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ABSTRACT

Rhode Island College in Providence had a televised biology course from 1964 to 1967. The televised lectures were unrehearsed and delivered without visual aids. Student reaction was so unfavorable that the televised course was discontinued. For the 1968 school year, a series of 64 videotaped lectures were produced, each approximately 35 minutes in length; they were designed to fully exploit the visual advantages of the television medium. Abridged audio-video scripts for each lecture were made available to students so that no note taking would be required. After the televised lectures students spent 15 minutes with an "integration leader" who was supposed to answer questions and integrate course concepts. When students were questioned about the restructed course, it was found that their attitude toward televised biology instruction had shifted from disapproval to over 80% approval. In addition they liked the availability of scripts and the provision for interaction with the integration leader. (JY)

FINAL REPORT
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Dr. Richard N. Keogh
Department of Biology
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Contents

I. Summary

This study is concerned with student attitude toward utilization of instructional television (ITV) within an introductory biology course at Rhode Island College in Providence, Rhode Island. Since 1964, 400-600 students have annually been enrolled in the course. Prior to this study, students had not responded favorably to ITV utilization within the two-semester introductory course (Biology 101-102). Between September 1964 and June 1967, students had met twice weekly within small groups (20-24 students) to view a 50 minute videotaped lecture. The ITV lectures were usually unrehearsed and largely delivered from the "lecturn" without accompaniment of supporting visuals (e.g., graphs charts diagrams). Student reaction was so unfavorable that ITV lectures were discontinued as of June 1967. Most Biology 101-102 students were taught in large groups within traditional lecture halls during the 1967-1968 academic year.

In December, 1967, the author recommended that a restructured ITV format be utilized beginning in September, 1968. A summary of the major recommendations follows:

A. The author be directed to develop a series of 64 videotaped lectures to comprise a new Biology 101-102 series.

B. The lectures be approximately 35 minutes in length and fully exploit the visual advantages offered by the television medium.

C. The author develop a series of abridged audio-video scripts to accompany each TV lecture. That they be compiled and sold, at cost, to students through the college bookstore. It was reasoned that such scripts would permit the TV teacher to introduce as much conceptual information within 35 minutes as had formally been presented within 50 minutes since students would already possess most of the notes for each TV lecture.

D. An "integration leader" be assigned to each section of the course during the last 15 minutes of the 50 minute period. No more than 24 students were to be enrolled in each section. The primary responsibility of the integration leader would involve answering student questions, encouraging student discussion and integrating course concepts.

E. The restructured format be tested during the 1968-1969 academic year.

F. Student attitude toward the restructured format be evaluated in May, 1969.

During the 1967-1968 academic year Biology 101-102 students were taught by three different instructors meeting in three large lecture halls. These students had no knowledge of our proposed restructured format. A questionnaire was distributed to these students in May, 1968 to determine their attitudes toward ITV and toward lectures delivered in traditional lecture halls. A similar but more extensive questionnaire was presented to all Biology 101-102 students in May, 1969 after they had experienced the restructured format. The results of the two questionnaires were compared.

General student attitude toward ITV among 1967-1968 students was negative. Almost all of these students were enrolled in one or more college courses which employed ITV as in instructional tool. Almost 80% of these students indicated disapproval of proposed ITV lectures within Biology 101-102. The same percentage indicated preference for in-person lectures within courses of large enrollment.

After experiencing the restructured format, the attitude of 1968-1969 Biology 101-102 students was almost the reverse of the former group. Almost 80% indicated a preference for the restructured ITV format over the traditional lecture hall approach. A majority of these students also felt that the restructured format would provide a better educational experience within other courses having large enrollment.

Our data further indicate that the additional time and money invested in the preparation of special visuals for Biology 101-102 ITV lectures was justified. Ninety-two percent of all 1968-1969 students indicated that there were more visuals utilized in Biology 101-102 than in most of their other courses and that our utilization of visuals greatly enhanced the overall quality of the lectures.

Our results indicated that the ITV teacher could introduce and thoroughly exemplify as many concepts within 35 minutes as he could in 50 minutes providing students possessed the teacher-prepared notes for each ITV lecture. Although the amount of information presented per lecture was comparable for the two groups, a greater percentage of 1967-1968 students found the pacing too fast when compared to 1968-1969 students. After experiencing the Biology 101-102 course, 85% of all students felt that having lecture notes provided by the instructor was more valuable than taking notes themselves. Most of our 1968-1969 students supplemented the information in the teacher-prepared notes with their own personal notes and felt that the combination led to a better understanding of concepts being presented in the ITV lectures.

Eight staff members were assigned as integration leaders for 25 sections. The most sections handled by a single integration leader was 6; the least number handled was one. Although students were divided in their opinion of the most important function of their integration leader, over 90% indicated that their primary functions included answering student questions and integrating information among the various components of the course. Sixty percent of our

students felt that the arrangement of a 35 minute ITV lecture and a 15 minute integration session was optimal for a 50 minute period. Only 11% felt that the ITV lecture should have been longer. The vast majority of students agreed that the integration session should be scheduled to immediately follow the ITV lecture.

Certain integration leaders were highly valued by their students while others were viewed far less favorably. Sections having high regard for their integration leaders also considered the integration sessions to be highly effective and valuable. Integration leaders considered by students to be most effective seemed to be those most able to answer student questions and help students appreciate fundamental interrelationships among course concepts. They also seemed to be teachers most talented in leading student discussion. Leaders who were not as warmly received by their students seemed to be those less talented in leading student discussion. Such results discourage indiscriminate utilization of teachers as integration leaders. Although some integration leaders were not highly regarded by their sections, less than 8% of all students indicated a preference for no integration session and almost 30% indicated a preference for a somewhat longer integration period.

The overall results of this study support previously published recommendations that the entire weight of instruction cannot normally be completely turned over to ITV. Effective utilization of ITV is almost always combined with classroom teaching. If the visual advantages of the medium are properly exploited, ITV lectures can be more effective than traditional lectures where one-way communication from teacher to student is all that is required. But most learning requires some active response and interplay between student and teacher. Television is weak in this area and requires compensation. Our restructured format was designed on the assumption that this recommendation is prerequisite to successful ITV utilization. Our results seem to reaffirm the soundness of this recommendation.

II. Introduction

A. Background For The Study:

The Department of Biology at Rhode Island College has actively experimented with instructional television (ITV) as an educational tool since 1963. Experimentation has been exclusively associated with the department's two-semester introductory biology course (Biology 101-102). The course consists of two 50-minute lecture periods and one 2-hour laboratory per week. Since 1964, 400-600 students have annually been enrolled in the course. The vast majority of Biology 101-102 students have been non-science majors who have elected the course to fulfill the science requirement imposed by the college.

Following a year of experimentation, the lecture portion of Biology 101-102 was first presented via ITV in September, 1964. Students met, twice weekly, in relatively small groups (20-24 students) to view a 50-minute videotaped lecture. No attempt was made to utilize ITV within the laboratory portion of the course. Time was rarely made available for rehearsal of ITV lectures or for the production of accompanying visuals (e.g., graphs, charts, diagrams). Although demonstrations were occasionally presented, ITV lectures were largely presented "from the lecturn" without extensive utilization of visual aids.

