STUDENT ATTITUDES TOWARD A NEW APPLICATION OF INSTRUCTIONAL TELEVISION IN A COMPUTER PROGRAMMING COURSE

By

THEROLD EUGENE BAILEY

Bachelor of Science
Harding College
Searcy, Arkansas
1957

Master of Science
Oklahoma State University
Stillwater, Oklahoma
1962

Submitted to the Faculty of the Graduate College
of the Oklahoma State University
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Thesis Approved:

Kenneth E Wiggins
Thesis Adviser

Craig A. Wood

Dean L. Post

D. Durham
Dean of the Graduate College

Dedicated to

HORACIO A. MOTTOLA

Who is sincerely committed to
The welfare of his students

And to

KIM

Who sacrificed some of her
Parents' time in my behalf

PREFACE

When I was assigned the task of preparing a new instructional television series for a computer programming course, I really had no notion of what a challenging and rewarding experience the project would become. It required a fantastic amount of work, a great deal of patience, and untold perseverance from all of the many people involved in the enterprise. Everyone cooperated splendidly, however, and the project was successfully completed approximately a year from the time of its beginning.

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of the series, did a masterful job with the production. He had many helpful ideas for making the series better; he was also patient in receiving my ideas and procedural changes - even the last minute ones. There are others: Marshall Allen, Head of ETS, who gave words of encouragement and contributed ideas; Frank Gibbons, formerly with ETS, who designed the set; Roger Bolton, Art Director, who designed and executed most of the visual materials; Charles Stacey, who prepared and managed the studio and did much of the photographic work; Wilbur Brakhage and Paul Smith, engineers, who worked patiently to make the equipment do what we needed and wanted; and Judy Vermeire, secretary, who relayed many messages and offered encouragement.

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CHAPTER I

INTRODUCTION

Purpose and Scope of the Study

In general, students exhibit a rather negative attitude toward the use of instructional television at the college level. One reason for this is that the real potential of television as a teaching medium has rarely been exploited. Many applications of television in the classroom have been framed in the same format that is used in the traditional lecture, and only the ability of television to transport and multiply the visage and voice of the instructor is utilized.

Williams (43) has suggested that it seems reasonable to suppose that an instructional television series that is designed around the special capabilities of television should be able to do a better job of teaching certain types of material than the conventional lecture method. Student attitudes toward television should be at least relatively good if television teaching is interesting and informative and wastes as little as possible of the students' time.

The purpose of this study is to demonstrate that an instructional television series, designed with careful consideration of what television is and is not able to do, can elicit a favorable response from students.

The scope of the study is limited to the production of a new television series for a computer programming course and a measure of

students' attitudes toward the series.

Background for the Study

For approximately three years during the period of 1967 to 1970 the beginning computer programming course (Computer Science 2112) at the Oklahoma State University was taught using instructional television (ITV). The course was structured with a television lesson once a week and a two-hour laboratory once a week. The television lessons were done in a conventional lecture format.

Student response to the television series was quite negative as evidenced by a high rate of absenteeism, a high percentage of sleepers among those who did attend, and constant complaining on the part of the students that the TV class was a waste of time. Results of a questionnaire that was given at the end of the last semester in which the TV series was used (Spring Semester, 1970) indicated something of the negative attitude of the students. Only 85% of the respondents said that they attended the TV class with any regularity. Only 35% of the respondents indicated that they thought that the TV lessons were informative, while a small 11% felt that the TV lessons were interesting. Respondents indicated by 12% that they preferred a TV class to a "live" class.

The old TV series clearly had serious shortcomings that made its use as a teaching medium of questionable value. As plans for the future use of instructional television in the course were being considered, certain basic questions had to be answered. Can television instruction be used for teaching computer programming? Is it possible to design a television series in computer programming that will be

both informative and interesting? What must be done in order to produce such a television series, if indeed one can be produced?

In answer to the first question, a long period of deliberation turned up no particular reason why television instruction could not be used for teaching computer programming. A significant reason for using instructional television was the large enrollment in the course and the use of graduate assistants as instructors. By using television instruction for presenting the basic material in the course and then letting graduate assistants develop the material given in the TV lessons, the course could be fairly well standardized for all the students. In addition, television could be used quite effectively for showing close-ups of computer cards and output and for showing computer equipment in operation to large numbers of students.

The answer to the second question was more difficult. What criteria should be used in characterizing the words informative and interesting? As a working description of informative, it was decided that an informative presentation should be characterized at least by a clear, concise, well organized presentation that is easy to follow and to understand. A presentation that is interesting should be characacterized at least as grasping the student's attention and holding it throughout the lesson and motivating the student to learn material that is challenging, but still comfortable. A preliminary investigation of possible ways of achieving the objectives of interesting and informative seemed to indicate an affirmative answer to the basic question under consideration; there are ways of making an instructional television series both informative and interesting.

The third question was, of course, the most difficult of all to answer. The details of exactly how to produce a series that would achieve the objectives were rather elusive, but intuition coupled with trial and error did in fact reveal a workable solution. A detailed description of methods used to achieve the objectives is given in Chapter III.

A new television series was produced and taped during the first eight months of 1970 and was used experimentally during the Summer Session of 1970. The response of the students was greatly encouraging. The same questionnaire that was given to the students taking the old series during the previous Spring Semester was given at the end of the Summer Session. In sharp contrast to the results of the previous group, 98% of the summer group indicated that they attended the TV class with regularity. An exciting 90% of the respondents indicated that they thought that the TV lessons were informative, while 83% felt that the TV lessons were interesting. Perhaps most surprising was the 48% that indicated a preference for a TV class over a "live" class.

These preliminary results indicated that the objectives were being fulfilled to an encouraging degree. Revisions were made in the series in order to improve the quality and to remove glaring errors in both the material and the presentation. The series in its final form was then used during the Fall Semester of 1970.

Again the same questionnaire was given to the students at the end of the Fall Semester. The results, while not so strongly positive as those of the Summer Session, were very encouraging. Of those responding, 92% said that they attended the TV class with regularity, and 61% of the respondents indicated that they thought that the TV lessons

were informative, while 41% felt that the TV lessons were interesting. Indicating a preference for a TV class over a "live" class were 32% of the respondents.

The results of the questionnaire for the three groups cited are summarized in Table I.

TABLE I

SOME RESULTS OF A QUESTIONNAIRE SAMPLING STUDENTS' RESPONSES TOWARD TV INSTRUCTION IN A BEGINNING COMPUTER PROGRAMMING COURSE

	Old TV Series	New TV Series	
	Spring 70	Summer 70	Fall 70
Attended class regularly	85%	98%	92%
Thought TV lessons were informative	35%	90%	61%
Thought TV lessons were interesting	11%	83%	41%
Expressed preference for TV class over conventional class	12%	48%	32%

Since the preliminary results of using the new TV series with two groups suggested that the original objectives of producing informative and interesting TV lessons were being achieved to an encouraging degree, a formal study was undertaken during the Spring Semester of 1971 in order to determine whether student attitudes were favorable toward the TV series. The experimental procedure, the experimental group, and the data collected during the semester are discussed in Chapter IV. Several hypotheses, relating prior exposure to instructional television,

and attitude as measured by attendance data, to some attitudinal and performance variables, are tested and discussed in Chapter V, along with some hypotheses correlating certain attitudinal and performance variables. Conclusions that may be drawn from the study and implications regarding the future of instructional television at the college level are discussed in Chapter VI.

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

In the early 1950's when commercial television was beginning to take hold across the nation, the possibilities of the use of television in the educative process began to be explored and implemented. The educational television (ETV) stations began to make their appearance. This venture was launched with practically no money behind it - a condition that too often has prevailed throughout the entire experiment. The closed-circuit television (CCTV) systems sprang up on some university campuses, and television teaching "in house" was begun. Some educators, pressed by the great surge in enrollment in higher education, increasing costs of education, and the shortage of teachers, accepted the notion that instructional television (ITV) would alleviate the difficulties faced by institutions of higher learning. The CCTV systems faced the same basic problem of the educational television stations, however, being for the most part poorly funded and inadequately staffed. Gilkey (8) cites the lack of money as a major reason for the failure of television to meet the needs of education.

The next decade ushered in at its beginning and out at its end the great educational experiment with television. Numerous studies were initiated in the utilization of television for teaching a variety

of subjects to a variety of students from preschool children through adults. For the most part, these experiments used the conventional classroom lecture transmitted through the medium of television; this fact is of great importance in evaluating the impact of television teaching - a fact whose implications are generally overlooked. There were other uses, however, besides the televised lecture, most notable of which was the use of television in demonstrations such as one might find in science classes.

Of necessity the scope of this review must be limited primarily to the use of television at the college and university level. A further restriction is imposed by the exclusion of public broadcast television. In many areas, however, public television and instructional television overlap. The primary concern of this review is to summarize the two decades of instructional television of the closed-circuit type employed at the college and university level.

Selected Studies

The studies that have been reported in the use of CCTV for instructional purposes constitute a vast amount of literature. There are at least two notable review articles summarizing much of the literature; these are by McKeachie (22) and by Chu and Schramm (5).

The review by McKeachie was published in 1963. Special attention is given to the use of instructional television at Pennsylvania State University, New York University, and Miami University. A number of variables were investigated, such as class size, the use of visual materials, student achievement, student attentiveness, student attitudes, student ability, faculty attitudes, and subject matter taught.

Some conclusions that were drawn from these studies follow: Class size bears no relationship to learning; use of visual materials seemed to be less effective than a "straight" televised lecture; achievement of students seemed as good as those taught by conventional methods; students paid little attention to the television monitors, indicating that most of the learning took place through audio stimuli or through some other source; students were generally negative toward television teaching; student ability and student evaluation of ITV were inversely related; attitude of faculties was generally negative; levels of achievement and attitudes of students seemed unrelated to subject matter. The most general conclusion that can be drawn from these studies is that there is "no significant difference" between the learning of students by conventional teaching methods and by instructional television, even though attitudes were generally negative. McKeachie stated his conclusion this way:

> Taking the results of all research on television instruction, we feel safe in concluding that television instruction for a complete course is inferior to classroom lectures in communicating information, developing critical thinking, changing attitudes, and arousing interest in a subject, but that this inferiority is probably not great . . . . When one weighs heavily the necessity for accommodating higher education to large numbers of students, however, the differences between television and conventional instruction seem very small.

McKeachie footnotes one additional comment of great importance:

> Note that most research has dealt with television as a substitute for conventional instruction. The potential of television as a tool for enriching classroom teaching has not been assessed.

The review by Chu and Schramm (5) is rather more favorable in its evaluation of instructional television. The authors, unlike McKeachie,

review the full gamut of instructional television utilization. Of particular importance is the finding that there was an inverse relationship between the level of schooling and favorable attitudes toward instructional television. Lack of two-way communication (feedback) is cited as one possible explanation for this, but they conclude that lack of feedback does not necessarily seem to handicap learning. As the material becomes more complicated, however, inability to question the teacher may become significant in reducing the effectiveness of learning from instructional television. The authors discuss the application of a technique found useful in programmed instruction, testing and revising television lessons in order to overcome to some extent the problem of lack of feedback. The taking of notes may interfere with learning from television instruction, if the tele-lessons are improperly structured. Some of the conclusions of Chu and Schramm are summarized in the following quotations:

> For one thing, it has become clear that there is no longer any reason to raise the question whether instructional television can serve as an efficient tool of learning. This is not to say that it always <u>does</u>. But the evidence is now overwhelming that it <u>can</u>, and, under favorable circumstances, does. This evidence now comes from many countires, from studies of all age levels from preschool to adults, and from a great variety of subject matter and learning objectives. The questions worth asking are no longer whether students learn from it, but rather, (1) does the situation call for it? and (2) how, in the given situation, can it be used effectively?
>
> Beyond those larger considerations, the research seems to suggest that effective use of television grows out of attention to the basic requirements of good teaching, rather than to any fanciness that might be peculiar to television. The qualities that emerge from the research described . . . are qualities like simplicity, good organization, motivation, practice, knowledge of results, rest pauses at appropriate points, cues that direct the pupil to the essential things he is to learn . . . .

> Teaching on television can be as interesting or as uninteresting as most classroom teaching; and we ought to know enough now about the qualities of good teaching, and have enough experience with bringing resources to bear on preparing good television classes, to reduce the proportion of uninteresting teaching to a minimum.

Chu and Schramm, like McKeachie, point out an important key to understanding the overall lack of success of instructional television.

> There are sufficient number of favorable reactions in the higher academic levels, and a sufficient number of unfavorable ones in the lower grades, to lead us to suspect that the way television is used, rather than the grade level, controls the attitude.

In this same line of thinking, Guba and Snyder (13), in a detailed study involving utilization of instructional television in elementary schools, point out that the chief shortcoming of television in the classroom is the unimaginative "gray curtain" effect of instructional television; the real capabilities that television has to offer are rarely used.

A detailed study of CCTV used in teaching an introductory business course at Indiana State University is reported by Harrington and Knoblett (14). The authors concluded that "students in the experimental group generally achieve at a lower level than predicted and lower than comparable students in the control group." It is important to take note of the fact that the television lessons consisted of simply televising a classroom-type lecture.

Rawls and Rawls (32) report a study in the use of CCTV for teaching educational psychology at Louisiana State University. They summarized their findings as follows:

> Results indicated that there were no significant differences in achievement and retention of students taught by conventional and televised instruction. Students in general held highly unfavorable attitudes about television instruction

> and strongly preferred the conventional classroom approach. . . . Students paid little heed to the image on the screen and were observed looking in the direction of a television set only 20% of the time; students in conventional classes looked at the lecturer 42% of the time.

As in the previous study cited, the television instruction consisted merely of a televised classroom-type lecture. In this regard, the authors point out that

> it appears on the surface that televised instruction might be readily replaced by the tape recorder. An obvious alternative explanation, of course, is that the visual medium was not used to full advantage.

Some suggestions for improving the course and criticisms of the course are reported. Graduate students assisting in the television classes reacted as follows:

(1) Utilize more visual aids, demonstrations, attention-getting devices, etc.
(2) Make use of outside speakers and guest lecturers.
(3) Provide more camera positions.
(4) Have lecturers watch themselves on the monitors.

Students in the television classes reacted as follows:

(1) More visual aids and demonstrations are needed.
(2) Guest lecturers and outside speakers should be provided.
(3) More communication with lecturers is needed.
(4) There should be more explanation and discussion of televised lectures.
(5) More inflection and range of voices are needed.
(6) The lectures are too impersonal.

The authors conclude their article with these words:

> Certainly . . . televised instruction should not be used to espouse or implement conventional instruction but to provide instruction which conventional methods cannot.

Moss (26) reports on the use of instructional television in the teaching of English literature, both on public television as well as on CCTV. He records some student reactions to the CCTV used in the classroom.

