A SURVEY FOR THE PLANNING AND UTILIZATION OF THE TELEVISION MEDIUM IN TEACHING SELECTED COURSES AT UTAH STATE UNIVERSITY AND CONTINUING EDUCATION CENTERS IN UTAH

by

Gordon M. Taylor

A thesis submitted in partial fulfillment of the requirements for the degree of

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in

Speech

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I would like to thank Dr. Rex Robinson, Professor and Head of the Department of Speech, for his timely and critical review of the thesis and for acting as chairman of my graduate committee. I would also like to thank Dr. Eldon M. Drake, Professor of Education, and Dr. C. Jay Skidmore, Professor of Family and Child Development, for their criticism and support of this thesis project.

Special thanks is extended to Mr. Delbert Purnell, coordinator of the Uintah Basin Continuing Education Center, for his cooperation. Appreciation is also expressed to Dr. Lloyd Drury, Associate Director of Extension Services, and to the instructors of the selected instructional television courses at Utah State University. Grateful acknowledgment is expressed to Dr. Burrell F. Hansen, chairman of the Radio and Television Center, and to the management and staff of KUSU-TV for their assistance and advisement concerning the problems encountered in the project.

Words cannot express the gratitude to my loving wife, Susan, who typed every word of the thesis to bring it to its finished form.

Gordon Morris Taylor
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ABSTRACT

A Survey for the Planning and Utilization of the Television Medium in Teaching Selected Courses at Utah State University and Continuing Education Centers in Utah

by

Gordon M. Taylor, Master of Science

Utah State University, 1968

Major Professor: Dr. Rex E. Robinson
Department: Speech

The purpose of this thesis was to survey facilities at Utah State University and the Uintah Basin Center, develop teaching utilization models which would operate in given situations, and identify problems and recommend areas for further study.

The investigator found the facilities presently used by the Uintah Basin Center adequate or nearly adequate for the use of instructional television. There are also classrooms and auditoriums at Utah State University which can be adapted for the use of television. However, equipment must be purchased in both localities. The Uintah Basin Center also must have a trained technician responsible for the equipment.

In view of the large number of students taking the televised courses each quarter, the investigator recommends the use of large screen projectors rather than monitors at Utah State University. This is not to say that courses taught by television with smaller enrollments per quarter should not use monitors.
The teaching utilization models developed by the investigator for the Uintah Basin Center and Utah State University were similar in nature, but each met the unique requirements for the institution for which it was designed.

As a result of the survey, this writer recommends the appointment of a coordinator for the whole project of determining the effective utilization of television at Utah State University, the Uintah Basin Center, and other continuing education centers as they may develop as a part of Utah State University's instructional program. He also recommends the development of a public relations program to stimulate interest in instructional television and the development of utilization seminars to instruct those involved in television with effective ways of utilizing course material.

It is the opinion of the writer that the use of television instruction at continuing education centers and institutions of higher learning can be as good as it is planned to be. The success of instructional television is based upon the coordination of the entire television package. This coordination includes the detailed preparation of the physical classroom setting and courses of instruction designed to be effectively utilized in this classroom situation. The interweaving of these elements can provide effective student learning through instructional television.
CHAPTER I
INTRODUCTION AND STATEMENT OF PROBLEM

Today the importance of getting a college degree might be compared to that of obtaining a high school diploma a generation ago. Young people realize this and currently enrollment is flooding the institutions of higher education. Kroepsch and Buck (1968) reported that there are currently six million young people in colleges and universities and that nine million will be seeking a higher education by 1975. Master Plan Study Committee M (1968), a subcommittee of the Utah Coordinating Council of Higher Education, reported that in 1940 only 8 percent of the 22-year-olds in the United States acquired baccalaureate degrees from colleges and universities. By 1960, this figure had grown to 18 percent. By 1970 it is estimated that this figure will reach 25 percent.