Between September, 1964 and June, 1967, a few attempts were made to evaluate student attitude and educational impact of the televised lectures. Unfortunately, none of these evaluations provided information which could be readily quantitated. However, they left no doubt regarding the unfavorable attitude of students toward ITV lectures. The most common student complaints follow:

1. Utilization of ITV does not permit sufficient personal contact between student and teacher.

2. Students do not have the opportunity to immediately obtain answers to their questions.

3. The instructor sometimes lectured too fast for efficient note-taking. There was no opportunity to request the instructor to slow his delivery.

As a result of frustrations which grew from such criticism, the department discontinued use of ITV in June, 1967. Most Biology 101-102 students were taught in large groups within traditional lecture halls during the 1967-1968 academic year.

The author was hired in July, 1967 to undertake a one-year study of ITV utilization by selected biology departments within other colleges and universities throughout the United States. The purpose of the study was to determine reasons for the unfavorable attitude toward ITV on the part of Rhode Island College students. Was the unfavorable response due to improper use of ITV by the department or due to an inherent deficiency of the medium itself?

I initially began extensive reading into relevant literature and distributed questionnaires to a number of individuals who were directly involved in the production of videotapes for biology and other science courses at the college level. I also visited a few universities to talk with science faculty, technicians and producer-directors who were associated with ongoing ITV courses. My visits included the biology departments at the University of Connecticut, Pennsylvania State University, Purdue University, Ohio State University and the University of Wisconsin at Madison.

Following this study, I critically evaluated the shortcomings of the department's previous involvement with ITV. I concluded that the primary reasons for the department's previous difficulties were as follows:

1. The lack of fundamental knowledge concerning the relative strengths and weaknesses of ITV as an instructional tool.

2. The absence of sufficient time and money for ITV talent and personnel to produce supporting visual aids for ITV lectures and for adequate rehearsal of the productions themselves..

The most serious mistake centered around the department's failure to recognize that, unlike classroom teaching, teaching via television is essentially one-way, not two-way communication. Students cannot question or directly communicate with the ITV teacher. Since cameras are impersonal creatures, studio teachers must compensate for the lack of feedback which they normally experience within their classrooms.

A number of studies have indicated that the lack of opportunity for students to question instructors and to engage in free discussions significantly reduces the effectiveness of learning from ITV. This seems particularly true if the subject being taught is relatively complex (see review of relevant research by Chu and Schramm, 1967). Questionnaire returns also indicated that many students of other colleges had voiced annoyance over the fact that some of their ITV courses did not allow or encourage sufficient free discussion between teacher and student. Several other studies have left little doubt that students of all age groups are often frustrated by lack of contact with an instructor (Henninghaus, 1957; Macomber, 1956; Pflieger, 1958).

Even a brief survey of recent ITV research provides dramatic evidence that "total teaching" by television has had little success. ITV has proven successful when its advantages have been exploited and its disadvantages avoided. Utilizing the magnification potential of the medium and the skill of the studio's graphic artist, the television teacher can often illustrate concepts more effectively and efficiently than the classroom teacher, especially where large numbers of students are involved. But the role of answering questions, leading discussions and integrating concepts is usually best left to the classroom teacher working with small groups of students. Television has played a central role in the Hagerstown project (Wade, 1967). Yet, television itself is rarely used for more than 30 minutes of the class period.

In light of such evidence, it seemed clear that any restructuring of the ITV format for Biology 101-102 must provide opportunity for students to obtain personal contact with a qualified instructor immediately following the presentation of a TV lecture. Such contact should provide opportunity for students, meeting in small groups, to obtain answers to questions and for free discussion of concepts introduced by the TV teacher. Furthermore, the classroom teacher should attempt to show interrelationships between and among concepts presented not only in the TV lectures, but also in the student's text and laboratory sessions. In short, the classroom teacher should attempt to become an "integration leader".

It was therefore decided to present the videotaped lectures to relatively small groups (20-24 students) and that the lectures should not normally be more than 35 minutes in length. The remaining 10-15 minutes of each class period should be used for personal contact between students and integration leader.

The decision to present videotaped lectures to small groups of students was based on the following rationale:

1. The attention of students could be immediately directed toward their integration leader at the conclusion of the taped lecture.

2. Although there do not appear to be any significant differences in the effectiveness of ITV when used with small or large groups (Capraro, 1957; Carpenter and Greenhill, 1958; Neale, 1961; Driscoll, 1959), research has indicated that college students generally prefer small TV classes to large TV classes or to large non-TV classes (Los Angeles City School Districts, 1957; Carpenter and Greenhill, 1958).

Although the restructured format promised to provide more personal contact between teacher and student, the new arrangement did not promise success in the absence of quality TV lectures. In the 1950's and early 1060's many colleges including Rhode Island College, properly recognized the educational value of television as a mass medium. ITV

was viewed as a vehicle for educating large numbers of students within courses of ever increasing enrollment. Most colleges recognized that ITV production is an expensive proposition and to be used efficiently it must be used in a large way. As clearly indicated by Chu and Schramm (1967), "... the strategy of efficient television use is to direct the tool toward large goals and many uses, and thus justify both cost per user and total costs against the objective".

Unfortunately, many colleges began utilizing ITV simply as a device to record and distribute a traditional classroom lecture to large numbers of students. In many cases, colleges gave little attention to methods and objectives of ITV instruction. Many college administrators simply viewed ITV as a way of teaching large numbers of students with minimal cost. Such usage of ITV has produced disastrous results.

When used properly, television can present certain types of visual information more effectively and easily than can the classroom teacher. Once recorded on tape, the information is always at hand for distribution at any time. Films may be integrated with charts, diagrams, slides and other visuals. Guest speakers may be interviewed and introduced to unlimited numbers of students via videotape. Because of the magnification potential of the medium, it is possible to perform experiments and exhibit materials too small for presentation within a large auditorium.

In 1967, the decision was made to produce all Biology 101-102 ITV lectures within this context. Rhode Island College and the Biology Department displayed considerable courage in supporting this decision. Such TV productions would cost considerably more in time and money than was originally anticipated. Our pilot productions indicated that I, as TV lecturer, and the production staff would need to expend between 100-150 total man-hours to produce a single 35 minute TV lecture. Each production would cost approximately $250. The total Biology 101-102 series was to consist of 64 lectures. In the end, we hoped to demonstrate that we could illustrate biological concepts more effectively via ITV than could normally be accomplished within the format of a traditional lecture delivered within a large auditorium.

At this point in planning, another question was raised concerning the nature of ITV lectures. The problem of including enough pauses within the TV lectures to permit efficient note-taking on the part of students seemed to be critical. Several students at Rhode Island College and elsewhere had stated that their TV instructors often lectured too rapidly. They voiced frustration over the fact that they were unable to request the television instructor to slow his delivery. The ease of presenting previously prepared visuals within the television studio, coupled with the lack of feedback from a student audience, has often resulted in a too rapid presentation for effective student note-taking in many ITV courses (Brown and Thornton, 1963).

