such equipment. Rugged inexpensive video machines are now available and most students enjoy the novelty of directing their own short programs. Another novel twist of letting the students do the production work is

that only a few students need perform each laboratory exercise--each of which might take hours to produce. Yet in the subsequent reproduction before the class the exercise may be shortened to a manner of minutes. I personally prefer to have the students orally add dialogue to the video screen during presentation. This allows one to emphasize communication skills which are so frequently forgotten in the conventional lecture experience.

Much of the benefit to the students stems from their feeling of excitement while engaging in the project. They regard the technique as a new and novel means to study real engineering problems rather than merely being lectured about it. This also provides substantial excitation which stimulates more interest in the content of the course.

Another fascinating mode of student production has been developed by Morton Cotlar, College of Business, Colorado State University. This involved sending the students out into the business (read engineering) community to interview business men in their own organizational setting. The novel twist is to send only a few students and they take along a video camera and video recorder. The students sit around the business man's desk, or walk through his facility, with the portable video system capturing all the "data." The camera sees the facial expressions of the executive and it records all of his body language as well as his verbal utterances. The advantages are considerable. Instead of a whole class appearing for a plant tour, only a few representatives need be accommodated. The students who view the final product are "turned on" by the excitation of a fresh new classroom device. They are inspired by the produce of their peers, and the exhilaration yields several benefits--an opportunity to perceive situations in which the classroom

theory is applicable to the real situation, a feeling of timeliness, an opportunity to stop action and analyze a situation or comment.

Production and Utilization Experience

The investment in equipment necessary to produce videotape programs of this sort is not extraordinary. Highly sophisticated equipment is not needed because a high level of professionalism is not warranted. A documentary type of program such as this can tolerate considerable imperfection without detracting from the acceptability or the value of the final product. A relatively inexpensive black and white portable system is perfectly adequate for field recording. A somewhat better system for editing is helpful but not absolutely necessary. Equipment of the sort typically found in most universities is entirely suitable. Examples of specific equipment available are considered in the next section.

Raw videotape is fairly inexpensive and can be reused many times. A few hours of field or laboratory taping might be needed, but once this is edited into a final program, it can be reused.

Labor required for production is largely provided by the students themselves as part of the course involvement. Typically, students will spend considerable time on this "video-termpaper," but they do it by their own choice. Faculty time required for advice and guidance is quite small; however, one's own enthusiasm sometimes extends the necessary commitment. Technician labor is required to do a really creditable job of assembly editing. Tape editors can be quite expensive; however, it is not entirely necessary. Limiting the students' programs to from 10 to 20 minutes keeps the number of electronic cuts and splices to a reasonable level.

General Comments on Video-Production Units

A typical small black and white TV system such as that shown in the accompanying figure need not be expensive nor difficult to operate. Typical systems such as the Sony Video Recorder AV3400 provides high quality video and audio record playback in a truly portable compact unit. The recorded material can generally be immediately played back and seen on the camera view finder screen. A video monitor with a connecting cable can be used or a conventional TV screen with a RF unit. Systems available today generally adjust audio and video recording levels automatically to assure perfect control with very little effort. Most cameras come with zoom lenses which allow close and then far distance shots of the same object. Stop action can also be obtained for close examination. Additional sound such as commentary or background music may be recorded on the prerecorded picture during playback.

It has been our experience that flow visualization recorded by black and white video recorder systems is often more capable of documenting small nuances of an indistinct flow field than is initially observed by a person's eye. Indeed it is usually far clearer than can be taken with conventional 16mm photography equipment. Light levels required by such video recorder equipment often are quite a bit less than required by conventional 16mm film. This is obviously an attribute of what is essentially a light amplification system built directly into the video recorder. This means that hot photo floodlights need not be used and their additional heat which may influence a given experiment can be eliminated.

If it is planned to allow the student to playback the television equipment instead of the instructor it may be wise to make use of the

cassette type TV tape recording equipment now available. Such equipment can be obtained in a variety of sizes, however, the 3/4 inch TV cassette system seems to be a standard of the industry and provides the most satisfactory general performance. These cassette tape machines frequently are available with two soundtracks allowing subsequent dubbing in of audio material while listening to the comments recorded during the laboratory experiment itself.