> You might as well mimeograph these lectures and have us read them . . . . Television has fantastic potential for enriching a lesson - photography, sound effects, music, characterization, prints, etc. Why . . . didn't they use them? One important thing [is lacking] - imagination.

Some suggestions for improving the television lessons were

1. More audiovisual aids.
2. Use of costumes, sets, etc.
3. Professional readers.
4. Color.
5. Better camera work (more imaginative)

Moss makes these crutial observations regarding the utilization of the full potential of instructional television:

> The challenge lies in employing more creatively that medium's unique capabilities - not to be content, that is, merely with a taped recording of conventional "background" facts or undeveloped themes. The loss of the classroom's immediacy must be compensated for by more than an occasional use of slides or other simple audiovisual techniques.
>
> The televised offerings must be carefully designed to penetrate the coldness of the picture tube and the passivity of the viewing audience.
>
> The goal of instructional television should be to guide thought, not to circulate information or undeveloped generalities.

Several studies have been done which investigate students' attitudes and responses toward ITV. Becker (2) found, using galvanic skin response, push-button response, and pencil response, that the interest in the TV lesson indicated by the student had little to do with how well the student learned.

> We conclude that whether the student in the classroom finds what he is viewing interesting or tension arousing has little to do with the new knowledge he will gain from that viewing.

Janes (17) investigated response to the use of ITV in terms of preexisting attitudes which the students brought into the classroom - authoritarianism, self-confidence, and intelligence scores.

> The results of the study suggest that none of these particular qualities . . . operate to inhibit student learning predicted on televised instruction.
>
> All measures showed a positive statistical correlation with preference for televised lectures.
>
> . . . The evidence does indicate that a course which presents the subject matter to beginning undergraduates can be organized effectively around a televised presentation. None of the preexisting student attitudes and capacities examined in this study provide predispositions which limit most students from developing positive reaction to lectures by television.

Rayder and Neidt (33) found that attitudes toward TV declined during the semester. In particular they studied the effect of the frequency of attitude testing on the attitude measured and found that the decline in attitude was not "necessarily a function of repeated measurements during the learning experience."

Use of ITV in programmed instruction has been investigated. Gryde (12) explored the possibilities and found that ITV lacks only three of the criteria used in programmed instruction: feedback, pacing, and active response. He gives suggestions for overcoming these inadequacies.

Perhaps a more significant application of the techniques of programmed instruction is in preparation of televised lessons. An instructional presentation can be videotaped, used and tested, then revised in order to remove inadequacies. In this way a lesson can be "tuned" to a high level of efficiency, just as material for conventional programmed instruction is prepared. Gropper (10) discusses this technique in detail.

A number of special uses of ITV have emerged. Most of these make use of portable videotape recorders that are available now at

relatively low cost. Applications of ITV in teaching chemistry for demonstrations both in the laboratory and the lecture room are discussed by several authors (1, 16, 28). Use of ITV in classes in which students perform is discussed by Gross (11). Closely related is the application of ITV in the training of teachers (7, 20, 21). Neidt (27) reports the use of videotapes in teaching study skills to beginning students.

Summary of Studies

What conclusions can be drawn from these reports and studies? Students have been able to learn in spite of the use of television instruction, but they generally do not like television classes. Administrators, still thinking in terms of the efficacies of television for some of the ills of higher education, have been rather favorable toward the introduction of instructional television, while faculty members too often took the presence of the television monitor in the classroom as a threat to themselves and their autonomy. In general, television utilization has been relegated to the role of the traditional lecturer, and the real capabilities offered in unique ways by television have not been used, although the trend is now away from the traditional approach.

Television cannot fulfill the role of the traditional classroom lecturer, nor can it replace the teacher.

ITV in Transition

The failure of instructional television to fulfill the expectations of the early 1950's has produced a great deal of effort to

understand its failure. Results of studies and experiences in the use of ITV have pin-pointed the weaknesses and the misuses of the medium. Gilkey (8) summarized the situation well when he suggested that the greatest weakness of ITV is the use of illustrated lectures, panel discussions, and related undynamic formats. Furthermore, "while lectures were bad live, they were even worse when recorded on videotape or transmitted via television." Siepmann (38) was even more pointed.

> That such a primer [on the use of instructional television] is needed comes clear when you note how frequently newcomers to ITV repeat the past errors . . . of their pioneer forerunners. The result is doubly disastrous. The television medium is misused, and outworn practices in education (by harnessing television to them) are given the veneer of a spurious modernity.

In short, the full potential of television has rarely ever been exploited or even approached. Teachers were often reluctant to succumb to the televised classroom; and when they did, the conventional lecture method was simply piped into monitors with little or no thought given to the medium itself as a vehicle for teaching. Equipment was usually of inferior quality and was generally manned by amateur personnel. The result was simply a poor teaching and learning situation - unimaginative, uncreative, and uninteresting.

Instructional television and its utilization are now in a transitional period. The use of television for <u>televised teaching</u> is being replaced by a more suitable concept of <u>television teaching</u>, that is, telelessons that are designed around the capabilities of television and what it can do that cannot be done otherwise. Wolfe (44) summarizes this new approach as follows: "Use television <u>only</u> when its proper application will improve learning . . . . Design every session specifically for this medium." Siepmann (38) lays the ground rules

in these words: "The golden rule of ITV is never to use it except where it fills a vacuum of need, and always to use it professionally. Avoid amateurism like the plague."

A number of other authors have written on the subject of how to make use of ITV in creative and innovative ways (4, 29, 39, 40). Meyer (24) summarizes some important problems that must be dealt with in order to improve the quality of ITV.

> Aside from the present stumbling blocks to TV in higher education, which include faculty and administration resistance, lack of money, and the traditional college lecture approach to programming, the grossest omission is in the area of research and development. It is true that research and development have occurred in the area of engineering and hardware, but almost no instructor of higher education in the United States is experimenting with the software or programming aspects of the medium. Instead, TV programs and college credit and noncredit courses are being produced meat-grinder fashion through the U. S. These appear on closed-circuit as well as open-circuit TV. The entire area of pure research into the nature of the TV medium and its applications to various problems of higher education remains untapped. Instead of reviewing these undertakings, most of which are mediocre, this writer will suggest a way in which research and development can take place in TV for higher education.
>
> Those engaged in the profession of higher education must capture the TV medium rather than apathetically "view" the present condition in which TV enslaves their world. A kind of Bauhaus located on or near the campus of a university must be created to be part of an on-going process in the development of the TV medium for education. . .
>
> . . . This writer strongly urges that those engaged in the profession of higher education immediately wrest the TV medium from the entrepreneurs, turn the medium into air waves that will purify the urban environment, and begin to experiment in the nature of TV and apply the discoveries to the myriad problems which exist in our society.

Evidence clearly indicates that just any teacher will not necessarily be a good television teacher. Montgomery (25) cites the survey by Hoffman of the Great Plains Instructional Television Library and

lists some of the criteria that ITV administrators surveyed felt were important in choosing a television teacher. The ones listed and discussed are ability to communicate by television, having a command of the language, being a content specialist in the area to be taught, general maturity, ability to organize materials, ability to work under pressure, imagination, showing a desire to function in the medium, ability to get along with people, personality, general cultural background, showmanship, and teaching experience. Blenheim (3) even explored the use of professional television people for teachers or communicaters on television, but experienced teachers performed with better results than did the professionals. (His study made use of the television lecture, however.)

Television has certain limitations, of course, as does any medium for teaching. Television teachers must realize just exactly what can and cannot be done with television. Siepmann (38) says that "ITV is not a panacea, an alibi for teaching, a substitute for teachers, or just one thing with one use or purpose."

There are a number of things that television can do, and many of these are unique. Siepmann (38) lists three: "ITV can put teacher-artists into every classroom, rescue schools where there is no teacher for particular subjects, and make use of team teaching." Special capabilities of television are elaborated more fully by Wolfe (44) and Tyler (41): magnification, multiplication (feeding the signal to any number of monitors), transportation (bringing the teacher or teaching situation to the learner, rather than requiring that the learner be brought to the teacher), association (using special effects, such as matting, split screen, and supers), framing

(centering on particular objects, words, or concepts being emphasized), contrast (highlighting important points visually), recording of rare incidents (particularly useful in medicine), personalization (eye-to-eye tutorial approach), and sharpening performance by self-evaluation of video tapes. This list is a very good summary of techniques for utilization of television for effective teaching.

According to Gilkey (8),

> Developments in technology and experience with past television programming [are] structuring an [entirely] new approach to television in elementary schools, high schools, and universities. Most significant is that the use of television as a means of transmitting or permanently recording an illustrated lecture is on the way out. This is no longer a significant use of television.

The Future of ITV

Writers in the current literature seem convinced that television is here to stay. The transitional period from the televised lecture to television teaching is apparently progressing well. The trend seems to be in the direction of imaginative and novel applications (not novel just for the sake of novelty, however) of instructional television.

A number of authors are suggesting that instructional television definitely has a place in a total systems approach to education (9, 29, 38). Gill (9) lists some particular advantages of television in such an approach: trying out new techniques of teaching; supplying inquiry materials that do not give answers; providing overviews of materials, leaving the details to the learner; testing; and demonstrating concepts.

The future of instructional television not only seems assured, but also, much more happily, indicates great promise. It must be remembered, however, that the hopes of twenty years ago were not adequately fulfilled by utilization within the traditional framework of education. Only a dynamic and creative approach to the use of instructional television will prevent the dashing of present renewed hopes for the future.

Siepmann (38) suggested the greatest single problem of the passing era of instructional television: "G. K. Chesterton once said that the trouble with Christianity is that it has never been tried. Much the same could be said of ITV - or, for that matter, of real, life-giving education." Such a remark hopefully cannot be said of the new era of instructional television.

CHAPTER III

THE NEW TV SERIES

An operational description of what should characterize the new television series was introduced in Chapter I. The basic objectives were to produce a television series that is both informative and interesting.

In order to be informative the television lessons must present the material in a well organized, meaningful, clear, and concise manner. The following procedures were used in accomplishing this general objective.

In order to enhance the teaching of problem solving using the tools of the FORTRAN language and a computer, the problems in the television lessons were designed to be simple, yet relatively comprehensive; problems that could be easily visualized by actually physically performing the solution or problems that could easily be encountered in daily affairs were chosen. Each lesson was built around the solution of one particular problem.

New statements and capabilities of the FORTRAN language were introduced within the framework of the problem being solved as they were needed. In this way new material was not introduced just for its own sake, but rather was introduced as the need for it arose in the solution of the problem under consideration.

The material of the course was organized so that all of the

fundamental material was introduced by the end of the sixth lesson. The remaining seven lessons introduced more sophisticated concepts of computer programming, at the same time reviewing all of the fundamental material and using it at a deeper level. This additional reinforcement was used for increasing the probability that the students would be able to grasp the material and also for demonstrating the uses of the programming language in a wide variety of contexts.

An effort was made to organize the material of the course so that the students could be led logically and naturally from simple concepts to more complex ones with a minimum of difficulty.

Excessive detail was omitted from the lessons and a general overview of each lesson was emphasized.

A set of written materials was prepared to accompany the lessons, summarizing the lessons and explaining potentially difficult material. Using these materials, the students could have a review of each lesson at their convenience.

An effort was made to anticipate questions that would arise in the students' minds as the lessons progressed and to deal with these questions in the lessons.

In order to be <u>interesting</u> the television lessons must gain and maintain close attention to the material being presented. The following procedures seemed especially appropriate for accomplishing this general objective.

The lessons were usually restricted to approximately thirty minutes (or less) in length.

The material in the lessons was presented in a series of "rapid-fire volleys," having been organized in short segments; and new material was presented fairly rapidly, followed usually by some form of restatement in a later segment of the lesson.

A team of three television instructors was used with at least two of them appearing in each lesson (with the exception of one lesson). The organizing of the material into short segments was enhanced by the changing of instructors with the beginning of each segment.

A female instructor was included in the teaching team in order to accent the use of different teachers and voices.

An off-camera voice was used in the lessons for stating and/or reinforcing important principles and for teaching certain aspects of the syntax and form of the programming language. (These potentially less interesting parts of the course were generally introduced only by use of the off-camera voice and visual materials. These blurbs were designed to be very short and attention demanding.)

The lessons were oriented heavily toward visual materials. The "face on the screen" was avoided as much as possible.

The lessons were prepared in a conversational format rather than a straight lecture format.

The set of written materials prepared to accompany the lessons minimizes the need of students to have their attention distracted by note taking.

A typewriter terminal connected to a computer was placed in the set and was used so that students could see the written output from the computer as it was being produced.

Use of special effects (split screen, matting, spotlighting, etc.) was employed as much as possible.

Not all of the "answers" were given in the lessons. Some of the material was deliberately left unsaid in order to stimulate the students to question and hopefully to find some answers for themselves.

Some "previews" of material to be covered in later lessons were inserted at strategic places in the lessons so that the students might be encouraged to anticipate material that would be covered later.

No evidence was found in the literature of a college level course having been couched in a format like that described above.

An outline of the material presented in the TV lessons is given in Appendix A, and a sample script for a TV lesson is given in Appendix B.

CHAPTER IV

GIVING THE STUDENTS A CHOICE

The Two Classes

Measuring attitudes is, of course, a difficult task. Since questionnaires and opinionnaires have limited credibility, some behavioral measure of attitude is probably more reliable.

Based upon the assumption that a student will, given two alternatives, choose the one that appears to him to be more suitable for his purposes, a plan was devised whereby a student could choose between a television class and a conventional class covering the same material. Two sections of students enrolled in the course were selected and combined into one section, since both of these sections were scheduled to meet at the same time. The two rooms which were scheduled for the two sections are identical to each other and are on the same floor of the same building; both are set up for TV viewing rooms. One of the rooms was designated as the place to go if the student wished to view the television lesson, while the other room was set aside for a conventional class should the student choose to attend that class. All students were given an open-ended choice during the semester of attending the the TV class or attending the conventional class or not attending at all. They were allowed to change from one class to the other as often as they wished, but they were expected to remain for the entire class

period once they had made the choice for that particular day.

The instructor chosen for the conventional class was the main television instructor of the TV series, while the person in charge of the television class was one of the assistant instructors in the TV series. Thus each class had the "prestigue" of having a television instructor in the classroom. The instructor giving the conventional presentation was the one who had written most of the material for the TV series; it was assumed that he would best be able to duplicate the material in the TV lessons for presentation in the conventional class.