Lawrence Dennis, director of academic affairs for the American Council of Education, reported before the National Association of Educational Broadcasters the importance of an education beyond the high school level:

More and more people will demand--and in my judgment will receive--more and more education of all types, technical, occupational, general, adult, professional, college, two-year, three-year, four-year. Education of all kinds will expand in a manner that will make the expansion of the past fifteen years look rather small and pale. There will be more job flexibility. Secretary Wurtz believes, from his studies in the Department of Labor, that in this country now men and women must look forward to preparing themselves and continuing their training and preparation in order to hold as many as four or five different jobs throughout a lifetime.... We are in a period, he says, in which the kinds of education that we get at the elementary and secondary level and at the higher and adult
levels must take account of the fact that our society will no longer put a premium on the man who will hold one or two jobs through his lifetime.... We are heading for a situation in which men and women must be prepared for four or five jobs throughout a lifetime. (Griffith and MacLennan, 1964, p. 4)

With such a growing need for a college education, there is a demand for an effective means of instructing the increasing numbers of students. They must be taught efficiently and they must be taught economically.

For the past ten years the use of television in higher education has indicated that this is a way of providing quality instruction to growing numbers of students at reduced costs.

Some of the earliest leaders in offering college courses taught by television were Western Reserve University, Iowa State University, New York University, and Pennsylvania State University. Their pioneering work was done in the early 1950's as reported in a publication of the Educational Facilities Laboratories (1960) and by Tarbet (1961).

Tarbet (1961) also reported that in 1956 the Chicago City Junior College began offering a two-year college curriculum taught by television.

These universities used television as a direct teaching device. This is one of the two recognized approaches to using television for educational purposes as reported by Lewis (1961), Costello and Gordon (1961), Tarbet (1961), and Dale (1954). The other approach is as enrichment to a present curriculum. Enrichment television provides supplementary knowledge or insight regarding the course material and may be used at the instructor's discretion. As a direct teaching
device television provides the key lesson points and cannot be eliminated. The present survey is concerned with the utilization of television in a direct teaching situation as it applies to higher education.

Research continuing from these early studies has shown that there is no significant difference between the traditional face-to-face instruction and direct teaching by television. The Master Plan Study Committee M reported:

Instructional television classes and procedures have been investigated more thoroughly than any other educational technique. In over 65% of the cases studied, there has been no significant difference in the learning achieved by instructional television classes as compared with conventional methods. In the other 35% of the cases, there is approximately an equal division of those that have greater learning and those that have less learning. (Master Plan Committee M, 1968, p. 11)

The publication of the Educational Facilities Laboratories (1960) has indicated a number of possible reasons why television has been an effective means of instruction while other projection and filming techniques have had only lukewarm reception:

Of audio-visual tools available, television appears to offer the broadest potential. The teaching image is easily transmissible by air and cable. It is reproducible from magnetic tape. It is viewable at relatively high ambient light levels without the need for darkening a room. It permits viewing of current events concurrently with the occasion. Taped programs, entire courses or laboratory demonstrations may be banked in libraries for use as required.... The viewing and audio instrument itself is relatively inexpensive, easily used, widely available, and easily maintained. The arts of the industry are rapidly improving receiving, transmission, recording and production equipment. (Educational Facilities Laboratories, 1960, p. 22)

Television is proving to be an effective and efficient means of instruction.

Utah has one of the highest percentages in the nation of high school graduates who enroll in post-high-school education. The state,
therefore, should be concerned with providing educational opportunities to these students. Since the television medium can provide quality instruction to large groups of students, Utah should be experimenting in this area.

For the past several years Utah State University has been preparing facilities to produce instructional television (ITV) courses. In the fall of 1967 the university received a grant of $40,000 from the Coordinating Council of Higher Education in the state of Utah to help in the development of ITV programs. The grant stipulated that the courses developed from these funds were to be used at educational institutions throughout the state including Utah State University and continuing education centers, specifically those at the Uintah Basin.

The problem now is to find how these courses can be used effectively at both the continuing education centers and Utah State University. Research must be conducted to determine effectiveness. The physical facilities available for ITV and the methods of incorporating television in a teaching situation must be determined for both USU and the continuing education centers. The most effective means of teaching a course by television must also be established. What are the problems in setting up ITV courses designed for both USU and continuing education centers?

The purpose of the present survey was threefold:

1. To survey the facilities at both the Uintah Basin Center and Utah State University and show how they can be used for television, pointing out any problems inherent in the present situation.