Moreover, it seemed illogical to substantially increase visual information within our TV productions if our students would spend a great portion of their time looking at their note pads.

To avoid this problem, I decided to create a workbook for the two-semester course made-up of abridged audio-video scripts for each ITV lecture. The workbook which resulted is similar in format to those produced by other ITV lecturers for their courses (Bucklin, University of Wisconsin; Pearson, Rutgers University). The esential notes and many illustrations were included to accompany each lecture. Students would be able to spend more time watching the television screen and should thus be able to follow the development of concepts more closely. In addition, the ITV instructor would be able to introduce more concepts at a somewhat faster pace.

The decision to develop a workbook for the Biology 101-102 course was bouyed by a review of pertinent research. Such research has clearly indicated that note-taking will interfer with learning, especially if the subject matter is relatively complex. The most notable studies include those of Ford (1948) and Ash and Carlson (1951). Although these investigations utilized film instead of TV, their results seem appropriate for inclusion here.

Ford showed 3 films to a group of students. The students took notes while watching two films and refrained from note-taking while watching the third. Ford's test results indicated that students learned more effectively when notes were not being taken. The investigation of Ash and Carlson also led to the conclusion that groups which took notes learned significantly less than the groups which saw the film but did not take notes. The latter investigators felt that the films did not possess sufficient pauses to allow note-taking and thus interfered with the learning process.

Full scale production of Biology 101-102 ITV lectures and workbooks began in the summer of 1968 and continued throughout the 1968-1969 academic year. The videotapes were utilized within the restructured Biology 101-102 format throughout the 1968-1969 academic year. All Biology 101-102 students participated in an evaluation of the restructured format in May, 1969.

B. Purpose Of The Study:

In April, 1968, the author initiated a request for $9,911.97 to the Office of Education in Boston, Mass. The subsequent acquisition of funds permitted the author and his staff to accomplish the following objectives:

1. Produce a series of 64 videotapes for the Biology 101-102 series. The grant money was principally used for salary and production costs associated with those ITV lectures completed during the summer of 1968. The grant also supplied funds for the purchase of videotape stock and commercially prepared super 8 mm single concept film loops.

2. To compare student attitude toward ITV and our restructured format with that of students previously taught via traditional lectures delivered within large auditoria.

III. Materials and Methods

All ITV lectures were produced within the college television studio located on the Rhode Island College campus. Television facilities include a medium sized studio (26' x 49') possessing a 13' lighting grid equipped with full professional television lighting facilities. A master control room of 465 square feet is annexed to the studio. Additional support and storage areas, including a dark room and graphics area, are located near the studio.

The equipment complement includes three viewfinder studio vidicon camera chains, a film/slide mutiplexer; vidicon camera associated with two 16 mm sound motion picture projectors and a dual-drum slide projector; two 2-inch helical scan videotape recorders with editing and dubbing capability; TV microscope; a two camera portable remote facility; and 16 mm motion picture production facility.

Television distribution at Rhode Island College is quite extensive. Video and audio access cables exist between all large group areas, including science laboratories and the television master control room. This capability allows remote telecasting from a wide variety of areas for distribution to the entire campus. At present, the distribution system is comprised of three closed-circuit channels and four off-air channels.

Students viewed all ITV lectures in one of four small classrooms. The dimensions of each classroom were approximately 25' x 31'. A single 23" television monitor faced 5 rows of students. The TV monitors were mounted on stands equipped with casters. The base of each monitor was 4 feet from the floor. No student sat more than 19 feet from the television monitor.

Individual sections were comprised of a maximum of 24 students. In September, 1968 the average number of students per section was 21. The entire two-semester course was comprised of 25 sections. Four-hundred ninety-seven students completed the Biology 101 course in January, 1969 and 465 students completed Biology 102, in May 1969.

All written and digramatic information to be encorporated into the Biology 101-102 workbooks was first placed on stencil and duplicated by the college's stenographic department. The pages of the workbook were bound into a 3-ring notebook and sold, at cost, to all students through the college bookstore. In addition to an abridged audio-video script for each ITV lecture, the workbook also included reading assignments, laboratory assignments, homework problems, dates of examinations and orientation information.

A questionnaire was prepared to determine student attitude toward the restructured format (see Appendix A). With few exceptions, all students were required to complete the questionnaire at a special meeting held on the last day of classes (457 students completed the questionnaire). All students completed the questionnaire simultaneously. Our staff was primarily interested in obtaining information

relating to:

A. General student attitude toward our restructured format.

B. The effectiveness of our utilization of visuals within ITV lectures.

C. The value and effectiveness of the Biology 101-102 workbook.

D. The value and effectiveness of the integration sessions.

A similar questionnaire had already been distributed among students who were about to complete the Biology 101-102 course in May, 1968 (see Appendix B). At this time, students were taught in one of three large lecture halls by one of three different instructors. Thirty-five students were enrolled in Class A; 180 in Class B; 215 in Class C. This questionnaire was distributed in anticipation of our desire to compare attitudes toward ITV and large lecture instruction between students having experienced our restructured format with those not possessing such experience.

IV. Results

A. Student Attitude Toward the Restructured Format:

The following data indicate that almost 80% of all students completing the 1968-1969 Biology 101-102 course preferred the restructured ITV format over the traditional large lecture approach.

Question 3: 1968-1969 Questionnaire

Biology 101-102 could also be taught in large lecture halls (150-300 students per lecture). Under these conditions, a "live" instructor would usually present a 50 minute lecture using a blackboard and/or overhead projector. With which of the following statements do you most closely agree?

	Percent of Class in Agreement
a. I emphatically prefer being taught in the large lecture hall.	3.7%
b. I prefer being taught in the large lecture hall.	7.3%
c. I have no preference.	11.8%
d. I prefer the present ITV - integration format.	33.2%
e. I emphatically prefer the present ITV - integration format.	44.0%

Furthermore, a majority of students felt that the restructured format would provide a better educational experience within other courses having large enrollment.

Question 4: 1968-1969 Questionnaire

What is your opinion concerning the use of our ITV - Integration format in other courses at RIC having large enrollments?

	Percent of Class in Agreement
a. Strongly approve.	16.2%
b. Approve.	40.8%
c. Disapprove.	24.2%
d. Strongly disapprove.	18.8%

Data derived from students enrolled in Biology 101-102 during the 1967-1968 academic year provide an interesting comparison. Almost 70% of all students indicated disapproval of TV usage within courses such as Biology 101-102 and almost 80% indicated preference for the traditional large lecture format.

Question 6: 1967-1968 Questionnaire

What is your opinion concerning the use of television to provide lectures within courses such as Biology 101-102?