In at least two senses the conventional class was not entirely conventional. The organization of the material in the special way that was used in the TV lessons made the conventional class more structured and more rigidly paced than would probably be expected in the usual conventional class. All students had access to the printed materials that are an essential part of the television series, and these printed materials were used in the conventional class because they were available and because their use was necessary in order to conserve time that would ordinarily be wasted in writing on the chalkboard. (Actually more material was covered in the TV lessons than could be covered in a conventional class period. One of the advantages of TV instruction is the elimination of most of those things that take up time in the classroom, but probably contribute little or nothing to the student's learning. Even with the printed materials that were designed to accompany the TV lessons the instructor was hard pressed to cover in a fifty-minute period the same material that was covered in a thirty-minute TV lesson.) The conventional class was conventional mainly in that it had a "live" lecturer with whom the students could interact

during the class if they wished to do so by asking questions or requesting further explanation.

The first class meeting of the semester was devoted to an orientation period for the combined sections in a single room given "live" by the instructor who would be conducting the conventional class. An explanation of the two classes and the students' freedom to choose during the semester was given. The students were told that their choices would in no way be linked directly to their grades in the course, since no grades are kept by lecture sections in the course anyway. (All grading is done in the laboratory sections.) Each student was given a packet of computer cards which would serve as his "tickets" to either class during the semester. There was a card for each lesson with the date, the lesson number, the student's name, and some other information for record keeping purposes punched in the card. The student was to present a card for the particular date at the door of the classroom so that exact attendance records could be kept for each student during the entire semester. The use of punched cards made the processing of the data with a computer a relatively simple matter.

During the first class meeting all students were given a questionnaire which provided background information on each student for later use. Of particular interest was the student's prior exposure to instructional television at the elementary, secondary, or college level. In addition, a sampling of the student's attitude toward the use of instructional television in general and in this particular course was obtained, along with what he expected his attitude toward instructional television to be at the conclusion of the course. This questionnaire is shown in Appendix C.

In order to introduce those students who had never attended a class using television instruction to at least one TV lesson, all students were required to attend the first TV class. (There was a very practical reason for this requirement too. Some of the special capabilities of television had been employed to a large extent in the first lesson, and much of the material in the lesson could not be presented easily without the use of television.) For all subsequent classes, however, students were free to choose the television or the conventional class.

The experimental section finally contained eighty-one students after drops (including one student who was auditing the course). There were a few more students enrolled, but they enrolled late and did not take the pretest questionnaire and did not attend the orientation session; so they were not considered to be experimental subjects.

At the conclusion of the course another questionnaire was administered which asked some of the same questions that were asked on the first questionnaire. At the same time the Short Dogmatism Scale of Schulze (37), which is a shortened form of the Rokeach Dogmatism Scale (36), was given in order to determine, if possible, whether any relationship existed between dogmatism and the acceptance of instructional television. A copy of the questionnaire is shown in Appendix D, and a copy of the dogmatism scale that was used is given in Appendix E.

Attendance Records for the Semester

When the students exercised their choice for the first time, the majority of them chose the conventional class. When the second choice

was made a majority chose to attend the TV class. More of the students chose the TV class for the remainder of the semester than chose the conventional class.

A graph of the attendance for the semester after the students were free to choose (beginning with the second lesson) is shown in Figure 1. The graph suggests that most of the students had fairly well decided upon a class to attend early in the semester. (The large number of absentees for the fifth lesson occurred because of a blizzard on 21-22 February. A number of the students who were absent viewed the lesson later on a video tape machine in the Library. What effect, if any, this "forced" viewing had on later attendance is, of course, unknown.)

The attendance data by lessons for all students are included in Appendix F. A summary of the attendance by lessons is shown in Table II. (The graph in Figure 1 was prepared from this table.) A summary of the attendance data during the semester is shown in Table III, and the data from which this summary was derived are given in Appendix G.

Some Reasons for Attending as They Did

In the last questionnaire that was given to the students, they were asked to write their main reasons for attending (or not attending) classes as they did. Only 91% of the students could be reached and given the questionnaire; and not all of the students who took the questionnaire responded to that part, but for those 77% of the students who took the questionnaire and responded, several reasons seemed to stand out for attending the TV class or for attending the conventional class.

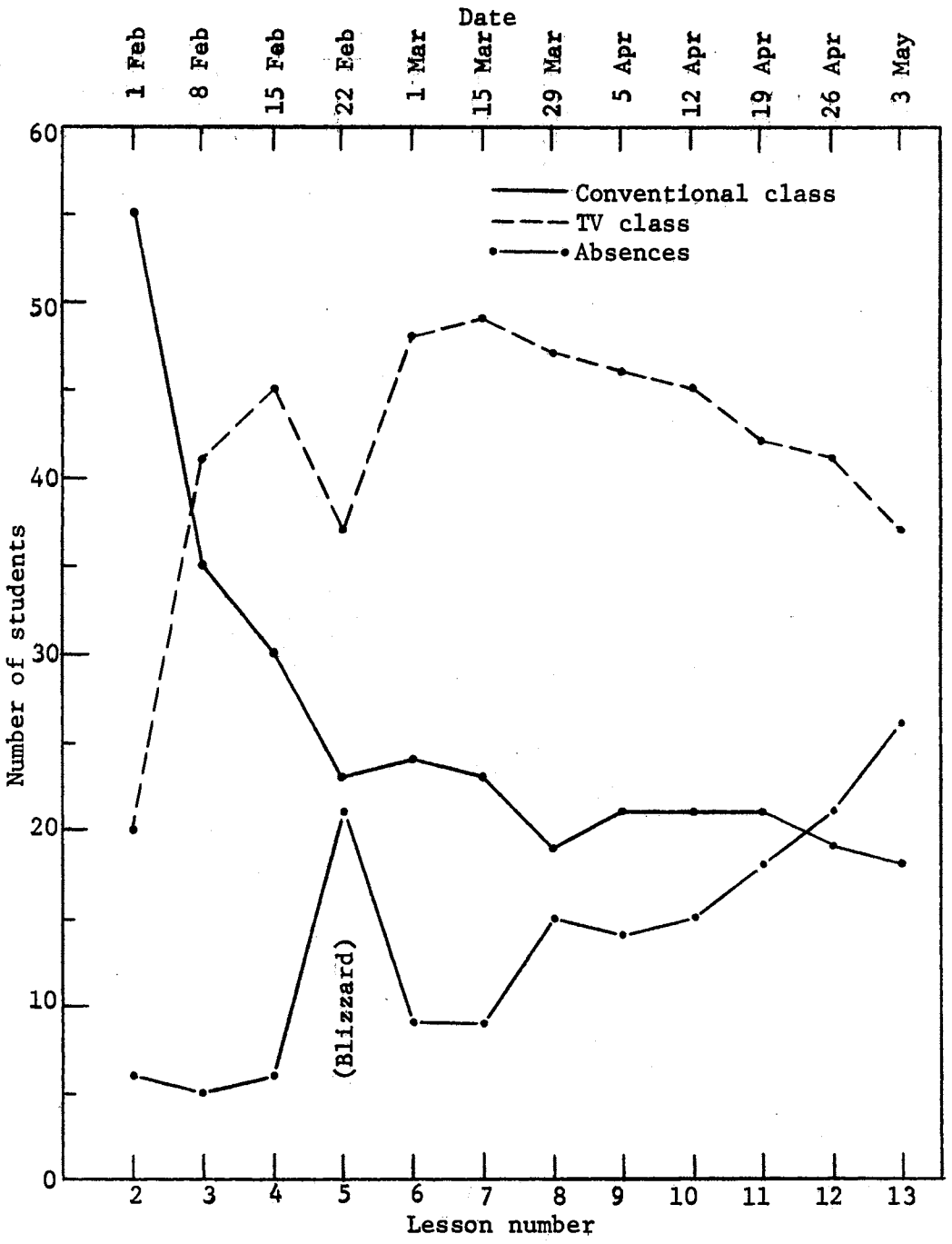

Figure 1. Graph of Attendance After Students Were Free to Choose the Class They Wished to Attend

TABLE II

SUMMARY OF ATTENDANCE DATA BY LESSONS

Date	Feb				Mar			Apr				May
	1	8	15	22	1	15	29	5	12	19	26	3
Lesson number	2	3	4	5	6	7	8	9	10	11	12	13
Conventional class	55	35	30	23	24	23	19	21	21	21	19	18
TV class	20	41	45	37	48	49	47	46	45	42	41	37
Absences	6	5	6	21[1]	9	9	15	14	15	18	21	26
% Conventional class	68	43	37	28	30	28	23	26	26	26	23	22
% TV class	25	51	56	46	59	60	58	57	56	52	51	46
% Absences	7	6	7	26[1]	11	11	19	17	19	22	26	32

[1]Unusually high absenteeism resulted from a blizzard on 21-22 February.

TABLE III

SUMMARY OF ATTENDANCE DATA
FOR THE SEMESTER

Total visits to conventional class	309
Total visits to TV class	498
Total visits to both classes	807
Percentage of visits that were TV	62%
Total absences	165
Total visits and absences	972
Percentage of visits-absences that were TV	51%
Total number of changes from one class to the other	81

For purposes of this discussion the students in the experimental sections were divided into two groups, "TV" students and "conventional" students. Those students who attended the TV class 50% or more of the times they attended either class are referred to as TV students or TV attenders; those students who attended the TV class less that 50% of the times they attended either class are referred to as conventional students or conventional attenders. (See Appendix G for the percentage of visits to the TV class.)

The TV attenders who responded to the questionnaire (39 students) gave most often as reasons for attending the TV class that the TV class covered more material in less time and that the TV class did a better job of presenting the material, or some variation of these two reasons. Three students indicated that they did not like other students' asking questions during the conventional class and taking up class time for themselves. One student put it quite tersely: "Some dummy would ask simple questions which took up the entire class's time." Some students also liked the compactness and conciseness of the TV lessons. One student stated a rather interesting reason for attending the TV class, making one wonder how many others did the same thing, but did not admit it: ". . . just started and didn't see any reason to change." One student stated as his reason that the TV class was "less threatening to me as a student." Exactly why he felt that the conventional class was a threat to him was not elucidated! One student wrote on her questionnaire:

> At first I chose not to go to TV, as I had had TV classes before and had found them boring, but I decided to try it and found that these TV lectures are not only interesting, but [also] informative.

The conventional attenders who responded to the questionnaire (19 students) also gave most often two reasons for attending the conventional class: it was possible to ask questions and it was more personal. (It is interesting to note that most of the students who said that they liked being able to ask questions never themselves asked questions in the conventional class.) Several also insisted that the TV lessons were boring.

Of special interest is the fact that two international students responding to the questionnaire said that the TV lessons were clearer and more easily understood by them than the conventional lessons. Perhaps the visualization of concepts in the TV lessons helps somewhat to bridge the language barrier.

Table IV contains a summary of the responses of the students to this particular part of the questionnaire and the actual numbers of students giving specific responses.

Some Interesting Inferences

One of the questions on the last questionnaire asked the students whether they would rate their attitude toward instructional TV as having improved, deteriorated, or remained unchanged during the semester. Of the students responding, 47% indicated that their attitude had improved; 4% said that their attitude had deteriorated; and 42% felt that their attitude was unchanged. The rest were undecided.

During the semester 69% of the students became TV class attenders (attending the TV class 50% or more of the times that they attended either class) and 31% of the students became conventional class attenders (attending the TV class less than 50% of the times that they

attended either class). When the students entered the course, 64% indicated on the pretest questionnaire a negative attitude toward instructional TV, while 19% indicated a positive attitude and 17% were neutral. At the conclusion of the course only 27% expressed a negative attitude on the posttest questionnaire toward instructional TV, while 64% expressed a positive attitude and 9% were neutral.

TABLE IV

SUMMARY OF REASONS GIVEN BY STUDENTS FOR ATTENDING CLASSES AS THEY DID

Reason given	Number	Percentage
TV attenders (39 students responding)		
Covered more material faster	18	46%
Better presentation of the material	15	38%
Presentation more compact and concise	5	13%
Too many questions asked in conventional class	3	8%
More interesting	2	5%
Conventional attenders (19 students responding)		
Possible to ask questions as material was presented	8	42%
More personal	7	37%
TV boring	5	26%
Material in TV lessons presented too fast	2	11%

One may suppose then that for a fairly large number of students the TV series was considered successful by them as a teaching medium, and that it is possible to overcome some of the negative attitudes toward ITV with careful planning and careful attention to details

based on the guidelines in Chapter III.

Another interesting bit of information came to light when the questionnaire that is given to all students enrolled in the course was analyzed. The same four questions referred to in Table I of Chapter I were examined and the responses of the students in the experimental section were compared with the responses of all of the students together. The results are shown in Table V, indicating that the students who had a choice really did seem to prefer the TV classes as their attendance indicated. One student wrote on her questionnaire that she never liked ITV until she had a choice and could compare the TV with the conventional presentation. Then she became aware that the TV lessons were better organized and presented, and she preferred TV.

TABLE V

SOME RESULTS OF A GENERAL QUESTIONNAIRE GIVEN TO ALL STUDENTS ENROLLED IN THE COURSE WITH THE EXPERIMENTAL SECTION TALLIED SEPARATELY

	Spring 71 All students	Spring 71 Experimental section
Attended class regularly	93%	83%
Thought TV lessons were informative	67%	64%
Thought TV lessons were interesting	35%	45%
Expressed preference for TV class over conventional class	34%	58%

CHAPTER V

TESTING SOME HYPOTHESES

Some Assumptions

When the experimental section was being planned and set up, there were certain intuitive assumptions regarding outcomes. Based on past experience, it could be assumed that most students would probably have a negative attitude toward the use of instructional television and that they would initially choose the conventional class. It was hoped that the new TV series would be able to change their attitudes toward TV in a more positive direction. Based upon the experiments to which reference was made in Chapter II, it was assumed that most students would perform equally well in the course regardless of their choice of teaching method. That students would tend to be absent more from the TV class seemed a justifiable assumption. It was also assumed that the more dogmatic students would tend to choose the conventional class and would tend to exercise the freedom of choice less. There was no particular assumption with regard to cumulative grade point average, although McKeachie (22) cites a study in which students with higher ability tended to rate instructional TV lower than students of lower ability.

In order to determine whether some of these assumptions were correct, several hypotheses were stated and tested. Some additional data were required which were obtained and are shown in Appendix H.

Seven dependent variables were used in the analyses of variance: (1) attitude toward instructional TV at the beginning of the course, as measured by the pretest questionnaire; (2) attitude toward instructional TV at the end of the course, as measured by the posttest questionnaire; (3) the change in attitude toward instructional TV from the pretest to the posttest, found by subtracting the pretest score from the posttest score and adding ten (in order to prevent the occurence of negative numbers); (4) the performance in the course, as measured by the number of points earned in the course out of a possible 102 points; (5) the number of absences during the semester after the students were given a choice of classes to attend; (6) dogmatism, as measured by the Schulze Short Dogmatism Scale; and (7) the cumulative grade point average through the previous semester.