2. To develop suggested models of teaching utilization techniques which could be adapted to both the Uintah Basin Center and USU.
3. To identify problems and recommend areas that need further study and coordination.

The foregoing objectives were designed to help find answers to questions currently being raised and to uncover other problems and questions for further research and study.
CHAPTER II
BACKGROUND

On August 9, 1967, Utah State University undertook a new program in the field of higher education for the state of Utah. Under the direction of the Coordinating Council of Higher Education and at the request of Governor Calvin L. Rampton, the university initiated a continuing education center for the residents of the Uintah Basin area of Utah. This culminated eight years of work by the citizens and legislators from this area of the state. In 1959 a bill was introduced on the floor of the Utah House of Representatives. It provided for a junior college at Roosevelt. Since that time citizens from the Uintah Basin area have been actively working for a junior college.

On March 8, 1967, the Governor signed House Bill 187 into law, but he did so with the verbal reservation that he was assigning the program to the Coordinating Council of Higher Education and that he would release the funds only upon their recommendation.

On April 27 and 28, 1967, the Coordinating Council's Executive Committee, consisting of Dr. Merle Allen, Dr. Kent Fielding and Mr. Bert Bunker, visited the Uintah Basin to make an "on-the-spot" survey. They met with groups and communities throughout the Uintah Basin and had two mass meetings, one at the Roosevelt Junior High School where 450 attended and one at the Court Room in Vernal where some 50 people were present. On this visit, the Executive Committee presented a new
concept, which gained stature as the survey progressed.

The new concept presented by the Executive Committee was the establishment of a continuing education center instead of a junior college. Under this program a continuing education center would be developed which would provide basic undergraduate and selected graduate and re-certification courses.

A contractual agreement with USU made this Uintah Basin Continuing Education Center an arm of the university. On September 20, 1967, a contingent from USU, including Daryl Chase, President; Director of Extension Services, Dr. William H. Bennett; Associate Director Dr. Lloyd Drury and others, as well as members of the Executive Committee met with 400 citizens of the Roosevelt area to outline the new program.

The contract provided that the university use "new media and methods of teaching, with professors commuting by air, utilizing local talent and facilities" (Report of the Continuing Education Extension Services of USU, 1968). The credits earned at the Uintah Basin Center were to be "resident credits" rather than extension credits. This meant that all credits earned at these continuing education centers might be applied toward a degree at the university.

The first registration for classes at the Uintah Basin Center was conducted at Roosevelt on September 27 and 28 and at Vernal on October 2. At the close of registration there were 186 people enrolled in a total of 20 different courses. The enrollment far exceeded that estimated by the Coordinating Council or planned for in the budget provided to USU. The enrollment at the Uintah Basin Center increased throughout the school year as noted in Table 1. The enrollment followed a normal attendance curve with a high point at winter quarter.
Table 1. Enrollment and course statistics for the Uintah Basin Center for the 1967-68 school year.

<table>
<thead>
<tr>
<th>Number of</th>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students enrolled for credit</td>
<td>186</td>
<td>282</td>
<td>181</td>
</tr>
<tr>
<td>Credit registrations</td>
<td>257</td>
<td>432</td>
<td>308</td>
</tr>
<tr>
<td>Audit registrations</td>
<td>13</td>
<td>30</td>
<td>16</td>
</tr>
<tr>
<td>Students enrolled in 12 hours or more</td>
<td>12</td>
<td>33</td>
<td>22</td>
</tr>
<tr>
<td>Lower division courses taught</td>
<td>16</td>
<td>17</td>
<td>16</td>
</tr>
<tr>
<td>Upper division courses taught</td>
<td>4</td>
<td>10</td>
<td>9</td>
</tr>
</tbody>
</table>

Mr. Delbert Purnell was named coordinator for the Uintah Basin Center. Under Mr. Purnell's direction the Uintah Basin Center has had students enrolled for 997 credit hours of classwork. Mr. Purnell's (1968a) goal for the 1968-69 school year is to have from 75-200 of the graduating seniors of the class of 1968 from the high schools in the area register for courses offered at the Uintah Basin Center. This would be a substantial addition to the enrollment.