	Class of 35 Students	Class of 180 Students	Class of 215 Students	Combined
a. Strongly approve.	8.3%	2.7%	17.8%	10.1%
b. Approve.	12.5%	6.3%	25.9%	15.8%
c. No opinion.	8.3%	5.4%	8.1%	6.9%
d. Disapprove.	41.7%	30.6%	20.0%	26.7%
e. Strongly disapprove.	29.2%	55.0%	28.2%	40.5%

Question 7: 1967-1968 Questionnaire

What is your opinion concerning a televised lecture versus an in-person lecture within courses of large enrollment?

	Class of 35 Students	Class of 180 Students	Class of 215 Students	Combined
a. Emphatically prefer TV lecture.	4.2%	0.9%	8.9%	4.8%
b. Prefer TV lecture.	8.3%	1.8%	23.7%	12.4%
c. No preference.	0%	0.9%	12.6%	6.2%
d. Prefer in-person lecture.	45.8%	36.4%	26.7%	32.8%
e. Emphatically prefer in-person lecture.	41.7%	60.0%	28.1%	43.8%

It should be noted that the majority of students within the 1967-1968 and 1968-1969 groups had previous experience with other ITV formats. Almost all students responding were simultaneously enrolled in an introductory mathematics course taught via ITV. However, the format of the ITV math course was quite different from that used in

Biology 101-102. From 1967-1969, Math ITV lectures were presented by the same instructor. The lectures lasted the entire period without benefit of an integration session and were largely "chalk-board" lectures without benefit of other visuals.

Question 1: 1967-1968 Questionnaire

Have you been enrolled in the introductory math course at RIC taught via instructional television?

		Percent of Total Class
a.	Yes	78.1
b.	No	21.9

Question 1: 1968-1969 Questionnaire

Have you been enrolled in the introductory math course at RIC taught via instructional television?

		Percent of Total Class
a.	Yes	88.2
b.	No	11.8

Data from the two groups also provided insight into the students' attitudes toward optimum class size. Data from the 1967-1968 questionnaire indicates that students consider smaller groups more conducive to learning. As class size increased, so did the percentage of students who felt that class size was too large. The section containing 35 students was the only section which possessed a distinct majority indicating approval of class size. We were therefore not suprised to find almost 90% of students satisfied with no more than 24 students per section.

Question 2: 1967-1968 Questionnaire

What is your opinion concerning the size of the lecture which you attended this year?

		Class of 35 Students	Class of 180 Students	Class of 215 Students	Combined
a.	Much too large.	3.5%	12.2%	42.6%	25.3%
b.	Too large.	3.6%	36.1%	30.4%	30.7%
c.	About right.	89.3%	51.7%	27.0%	43.7%
d.	Too small	3.6%	0%	0%	0.3%
e.	Much too small.	0%	0%	0%	0.0%

14.

Question 2: 1968-1969 Questionnaire

What is your opinion concerning the size of the lecture you attended this year?

		Percent of Students
a.	Much too large.	2.5
b.	Too large.	6.7
c.	About right.	88.5
d.	Too small.	1.6
e.	Much too small.	0.7

B. The ITV Lectures:

A few points which related to the effectiveness of specific visual techniques used within the ITV lectures required evaluation. Among the questions most often asked were the following:

A. Was the additional time and money which had been invested in the preparation of special visuals (e.g., charts, films, photos, models) justified? Were they appreciated by the students and being used effectively?

B. Were certain special techniques more valuable than others?

Biology 101-102 students, taught in conventional lecture halls during the 1967-1968 academic year, provided background for the study. Each teacher within the 3 sections utilized visuals of some sort throughout the year. All occasionally used one or more 16 mm movies. However, the class of 180 students received much more of their information via visual reproduction than either of the other two groups. Almost 90% of the information presented within this section was based on transparencies reproduced via overhead projector. It should be noted that a far greater percentage of students indicated strong appreciation for the use of visuals in this section.

Question 4: 1967-1968 Questionnaire

What is your opinion concerning the effect of visual material such as films, transparencies, slides, models, graphs, etc. used in the Biology 101-102 lectures?

	Class of 35 Students	Class of 180 Students	Class of 215 Students	Combined
a. Visuals greatly improve lectures.	17.5%	48.0%	19.7%	32.4%
b. Visuals improve lectures.	78.6%	48.0%	55.8%	54.2%
c. No opinion.	3.6%	2.0%	8.2%	5.1%
d. Visuals do not improve lectures.	.3%	2.0%	15.6%	8.0%
e. Visuals reduce the effectiveness of the lecture.	0%	0%	0.7%	0.3%

The reaction of students who viewed ITV lectures in 1968-1969 also indicates strong appreciation for use of substantial amounts of visual information. Almost all students indicated that they could always readily see the TV screen and indicated that far more visual information was presented within Biology 101-102 than in most of their other courses.

Question 5: 1968-1969 Questionnaire

What is your opinion concerning the effect of visuals, (e.g., films, slides, models, graphs, etc.) used in the Biology 101-102 TV lectures?

	Percent of Class In Agreement
a. Visuals greatly improve lectures.	31.8
b. Visuals improve lectures.	59.8
c. Visuals do not improve lectures.	7.5
d. Visuals reduce the effectiveness of lectures.	0.9

Question 7: 1968-1969 Questionnaire

Could you always adequately see the images being presented on the TV screen?

		Percent of Class in Agreement
a.	Yes	91.5
b.	No	8.5

Question 6: 1968-1969 Questionnaire

Do you agree or disagree with the following statement? The number of visuals (e.g., films, slides, models, graphs, etc.) used in the Biology 101-102 TV lectures was far greater than in most of the other courses I have taken at RIC.

		Percent of Class in Agreement
a.	Strongly agree.	41.8
b.	Agree.	50.1
c.	Disagree.	5.8
d.	Strongly disagree.	2.3

We were curious to determine whether the presentation of actual living or preserved specimens would be more effective than the presentation of more abstract visuals (e.g., diagrams and photos). We discovered that there was no strong preference for one method over the other although students were consistently enthusiastic over our encorporation of film clips to illustrate concepts being presented within the ITV lectures. Film clips were encorporated into approximately 25% of our lectures and were primarily used to:

A. Illustrate motion of actual organisms, organs or organelles.

B. Illustrate a particular concept in animated sequence.

C. Illustrate various aspects of the environment which normally could only be viewed via field trips.

Question 8: 1968-1969 Questionnaire

Close-ups of preserved specimens (e.g., grasshopper, shark, etc.) were occasionally used in some ITV programs. At other times, still-photos or diagrams were used to illustrate organisms and/or their parts. With which of the following statements do you most closely agree?

	Percent of Class in Agreement
a. I learned more about the organisms from still-photos and diagrams than from close-ups of specimens.	27.8
b. I learned more about the organisms from close-ups of specimens than from still-photos or diagrams.	28.9
c. I have no preference.	43.3

Question 9: 1968-1969 Questionnaire

What is your opinion concerning the effectiveness of the films (e.g., film on insects, human development, etc.) which were encorporated into the TV lectures?