The first twelve hypotheses were treated by simple analysis of variance, while the last seven were analyzed using the Pearson product-moment coefficient of correlation. All calculations were done on an IBM System/360, Model 65, computer, using the Biomedical Computer Programs contained in the Oklahoma State University Computer Center Library.

Prior ITV Exposure

The students enrolled in the experimental section were divided into two groups, those who had been exposed to instructional TV previously and those who had had no exposure to instructional TV. Five hypotheses were tested for this grouping.

For the first case, the null hypothesis is stated as follows: There is no significant relationship in attitude toward instructional

TV as measured by the pretest between those who had prior ITV exposure and those who did not have prior ITV exposure. The alternate hypothesis is stated as follows: There is a significant relationship in attitude toward instructional TV as measured by the pretest between those who had prior ITV exposure and those who did not have prior ITV exposure. The F-table in shown in Table VI.

TABLE VI

F-TABLE FOR PRIOR TV EXPOSURE AND PRETEST ATTITUDE

	Sum of Squares	DF	Mean Square	F Ratio	P
Between groups	32.8629	1	32.8629	7.1101	<0.025
Within groups	365.1367	79	4.6220		
Total	397.9995	80			

The null hypothesis is rejected at the 0.025 confidence level. Students coming into the course with prior ITV experience had a more negative attitude toward ITV than did students with no ITV exposure, the latter group having a higher mean score on the pretest.

For the second case, the null hypothesis is stated as follows: There is no significant relationship in attitude toward instructional TV as measured by the posttest between those who had prior ITV exposure and those who did not have prior ITV exposure. The alternate hypothesis is stated as follows: There is a significant relationship in

attitude toward instructional TV as measured by the posttest between those who had prior ITV exposure and those who did not have prior ITV exposure. The F-table for this hypothesis is shown in Table VII.

TABLE VII

F-TABLE FOR PRIOR EXPOSURE AND POSTTEST ATTITUDE

	Sum of Squares	DF	Mean Square	F Ratio	P
Between groups	31.3285	1	31.3285	3.1904	NS
Within groups	707.0071	72	9.8195		
Total	738.3354	73			

The null hypothesis is accepted at the 0.05 confidence level. This indicates that the attitudes of students at the end of the course were not prejudiced by their prior exposure or lack of exposure to instructional TV. This may be interpreted to suggest that the attitudes toward ITV with which students entered the course were not necessarily carried through to the end of the course, and the TV series used in the course was evaluated on its own, rather than upon the students' prior experiences.

For the third case, the null hypothesis is stated as follows: There is no significant relationship in course performance between those who had prior ITV exposure and those who did not have prior ITV exposure. The alternate hypothesis is stated as follows: There is a significant relationship in course performance between those who had

prior ITV exposure and those who did not have prior ITV exposure. The F-table is shown in Table VIII.

TABLE VIII

F-TABLE FOR PRIOR TV EXPOSURE AND COURSE PERFORMANCE

	Sum of Squares	DF	Mean Square	F Ratio	P
Between groups	212.5308	1	212.5308	0.5905	NS
Within groups	28075.3008	78	359.9397		
Totals	28287.8281	79			

The null hypothesis is accepted at the 0.05 confidence level. Prior exposure or lack of exposure to instructional TV was not related to the students' performance in the course.

For the fourth case, the null hypothesis is stated as follows: There is no significant relationship in absenteeism between those who had prior ITV exposure and those who did not have prior ITV exposure. The alternate hypothesis is stated as follows: There is a significant relationship in absenteeism between those who had prior ITV exposure and those who did not have prior ITV exposure. The F-table is shown in Table IX.

The null hypothesis is accepted at the 0.05 confidence level. Prior exposure to ITV was not related to attendance, even though it might appear that a more negative attitude resulting from prior

exposure would tend to support a higher rate of absenteeism. Of course, in this particular case, since the students had a choice of classes to attend, perhaps an inclination to absent oneself from the TV class would be supplanted by attending the conventional class.

TABLE IX

F-TABLE FOR PRIOR TV EXPOSURE AND ABSENTEEISM

	Sum of Squares	DF	Mean Square	F Ratio	P
Between groups	4.3583	1	4.3583	0.6991	NS
Within groups	492.5286	79	6.2345		
Total	496.8867	80			

For the fifth case, the null hypothesis is stated as follows: There is no significant relationship in change of attitude toward ITV during the semester between those who had prior ITV exposure and those who did not have prior ITV exposure. The alternate hypothesis is stated as follows: There is significant relationship in change of attitude toward ITV during the semester between those who had prior ITV exposure and those who did not have prior ITV exposure. The F-table is shown in Table X.

The null hypothesis is accepted at the 0.05 confidence level. The change in attitude toward instructional TV was not related to prior exposure or lack of prior exposure to ITV. Again this suggests that the attitudes toward ITV with which students come into the course were

not necessarily carried through to the end of the course, and the attitudes changed during the semester for both groups at the same rate.

TABLE X

F-TABLE FOR PRIOR TV EXPOSURE AND CHANGE IN ATTITUDE FROM PRETEST TO POSTTEST

	Sum of Squares	DF	Mean Square	F Ratio	P
Between groups	0.2961	1	0.2961	0.0285	NS
Within groups	747.7141	72	10.3849		
Total	748.0100	73			

In summary, the hypotheses tested against prior exposure to ITV or lack of exposure to ITV all show no significance, except for the attitude toward ITV with which students entered the course, with students having been exposed to ITV having a more negative attitude.

Type of Attenders

For the next group of hypotheses, the students were divided into two groups, those who attended the TV class 50% or more of the times that they attended either class (designated as "TV attenders") and those who attended the TV class less than 50% of the times that they attended either class (designated as "conventional attenders"). Seven hypotheses were tested for this grouping.

For the first case, the null hypothesis is stated as follows: There is no significant relationship in attitude toward ITV as measured

by the pretest between the TV attenders and the conventional attenders. The alternate hypothesis is stated as follows: There is a significant relationship in attitude toward ITV as measured by the pretest between the TV attenders and the conventional attenders. The F-table is shown in Table XI.

TABLE XI

TYPE OF ATTENDER AND PRETEST ATTITUDE

	Sum of Squares	DF	Mean Square	F Ratio	P
Between groups	11.1607	1	11.1607	2.2792	NS
Within groups	386.8386	79	4.8967		
Total	397.9993	80			

The null hypothesis is accepted at the 0.05 confidence level. The attitude toward instructional TV with which most students came into the course was not related to their overall attendance to the TV classes. This suggests that their initial attitudes did not necessarily carry over to the end of the course, but that they attended the class of their choice based upon the immediate situation rather than upon prior attitudes.

For the second case, the null hypothesis is stated as follows: There is no significant relationship in attitude toward ITV as measured by the posttest between the TV attenders and the conventional attenders. The F-table is shown in Table XII.

The null hypothesis is rejected at the 0.001 confidence level. The attitudes toward instructional TV in the TV class as given on the posttest questionnaire were indeed reflected in their choice of classes. The TV attenders had a higher mean, having had a better attitude at the end of the course than the conventional attenders. This gives substance to the assumption that the behavioral response to the choice is a good indicator of attitude toward the alternatives of the choice. Again there is the suggestion that attitudes did change during the semester, since attendance was related to the attitude at the end of the course and not at the beginning.

TABLE XII

TYPE OF ATTENDER AND
POSTTEST ATTITUDE

	Sum of Squares	DF	Mean Square	F Ratio	P
Between groups	368.1924	1	368.1924	71.6203	<0.001
Within groups	370.1445	72	5.1409		
Total	738.3369	73			

For the third case, the null hypothesis is stated as follows: There is no significant relationship in change of attitude from the pretest to the posttest between the TV attenders and the conventional attenders. The alternate hypothesis is stated as follows: There is a significant relationship in change of attitude from the pretest to the posttest between the TV attenders and the conventional attenders.

The F-table is shown in Table XIII.

TABLE XIII

TYPE OF ATTENDER AND CHANGE IN ATTITUDE FROM PRETEST TO POSTTEST

	Sum of Squares	DF	Mean Square	F Ratio	P
Between groups	276.3748	1	276.3748	42.1912	<0.001
Within groups	471.6377	72	6.5505		
Total	748.0125	73			

The null hypothesis is rejected at the 0.001 confidence level. The students attending the TV class had a higher mean, showing a greater change in attitude than did those attending the conventional class. The change in attitude was toward a more favorable response to the use of TV.

For the fourth case, the null hypothesis is stated as follows: There is no significant relationship in course performance between the TV attenders and the conventional attenders. The alternate hypothesis is stated as follows: There is a significant relationship in course performance between the TV attenders and the conventional attenders. The F-table is shown in Table XIV.

The null hypothesis is accepted at the 0.05 confidence level. The students in both groups performed equally well.

For the fifth case, the null hypothesis is stated as follows: There is no significant relationship in absenteeism between the TV

attenders and the conventional attenders. The alternate hypothesis is stated as follows: There is a significant relationship in absenteeism between the TV attenders and the conventional attenders. The F-table is shown in Table XV.

TABLE XIV

TYPE OF ATTENDER AND
COURSE PERFORMANCE

	Sum of Squares	DF	Mean Square	F Ratio	P
Between groups	118.4727	1	118.4727	0.3280	NS
Within groups	28169.3789	78	361.1458		
Total	28287.8516	79			

TABLE XV

TYPE OF ATTENDER AND
ABSENTEEISM

	Sum of Squares	DF	Mean Square	F Ratio	P
Between groups	2.0318	1	2.0318	0.3244	NS
Within groups	494.8552	79	6.2640		
Total	496.8870	80			

The null hypothesis is accepted at the 0.05 confidence level. Students did not tend to be absent more from the TV class than from the conventional class; absenteeism was not related to which class the

students were choosing to attend when they did attend.

For the sixth case, the null hypothesis is stated as follows: There is no significant relationship in dogmatism between the TV attenders and the conventional attenders. The alternate hypothesis is stated as follows: There is a significant relationship in dogmatism between the TV attenders and the conventional attenders. The F-table is shown in Table XVI.

TABLE XVI

TYPE OF ATTENDER AND DOGMATISM

	Sum of Squares	DF	Mean Square	F Ratio	P
Between groups	17.9352	1	17.9352	0.1995	NS
Within groups	6474.0469	72	89.9173		
Total	6491.9805	73			

The null hypothesis is accepted at the 0.05 confidence level. The more dogmatic students did not show a greater tendency to attend the conventional class or the TV class.

For the seventh case, the null hypothesis is stated as follows: There is no significant relationship in cumulative grade point average (GPA) between the TV attenders and the conventional attenders. The alternate hypothesis is stated as follows: There is a significant relationship in cumulative grade point average (GPA) between the TV attenders and the conventional attenders. The F-table is shown in Table XVII.

TABLE XVII

TYPE OF ATTENDER
AND GPA

	Sum of Squares	DF	Mean Square	F Ratio	P
Between groups	0.3317	1	0.3317	0.8857	NS
Within groups	24.3464	65	0.3746		
Total	24.6781	66			

The null hypothesis is accepted at the 0.05 confidence level. GPA was not a factor in the students' choices.

In summary, only the posttest attitude toward instructional TV and the change in attitude from the pretest to the posttest were significantly related to whether the students were TV attenders or conventional attenders. The TV attenders had a better attitude toward TV than did the conventional attenders; and they also showed a greater change in attitude toward TV than the conventional attenders, change in attitude being toward a more favorable attitude toward TV.

Changes in Class Attendance

Some additional hypotheses were tested using the Pearson product-moment coefficient of correlation. The correlation matrix obtained from the computer program is shown in Table XVIII. These tests were in order to determine whether the number of times students changed from one class to the other was correlated with other variables.

For the first case, the null hypothesis is stated as follows: There is no significant correlation between the number of times students

TABLE XVIII

CORRELATION MATRIX

	Course performance	Grade point average	Dogmatism	Attitude, posttest	Attitude, pretest	Times changed
Times changed	0.01777	0.05479	-0.12290	0.15040	0.12972	1.00000
Attitude, pretest	-0.01560	-0.20284	-0.01971	0.18016	1.00000	
Attitude, posttest	0.48770	-0.17574	0.48394	1.00000		
Dogmatism	0.37863	-0.07636	1.00000			
Grade point average	0.02791	1.00000				
Course performance	1.00000					

changed from one class to the other and grade point averages (GPA). The alternate hypothesis is stated as follows: There is a significant correlation between the number of times students changed from one class to the other and grade point averages (GPA). With a correlation coefficient of 0.05479, the null hypothesis is accepted at the 0.05 confidence level.

For the second case, the null hypothesis is stated as follows: There is no significant correlation between the number of times students changed from one class to the other and attitude toward ITV as measured by the pretest. The alternate hypothesis is stated as follows: There is a significant correlation between the number of times students changed from one class to the other and attitude toward ITV as measured by the pretest. With a correlation coefficient of 0.12972, the null hypothesis is accepted at the 0.05 confidence level.

For the third case, the null hypothesis is stated as follows: There is no significant correlation between the number of times students changed from one class to the other and attitude toward ITV as measured by the posttest. The alternate hypothesis is stated as follows: There is a significant correlation between the number of times students changed from one class to the other and attitude toward ITV as measured by the posttest. With a correlation coefficient of 0.15040, the null hypothesis is accepted at the 0.05 confidence level.

For the fourth case, the null hypothesis is stated as follows: There is no significant correlation between the number of times students changed from one class to the other and performance in the course. The alternate hypothesis is stated as follows: There is a significant correlation between the number of times students changed

from one class to the other and performance in the course. With a correlation coefficient of 0.1777, the null hypothesis is accepted at the 0.05 confidence level.

For the fifth case, the null hypothesis is stated as follows: There is no significant correlation between the number of times students changed from one class to the other and dogmatism. The alternate hypothesis is stated as follows: There is a significant correlation between the number of times students changed from one class to the other and dogmatism. With a correlation coefficient of -0.12290, the null hypothesis is accepted at the 0.05 confidence level.

In summary, the number of times students changed from one class to the other is not significantly correlated with course performance, GPA, dogmatism, pretest attitude toward ITV, or posttest attitude toward ITV.

Attitude and Performance

Of interest also is whether there is any correlation between pretest attitude toward ITV and performance in the course and posttest attitude toward ITV and performance in the course.

For the first case, the null hypothesis is stated as follows: There is no significant correlation between attitude toward ITV as measured by the pretest and course performance. The alternate hypothesis is stated as follows: There is a significant correlation between attitude toward ITV as measured by the pretest and course performance. With a correlation coefficient of -0.01560, the null hypothesis is accepted at the 0.05 confidence level.

