DOCUMENT RESUME

ED 259 709 IR 011 741

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TITLE Assessing Instructional Strategies and Resulting Student Attitudes Regarding Two-Way Television Instruction.
PUB DATE 82
NOTE 23p.
PUB TYPE Reports - Evaluative/Feasibility (142) -- Tests/Evaluation Instruments (160)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Classroom Observation Techniques; Comparative Analysis; *Delivery Systems; Higher Education; Interaction; *Intermode Differences; *Lecture Method; *Medical Education; Medical School Faculty; Medical Students; *Student Attitudes; Television; Worksheets
IDENTIFIERS *Two Way Television

ABSTRACT

Designed to compare instructional strategies and effectiveness of medical school faculty using both in-person and two-way television delivery systems, this paper presents classroom observation data obtained from presentations by seven faculty members of the College of Medicine at Texas A&M University over a 9-month period. It includes a comparison of the instructional strategies used by faculty using alternative delivery systems and presentations, and collects affective information on and from students regarding the merits and limitations of two-way television as an instructional delivery medium. The procedures for collecting data are stated (Classroom Observation System) and illustrated by a sample coding sheet. Analysis of the data showed that, in general, medical students favorably reviewed the quantity of information presented, the presentation style of the professor, and the technical quality of televised presentations. However, they were not so satisfied with the ease of note taking during two-way televised presentations, and they expressed less interest in topics presented via two-way television. The document concludes with a recommendation for further instructional application of television, especially when obstacles such as travel and time are considerations. (JB)

Assessing Instructional Strategies and Resulting Student Attitudes Regarding Two-Way Television Instruction

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ABSTRACT

This inquiry was conducted to examine the potential of two-way television as an instructional medium. Classroom observation data were collected from 32 presentations by seven medical faculty. Half of the observed presentations were from two-way television mediated lessons, while the remaining observations were made in a conventional professor-in-front-of-class mode. Comparisons of observation data from these two presentation modes revealed similar instructional strategies by the professors regardless of the presentation mode. An additional analysis revealed attitudes of students were mixed regarding instruction provided via two-way television.

Television has great potential as a communication resource in education. Color, motion, sound, magnification, slow-motion, split screen, time-lapse are among the capabilities of the medium available for the instructional designer employing television as a transmission medium (Craig, 1972). Recent advances linking video-disk players with microcomputers and interactive television offer even greater expedients for the instructional designer. The challenge is to integrate these current technological marvels with instructional strategies and extant curricula.

Examining the literature on educational utilization of two-way television has yielded a variety of instructional applications, such as, psychiatry (Maxmen,1978), physical therapy (Sanborn, Sanborn Seibert, and Pyke, 1974), speech therapy (Sanborn, Sanborn, Seibert, Pyke, Ferland, and Welsh, 1974), social and informational needs of older people (Felton, Moss, and Sepulveda, 1980), clinical examinations and medical diagnosis (Coltman, 1971; MacLean, 1971), surgery (Burch and Hodges, 1972; Goldman, Stanton, Saltzman, and Rosemund, 1972; Khanna, 1970), special education (Genensky, Petersen, Clewett, and Yoshimura, 1978), and teacher preparation (Boyle, Burge, and Moore, 1982).

Investigations addressing the perceived value of two-way television as an instructional medium have reported mixed findings. To illustrate, Carpenter (1979) found that television presentations in special education were well received because the participants could respond to the presenter. Generally, participants (78%) reported they were not intimidated by the prospect of responding in a live, state-wide closed circuit program. Similarly, Sanborn, Miller, and Naitove (1976) reported that exposure to instruction via two-way television enhances attitudes toward the medium. These investigators found that quality of television production, quality of teaching, as well as student parti-

cipation were factors influencing the positive attitudes. Conversely, Sanborn, Sanborn, Seibert and Pyke (1975) have reported that when nurses were asked their preference of taking courses in person or by two-way television, 67% indicated a preference to receive instruction "live." Similarly, MacLean (1971) reported that students reacted unfavorably to any situation in which they were completely isolated from teaching staff with contact provided only by television. Finally, comparative media studies on televised instruction have been generally characterized by a lack of significant findings. A number of causes for these equivocal findings have been suggested, but while differences have occurred, live and televised instruction have each been favored about half the time. From a research design perspective, the only variable typically considered was whether the teacher appeared live or on the televison screen. Rarely were the unique capabilities of television designed into the treatments. Under these conditions, it is hardly surprising that groups of learners with similar backgrounds studying identical content under nearly identical conditions produced nearly identical results (Winn, 1979; Wilkinson, 1980).