	Percent of Class in Agreement
a. Films greatly improved lectures.	48.5
b. Films improved lectures.	40.8
c. Films did not improve lectures.	9.8
d. Films reduced the effectiveness of the lectures.	0.9

At the outset, some staff felt that the occasional appearance of guest lecturers would greatly inhance the quality of our programming and would be most appreciated by our students. However, the opinion of most students did not appear to support this view.

Question 10: 1968-1969 Questionnaire

What is your opinion concerning the general effectiveness of guest speakers (e.g., Dr. Hartmann, Dr. Quevedo) who occasionally appeared on specific programs?

	Percent of Class in Agreement
a. Guests greatly added to the overall quality of the course.	4.6
b. Guests added to the overall quality of the course.	29.5
c. Guests did not add to the overall quality of the course.	54.1
d. Guests reduced the overall quality of the course.	11.8

As the 1968-1969 course neared completion, it was already obvious that our techniques of presenting guests had not been as effective as originally hoped. It was suggested that the reason for the inadequacy stemmed either from the fact that our guests had assumed to much background information on the part of our students or that guests were directing their comments to the interviewer rather than to the students themselves. The following data does not indicate that students generally feel that these are the only two factors involved or, in fact, that they are even the most significant factors.

Question 11: 1968-1969 Questionnaire

With which of the following do you most closely agree?

	Percent of Class in Agreement
a. I did not learn as much from the guests because they were involved in conversation with Dr. Keogh and did not direct their comments to me.	10.9
b. I did not learn as much from the guests because they spoke in a language which was too "technical" and advanced.	15.6
c. I agree with both of the above.	22.8
d. I agree with neither of the above.	50.7

Students generally viewed all ITV lectures within unproctored rooms. In almost all cases, the teacher who functioned as an "integration leader" did not enter the classroom until the videotape was almost finished. However, the attendance of each section was recorded by a single student who circulated among the four rooms during the videotape replay.

The value of not proctoring sections during the videotape replay was mixed. Additional funds were not needed for proctors' salaries. However, a significant minority of students indicated the presence of occasional "background noise" which interfered with their desire to give full attention to the TV lecture.

Question 12: 1968-1969 Questionnaire

Was there too much background noise (e.g., students talking) for you to adequately concentrate on the TV lectures?

	Percent of Class in Agreement
a. Always.	8.7
b. Often.	28.0
c. Not usually.	49.7
d. Never.	13.6

An informal preliminary questionnaire conducted earlier in the year supported the conclusion of many faculty that most unproctored sections remained very quiet during the entire year. Six or seven sections possessed certain individuals who insisted on engaging in rather noisy conversations. Our experience taught us that the majority of these "noisy" sections were encountered late in the day. Morning sections were almost uniformly quiet. Such information may aid us in overcoming this problem in subsequent years without necessitating hiring proctors for all sections.

C. Relationship Between ITV Lectures and Biology 101-102 Workbooks:

During the initial planning of the restructured format, some staff members expressed concern over the proposed length of each ITV lecture. They felt that 35 minutes was not enough time to permit the encorporation of sufficient course content. It was reasoned that the relative effectiveness of the lectures and integration sessions might be lessened as a result.

Proponents of the restructured format agreed that the proposed Biology 101-102 workbooks would greatly relieve the often laborious task of student note-taking and would permit students to direct their full attention to the concepts being presented on the television screen. The workbooks should therefore enable the ITV teacher to introduce and thoroughly exemplify as many concepts within 35 minutes as he could within 50 minutes without benefit of workbook. The following data indicate that such reasoning was justified.

Less than 10% of all students felt that the ITV lectures were too short. A majority felt that the amount of information being presented within the lectures was optimum while a distinct minority felt that somewhat too much information had been included.

Question 14: 1968-1969 Questionnaire

What is your opinion concerning the length of the TV lectures (TV lectures were approximately 35 minutes in length)?

	Percent of Class in Agreement
a. TV lectures were far too long.	4.6
b. TV lectures were too long.	14.4
c. TV lectures were about the right length.	73.7
d. TV lectures were too short.	6.4
e. TV lectures were far too short.	0.9

Question 13: 1968-1969 Questionnaire

What is your opinion concerning the amount of material presented in the TV lectures?

	Percent of Class in Agreement
a. Far too much.	17.5
b. Too much.	26.7
c. About right.	52.3
d. Not enough.	2.8
e. Not nearly enough.	0.7

Question 15: 1968-1969 Questionnaire

What is your attitude toward the 35 minute TV lecture and the 15 minute integration session?

		Percent of Class in Agreement
a.	The TV lecture should have lasted 50 minutes with no integration session.	4.8
b.	There should have been a longer TV lecture and a shorter integration session.	6.7
c.	Arrangement of TV lecture and integration session were about right.	59.4
d.	There should have been shorter TV lectures and more time for integration.	29.1

Furthermore, no substantial difference is found regarding the amount of material being presented when the 1968-1969 and 1967-1968 questionnaires are compared.

Question 5: 1967-1968 Questionnaire

What is your opinion concerning the amount of material presented in the lectures?

		Class of 35 Students	Class of 180 Students	Class of 215 Students	Combined
a.	Far too much.	3.6%	8.0%	16.2%	11.3%
b.	Too much.	48.1%	40.0%	36.5%	39.2%
c.	About right.	37.2%	50.0%	27.7%	38.7%
d.	Not enough.	11.1%	2.0%	14.9%	8.7%
e.	Not nearly enough.	0%	0%	4.7%	2.1%

It should also be noted that the vast majority of students (about 80%) indicated that at least 50% of the conceptual information presented within Biology 101-102 was information which had not been presented within their high school courses. Biology 101-102 has no prerequisite and does not assume previous background. However, almost all of our students have taken high school courses in the biological sciences.

Question 16: 1968-1969 Questionnaire

The information presented in the Biology 101-102 course was:

	Percent of Class in Agreement
a. Almost entirely a review of my high school biology course(s).	4.8
b. 75% review of my high school biology course(s) and 25% new information.	13.2
c. 50% review of my high school biology course(s) and 50% new information.	20.8
d. 25% review of my high school biology course(s) and 75% new information.	34.9
e. Almost 100% new information.	26.3

Almost all students found the workbook valuable and almost 70% found it exceedingly valuable. After experiencing the Biology 101-102 course, 85% of all students felt that having lecture notes provided by the instructor is more valuable than taking their own notes. The same number also felt that the lectures would have been paced too fast if the workbooks were not provided and the majority felt that the pacing was about right when supplemented by the workbooks.

Question 17: 1968-1969 Questionnaire

Did you find the workbooks (lecture notes) of value?

	Percent of Class in Agreement
a. The workbooks are exceedingly valuable.	69.2
b. The workbooks are valuable.	26.0
c. The workbooks are of little value.	3.9
d. The workbooks are of no value	0.9

Question 22: 1968-1969 Questionnaire

What is your opinion regarding note-taking? With which of the following statements do you most closely agree?