For the second case, the null hypothesis is stated as follows:

There is no significant correlation between attitude toward ITV as measured by the posttest and course performance. The alternate hypothesis is stated as follows: There is a significant correlation between attitude toward ITV as measured by the posttest and course performance. With a correlation coefficient of 0.48770, the null hypothesis is rejected at the 0.001 confidence level. The more positive students' attitudes toward ITV at the end of the course were, the better their performance in the course.

CHAPTER VI

SUMMARY AND CONCLUSIONS

A new instructional television series for a beginning computer programming course was prepared, using a new format that was designed to be both informative (presented in a well organized, meaningful, clear, and concise manner) and interesting (gaining and maintaining close attention) and making use of special capabilities of the television medium. A television series so designed should overcome to some extent the negative attitudes of students toward the use of instructional television.

An experimental section of the course was set up during a semester in which the students were given a choice of attending a television lesson or a conventional lecture covering the same material. During the semester 69% of the students became TV class attenders (attending the TV class 50% or more of the times that they attended either class) and 31% of the students became conventional class attenders (attending the TV class less than 50% of the times that they attended either class). As measured by the pretest questionnaire, the posttest questionnaire, and the attendance data, the attitudes of the students did change during the semester and became less negative toward TV.

Statistical analysis of the attendance data indicated that the types of attenders that the students became were unrelated to their pretest attitudes, but were significantly related to their posttest

attitudes. The attitudes with which the students entered the course did not necessarily determine whether they chose to become TV attenders or conventional attenders. Once they had become TV attenders or conventional attenders, however, their attitudes toward instructional TV were reflected in their attendance records. Thus, giving the students an open-ended choice seems to be a good way of obtaining a behavioral measure of attitude toward the alternatives.

The new TV series can be said to be successful, accomplishing to a satisfactory extent the initial objectives of producing a series that would elicit a more favorable response from the students. There are refinements in content and method that should be made, however, in order to accomplish the objectives more fully. There are places in which the material is not clear, and there are parts that are certainly less than stimulating. But the approach as outlined in Chapter III is demonstrated to be sound, and, with additional refinements in executing the procedure, could be quite successful.

Instructional television at the college level can be used effectively as a teaching medium, provided that the unique capabilities inherent in television are used to their fullest. In general, instructional TV should not be used just for transporting a conventional lecture; it should be used with an attitude of creativity and innovation within the framework of what television can and cannot do for the teaching-learning process.

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APPENDIX A

OUTLINE OF THE TV LESSONS

I. Lesson 1: Programming Fundamentals

- A. Digital computing devices
  - 1. Abacus
  - 2. Hands
  - 3. Modern high-speed electronic digital computers
- B. The frontage problem
  - 1. Algebriac notation of problem
  - 2. Solution using computer
- C. Compiler and compile phase
- D. Execution
- E. Building the program
  - 1. Assignment statements
  - 2. END - compilation error
  - 3. STOP - execution error
  - 4. WRITE
  - 5. FORMAT
  - 6. Complete program
- F. Order of execution
  - 1. Executable statements
  - 2. Nonexecutable statements
- G. FORTRAN names

H. Arithmetic operators

I. FORTRAN punched cards

J. Punching and running a program

II. Lesson 2: Input and Output Instructions

A. Review of the frontage problem

B. WRITE statement in detail

C. FORMAT statement in detail

1. F-type numbers

2. Fields

3. Number of digits to the right of the decimal point

4. Right-justified

5. Fw.d

6. Line printer code, 1H0

D. Writing three numbers

1. (1H0,F10.1)

2. (1H0,3F10.1)

E. READ statement

1. Data cards

2. Decimal point punched and not punched

3. Blank fields

III. Lesson 3: Decision-Making Instructions

A. Games and flow charts

1. Transfer and looping

2. Writing a program for playing a simple game

B. Integer numbers and names and I-specification

C. Running sums

D. Computed GO TO statement

E. Unconditional GO TO statement

F. Hollerith strings, output

G. Arithmetic IF statement

IV. Lesson 4: Looping

A. Flow chart for table of squares and square roots

B. Loop counter: initial value, increment, and test

C. FORTRAN-supplied subprograms - SQRT(Y)

D. Exponentiation operator

E. X-specification, output

F. Continuation card

G. DO statement and CONTINUE statement

H. General program for making table

V. Lesson 5: Single-Dimensional Arrays

A. Definitions of array and subscript - DIMENSION statement

B. The maximum temperature problem

C. Input of array

1. Using DO

2. Using implied DO

3. New record (/), input

4. A-specification, input

5. Nested parentheses in FORMAT

6. X-specification, input

D. Algorithm for finding maximum element of an array

1. Definition of algorithm

2. Explanation of the algorithm

E. Output of array

1. Using DO

2. Using implied DO

3. New record (/), output

4. A-specification, output

5. Nested parentheses in FORMAT

F. Test data for program

VI. Lesson 6: The Dean's List (A Review)

A. A program to compile the Dean's List

B. INTEGER statement

C. I/O of entire arrays

D. Integer arithmetic

VII. Lesson 7: Two-Dimensional Arrays

A. Table manipulation problem

B. Concept of "by rows" and "by columns"

C. Input of two-dimensional array

1. Using nested DO statements

2. Using nested implied DO

3. By columns and by rows

4. Including alphameric data

D. Manipulation of two-dimensional array

1. By rows

2. By columns

E. Output of two-dimensional array

1. Using nested DO statements

2. Using nested implied DO

F. DATA initialization statement (alphameric data)

VIII. Lesson 8: Logical Operations

A. Logical IF statement

1. Relational operators
2. Examples with flow charts
3. Logical operators and compound arguments
4. Truth tables for .NOT., .AND., and .OR.

B. Logical data - the "plumbing" problem
1. LOGICAL statement
2. L-specification
3. Logical expressions

IX. Lesson 9: FORMAT Statements

A. Input
1. Numeric fields
a. Integer data
b. Real data
(1) F-type
(2) E-type
2. Alphameric fields
a. A-type
b. H-type (Hollerith)
c. Use of apostrophes or single quotes
3. Positional specifications
a. X: blank columns
b. T: "tabulator"
c. /: new record (data card)

B. Output
1. Numeric fields
a. Integer data
b. Real data

(1) F-type

(2) E-type

2. Alphameric fields

a. A-type

b. H-type (Hollerith)

c. Use of apostrophes or single quotes

3. Positional specifications

a. Horizontal (across page)

(1) X: blank columns

(2) T: "tabulator"

b. Vertical (down page)

(1) /: new record (line)

(2) Printer "line-skipping" codes

(a) Single-spacing

(b) Double-spacing

(c) New page

(d) Printing on current line (overprinting)

C. Grouping in FORMAT statements

X. Lesson 10: Subprograms I - FUNCTION Subprograms

A. Concept of subprograms

1. FORTRAN-supplied subprograms

2. User-supplied subprograms

3. Using subprograms

a. Invoking the name

b. Passing the arguments

c. Executing the subprogram

d. Returning the "answer"

B. Making the maximum algorithm into a FUNCTION

1. FUNCTION statement - arguments

2. RETURN statement

C. Calling statement

XI. Lesson 11: Subprograms II - SUBROUTINE Subprograms

A. The frequency counter problem

B. SUBROUTINE subprogram for frequency count

1. SUBROUTINE statement

2. Arguments

C. CALL statement

D. COMMON storage

E. CALL EXIT

XII. Lesson 12: Subprograms III - Graphic Output

A. Introduction to graphic types of line printer output

B. Problem of making a histogram on the line printer

C. SUBROUTINE for printing histogram, given frequency counts

1. User-supplied error messages for "bad" data

2. Variable FORMAT

3. Debugging program for testing

D. Adding SUBROUTINE from Lesson 11 and main program

XIII. Lesson 13: Tasty Leftovers

A. Single statement functions (review of subprograms)

B. DOUBLE PRECISION

C. Assigned GO TO statement (review of conditional transfer statements)

D. Sorting algorithms - the interchange sort

APPENDIX B

A SAMPLE SCRIPT FOR A TV LESSON

The following script was used for Lesson 1, making use of two instructors and an assistant to work the props.

Eugene Bailey is the first instructor for this particular lesson, and Ellen Wood is the second instructor. Seymour is the name given to the off-camera voice, which is used for teaching the syntax and form of the language, as well as for emphasizing important points that require special attention. Carl Provence, who served as the second instructor in several of the lessons, worked the props for this lesson.

COMSC 2112, LESSON 1

PROGRAMMING FUNDAMENTALS

With

Eugene Bailey and Ellen Wood

EUGENE: This is a Chinese abacus, an ancient and versatile computing device. With this instrument we can add, subtract, multiply, and divide. The abacus is one of the earliest of the man-made digital computing devices. Suppose that I want to find the sum of the numbers 1 through 10.

[Sums numbers on abacus.]

The sum of the numbers 1 through 10 is 55. In effect, I simply counted out the beads of the abacus one at a time as I added the numbers - one digit at a time. Consequently, the abacus is called a digital computing device.

Can you think of a very simple digital computing device? You have at least one with you right now. Try your hands and fingers. For example, I can add 5 and 3 and get 8. Again I counted up the digits one at a time; my fingers constitute a digital computing device.

/Visual/ Super: hand and the word "digital"

But, of course, my hands and fingers cease to be useful if I want to find the sum of the numbers 125 and 250. I run out of

fingers too quickly. But with the abacus this problem is simple. [Adds 125 and 250 to get 375.] The answer is 375.

But suppose that I want to handle all the details of the national budget, or keep all the information on students enrolled in a university, their class schedules, grades, grade points, etc. For either of these massive problems the abacus is of little value to me. Such a vast amount of information would spill off the end of my abacus almost immediately! Besides that, the abacus, like the hands and fingers, cannot be used to store and recall vast amounts of information, do computational operations, and accomplish all of this at the snap of a finger - or even in less time. Such a device is the modern high-speed electronic digital computer.

/Movie/ Showing the computer room

> This is a typical high-speed electronic digital computer with some of its supporting equipment. The actual computing or data processing part, known as the central processing unit, is capable of performing millions of operations per second as well as storing and retrieving millions of units of information in the memory unit, shown behind the operator's console. The central processing unit also controls the entire operation of the computer system. Most of the rest of the equipment that you see in the room is used for putting information into the central processing unit and for getting it back out.

[Walks to terminal.]

Here we have a typewriter terminal connected to the computer that you just saw by an ordinary telephone. [Shows phone and acoustic coupler.] With this device we have direct access to the computer very conveniently anywhere there is a telephone, and we have all the power and versatility of the computer literally at

our fingertips.

[Sits at terminal.] I'll tell the computer that you're here. [Types following and gets responses.]

EB: Hello, Computer.

IBM: Hello, User 25. Please tell me your name.

EB: My name is Eugene Bailey.

IBM: Your name is Eugene Bailey. There are other people with you. Who are they?

EB: My assistants, Ellen Wood and Carl Provence, and some students.

IBM: Hello, Mrs. Wood, and hello Mr. Provence, and a special welcome to the students!

EB: Thank you.

IBM: You're welcome.

Of course, the computer can do only what it is told to do. It is not some mysterious device that thinks. I programmed the computer attached to this terminal to converse with me; I programmed the responses myself. Incidently, the part of the computer that I am using here is said to be in the conversational mode. This is a special capability that this typewriter terminal and the computer provide.

This demonstration is simply to show you one of the many capabilities of the computer available to the user. In this particular course, we will be teaching you one way to program an electronic computer so that you can make it work for you.

The purpose of this course is to introduce fundamental concepts of a particular programming language. We will not even

attempt to tell you all the details. Rather you should refer to a programmer's manual or to other materials for details. It will probably be better if you do not attempt to take many notes; just watch and listen.

Well, let's start. We're going to begin with a ridiculously simple problem, which is not intended to insult your intelligence. I have deliberately chosen a problem so simple that the problem itself will not be a barrier in your understanding of what we will be doing.

Ellen, will you please state the problem?

ELLEN: Suppose that I have bought a piece of property in a business district and the property is on a corner, facing onto two streets. The building is 75.5 feet on the west side and 180.0 feet on the south side.

/Visual/ Model of the building, Carl pointing

I'd like to know just how much of the building faces on the two streets, or in other words, how much frontage the building has. Of course, all I have to do is just to add the number of feet on the west side, 75.5, to the number of feet on the south side, 180.0.

[Camera on Ellen.] I think that all of you can understand this problem and how to solve it. Now, I will put the problem on the magnetic board in some clear and convenient form that everyone can understand.

Let's call the west side "W" and put W=75.5 on the board. Then call the south side "S" and put S=180.0 up. Then we add the

two numbers together, calling the frontage "F": F=W+S.

[Board now contains W=75.5
S=180.0
F=W+S]

That's simple enough, Eugene.

EUGENE: Yes, it is. Now, how can we get the computer to work the problem for us? That's the next question. Well, I'm going to get the answer using the computer. To do this, I will simply type the information on the board into the computer, adding some additional necessary instructions for the computer, which we will investigate in detail later.

[Types into terminal:

```
W=75.5
S=180.0
F=W+S
WRITE(6,1)F
1 FORMAT(1H0,F10.1)
STOP
END
```

Computer output:

```
W=75.5
S=180.0
F=W+S
WRITE(6,1)F
1 FORMAT(1H0,F10.1)
STOP
END

EXECUTION

     255.5

EXECUTION COMPLETED
```

]

And there is the answer, the sum of W and S, 255.5.

[Camera to Eugene.] Let's try to understand what happened and what those additional statements that I typed in are for. I'll begin by telling you to read the information on this card for me, and do what it says.

/Visual/ Camera card with Thai writing on it

Unless you are familiar with the Thai language, and assuming that my Thai writing is correct, you're having a little trouble, aren't you? I will have it translated for you.

SEYMOUR: Touch your toes five times.

/Visual/ Super: Touch your toes five times.

EUGENE: You see, the point I'm trying to make is this. You couldn't do what the writing on the card told you to do until someone translated it for you. The computer is going to have a similar problem. The information that Ellen put on the board is meaningful to us, but it is not meaningful to the computer and its electronic gear in its present form. The information that is meaningful to us must be translated into information that is meaningful to the computer.

This problem of translating is solved by making the computer do double duty for us by having it translate the information that is meaningful to us into information that is meaningful to it. The manufacturer of the computer provides the translating program with the computer; this translating program is called a compiler.

SEYMOUR: The compiler is a translating program that translates information that is meaningful to us into information that is meaningful to the computer.

/Visual/ Illustrating the compiler

EUGENE: So, in order to have the computer work our problem, our procedure must be to write a set of instructions, called a program, in a language that is meaningful to us and also to the trans-

lating program or compiler.

Let's take another look at what Ellen put on the board. [Camera to board.] This is a set of instructions that are meaningful to us for solving the problem; it is a program. This program, as it stands, is also written in the FORTRAN language

/Visual/ Super: FORTRAN

for which there is a compiler to translate the set of instructions into instructions meaningful to the computer.