OBJECTIVES

This investigation was conducted to assess two-way televised instruction. Due to a number of factors, nearly 200 clock hours of instruction are delivered each year to medical students by faculty from the clinical campus approximately 35 miles away. It was anticipated that a number of these faculty would elect to present a portion of their lecture-discussions using the two-way television system via microwave communications rather than to travel to the central campus for a series of multiple hour, vis-a-vis presentations with students. The following objectives were developed to guide this investigation.

Activities will be planned and implemented to:

1. Compare instructional strategies of faculty using alternate delivery systems (two-way television and vis-a-vis presentations).
2. Collect affective information on and from students regarding merits and limitations of two-way television as an instructional delivery medium.

PROCEDURES

Setting: Classroom observation data were obtained from presentations of seven faculty members of the College of Medicine at Texas A&M University over a nine month period. Sixteen observations were made from two-way television mediated lessons transmitted from the Veteran's Administration Hospital in Temple, Texas to College Station, Texas, while sixteen observations were made in a conventional professor-in-front-of-class mode on the central campus in College Station. Since faculty participation in this project was voluntary, findings from this inquiry should be viewed as tentative and not generalizable to other settings or faculty.

Instrumentation: The Classroom Observation System (COS) was developed and used to obtain low-inference data regarding instructional moves during class presentations. The COS is based in part on the events of instruction specified by Gagne and Briggs (1974). Coding conventions for the instructional events component as well as coding conventions for three other components of the scale, i.e., communication-oral, communication-behavioral, and media support were developed by the investigators. The COS is designed for use in a large group instructional setting with instruction directed and controlled by a teacher. Observations of the class were recorded at one minute intervals across the four dimensions. This arrangement permits monitoring of the type of activities occurring within each dimension over time as well as the interactions of one

dimension with another. For example, the frequency of chalkboard use during a 10 minute stimulus presentation can be determined with this system as well as whether the chalkboard is being used more extensively than other forms of media. Coding begins by recording the type of oral communication being exhibited in column I, row 1 (first minute). Next, a decision is made regarding which behavioral-communication category is appropriate and this is recorded in column II, row 1. The coder then shifts attention to the events-of-instruction, again makes a categorizing decision and records this decision in column III, row 1. Finally, a decision is made regarding the media support being used by the instructor. This decision is recorded in column IV, row 1. As mentioned earlier, this process is repeated throught the observation period. If transitions and multiple categories occur during a minute interval more than one code may be placed in a cell.

A variety of reliability measures were determined for the COS during its development and subsequent application. During the pilot study, interobserver measures of agreement were calculated to determine the extent of observer misunderstanding of category definitions and overlap of categories. Subsequently, eight classroom sessions were coded by a single observer and compared to determine the stability of instructional behavior across observations. These measures indicated that each component of the COS had one or more categories which applied to instructional processes occurring in the typical presentation format in college level instruction. At the conclusion of the data collection phase, six observations of a single presentation were made to determine the extent to which the coder was consistent with himself in applying the COS. The intra-coder agreement across the six trials of a brief presentation (10 minutes) was 1.00. This is not surprising since the video lesson being

coded was relatively simple and the coder had used the COS extensively for nearly a year in coding actual class sessions. This individual was not responsible for subsequent analyses or interpretation of the data nor was he a co-investigator in this project. A sample coding sheet of this instrument is provided in figure 1.

Place figure 1 about here

Each of the scales, Student Perceptions and Assessments of Interactive Television (forms A,B,C), and Student Perceptions and Assessments of Interactive Television Instruction Summative Rating, were developed to obtain student perceptions of two-way television as a medium for transmitting instruction. These instruments contained items linked to a 50 millimeter dipolar line. The left end of the line segment was labeled strongly agree (SA), while the right end of the line was labeled strongly disagree (SD). Individuals were directed to respond to the item by marking the spot along the SA-SD continuum which reflected their position regarding the item. Scoring of the scales was performed by forming a scoring template divided into 5 intervals, placing the template over the page and registering in which of the intervals the mark occurred.

Measures of internal consistency were determined for each of these scales using the Spearman-Brown split-halves reliability test. The resulting reliability coefficients for the Student Perceptions and Assessments of Interactive Television, forms A,B, and C were $r_A = .96$, $r_B = .93$, and $r_C = .94$, respectively. For the scale, Student Perceptions and Assessment of Interactive Television Instruction Summative Rating, the correlation was $r = .75$.