	Percent of Class in Agreement
a. Taking your own notes is far more valuable than having them provided by the instructor.	4.2
b. Taking your own notes is more valuable than having them provided by the instructor.	10.6
c. Taking your own notes is less valuable than having them provided by the instructor.	42.6
d. Taking your own notes is far less valuable than having them provided by the instructor.	42.6

Question 18: 1968-1969 Questionnaire

What is your opinion concerning the rate at which material was presented in the TV lectures? (Assume you have the lecture notes in front of you).

	Percent of Class in Agreement
a. Much too fast.	9.4
b. Too fast.	29.7
c. About right.	53.6
d. Too slow.	6.4
e. Much too slow.	0.9

Question 19: 1968-1969 Questionnaire

Whatis your opinion concerning the rate at which material was presented in the TV lectures? (Assume you do not have the workbook in front of you and are taking your own notes.)

	Percent of Class in Agreement
a. Much too fast.	51.5
b. Too fast.	32.5
c. About right.	14.0
d. Too slow.	1.5
e. Much too slow.	0.5

24.

A somewhat greater number of our 1967-1968 students, taking their own notes on conventional lecture halls, found the pacing too fast when compared to our 1968-1969 students.

Question 3: 1967-1968 Questionnaire

What is your opinion concerning the rate at which material was presented in the lectures?

	Class of 35 Students	Class of 180 Students	Class of 215 Students	Combined
a. Much too fast.	7.1%	8.1%	12.4%	9.9%
b. Too fast.	50.0%	52.7%	46.2%	49.6%
c. About right.	39.3%	37.8%	34.5%	36.4%
d. Too slow.	3.6%	1.4%	4.8%	3.1%
e. Much too slow.	0%	0%	2.1%	1.0%

Most of our 1968-1969 students supplemented the information in the workbooks with their personal notes and most felt that the combination led to a better understanding of the concepts being presented in the ITV lectures.

Question 20: 1968-1969 Questionnaire

With which of the following do you most closely agree?

	Percent of Class in Agreement
a. I usually did not supplement the notes in the workbook with my personal notes.	26.8
b. I usually supplemented the workbook with my personal notes.	45.2
c. I always supplemented the workbook with my personal notes.	28.0

Question 21: 1968-1969 Questionnaire

Indicate your reaction to the following statement: The combination of workbook notes and my personal notes led me to a better understanding of the concepts being presented within the TV lectures.

	Percent of Class in Agreement
a. Strongly agree.	20.0
b. Agree.	56.1
c. Disagree.	17.1
d. Strongly disagree.	6.8

D. Relationship Between ITV Lectures and Integration Sessions

The relative effectiveness of the integration session and its leader was of primary concern. After some administrative rearrangement, a total of eight faculty were assigned as integration leaders for 25 sections. The author was assigned 5 sections; one faculty member was assigned 6 sections; one 4 sections; one 3 sections, three members of the faculty were assigned 2 sections each and one faculty member was assigned 1 section.

Faculty either previewed the week's videotapes before they were presented to students or viewed them as they were shown to their first section. All integration leaders eventually adopted one of the two methods and generally indicated strong preference for the method chosen.

From the outset, integration leaders were asked to encourage student questions and discussion. Leaders were also asked to actively help students perceive fundamental interrelationships presented in TV lectures, required reading assignments and laboratory. In short, integration leaders were asked to help students integrate information and experiences in the hope that a better appreciation of fundamental interrelationships would result. Although integration leaders were free to provide additional information not presented within other aspects of the course, they were not encouraged to simply provide a 15 minute lecture to supplement the TV lecture.

Some staff quickly adapted to this fundamentally new role while others seemed to have greater difficulty. From discussion with several students, it was learned that certain integration leaders almost always provided supplemental lecture material during integration sessions. Students did not generally support the suggestion that integration leaders provide such substantial additional lecture information or should formally test their knowledge of course concepts.

Although students were divided in their opinion of the most important function of their integration leader, over 90% indicated that their primary functions included answering student questions and integrating information among the various components of the course.

Question 26: 1968-1969 Questionnaire

What is the most important function of the integration leader?

		Percent of Class in Agreement
a.	To answer student questions.	40.4
b.	To test student understanding of the concepts being presented in the TV lectures.	8.6
c.	To integrate the TV lectures with text, lab, other TV lectures, etc.	44.6
d.	To provide additional lecture information.	4.2
e.	None of these (please comment).	2.2

Question 27: 1968-1969 Questionnaire

Indicate your reaction to the following statement: The integration sessions are substantially more valuable when the integration leader not only answers students' questions, but also attempts to integrate the TV lecture with text, lab, other TV lectures, etc.

		Percent of Class in Agreement
a.	Strongly agree.	59.3
b.	Agree.	36.8
c.	Disagree	2.7
d.	Strongly disagree.	1.2

Sixty percent of our students felt that the arrangment of a 35 minute ITV lecture and a 15 minute integration session was optimum for a 50 minute period. Only 11% felt that the TV lecture should have been longer. The vast majority of students felt that the integration session should be scheduled to immediately follow the TV lecture. Less than 4% indicated their preference for an integration session to be held a few days following the TV lecture.

Question 15: 1968-1969 Questionnaire

What is your attitude toward the 35 minute TV lecture and the 15 minute integration session?

	Percent of Class in Agreement
a. The TV lecture should have lasted 50 minutes with no integration session.	4.8
b. There should have been a longer TV lecture and a shorter integration sessinn.	6.7
c. Arrangement of TV lecture and integration session were about right.	59.4
d. There should have been shorter TV lectures and more time for the integration sessions.	29.1

Question 25: 1968-1969 Questionnaire

What is your attitude toward the arrangement of ITV lectures and integration sessions?

	Percent of Class in Agreement
a. Integration sessions should come immediately after the TV lectures.	79.4
b. Integration sessions should come a few days after the TV lectures.	3.9
c. It does not matter how the TV lectures and integration sessions are arranged.	8.8
d. There should be no integration sessions.	7.9

Student opinion regarding the overall value of the integration session was mixed. Although a majority of students found value in the integration sessions and less than 8% of all students indicated their preference for no integration sessions (see questions 15 and 25: 1968-1969 Questionnaire), a significant minority were critical of the overall value of the integration sessions.

Question 23: 1968-1969 Questionnaire

What is your opinion concerning the value of the integration sessions which followed each TV lecture?

	Percent of Class in Agreement
a. The integration session was of great value.	23.8
b. The integration session was of value.	33.9
c. The integration session was of little value.	28.6
d. The integration session was of no value.	13.7

Question 24: 1968-1969 Questionnaire

What is your attitude toward the integration leader of your section?

	Percent of Class in Agreement
a. Integration leader was a great help to my understanding of course concepts.	24.3
b. Integration leader was a help to my understanding of course concepts.	32.4
c. Integration leader neither helped nor hindered my understanding of course concepts.	33.8
d. Integration leader hindered my understanding of course concepts.	3.5
e. Integration leader greatly hindered my understanding of course concepts.	6.0

This data surprised some integration leaders who had expected far greater approval. The basic reason for the mixed reaction can be readily appreciated when data for questions 23 and 24 are subdivided by integration leader (Tables I and II). Certain integration leaders were highly valued by their students while others were viewed far less favorably. Sections having high regard for their integration leaders also considered the integration sessions to be highly effective and valuable. Note that individual integration leaders are designated by number in Tables I and II. The number designations are equivalent for both tables (i.e., Integration Leader #1 in Table I is the same individual designated by Integration Leader #1 in Table II).