The FORTRAN language closely resembles the English language and also the symbolism of algebra. The computer takes our FORTRAN program, translates or compiles

/Visual/ Super: Compiles

it with the FORTRAN compiler, and then executes

/Visual/ Super: Executes

the set of instructions provided by the compiler.

So every job that we run on the computer requires a two-fold operation by the computer: compiling or translating the program and then executing the program.

Now let's build the complete FORTRAN program for this particular problem, starting with the first three instructions or statements, so that you will be able to see what the statements that I added mean.

Let's see what happens if I use only the first three statements that are on the board as my program.

[Types into terminal: W=75.5
S=180.0
F=W+S

and runs on computer, mentioning compiling.

Computer output: W=75.5
S=180.0
F=W+S

ERROREND STATEMENT MISSING**]

The compiler was translating the program, but it ran into difficulty. Here's what happened. I gave the compiler an incomplete set of instructions in that I didn't tell it when to end the translation phase and to begin the execution phase. In other words, the compiler must be told when its job is completed, that is, when there are no more FORTRAN statements to translate.

Let me illustrate the problem this way. Suppose that you are waiting at a railroad crossing for a train to pass.

/Visual/ Train passing; END on caboose

What would be your cue that the train is passed so that you could cross the tracks? Obviously, the caboose, which is the last car of the train. When it is passed, then you can cross the tracks. Similarly, the compiler must have a cue when all the FORTRAN statements have been translated so that it can begin the execution of the program. The "caboose" statement for the compiler's cue is the END statement. Just as the caboose signifies the last car of the train, so the END statement signifies the last statement of the FORTRAN program.

SEYMOUR: The END statement marks the end of the compiling of the program or the translating of the program into machine coding.

The END statement terminates the compile phase.

ELLEN: Now I will put an END statement at the end of the program. See whether this eliminates the error, Eugene.

EUGENE: Right! In order to save myself the trouble of typing in the rest of the programs that we will be using in this lesson, I have already put the programs into the computer. All I need to do is to push the "go" button.

[Computer output:

```
W=75.5
S=180.0
F=W+S
END

EXECUTION
**ERROR**STOP STATEMENT MISSING**
```

]

This time the compile phase was accomplished without error, and the execution phase was begun. But this time an error occurred during the execution. Notice that the first error was a compile error since it occurred during compiling. This error is an execution error since it occurred during the execution of the program. The problem this time is that I failed to tell the computer when to stop executing the program; I gave it no instruction to make it stop, so the computer tells me about it with this diagnostic message.

Remember that the computer can do only what we tell it to do; we must tell it to stop the execution of the program when we want it to stop. We do this with the STOP statement.

SEYMOUR: The STOP statement stops the execution of the program. The STOP statement terminates the execute phase. STOP THE EXECUTION!

/Visual/ Man being executed on the gallows and someone yelling, "Stop the execution!"

ELLEN: We need to put the STOP instruction into the program. Where must we put it? First, let's raise the question, does the STOP statement have to be compiled? The answer, of course, is yes. It must be compiled. So it must be placed before the END statement, mustn't it? (The END statement must always be last, anyway.) Now, where in the program do we want the computer to stop? Logically we want it to stop when it is finished with the adding of W and S together. So I will put the STOP instruction here.

```
[Places on board:        W=75.5
                         S=180.0
                         F=W+S
                         STOP
                         END      ]
```

Does that eliminate the execution error, Eugene?

EUGENE: We'll see. I've already put this new program into the computer.

```
[Computer output:        W=75.5
                         S=180.0
                         F=W+S
                         STOP
                         END

                    EXECUTION

                    EXECUTION COMPLETED      ]
```

This time the compile phase was done without any errors, and the execute phase was also completed. But where do you suppose the answer is? Remember that the computer can do only what we tell it to do. Did we tell it to write out the answer for us? No, we didn't. So the answer is still inside the computer's memory. How do we get the answer out? Ellen will show you.

ELLEN: We want the answer, F, the frontage, to be written out after

it is calculated and before the computer stops execution. Clearly, the WRITE instruction tells the computer to write out the value of F, which is the answer we want. The FORMAT statement is required; it tells the computer the form of the written output and we'll save it for later. But notice especially that the "1" preceding the FORMAT statement corresponds to this "1" in parentheses in the WRITE statement.

[Program on board:

```
      W=75.5
      S=180.0
      F=W+S
      WRITE(6,1)F
    1 FORMAT(1H0,F10.1)
      STOP
      END
```

]

SEYMOUR: The WRITE statement: write parenthesis six comma one parenthesis F.

/Visual/ WRITE(6,1)F

EUGENE: Now I'll show you what this new program does.

[Computer output:

```
      W=75.5
      S=180.0
      F=W+S
      WRITE(6,1)F
    1 FORMAT(1H0,F10.1)
      STOP
      END

 EXECUTION

      255.5

 EXECUTION COMPLETED
```

]

At last, the program does exactly what we wanted; and you see why we have to have all of these statements in order to have a complete program.

Now let's consider the order in which the FORTRAN statements

in the program were executed.

ELLEN: I was very careful to put the statements in the order that they are in. It's very important to realize that the computer executed these statements from top to bottom.

Let's see what happens when the order of the statements is changed. I will interchange the second and third statements.

[Program on board:

```
      W=75.5
      F=W+S
      S=180.0
      WRITE(6,1)F
    1 FORMAT(1H0,F10.1)
      STOP
      END
```

]

Notice that we are now telling the computer to add the number represented by "W" to the number represented by "S," but only the value of W is known at that point in the program. Show us what the computer does now, Eugene.

EUGENE: OK.

[Computer output:

```
      W=75.5
      F=W+S
      S=180.0
      WRITE(6,1)F
    1 FORMAT(1H0,F10.1)
      STOP
      END

 EXECUTION
 **ERROR**UNDEFINED S**
```

]

The computer was unable to add the numbers since it didn't know what one of them was, specifically S.

Let me illustrate the difficulty so that you won't forget it with a nursery rhyme. I'll admit that the example is a bit bizarre, but I want you to remember it.

You all know about Mother Hubbard.

/Visual/ "Mother Hubbard" sequence of frames

She went to the cupboard to get her poor dog a bone, but the cupboard was bare and the poor dog had none. Now I'll expand the story a little and put a happier ending on it.

/Visual/ Second "Mother Hubbard" sequence

Mother Hubbard, finding no food for her poor dog in the cupboard, goes to the bank to get some money out of her account so that she can go to the store and get her dog some food.

This sequence of events has a logical order. Now if we change the order of events, then the sequence becomes incorrect. For example, when Mother Hubbard finds her cupboard empty, sup-

/Visual/ Third "Mother Hubbard" sequence

pose that she goes to the store without any money, not having gone to the bank, and tries to buy the dog food. Well, that's what happens; she's kicked out of the store! The poor dog still doesn't get any food.

/Visual/ Unhappy dog from first sequence

Yet, that's just exactly what some FORTRAN programmers try to do sometimes when they get their FORTRAN statements out of the proper order. They try to feed the dog with no food. Isn't that right, Ellen?

ELLEN: It certainly is! In fact, that's just what we did when we changed the order of the program. This program tells the computer to find the sum of W and S, but the computer doesn't know

what S is since S is not defined until the next statement. The order of execution of a FORTRAN program is from top to bottom as we would expect. And if we get the statements out of order, then in effect we may be trying to feed the dog without food, which is nonsense. Just as Mother Hubbard got kicked out of the store, we get kicked off the computer. We usually call that being "bombed off" the computer.

/Visual/ Bomb blast

So, let's put the statements of the program back into the proper order. [Does so on board.]

There's one statement, however, that we don't have to be concerned about. The FORMAT statement here is what is called a nonexecutable statement; it is not an instruction that the computer can perform as it can STOP or WRITE or add W and S, which are all executable statements. The FORMAT statement is just a blueprint or a pattern of how we want the printed output to look. Since the FORMAT statement is nonexecutable, we can put it anywhere in the program - as long as it goes before the END statement, of course. [Places FORMAT first in program.] Since the "1" in front of the FORMAT statement corresponds to the "1" in the WRITE statement, as long as the WRITE statement is in the proper order, the FORMAT statement referred to by the WRITE statement will be properly used, regardless of its position in the program.

EUGENE: [Now sitting in number 1 position.] In this particular program, the only arithmetic operation that we used was addition.

We can, of course, also use other operations on the computer. The four basic arithmetic operations are addition, subtraction, multiplication, and division. The FORTRAN symbols for addition and subtraction are just what we would expect them to be.

/Visual/ Illustrating addition symbol (+)

We use the plus sign for addition.

/Visual/ Illustrating subtraction symbol (-)

We use the minus sign for subtraction.

The symbols for multiplication and division, however, are somewhat different from what we might expect.

/Visual/ Illustrating multiplication symbol (*)

We use the asterisk, or star as we commonly say, for multiplication.

/Visual/ Illustrating division symbol (/)

We use the virgule, or more commonly, the slash, for division.

[Camera to Eugene.] We may also use parentheses in FORTRAN just as we do in algebra. For example, if we wanted to find the distance around the property, we could write P=2.0*(W+S),

/Visual/ P=2.0*(W+S)

where I have used "P" for the perimeter, the distance around the property.

[Camera on Eugene.] Now, with Ellen's assistance, I'll show

you another very useful feature of FORTRAN.

ELLEN: In our program we have used simply "W" for the west side and "S" for the south side. We could just as well have called the west side "WEST" and the south side "SOUTH."

[Places on board:

```
WEST=75.5
SOUTH=180.0
FRONT=WEST+SOUTH
WRITE(6,1)FRONT
```

]

The only requirements in the names that we choose are that they begin with letters of the alphabet and that they do not contain more than six characters.

We could also have used numbers in the names. For example, I could have called the west side "SIDE1" and the south side "SIDE2." [Places mag cards to the side of the program.] Notice again that these names begin with leters of the alphabet and are not more than six characters long.

EUGENE: We are relatively unlimited in our choice of names in FORTRAN. Usually we choose names that are descriptive of the problem, as we did with WEST for the west side and SOUTH for the south side, for example. There is one restriction, however; for the present we should restrict the names to names beginning with the letters A through H and O through Z.

/Visual/ Animation with man pointing to A-H and O-Z

The letters I through N are reserved for a special purpose.

I have been using the typewriter terminal for demonstrating the use of the computer. Ordinarily when one uses the computer for FORTRAN problems, he puts his program on punched cards and uses these cards for input to the computer. Since you will be

using punched cards for your programs, I want to show you how to go about the task of putting your program on punched cards and running the program on the computer. Here is an example of a computer card printed especially for use in FORTRAN.

/Visual/ FORTRAN Statement Card (slide)

Let's take a closer look.

/Visual/ Camera card with FORTRAN Statement Card, Carl pointing

You will notice that the card contains 80 columns. These 80 columns are marked off in blocks. Columns 1-5 are used for statement numbers, such as the "1" in front of the FORMAT state-

/Visual/ Super: 1 FORMAT(1HO,F10.1)

ment that we used. Column 6 has a special use that we'll discuss when we need to make use of it. Columns 7-72 are the columns in which we put anything that we wish the compiler to translate; in other words, we put the FORTRAN statements anywhere in these columns. For example, we would put the FORTRAN statement

/Visual/ Super: WEST=75.5

WEST=75.5 or the statement that stops the execution

/Visual/ Super: STOP

anywhere in columns 7-72. Finally, in columns 73-80, the last eight columns, we can put anything we wish, such as the programmer's name or initials or any other information for identifica-

tion purposes. These last eight columns are not compiled. Let me remind you that the FORTRAN statement card has the columns marked off and labeled, so you can't go wrong if you pay attention to the labels and the lines on the card.

There is an additional label in column 1 of the card. The label says "C for comment." Frequently the programmer needs to write certain information into the program that is not for the computer, but for the programmer himself or for the purpose of identification of the program. Since these are comments for the programmer and are not to be compiled, we must code such comments by punching a "C" in column 1 of the card on which this information appears. Then the compiler will not compile that statement. We may use any columns for comments as long as a "C" appears in column 1.

[Camera to Eugene.] I have punched the program that is on the board into computer cards.

/Visual/ Punched deck fanned out

Notice that the information punched on the card is also printed at the top of the card so that we can read it. I have placed a comment card at the front of the program for identifying it. Notice the "C" punched in column 1. There is a single card for each statement, and the cards are placed so that the first statement, WEST=75.5, is the first card; and END, the last statement, is the last card. The cards are read from front to back.

[Camera to Eugene.] How do you punch the cards?

/Movie/ Keypunch, card reader, line printer sequence

Here is a person using a card punch or keypunch machine. The keyboard is very similar to a typewriter keyboard. There you see a card that has been punched passing through the card track.

Once you get your program punched properly, then you place your deck of cards, along with the control cards for the particular computer system, on the card reader. This card reader you see here reads cards at the rate of up to 1000 cards per minute.

After the program has been compiled and executed, the output comes out on the high-speed line printer. This line printer is capable of printing 1100 lines per minute. It's a fantastic machine in its own right!

The keypunch machine, card reader, and line printer serve the same purpose that our typewriter terminal here does. Since these machines are not portable, we cannot bring them into the studio, so we substitute for these machines the portable typewriter terminal.

SEYMOUR: Write parenthesis six comma one parenthesis FRONT.

/Visual/ WRITE(6,1)FRONT

EUGENE: That, incidently, was Seymour, who will be helping me out along. He's a fine voice, that Seymour!

SEYMOUR: Thank you!

EUGENE: And courteous too! Isn't he marvelous?

Now you know enough to write a simple FORTRAN program. Try it!

/Visual/ Caboose with END on it

APPENDIX C

QUESTIONNAIRE GIVEN AT THE BEGINNING OF THE SEMESTER

In order to obtain an attitude score from this questionnaire, questions 14, 17, and 20 were scored from 1 (most unfavorable response to ITV) to 5 (most favorable response to ITV). The response "undecided" was given a value of 3, the same as a response of "don't care" or "neither favorable nor unfavorable." The sum of the values given to the questions is the score.

Name _____ Sex _____ Age _____ Classification _____

College _____ Major _____

1. In what city and state (cities and states) did you attend elementary school?

   City _____ State _____

   City _____ State _____

2. What was the approximate size of the elementary school(s) you attended?

   a. Less than 250
   b. 250 - 500
   c. 500 - 750
   d. 750 - 1000
   e. More than 1000
   f. Don't know

   (If you attended more than one school, indicate the city by the size you marked.)

3. Did you ever have a subject in elementary school in which television instruction was used in any way?

   a. No (Go directly to question 6, page 2.)
   b. Yes (Please supply the information for question 4.)