Data Collection: Arrangements for classroom observations of in-person and

two-way television presentations were made by the investigators. These arrangements in turn were communicated to the individual who observed and recorded the observational data for all 32 sessions. The initial observation was made on March 22, 1982, while the final observation was recorded on November 13, 1982.

In addition, the classroom observer administered the three different forms of the instrument, Student Perceptions of Instruction via Interactive Television during this nine month interval. The Summative Rating of Student Perceptions and Assessment of ITV instruction was administered on May 20, 1982; September 17, 1982; and November 17, 1982. Data obtained from the administrations of the rating scales were analyzed to provide information germane to objective 2.

FINDINGS

Objective 1: A variety of analyses were conducted on the observation data gathered during the course of this investigation. Bivariate tables were developed to compare the instructional strategies applied by faculty given in-person and telecast conditions. The results of these comparisons are presented in table 1. One comparison among the events-of-instruction turned out to be significant, i.e., presenting-stimulus material. The televised presentation mode in this comparison registered a greater frequency of time intervals in the high range of occurrence (67-100% of class time) than that which occurred during in-person presentations, reflected by the chi-square comparison, $X^2 = 7.7$, $p < .02$. The remaining events of instruction, i.e., reviewing prerequisites, providing objectives to learners, providing learner guidance, providing opportunities for learner performance, providing feedback, and assessing performance of learners occurred with similar frequency across the presentations.

Place Table 1 about here

Each coded observation was plotted for recurring instructional patterns. These plots are presented in figure 2. The number of instructional moves varies considerably across these observations. The plots for each observation begins with the event-of-instruction noted at the top of the frame. The length of the line represents the duration of time spent on that event. For example, the plot of the observation of professor 01 on March 25, indicates the presentation began with a 12 minute presentation of stimulus material followed by one minute of learner performance, 8 more minutes of stimulus presentation, and concluded with 2 minutes of learner performance and feedback from the professor. The instructional pattern noted for this observation was the presentation of stimulus information followed by a brief question and answer period (learner performance). This pattern occurred three times during the course of the class.

The first event in the remaining observations of professor 01 consisted of either reviewing prerequisites or stating the objective for the class. Then professor 01 generally proceeded with the presentation of new material, stopping periodically to clarify and check on learner understanding of the material. Instances of learner performance occurred throughtout nearly all of the observations for professor 01 and feedback usually was provided in conjunction with learner performances (student responses to questions). The length of the presentation-learner performance-feedback instructional cycle varied considerably across the observations, ranging from 3 minutes (3/25) to 36 minutes (4/8). It does appear, however, that the length of the periods of stimulus presentation tended to be greater during the televised (remote) classes (see classes of 4/8 and 4/29) than during in-person (live) presentations with exceptions occurring 4/1 and 5/20 for professor 01.

In contrast, consider the events-of-instruction recorded and plotted for professor 06. The instructional pattern, whether televised or in-person, was nearly constant across eight observations; that is, professor 06 began, continued, and concluded his class with the instructional event stimulus presentation. Two exceptions, however, did occur during the live presentation of professor 06. In one case, professor 06 began his class by providing the objective for the presentation; in the second case, the class was concluded with a response or comment by a student. otherwise, the presentations of professor 06 were constant with respect to the events-of-instruction being applied.

Observations from the remaining professors (02, 03, 04, 05, 07 and 08) were limited; thus, identifying recurring instructional cycles was not possible, However, as a means of examining the classes observed, comparisons were made among the observations of the remaining professors. For example, professors 03 and 07 appear to have elicited learner performance more frequently than professors 02, 04 and 08. Identification number 05 represents a team teaching situation where professors 02 and 03 conducted the class. It is apparent that in these observations a good deal of discussion occurred. Whether this discussion pattern is typical of a team teaching situation among medical faculty remains to be verified with additional observations.

Place figure 2 about here

Objective 2: Perceptions of medical students toward interactive television presentations were obtained from three forms of the instrument, Student Perceptions and Assessments of Interactive Television Instruction, and Student Perceptions and Assessments of Interactive Television Instruction Summative Rating. Summaries of responses to these scales are presented in tables 2

and 3. It appears from examining table 2 that students perceived the quantity of information presented via two-way television to be satisfactory (see responses to items A1, B2, C2). Also, the presentation style of the professor while presenting on two-way television was perceived to be natural (items A2, B3) and visuals used in conjunction with the presentations were perceived to be satisfactory (items A7, C6). However, student perceptions varied across these forms regarding whether sufficient opportunities were provided for asking questions (items A6, B7). Students were nearly neutral about whether a two-way television presentation was as effective as an in-person presentation (item C5) and slightly negative regarding whether professors were more serious during televised presentations than during in-person presentations (items A4, C1). Also, perceptions were nearly neutral regarding the quality of camera work (item B6) and whether the remote presentation held their attention (item C7).