Table I

Analysis Of Question 23 By Integration Leader

Integration Leader	Percent of Students Answering a or b	Percent of Students Answering c or d
1	80.7	19.3
2	67.9	32.1
3	61.3	38.7
4	50.1	49.9
5	41.0	59.0
6	29.9	70.1
7	27.3	72.7
8	14.2	85.8

Table II.

Analysis Of Question 24 By Integration Leader

Integration Leader	Percent of Students answering a or b	Percent of Students answering c	Percent of Students answering d or e
1	80.7	19.3	0
2	74.1	25.9	0
3	56.9	38.6	5.5
4	51.6	41.3	6.1
5	29.4	37.8	32.8
6	35.7	45.5	18.8
7	50.0	41.7	8.3
8	20.0	70.0	10.0

It was not possible to correlate average grade achievement for a particular section with that section's attitude toward its integration leader. Although average mean scores for hour examinations were somewhat higher for sections taught by integration leaders 1-3 than for integration leaders 4-8 (see Table III) there were too many other variables relevant to exam success which were impossible to control at this time. For example, sections having the same integration leader were usually taught by different laboratory instructors. It was not possible to evaluate the overall impact of the laboratory instructor on student grade achievement. A study is now being planned which will eliminate such variables and permit valid correlations among these factors.

Table III

AVERAGE HOUR EXAMINATION MEAN FOR INTEGRATION LEADERS SECTION(S)

Integration Leader[1]	Mean for Integration Leader's Section(s)[2]
1	59.07
2	59.35
3	58.71
4	56.54
5	56.30
6	57.25
7	57.25
8	57.70

[1] Numbers designate the same individuals indicated in Tables I and II.

[2] All hour exams consisted of 80 multiple choice questions. Hour exams were administered to all students simultaneously.

V. Conclusions

To be used effectively, the advantages of ITV must be exploited and its disadvantages compensated. Television has many visual advantages which can and should be utilized by the TV teacher. This study's results indicate that students will recognize and appreciate effective usage of visuals within TV lectures. However, proper use of visuals requires considerable planning. Good television programming requires considerably more time and expense than traditional lectures offered in large lecture halls. An average of 150 man-hours were required for each of our 35 minute TV productions. This initial investment of time and money cannot be cut beyond a certain minimum. The return of this investment does not become real until the lectures have been presented to large numbers of students over one or more years.

For these reasons, our restructured format seems inappropriate when the number of students being educated is relatively small. Television is a mass medium. To be used effectively it must be used in a big way. The restructured format seems most valuable for courses of large enrollment. Students have appropriately critized many such courses as being impersonal. They often consider themselves no more than a "number on an IBM card" or a "face in the crowd". Our restructured format can provide basic conceptual information to unlimited numbers of students. But the restructured format was also designed to free more teacher time for the purpose of providing more direct student-teacher contact within small groups. Since many of our videotapes can be utilized over successive years, staff time formally bound to the yearly preparation of traditional lectures within large auditoria can now be used to "individualize" and "personalize" the educational experience. It is somewhat ironic that an instructional medium as inherently impersonal as television can be used to provide more individualized instruction than has previously been possible within courses of large enrollment.

Overall, the concept of the integration session was well received by most students. Less than 8% of all students indicated a preference for no integration session and 30% indicated preference for a somewhat longer integration session. However, it must be recognized that quality teaching is prerequisite to the overall success of any instructional format. The success of individual integration sessions were largely dependent upon the talents of their leaders.

Integration leaders considered by students to be most valuable and effective seem to be those most able to answer student questions and help students appreciate fundamental interrelationships among course concepts. They also seem to be teachers most talented in leading student discussion. Our results suggest, but do not conclusively demonstrate, that integration leaders considered most effective by students usually lead their sections to higher average grade achievement on examinations. Integration leaders who were not

as warmly received by their students seem to be those who did not actively encourage student questions and discussion. Some of these leaders seemed content to simply provide traditional lecture material at greater depth than had been presented within the accompanying TV lectures.

Such results discourage indiscriminate utilization of teachers as integration leaders. Teachers who ineffectively lead discussions or who lack sufficient background in their subject areas will probably not be considered valuable assets to the course by most students. Within larger universities, a decision to indiscriminately utilize untrained graduate assistants as integration leaders might not prove wise.

Our study has demonstrated that student use of abridged audio-video scripts allow the TV teacher to effectively present conceptual information in a shorter period of time. Students do not generally indicate that the lectures are paced too rapidly when such "lecture notes" are provided. This study also indicates that the teacher-prepared lecture notes are not only warmly received by students but are generally considered more valuable than those written by students themselves.

The results of this study support the general conclusions of Chu and Schramm (1967) which resulted from their analysis of ITV research conducted through 1967. These authors conclude that the entire weight of instruction within any subject area cannot normally be completely turned over to ITV. Effective utilization of ITV is almost always conbined with classroom teaching. In general, the following rule of thumb seems to hold:

> ITV lectures can be as or more effective than traditional lectures where one-way communication from teacher to student is all that is required. If the visual advantages of television are properly exploited by a skilled teacher, the television lecture may even be more effective than the traditional lecture. But most learning requires some active response and interplay between student and teacher. Television is weak in this area and requires compensation.

Our restructured format was designed on the assumption that this rule is prerequisite to ITV success. Our results seem to reaffirm its validity. Almost 80% of all Biology 101-102 students indicated preference for the restructured format over the traditional lecture approach and the majority consider the approach applicable to other courses possessing large enrollments.

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VIII. APPENICES

Appendix A

1968-1969 Questionnaire

1. Have you been enrolled in the introductory math course at RIC taught via instructional television?

   a. yes
   b. no

2. What is your opinion concerning the size of the lecture you attended this year?

   a. much too large
   b. too large
   c. about right
   d. too small
   e. much too small

3. Biology 101-102 could also be taught in a large lecture hall (150-300 students per lecture). Under these conditions, a "live" instructor would usually present a 50 minute lecture using a blackboard and/or overhead projector. With which of the following statements do you most closely agree?

   a. I emphatically prefer being taught in the large lecture hall.
   b. I prefer being taught in the large lecture hall.
   c. I have no preference.
   d. I prefer the present ITV-integration format.
   e. I emphatically prefer the present ITV-integration format.