Good color systems are also available for use at a modest price. Currently the cost of typical color TV camera and control unit are approximately five to ten times the cost of the least expensive black and white units. However, such units generally contain more expensive lens systems and self-adjusting iris systems to account for the variation in light intensity. Depending upon the particular color system obtained one may have to obtain more expensive photo flood equipment. Those systems which have separate Vidicon tubes controlling the light intensity and the color levels generally are quite good at even low background light levels. However, those systems which are operated on a single Vidicon tube requiring the presence of color filters require increased illumination. In general, the illumination from these systems can be a minimum 200 lux.

A wide variety of playback recording units are also available ranging from the relatively expensive 3/4 inch cassette systems down to the relatively inexpensive 1/2 inch open can TV tape. In the purchase of any laboratory equipment consideration must be given to the advantages of lens flexibility. A system that has a built-in and irremovable lens system is not as adaptable as one with a C or S mount which can allow the use of standard, telephoto, wide angle and zoom lenses.

Concluding Remarks

The intensity with which students relate to the situation is quite remarkable. The resulting enthusiasm stimulates more awareness of the applicability of theory to practice than a class visit by a guest lecturer. The students are also sharply aware that the tape was produced by their peers in their own college community, and this promotes a great deal of excitation. For the team of students who produced the tape, it is clear that they have had an exhilarating experience, from which they have learned substantially more than they might have from creating a typical term paper.

But besides the direct benefits from field activity, the students also develop their "video literacy." They learn a great deal about technological communication. They lose their initial fear of the equipment involved and they gain a respect for the process in producing a video document. In addition, they recognize the role of mixed-media as a more effective communication device.

Slides

1. Children producers
2. Children producers
3. Children producers
4. Meroney and Hansen Sony System
5. Meroney and Hansen Hitachi System
6. Sony B&W System
7. Panasonic B&W System
8. JVC B&W System
9. Sanyo B&W System
10. Sony Color System

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PORTABLE VTR SYSTEMS
CAMERA UNITS

MANUFACTURER	POWER VDC	S/N RATIO DB	AUTOMATIC LIGHT COMPENSATION	MICRO-PHONE	MINIMUM ILLUMINATION	WEIGHT (LB)	LENS	RETAIL PRICE
PANASONIC WV-3085	12	>40	2000/1	YES	>50 LUX	4.4	F1.8 12.5-75MM	$1895- COMPLETE
JVC GS-4500	12	43	1000/1	YES	>300 LUX	5.5	F1.8 15-60 MM	$1795- COMPLETE
SANYO VC-500	12	42	5000/1	YES	>10 LUX	4.8	F1.8 12.5-75MM	$1995- COMPLETE
SONY VIDEOROVER II AVC-3400	12	>40	5000/1	YES	>100 LUX	6.0	F1.8 12.5-75MM	$1850- COMPLETE
JVC GC-4800U	12	>40	--	NO	>400 LUX	10.7	F2.0 15-60 MM	$3750 $6950 COMPLETE
SONY TRINITON DXC-1600	12 OR AC	>40	10/1	YES	>250 LUX	8.0	F2.5 17-96 MM	$5000
AKAI CCS-150S	12	>40	2000/60	YES	>600 LUX	5.76	F2.0 12.5-75MM	$7000- COMPLETE

PORTABLE VTR SYSTEMS
TAPE RECORDER UNITS

MANUFACTURER	POWER VDC	S/N RATIO DB	TAPE WIDTH IN.	RECORD TIME MIN.	BATTERY MIN.	WEIGHT (LB)	SLOW MOTION	STOP ACTION	RETAIL PRICE
PANASONIC NV-3085	12	>40	1/2	32	60	17.5	NO	NO	$1895- COMPLETE
JVC PV-4500	12	43	1/2	30	YES	17.0	NO	YES	$1795- COMPLETE
SANYO VTC-7100	12	42	1/2 CASSETTE	20	40	15.0	YES	YES	$1995- COMPLETE
SONY VIDEOROVER II AV-3400	12 OR AC	>40	1/2	>30	30	18.0	--	YES	$1850- COMPLETE
JVC PV-4800U	12	>40	1/2	30	YES	18.0	AVAIL	AVAIL	$1950- $6950 COMPLETE
SONY VO-3800	12 OR AC	>40	1/2 CASSETTE	20	60	26.0	NO	YES	$3000-
AKAI VT-150	12	>40	1/4	26	40	16.4	NO	YES	$7000- COMPLETE