Place table 2 about here

Responses on the summative scale summarized in table 3 reveal quite favorable perceptions on a number of characteristics of two-way television, such as technical quality of televised presentations (item 3), amount of information presented (item 6), and presentation styles of professors (item 8). Neutral to slightly positive perceptions were determined for the pace of the two-way television presentations (item 4), quality of visuals (item 5), and relative effectiveness of televised to in-person presentations (item 1). Conversely, mixed to slightly negative assessments were registered for the following characteristics: concentration (item 2), opportunities to pose questions during class (item 7), enhancement of notetaking by two-way television presentations (item 10) and improvement of organization due to presentation by television (item 13). Numerical summaries of the seriousness of the professor during two-

way television presentations (item 9) and the frequency of visuals being used (item 12) cannot be interpreted in terms of whether the valur was favorable or unfavorable due to the nature of the items.

Place table 3 about here

DISCUSSION

The preceding analyses which compared instructional strategies of faculty using both in-person and two-way television delivery systems reflect common skills being exhibited with few exceptions. Tests of significance revealed different levels of emphasis for one event-of-instruction, stimulus presentation, when the presentation medium changed from the in-person to the televised mode. The televised mode registered a greater number of time intervals in the high range of occurrence than were recorded for the in-person mode. Whether this emphasis on presenting information is a "good" or "desirable" practice for two-way television is a moot point if we expect to find justification in the literature on this technology's instructional applications, since this type of comparison has not been reported. However, Williams (1978) has reported that for teleconferences, tasks such as providing information and generating ideas are well suited for two-way television. If this observation regarding teleconferences holds for instructional applications, then our finding is compatible with desirable practices. Yet, as we review the plots (figure 2) of the various professors, we are struck by the influence that one professor (06) had on these findings. Because of the disproportionate number of observations recorded in the remote or televised mode, compared with live presentations for professor 06 and the fact this individual relied almost exclusively on one instructional

event, stimulus presentation, we can conclude that the number of observations/professor and the characteristic instructional cycle of that professor resulted in the observed statistical differences in this case.

Examining other time plots of individual presentations did reveal some differences of instructional strategies depending on the nature of the delivery system and the apparent style of the professor. Our review of the instructional technology literature suggests that low-inference instruments have not been used extensively in this type of investigation. Ironically from the data collected in this investigation, observations obtained from the analysis of individual presentations have generated greater thought and hypothesis generation than the sample statistics across the observations. Thus, we encourage the use of low-inference observation scales in subsequent efforts designed to explore the efficacy of two-way television in various instructional settings.

In the case of attitudes toward two-way television mediated instruction, our findings were mixed. In general, medical students perceived favorably the quantity of information presented, the presentation style of the professor, and the technical quality of televised presentations. These findings are consistent with student attitudes toward two-way television reported by Sanborn, Miller and Naitove (1976) and Carpenter (1979). However, medical students in our study were not so satisfied with ease of notetaking during two-way televised presentations, and they expressed less interest in topics presented via two-way television presentations. These findings are consistent with an observation by MacLean (1971) that students are nonplused when they are isolated from the instructor and the finding by Sanborn, Sanborn, Seibert and Pyke (1975) who reported nurses were more favorably inclined toward in-person instruction. While attitudes toward two-way television appear to be mixed, it is encouraging

that many of the qualities of television mediated lessons are well received. Further, modification of the technical system, such as, providing ready access to microphones, may alleviate some of the less positive feelings toward this technology, especially the attitudes related to organization of presentations, and ease of notetaking. Thus, while student attitudes toward the instructional application of two-way television is varied, further instructional applications are recommended especially when other considerations such as travel and time are considered for presenting information to students at a distant site.

P.