4. What is your opinion concerning the use of our ITV-integration format in other courses at RIC having large enrollments?

   a. strongly approve
   b. approve
   c. disapprove
   d. strongly disapprove

5. What is your opinion concerning the effect of visuals, (e.g., films, slides, models, graphs, etc.) used in the Biology 101-102 TV lectures?

   a. visuals greatly improve lectures
   b. visuals improve lectures
   c. visuals do not improve lectures
   d. visuals reduce the effectiveness
   e. visuals greatly reduce the effectiveness of lectures

6. Do you agree or disagree with the following statement? The number of visuals (e.g., films, slides, models, graphs, etc.) used in the Biology 101-102 TV lectures was far greater than in most of the other courses I have taken at RIC.

   a. strongly agree
   b. agree
   c. disagree
   d. strongly disagree

7. Could you always adequately see the images being presented on the TV screen?

   a. yes
   b. no

8. Close-ups of preserved specimens (e.g., grasshopper, shark, etc.) were occasionally used in some ITV programs. At other times, still photos or diagrams were used to illustrate organisms and/or their parts. With which of the following statements do you most closely agree?

   a. I learned more about the organisms from still photos and diagrams than from close-ups of specimens.
   b. I learned more about the organisms from close-ups of specimens than from still photos or diagrams.
   c. I have no preference.

9. What is your opinion concerning the effectiveness of the films (e.g., film on insects, human development, etc.) which were encorporated into the TV lectures?

   a. films greatly improved lectures
   b. films improved lectures
   c. films did not improve lectures
   d. films reduced the effectiveness of the lectures

10. What is your opinion concerning the general effectiveness of quest speakers (e.g., Dr. Hartmann, Dr. Quevedo) who occasionally appeared on specific programs?

    a. guests greatly added to the overall quality of the course
    b. guests added to the overall quality of the course
    c. guests did not add to the overall quality of the course
    d. guests reduced the overall quality of the course

11. With which of the following do you most closely agree?

    a. I did not learn as much from the guests because they were involved in conversation with Dr. Keogh and did not direct their comments to me.

b. I did not learn as much from the guests because they spoke in a language which was too "technical" and advanced.
c. I agree with both of the above.
d. I agree with neither of the above.

12. Was their too much background noise (e.g., students talking) for you to adequately concentrate on the TV lectures?

a. always
b. often
c. not usually
d. never

13. What is your opinion concerning the amount of material presented in the TV lectures?

a. far too much
b. too much
c. about right
d. not enough
e. not nearly enough

14. What is your opinion concerning the length of the TV lectures (TV lectures were approximately 35 minutes in length)?

a. TV lectures were far too long
b. TV lectures were too long
c. TV lectures were about the right length
d. TV lectures were too short
e. TV lectures were far too short

15. What is your attitude toward the 35 minute TV lecture and the 15 minute integration session?

a. the TV lecture should have lasted 50 minutes with no integration session
b. their should have been a longer TV lecture and a shorter integration session
c. arrangement of TV lecture and integration session were about right
d. there should have been shorter TV lectures and more time for the intogration sessions.

16. The information presented in the Biology 101-102 course was:

a. almost entirely a review of my high school biology course(s)
b. 75% of my high school biology course(s) and 25% new information
c. 50% review of my high school biology course(s) and 50% new information
d. 25% review of my high school biology course(s) and 75% new information
e. almost 100% new information

17. Did you find the workbooks (lecture notes) of value?

a. the workbooks are exceedingly valuable
b. the workbooks are valuable
c. the workbooks are of little value
d. the workbooks are of no value

18. What is your opinion concerning the rate at which material was presented in the TV lecture? (Assume you have the lecture notes in front of you).

a. much too fast
b. too fast
c. about right
d. too slow
e. much too slow

19. What is your opinion concerning the rate at which material was presented in the TV lecture? (Assume you do not have the workbook in front of you and are taking your own notes).

a. much too fast
b. too fast
c. about right
d. too slow
e. much too slow

20. With which of the following do you most closely agree?

a. I usually did not supplement the notes in the workbook with my personal notes.
b. I usually supplemented the notes in the workbook with my personal notes.
c. I always supplemented the notes in the workbook with my personal notes.

21. Indicate your reaction to the following statement: The combination of workbook notes and my personal notes led me to a better understanding of the concepts being presented within the TV lectures.

a. strongly agree
b. agree
c. disagree
d. strongly disagree

22. What is your opinion regarding note-taking? With which of the following statements do you most closely agree?

a. taking your own notes is far more valuable than having them provided by the instructor

40.

b. taking your own notes is more valuable than having them provided by the instructor
c. taking your own notes is less valuable than having them provided by thc instructor
d. taking your own notes is far less valuable than having them provided by the instructor

23. What is your opinion concerning the value of the integration sessions which followed each TV lecture?

a. the integration session was of great value
b. thc integration session was of value
c. the integration session was of little value
d. the intcgration scssion was of no value

24. What is your attitude toward the integration leader of your section?

a. thc intcgration leader was of great help to my understanding of coursc concepts
b. thc intcgration leadcr was a help to my understanding of course concepts
c. thc integration leader ncither helped nor hindered my understanding of coursc concepts
d. thc intcgration leader hindered my understanding of coursc concepts
e. the integration leader greatly hindered my understanding of course concepts

25. What is your attitude toward thc arrangement of the ITV lectures and intcgration sessions ?

a. integration sessions should comc immediately after the TV lecture
b. intcgration sessions should come a few days after the TV lecturcs
c. it docs not matter how the TV lecturcs and integration sessions are arranged
d. thcrc should be no integration sessions

26. What is the most important function of thc integration leader?

a. to answer student questinns
b. to tcst student understanding of the concepts being prescnted in the TV lectures
c. to integrate the TV lectures wich text, lab., other TV lecturcs, etc.
d. to provide additional lecture information
e. none of these (please comment)

27. Indicate your reaction to the following statement: The integration sessions are substantially more valuable when the integration leader not only answers student's questions, but also attempts to integrate the TV lecture with text, lab., other TV lectures, etc.

a. strongly agree
b. agree
c. disagree
d. strongly disagree

Appendix B

1967-1968 Questionnaire

1. Have you been enrolled in the introductory math course at RIC taught via instructional television?

   a. yes
   b. no

2. What is your opinion concerning the size of the lecture which you attended this year?

   a. much too large
   b. too large
   c. about right
   d. too small
   e. much too small

3. What is your opinion concerning the rate at which material was presented in the lectures?

   a. much too fast
   b. too fast
   c. about right
   d. too slow
   e. much too slow

4. What is your opinion concerning the effect of visual material such as films, transparencies, slides, models, graphs, etc. used in the Biology 101-102 lectures?

   a. visuals greatly improved lectures
   b. visuals improved lectures
   c. no opinion
   d. visuals do not improve lectures
   e. visuals reduce the effectiveness of the lecture

5. What is your opinion concerning the amount of material presented in the lectures?

   a. far too much
   b. too much
   c. about right
   d. not enough
   e. not nearly enough

6. What is your opinion concerning the use of television to provide lectures within courses such as Biology 101-102?

   a. strongly approve
   b. approve
   c. no opinion
   d. disapprove
   e. strongly approve

7. What is your opinion concerning a televised lecture versus an in-person lecture within courses of large enrollment?

a. emphatically prefer TV lecture
b. prefer TV lecture
c. no preference
d. prefer in-person lecture
e. emphatically prefer in-person lecture