4. In what subject or subjects was instructional television used, and approximately how many times per week was it used? (Mark also the column headed "Total" if the entire course was taught by television.)

Subject	Less than 1	1	2	3	4	5 or more	Don't know	Total	City

5. How would you rate your overall attitude toward instructional television at the time?

   a. Very favorable
   b. Favorable
   c. Neither favorable nor unfavorable
   d. Unfavorable
   e. Very unfavorable
   f. Undecided

Page 2

6. In what city and state (cities and states) did you attend secondary school?

City _____ State _____

City _____ State _____

7. What was the approximate size of the secondary school(s) you attended?

a. Less than 250
b. 250 - 500
c. 500 - 750
d. 750 - 1000
e. More than 1000
f. Don't know

(If you attended more than one school, indicate the city by the size you marked.)

8. Did you ever have a subject in secondary school in which instructional television was used in any way?

a. No (Go directly to question 11, page 3.)
b. Yes (Please supply the information for question 9.)

9. In what subject or subjects was instructional television used, and approximately how many times per week was it used? (Mark also the column headed "Total" if the entire course was taught by television.)

Subject	Less than 1	1	2	3	4	5 or more	Don't know	Total	City

10. How would you rate your overall attitude toward instructional television at the time?

a. Very favorable
b. Favorable
c. Neither favorable nor unfavorable
d. Unfavorable
e. Very unfavorable
f. Undecided

Page 3

11. Have you attended any other colleges or universities other than Oklahoma State University?

    a. No (Go directly to question 12.)
    b. Yes (Please supply the information for the table below.)

College	City	State	Approximate enrollment

12. Have you ever taken a course in college in which instructional television was used in any way?

    a. No (Go directly to question 14.)
    b. Yes (Please supply the information for question 13.)

13. In what courses was instructional television used, and approximately how many times per week was it used? (Mark also the column headed "Total" if the entire course was taught by television.)

Course	Less than 1	1	2	3	4	5 or more	Don't know	Total	College

14. How would you rate your overall attitude toward instructional television at the college level, regardless of whether you have been exposed to it?

    a. Very favorable
    b. Favorable
    c. Neither favorable nor unfavorable
    d. Unfavorable
    e. Very unfavorable
    f. Undecided

15. Have you ever watched programs of an instructional nature on public television (National Educational Television, Public Broadcasting Corporation, Oklahoma Educational Television Authority, etc.) outside a structured classroom setting?

    a. No
    b. Yes
    c. Don't know

16. How would you rate your overall attitude toward public television, regardless of whether you have viewed it?

    a. Very favorable
    b. Favorable
    c. Neither favorable nor unfavorable
    d. Unfavorable
    e. Very unfavorable
    f. Undecided

17. What is your reaction to the fact that instructional television is used in this course?

    a. Very favorable
    b. Favorable
    c. Neither favorable nor unfavorable
    d. Unfavorable
    e. Very unfavorable
    f. Undecided

18. What do you expect that your attitude toward the use of instructional television in this course will be at the conclusion of the course?

    a. Very favorable
    b. Favorable
    c. Neither favorable nor unfavorable
    d. Unfavorable
    e. Very unfavorable
    f. Undecided

19. How would you rate your overall attitude toward the conventional classroom lecture?

    a. Very favorable
    b. Favorable
    c. Neither favorable nor unfavorable
    d. Unfavorable
    e. Very unfavorable
    f. Undecided

20. Would you prefer that this course be taught using the conventional classroom lecture or television instruction?

    a. Strongly prefer conventional lecture
    b. Lean toward conventional lecture
    c. Don't care
    d. Lean toward TV
    e. Strongly prefer TV
    f. Undecided

APPENDIX D

QUESTIONNAIRE GIVEN AT THE END OF THE SEMESTER

The attitude score based upon this questionnaire was obtained by scoring the responses from 1 (most unfavorable response to ITV) to 5 (most favorable response to ITV), using questions 1, 2, and 3, and then accumulating the sum of the numbers. The response "undecided" was given a value of 3, the same as a response of "don't care" or "neither favorable nor unfavorable."

Name _____ Lab Section _____

Here is a record of your attendance for the semester.

Attended the conventional class _____ times

Attended the TV class _____ times

Percent attendance to the TV class is _____%

Please list one or more reasons in decreasing order of importance why you chose to attend or not to attend the TV class as you did; then please go to the next page.

Thank you for your cooperation in participating in the experimental lecture sections. Please do this one last questionnaire. Your response will in no way effect your grade in the course.

1. How would you rate your overall attitude toward instructional television at the college level?

    a. Very favorable
    b. Favorable
    c. Neither favorable nor unfavorable
    d. Unfavorable
    e. Very unfavorable
    f. Undecided

2. What is your reaction to the use of instructional television in this particular course?

    a. Very favorable
    b. Favorable
    c. Neither favorable nor unfavorable
    d. Unfavorable
    e. Very unfavorable
    f. Undecided

3. Would you prefer that this course be taught using the conventional classroom lecture or television instruction?

    a. Strongly prefer conventional lecture
    b. Lean toward conventional lecture
    c. Don't care
    d. Lean toward TV
    e. Strongly prefer TV
    f. Undecided

4. Is your attitude toward instructional television different now from your attitude when you came into this course as a result of having seen at least one television lesson?

    a. Attitude is unchanged
    b. Attitude toward TV is improved
    c. Attitude toward TV is worse than before
    d. Undecided

5. Is your attitude toward instructional television at the conclusion of this course what you expected it to be when the course began?

    a. Attitude is the same as expected
    b. Attitude is better than expected
    c. Attitude is worse than expected
    d. Undecided

APPENDIX E

THE SCHULZE SHORT DOGMATISM SCALE

The score on the dogmatism scale was obtained by adding 4 to each response and then accumulating the sum. If no response was marked, then a zero was assigned before calculating the score. The higher the score is, the more dogmatic the respondent is. The total possible score is 70.

The following is a study of what the general public thinks and feels about a number of important social and personal questions. The best answer to each statement below is your personal opinion. We have tried to cover many different and opposing points of view; you may find yourself agreeing strongly with some of the statements, disagreeing just as strongly with others, and perhaps uncertain about others; whether you agree or disagree with any statement, you can be sure that many people feel the same as you do.

Mark each statement in the left margin according to how much you agree or disagree with it. Please mark every one.

Write +1, +2, +3, or -1, -2, -3, depending on how you feel in each case.

+1: I agree a little	-1: I disagree a little
+2: I agree on the whole	-2: I disagree on the whole
+3: I agree very much	-3: I disagree very much

_____1. Most people just don't know what's good for them.

_____2. A person who thinks primarily of his own happiness is beneath contempt.

_____3. In the history of mankind there have probably been just a handful of really great thinkers.

_____4. The worst crime a person can commit is to attack publically the people who believe in the same thing he does.

_____5. In the long run the best way to live is to pick friends and associates whose tastes and beliefs are the same as one's own.

_____6. In this complicated world of ours the only way we can know what is going on is to rely upon leaders or experts who can be trusted.

_____7. Fundamentally, the world we live in is a pretty lovely place.

_____8. While I don't like to admit this even to myself, I sometimes have the ambition to become a great man like Einstein, or Beethoven, or Shakespeare.

_____9. Once I get wound up in a heated discussion I just can't stop.

_____10. It is often desirable to reserve judgment about what's going on until one has a chance to hear the opinions of those one respects.

APPENDIX F

ATTENDANCE RECORDS FOR ALL STUDENTS BY LESSONS

Table XIX contains the attendance data for the students enrolled in the experimental section.

The column labeled "ID" contains the student's identification number. The first two digits of the number are the laboratory section number in which the student was enrolled, and the last four digits form a number used for alphabetical sequencing.

The column labeled "CODE" contains the notation used by the University for identifying the student's college, his classification, and his sex. The abbreviations used for colleges are as follows:

AG	Agriculture
AS	Arts and Sciences
BU	Business
ED	Education
EN	Engineering
GR	Graduate
HE	Home Economics
TI	Technical Institute

The number in the code indicates the classification of the student as follows:

1	Freshman
2	Sophomore
3	Junior
4	Senior
5	Special
6	Graduate (Master's Degree)

The sex of the student is indicated by "M" for male and "F" for female.

For example, a code of "BU1F" means a female freshman enrolled in the College of Business.

The code of "AUD" means that the student was auditing the course.

All students were required to attend the first TV lesson on 25 January. The students were free to choose whether they attended the TV class or the conventional class (designated "LIVE" in the table) beginning with the second lesson on 1 February.

TABLE XIX

ATTENDANCE RECORDS FOR ALL STUDENTS BY LESSONS

			ATTENDANCE RECORD															
			JAN	FEB				MAR			APR				MAY			
			25	1	8	15	22	1	15	29	5	12	19	26	3			
ID	CODE		1	2	3	4	5	6	7	8	9	10	11	12	13			
010020	EN3M	LIVE		*														
		TV	*		*	*		*	*	*	*	*		*	*			
090050	BU2M	LIVE		*	*					*	*	*	*	*	*			
		TV	*			*	*	*	*									
040070	AG3M	LIVE		*														
		TV	*		*	*	*	*	*	*	*	*	*	*	*			
110130	GR6F	LIVE		*	*	*												
		TV	*				*	*	*	*	*	*	*	*	*			
040140	BU1M	LIVE		*														
		TV	*		*		*	*	*	*	*	*	*	*	*			
090160	GR5M	LIVE		*		*	*	*	*									
		TV	*		*					*	*	*	*	*	*			
010190	BU2M	LIVE																
		TV	*	*	*	*	*	*	*		*	*	*					
010210	BU1M	LIVE		*	*													
		TV	*			*	*	*	*	*	*	*	*	*	*			

TABLE XIX (CONTINUED)

090220	BU3M	LIVE		*													
		TV	*		*	*	*	*	*	*	*	*	*	*	*	*	*
090300	BU4M	LIVE		*													
		TV	*		*	*		*	*	*	*	*	*	*	*		
010490	BU2M	LIVE		*													
		TV	*		*	*	*	*	*	*	*	*	*	*	*	*	*
090550	AS2M	LIVE		*	*												
		TV	*			*	*		*	*	*	*	*	*	*	*	*
030640	AS2M	LIVE															
		TV	*	*	*	*	*	*	*	*	*	*	*		*	*	
010680	BU1M	LIVE															
		TV	*	*	*	*			*		*	*	*	*	*		
050830	AS1F	LIVE				*											
		TV	*	*			*	*	*	*	*	*	*		*	*	
080850	EN3M	LIVE		*													
		TV	*		*	*		*	*	*	*	*	*	*	*	*	*
100860	TI1M	LIVE		*	*	*	*	*	*	*	*	*	*	*	*	*	*
		TV	*														
090870	BU4M	LIVE															
		TV	*	*	*			*		*	*	*	*				
090940	AG2M	LIVE		*													
		TV	*		*	*		*	*	*	*	*	*	*	*	*	*

TABLE XIX (CONTINUED)

090950	BU3M	LIVE		*												
		TV	*		*	*	*	*	*	*	*	*	*	*	*	
031110	AS4M	LIVE														
		TV	*	*	*											
091180	BU2M	LIVE		*	*											
		TV	*			*	*	*	*	*	*	*	*	*	*	*
011220	BU1F	LIVE		*		*		*	*	*	*		*	*		
		TV	*													
031360	BU1F	LIVE		*												
		TV	*		*	*	*	*	*			*				
081430	AS3M	LIVE		*												
		TV	*		*	*	*	*	*			*	*	*	*	*
061500	BU1M	LIVE		*	*	*										
		TV						*	*			*	*		*	
051630	AS4M	LIVE		*	*	*	*	*	*	*	*	*	*	*	*	*
		TV	*													
041670	BU1M	LIVE		*												
		TV	*		*	*		*	*			*		*		
041700	BU2M	LIVE										*				
		TV	*	*	*	*	*	*	*				*	*	*	*
111830	TI3M	LIVE		*												
		TV			*	*	*	*								

TABLE XIX (CONTINUED)

061870	BU3M	LIVE		*	*	*		*	*	*	*	*		*			
		TV	*														
041970	BU2M	LIVE										*					
		TV	*	*	*	*	*	*	*	*				*			*
091990	AS1M	LIVE															
		TV	*	*	*	*		*	*	*	*	*	*	*	*		*
112060	BU2M	LIVE			*												
		TV	*														
052150	AS2F	LIVE															
		TV	*	*	*	*	*	*	*	*	*	*	*	*			*
042220	BU2M	LIVE		*													
		TV	*		*	*		*	*	*	*	*	*				
112280	TI3F	LIVE															
		TV	*			*					*	*	*		*		
012350	ED4M	LIVE		*	*	*	*	*	*	*	*	*	*	*	*	*	*
		TV	*														
062360	BU1F	LIVE		*													
		TV	*		*	*	*	*	*	*	*			*			*
102380	AS3M	LIVE		*													
		TV	*		*	*	*	*	*	*	*	*	*	*	*	*	*
032390	AS1M	LIVE			*												
		TV	*	*		*		*	*	*	*	*	*	*	*	*	*

TABLE XIX (CONTINUED)

042490	ED4F	LIVE			*			*									
		TV	*	*		*	*		*	*	*	*	*	*	*	*	*
052500	BU1F	LIVE		*													
		TV	*		*		*	*	*	*		*		*			
022540	BU1F	LIVE		*	*	*		*	*		*	*		*	*		
		TV	*							*							
052570	BU2M	LIVE		*	*												
		TV	*			*		*	*	*		*	*	*	*		
092660	BU1M	LIVE															
		TV	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
042670	AS1F	LIVE		*	*	*	*	*	*	*	*	*	*	*		*	
		TV	*														
032690	BU4M	LIVE			*												
		TV	*			*	*		*								
092750	BU4M	LIVE					*	*	*	*	*	*	*	*		*	
		TV	*		*	*											
062760	EN2M	LIVE		*	*												
		TV	*							*	*	*		*		*	
023010	BU2M	LIVE		*	*	*	*	*	*	*	*	*	*	*	*	*	*
		TV	*														
013080	AS4M	LIVE															
		TV	*	*	*	*	*	*	*	*	*	*		*			*

TABLE XIX (CONTINUED)

013120	GR6M	LIVE															
		TV	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
063240	BU2M	LIVE		*	*			*									
		TV	*			*	*		*	*		*	*	*	*	*	*
083270	EN4M	LIVE		*	*	*	*	*	*	*			*	*	*	*	
		TV	*														
103355	AS4M	LIVE		*													
		TV	*		*	*	*	*	*	*	*	*	*	*	*	*	*
043360	BU1M	LIVE		*	*	*		*					*	*	*		
		TV	*				*		*	*							
053380	HE3M	LIVE		*	*	*	*	*	*	*	*	*	*	*	*	*	*
		TV	*														
093470	AS1F	LIVE		*		*		*	*	*	*			*	*		
		TV	*														
023490	BU2M	LIVE		*			*										
		TV	*		*	*		*	*	*	*	*	*	*	*	*	*
023530	AS3M	LIVE		*		*	*						*	*	*	*	
		TV	*		*			*	*	*	*						
063580	BU2M	LIVE		*													
		TV	*		*	*	*	*	*	*	*	*	*	*	*	*	
053590	GR6M	LIVE		*	*	*	*	*	*	*	*	*	*	*			*
		TV	*														