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TABLE 1

Comparisons of In-person and Two-Way Television Presentations Across Instructional Events

Events of Instruction	Range* of Occurrence	Transmission Mode		Variance	Test of Significance
		Live	Remote	(%)	
Reviewing Prerequisites	L	16	16	-	N.S.
	M	0	0		
	H	0	0		
Providing Objective to Learner	L	16	16	-	N.S.
	M	0	0		
	H	0	0		
Presenting Stimulus Material	L	2	0	23	Sig.
	M	6	1		
	H	8	15		
Providing Learner Guidance	L	16	16	-	-
	M	0	0		
	H	0	0		
Performance by Learner	L	15	16	3	N.S.
	M	1	0		
	H	0	0		
Feedback Provided to Learner	L	14	16	7	N.S.
	M	2	0		
	H	0	0		
Assessing Performance During Class	L	16	16	-	N.S.
	M	0	0		
	H	0	0		

*Range of Occurrence = Relative frequency of codes/category in a presentation:
L = 0-33%
M = 34-66%
H = 67-100%

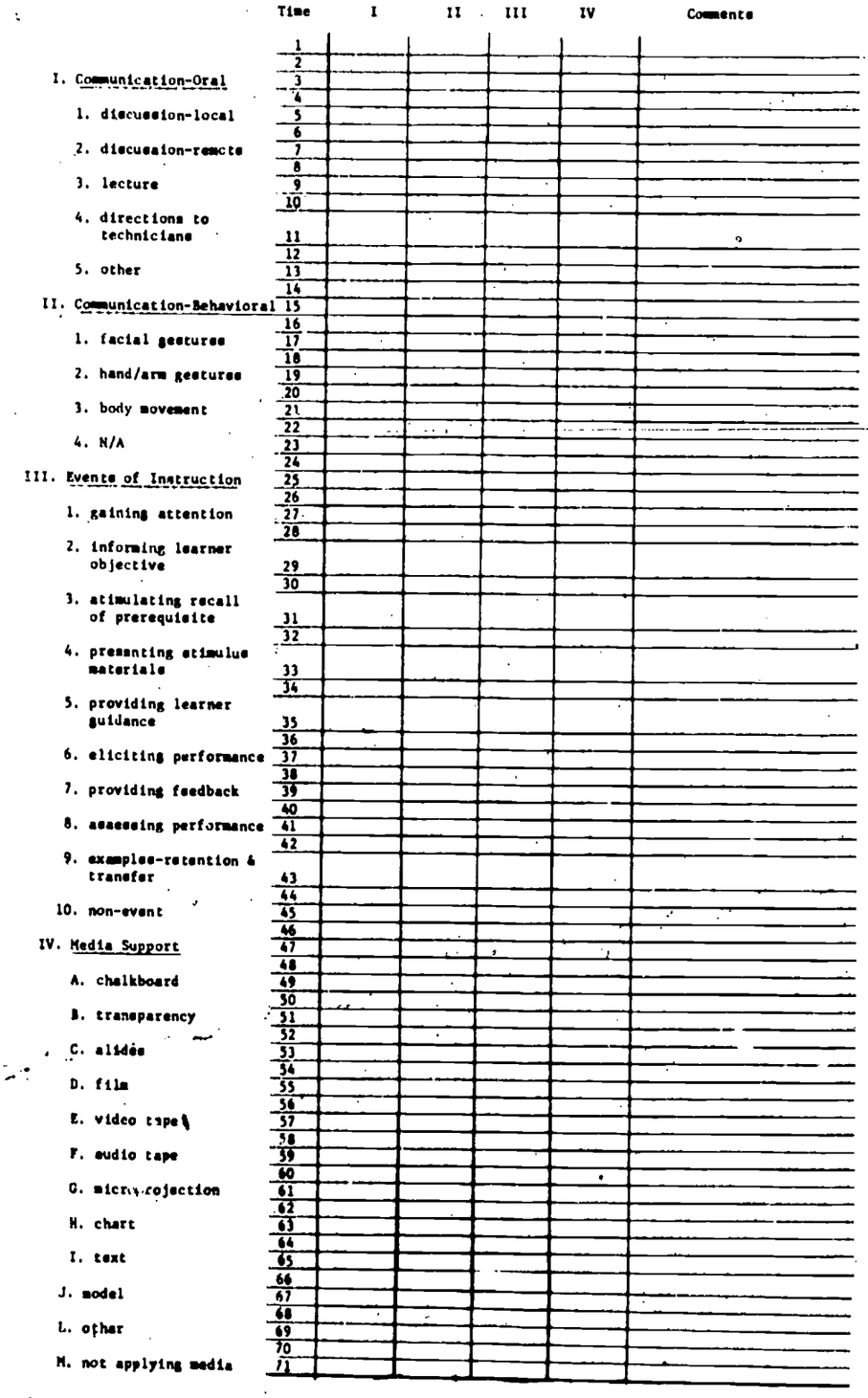

Figure 1
Class Observation Scale
(COS)