TABLE XIX (CONTINUED)

073770	BU1M	LIVE TV	*	*	*	*	*			*						
113850	TI3M	LIVE TV	*	*	*	*		*	*		*	*	*	*	*	*
093870	AS1M	LIVE TV			*	*	*	*	*	*	*	*	*	*	*	*
023880	BU3M	LIVE TV	*	*	*	*	*	*	*	*	*	*	*	*	*	*
013950	BU1M	LIVE TV	*	*	*	*	*	*	*	*	*	*	*	*	*	*
104045	AUD	LIVE TV				*	*	*	*	*	*	*	*	*	*	*
094180	BU2M	LIVE TV	*	*	*	*	*	*	*	*	*		*	*	*	*
094240	AS2M	LIVE TV	*	*	*	*	*	*	*	*	*	*	*	*	*	*
104340	TI4M	LIVE TV	*	*	*	*	*			*	*	*		*	*	*
044440	AS1M	LIVE TV	*	*	*	*	*	*	*	*	*	*	*	*	*	*
114470	BU1M	LIVE TV	*	*	*	*	*	*	*	*	*	*	*	*	*	*

TABLE XIX (CONTINUED)

044510	AS2M	LIVE				*	*										
		TV	*	*	*			*									
044540	AG2M	LIVE		*	*	*	*	*	*		*	*	*				
		TV	*														
014600	BU4M	LIVE		*	*	*	*	*	*	*	*	*	*	*	*	*	*
		TV	*														
C94700	BU2M	LIVE		*	*												
		TV	*			*	*	*			*	*	*				*
084720	BU4M	LIVE				*	*	*	*	*		*	*	*			
		TV	*	*	*												
094735	AG4M	LIVE		*	*												
		TV	*			*	*	*	*								
114830	GR6M	LIVE		*	*	*	*										*
		TV	*					*	*	*	*	*	*	*	*		

APPENDIX G

SUMMARY OF ATTENDANCE DATA BY STUDENTS

Table XX contains a summary of the attendance record for each student enrolled in the experimental section starting with the second lesson when the choice of attending the TV class or the conventional class was available.

The "ID" and "CODE" columns are explained in Appendix F.

The "% TV ATTENDED" is based upon the number of times the student attended the TV class out of the total number of times he attended both classes.

The column labeled "TIMES CHANGED" shows the number of times the student changed from one class to the other after the second lesson.

TABLE XX

SUMMARY OF ATTENDANCE DATA BY STUDENTS

ID	CODE	TIMES ABSENT	VISITS TO LIVE CLASS	VISITS TO TV CLASS	TOTAL VISITS	% TV ATTENDED	TIMES CHANGED
010020	EN3M	2	1	9	10	90	1
090050	BU2M	0	8	4	12	33	2
040070	AG3M	0	1	11	12	92	1
110130	GR6F	0	3	9	12	75	1
040140	BU1M	1	1	10	11	91	1
090160	GR5M	0	5	7	12	58	3
010190	BU2M	3	0	9	9	100	0
010210	BU1M	0	2	10	12	83	1
090220	BU3M	0	1	11	12	92	1
090300	BU4M	2	1	9	10	90	1
010490	BU2M	0	1	11	12	92	1
090550	AS2M	1	2	9	11	82	1
030640	AS2M	1	0	11	11	100	0
010680	BU1M	4	0	8	8	100	0
050830	AS1F	2	1	9	10	90	2
080850	EN3M	1	1	10	11	91	1
100860	TI1M	0	12	0	12	0	0
090870	BU4M	5	0	7	7	100	0
090940	AG2M	1	1	10	11	91	1
090950	BU3M	1	1	10	11	91	1
031110	AS4M	10	0	2	2	100	0
091180	BU2M	0	2	10	12	83	1
011220	BU1F	4	8	0	8	0	0
031360	BU1F	5	1	6	7	86	1
081430	AS3M	1	1	10	11	91	1
061500	BU1M	4	3	5	8	63	1
051630	AS4M	0	12	0	12	0	0
041670	BU1M	5	1	6	7	86	1
041700	BU2M	1	1	10	11	91	2
111830	TI3M	7	1	4	5	80	1
061870	BU3M	3	9	0	9	0	0
041970	BU2M	2	1	9	10	90	2
091990	AS1M	1	0	11	11	100	0
112060	BU2M	11	1	0	1	0	0
052150	AS2F	1	0	11	11	100	0
042220	BU2M	3	1	8	9	89	1
112280	TI3F	7	0	5	5	100	0
012350	ED4M	0	12	0	12	0	0
062360	BU1F	2	1	9	10	90	1
102380	AS3M	0	1	11	12	92	1
032390	AS1M	1	1	10	11	91	2
042490	ED4F	0	2	10	12	83	4

TABLE XX (CONTINUED)

052500 BU1F	4	1	7	8	88	1
022540 BU1F	2	9	1	10	10	2
052570 BU2M	2	2	8	10	80	1
092660 BU1M	0	0	12	12	100	0
042670 AS1F	1	11	0	11	0	0
032690 BU4M	8	1	3	4	75	1
092750 BU4M	2	8	2	10	20	1
062760 EN2M	5	2	5	7	71	1
023010 BU2M	0	12	0	12	0	0
013080 AS4M	2	0	10	10	100	0
013120 GR6M	1	0	11	11	100	0
063240 BU2M	1	3	8	11	73	3
083270 EN4M	1	11	0	11	0	0
103355 AS4M	0	1	11	12	92	1
043360 BU1M	2	7	3	10	30	4
053380 HE3M	0	12	0	12	0	0
093470 AS1F	4	8	0	8	0	0
023490 BU2M	0	2	10	12	83	3
023530 AS3M	0	7	5	12	42	4
063580 BU2M	1	1	10	11	91	1
053590 GR6M	1	11	0	11	0	0
073770 BU1M	8	4	0	4	0	0
113850 TI3M	0	3	9	12	75	3
093870 AS1M	1	11	0	11	0	0
023880 BU3M	0	11	1	12	8	2
013950 BU1M	0	2	10	12	83	1
104045 AUD	2	3	7	10	70	3
094180 BU2M	1	2	9	11	82	1
094240 AS2M	0	1	11	12	92	2
104340 TI4M	3	0	9	9	100	0
044440 AS1M	0	12	0	12	0	0
114470 BU1M	0	10	2	12	17	1
044510 AS2M	7	2	3	5	60	2
044540 AG2M	3	9	0	9	0	0
014600 BU4M	0	12	0	12	0	0
094700 BU2M	3	2	7	9	78	1
084720 BU4M	2	8	2	10	20	1
094735 AG4M	6	2	4	6	67	1
114830 GR6M	0	5	7	12	58	2

APPENDIX H

ATTITUDE SCORES, CUMULATIVE GRADE POINT AVERAGES, AND PERFORMANCE IN THE COURSE

Table XXI lists some miscellaneous data used in the statistical analysis of the attendance data.

The columns labeled "ID" and "CODE" are explained in Appendix F.

Prior exposure to instructional television is coded in the column labeled "PRIOR ITV"; a "1" indicates no prior exposure, and a "2" indicates prior exposure.

In order to obtain an attitude score on the pretest questionnaire (Appendix C), questions 14, 17, and 20 were scored from 1 (most unfavorable response to ITV) to 5 (most favorable response to ITV). The response "undecided" was given a value of 3, the same as a response of "don't care" or "neither favorable nor unfavorable." The sum of the values given to the questions was used as the score.

The attitude score on the posttest was obtained by scoring questions 1, 2, and 3 of the posttest questionnaire (Appendix D) in the same manner as the pretest questionnaire was scored.

The score on the dogmatism scale (Appendix E) was obtained by adding 4 to each of the responses and accumulating the sum of the numbers. If no response was marked, then a zero was assigned before calculating the score. More dogmatic respondents score higher.

The grade point averages were obtained from the Office of the Registrar and are cumulative grade point averages through the Fall Semester of 1970. (Grade point averages were not available for those students enrolling for the first time or enrolling after a break in enrollment.)

The score for the semester is based on a total of 102 points.

TABLE XXI

ATTITUDES, CUMULATIVE GRADE POINT AVERAGES, AND COURSE PERFORMANCE

ID	CODE	PRIORITV	ATTITUDE SCALE, PRETEST	ATTITUDE SCALE, POSTTEST	DOGMATISM SCALE SCORE	GPA	SCORE FOR COURSE
010020	EN3M	2	9	13	48	3.329	95
090050	BU2M	2	11	7	41		76
040070	AG3M	1	9	10	40	2.752	90
110130	GR6F	1	9	11	43		82
040140	BU1M	2	6	11	31	2.250	88
090160	GR5M	1	8	12	33	3.500	89
010190	BU2M	2	7	9	32	2.375	73
010210	BU1M	2	6	9	27	3.000	76
090220	BU3M	2	11	12	40	2.439	63
090300	BU4M	1	8	14	36		77
010490	BU2M	2	8	12	43	2.428	85
090550	AS2M	2	9	9	37	3.571	100
030640	AS2M	2	6	11	45	3.361	85
010680	BU1M	2	6	10	57	2.187	35
050830	AS1F	2	9	11	32	3.466	88
080850	EN3M	2	9	12	36		81
100860	TI1M	2	8	8	49	2.000	90
090870	BU4M	1	9	12	16	1.980	60
090940	AG2M	2	10	15	47	3.645	91
090950	BU3M	1	8	10	42	2.155	67
031110	AS4M	2	12	12	54		94
091180	BU2M	2	5	12	34		91
011220	BU1F	2	5	5	52	2.500	80
031360	BU1F	1	8			1.133	0
081430	AS3M	2	5	11	36	2.451	82
061500	BU1M	2	7	9	41	2.200	61
051630	AS4M	2	6	3	45	2.586	79
041670	BU1M	2	6	11	30	2.833	67
041700	BU2M	2	7	10	47	1.837	87
111830	TI3M	2	11			2.919	18
061870	BU3M	1	5	5	34	2.524	65
041970	BU2M	2	5	12	35	1.851	87
091990	AS1M	1	12	15	38	3.000	91
112060	BU2M	2	9	10	30	2.000	75
052150	AS2F	2	7	11	42	2.865	94
042220	BU2M	2	3			1.893	29
112280	TI3F	1	10	15	36		95
012350	ED4M	1	5			3.736	102
062360	BU1F	1	6	14	45	3.368	72
102380	AS3M	1	8	15	36		97

TABLE XXI (CONTINUED)

032390	AS1M	2	7	14	39	3.000	92
042490	ED4F	2	5	11	34	3.120	89
052500	BU1F	2	4	13	34	2.200	80
022540	BU1F	1	6	9	42	2.133	50
052570	BU2M	2	6	7	41	2.869	71
092660	BU1M	1	10	13	35		89
042670	AS1F	2	8	7	34	3.230	61
032690	BU4M	2	4	11	15	2.482	87
092750	BU4M	1	11	5	29	2.039	61
062760	EN2M	1	7	9	43	2.424	45
023010	BU2M	2	4	8	30	2.818	83
013080	AS4M	1	8	14	45	2.333	63
013120	GR6M	1	10			3.800	73
063240	BU2M	2	8	10	37	2.914	85
083270	EN4M	1	8	8	55	2.389	80
103355	AS4M	1	8	10	42		89
043360	BU1M	2	10	10	43	3.500	80
053380	HE3M	2	6	5	28	2.721	85
093470	AS1F	2	4	5	34	3.071	83
023490	BU2M	2	11	14	41	3.000	86
023530	AS3M	2	5	11	22	3.807	97
063580	BU2M	2	6	12	42	2.106	75
053590	GR6M	2	4	5	44	2.500	93
07377C	BU1M	2	5	11	61	2.200	63
113850	TI3M	1	9	9	52		78
093870	AS1M	2	6	5	42	1.466	91
023880	BU3M	1	10	8	32	2.426	73
013950	BU1M	2	9	11	38	2.400	65
104045	AUD	1	8			4.000	52
094180	BU2M	1	8	13	35	2.276	86
094240	AS2M	1	9	15	39		97
104340	TI4M	1	6	12	28	3.070	70
044440	AS1M	2	9	4	32	2.400	98
114470	BU1M	1	9	4	33	2.533	57
04451C	AS2M	2	11				27
044540	AG2M	1	6	5	38	1.744	75
014600	BU4M	2	7	7	36	2.752	84
094700	BU2M	2	3	5	34	1.893	56
C84720	BU4M	1	8	10	33	1.989	71
094735	AG4M	1	12	14	29	3.042	75
114830	GR6M	1	9	15			82

VITA ≥

Therold Eugene Bailey

Candidate for the Degree of

Doctor of Education

Thesis: STUDENT ATTITUDES TOWARD A NEW APPLICATION OF INSTRUCTIONAL TELEVISION IN A COMPUTER PROGRAMMING COURSE

Major Field: Higher Education

Biographical:

Personal Data: Born in Memphis Tennessee, July 17, 1935, the son of Therold B. and Gladys L. Bailey.

Education: Graduated from Messick High School, Memphis, Tennessee, in 1953; received the Bachelor of Science degree from Harding College, Searcy, Arkansas, with majors in chemistry and mathematics, in 1957; received the Master of Science degree from Oklahoma State University, with a major in chemistry, in 1962; attended the University of Oklahoma during the summers of 1962 and 1963; attended Central State College, Edmond, Oklahoma, in 1966; completed requirements for the Doctor of Education degree at Oklahoma State University in July, 1971.

Professional Experience: Mathematician Trainee, U. S. Army, Redstone Arsenal, Alabama, summers 1956-1958; Research Chemist, U. S. Army, Redstone Arsenal, Alabama, summers, 1964-1966; Instructor of chemistry and mathematics at Oklahoma Christian College, Oklahoma City, Oklahoma, 1961-1965; Assistant Professor at Oklahoma Christian College, 1965-1967; NDEA Fellow, Department of Chemistry, Oklahoma State University, 1967-1968; Graduate Teaching Assistant, Department of Chemistry, Oklahoma State University, 1958-1961; Graduate Teaching Assistant, Department of Computing and Information Sciences, Oklahoma State University, 1968-70; Graduate Associate (Instruction), Department of Computing and Information Sciences, Oklahoma State University, 1970-present; student member of Association of Computing Machinery.