Table 2

Summary of Responses
Student Perceptions and Assessments of
Interactive Television Scales

Item	N	X*	S.D.
Form A			
1. The amount of information presented in today's presentation is equal to the quantity of information presented when the professor is present in the classroom.	27	4.48	.64
2. The presentation style of the professor did not appear to be affected by being on television.	25	4.32	.80
3. The professor was less formal today than when he is present.	27	2.44	1.37
4. The professor seemed more serious on television than when he is present.	27	2.44	1.25
5. The television equipment distracted me today.	27	3.78	1.05
6. Opportunities to ask questions were more limited with this presentation than when the professor is actually present.	27	2.52	1.25
7. Information on transparencies were not legible today on the television monitor.	26	4.04	1.15
Form B			
1. Note taking was enhanced by television.	26	2.54	1.07
2. Pacing of this presentation was quite satisfactory.	26	3.62	1.06
3. The presentation style of the professor appears quite natural.	26	4.00	.69
4. Professor gestures and facial expressions were not evident on the television monitor.	24	3.00	1.10
5. Visuals were used more frequently today than when the professor presents in person to the class.	26	2.65	1.23
6. I felt the camera was not always showing me what I wanted to see.	24	3.25	1.33
7. Opportunities to ask questions were limited in today's presentation.	26	3.31	1.32
Form C			
1. The professor appeared to be very serious or "all-business" today.	28	2.46	1.20
2. The quantity of information presented was very satisfactory.	28	4.50	.84
3. The pace of this television presentation was more rapid than when the professor was present in person.	28	2.89	1.50
4. The technical quality of this television presentation was quite satisfactory.	28	4.04	1.07
5. This class presentation was as effective as face to face by the professor.	28	3.04	1.48
6. Visuals used in this presentation were legible.	27	3.48	1.25
7. I had difficulty concentrating on this television presentation.	28	3.18	1.36

* Items values were arbitrarily ordered to permit the interpretation 5 = very favorable
1 = very unfavorable

Table 3

Summary of Responses on
Student Perceptions and Assessment
of ITV Instruction Summative Rating

Items	Dates of Administration											
	May 1982			September 1982			November 1982			Composite		
	N	$\bar{X}$	S.D.	N	$\bar{X}$	S.D.	N	$\bar{X}$	S.D.	N	$\bar{X}$	S.D.
1. Class presentations via television were as effective as presentations made by the professor in the classroom.	20	3.45	1.43	20	3.65	1.39	10	2.70	1.49	50	3.38	1.44
2. I had difficulty concentrating when interactive television presentations were made.	20	2.65	1.53	20	2.40	1.43	10	2.10	.74	50	2.44	1.36
3. The technical quality of television presentations was quite satisfactory.	20	4.25	.97	20	3.85	1.23	10	3.90	.88	50	4.02	1.06
4. Presentations were paced more slowly on television than when the professor was present in the classroom.	20	3.80	1.11	20	2.70	1.26	10	3.80	.63	50	3.36	1.21
5. Visuals used during television presentations were generally as legible as those shown in the classroom.	20	4.15	1.23	20	3.20	1.28	10	2.80	1.40	50	3.50	1.37
6. The amount of information presented via television presentations was equal to the quantity of information presented when the professors were present in the classroom.	20	4.45	.76	20	3.60	1.10	10	3.70	1.16	50	3.96	1.05
7. Opportunities to ask questions were more limited with television than when the professors were actually present.	20	3.00	1.45	20	3.20	1.20	10	1.80	.63	50	2.84	1.32
8. Presentation styles of the professors did not appear to be affected by television.	20	4.30	1.08	20	4.10	1.17	10	3.70	1.16	50	4.10	1.13
9. Generally, professors were more serious on television than when they were present in person.	20	2.85	1.09	20	2.90	.55	10	2.80	.92	50	2.86	.86
10. Notetaking was enhanced when presentations were made via television.	20	2.20	.77	20	2.20	.70	10	2.30	.68	50	2.22	.71
11. Often gestures and facial expressions of professors were not evident in television presentations.	20	3.20	1.11	20	2.15	.88	10	2.40	.97	50	2.62	1.09
12. Visuals were used more frequently with television presentations compared with vis-a-vis presentations.	20	2.60	1.10	20	2.60	.82	10	2.00	.67	50	2.48	.93
13. Presentations on television seemed organized than those in class.	20	2.00	.97	20	2.55	.76	10	2.50	.71	50	2.32	.87