The concepts under which the Uintah Basin Center was organized are outlined in a report to the Utah Coordinating Council of Higher Education by the Master Plan Study Committee E. This report advocates a statewide continuing education system, similar to the system already adopted in Wisconsin. The report presented two basic conclusions concerning the statewide system:
1. The needs of the people of Utah for continuing education and public service are great and pressing on three levels:

   a. Individual growth and development--to help individuals continue their education, to renew their creative capacities, and to keep up to date professionally and technically

   b. Economic and industrial development of the state--to help provide the skilled manpower and womanpower required in a growing space-age economy and to attract and hold industry and business

   c. Development of communities--to provide the skilled leadership and informed citizenry, to raise the quality of community life and community social and economic change.

2. The resources of the state are inadequate to meet these needs. This is particularly true under existing arrangements in which each institution has commendable but limited programs and under which, to date at least, it has been impossible to achieve the degree of coordination through which it is possible to make the best use of available resources. (Master Plan Study Committee E, 1967, p. 40)

   The Uintah Basin Center is an experiment in the field of higher education in the state of Utah. Trustee Alva Snow in a personal interview with the investigator said:

   I feel that the Center is having a great influence on our people. I am particularly pleased to have USU through its extension service be a part of it. I am sure that this will be one of the services that will identify the university throughout the state as time goes on. We have long felt a need in our area for continuing education and this is the answer to the thing we have been hoping for all these years. Personally, I, as a member of the Board of Trustees, am anxious that the program succeed and that we have continuing support through the years from the legislature and the university to provide a stable and on-going institution. (Snow, 1968)

   Trustee Snow's remarks were similar to those of others in the community who serve as a Citizens' Advisory Committee to the Uintah Basin Center and their remarks are included in the Appendix.

   The experiment in the Uintah Basin Center is to determine the most practical means of providing quality, academic instruction to
other continuing education centers as they develop. The Coordinating Council has recommended the use of new media and instructional techniques to provide this quality instruction to large numbers of students at eventually reduced cost. To encourage this innovation, the Coordinating Council granted $40,000 to USU on April 15, 1968, to provide for the production on television tape of a core of pre-prepared college extension and credit courses for use on and off campus consisting of five three-hour courses containing approximately 27 lectures or hour presentations and three hours for testing and five five-hour courses containing approximately 45 hours on tape. (Contract, 1968)

For a number of years USU had been anticipating the use of educational television on its campus. Equipment had been purchased and an instructional studio established in the library for producing ITV courses. With the impetus provided by the grant, USU moved to carry out the terms of the contract.

The next problem was to select the courses to be taught. The Deans' Council on campus designated a subcommittee consisting of Dr. Judd Harmon, professor of political science; Dr. Oral Ballam, acting dean of the College of Education; Dr. Lloyd Drury, associate director of Extension Services; Jerry Allen, acting director of the Radio and Television Center; and Ted Christensen, director of closed circuit television at USU. They determined criteria for selecting the courses:

1. Courses should have a large per quarter enrollment.
2. They should be basic lower division or general requirement courses.
3. Courses should have a person "qualified" to teach by television.

These criteria were sent to members of the Deans' Council who
then suggested courses from their academic areas. The subcommittee met and selected eight courses listed in Table 2. The courses included six 5-credit courses and two 3-credit courses totaling 36 hours.

Table 2. Proposed courses to be recorded for instructional television at Utah State University and the Uintah Basin Center.

<table>
<thead>
<tr>
<th>Department and number</th>
<th>Credit</th>
<th>Title</th>
<th>Instructor</th>
<th>Ave. no. students per quarter at USU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Political Science 10</td>
<td>5</td>
<td>Am. Nat. Gov.</td>
<td>J. Emenhiser</td>
<td>450</td>
</tr>
<tr>
<td>English 24</td>
<td>3</td>
<td>Intro. to Lit.</td>
<td>T. Lyon</td>
<td>200</td>
</tr>
<tr>
<td>Chemistry 10</td>
<td>5</td>
<td>Gen. Chemistry</td>
<td>M. Cannon</td>
<td>478</td>
</tr>
<tr>
<td>Chemistry 11</td>
<td>5</td>
<td>Gen. Chemistry</td>
<td>M. Cannon</td>
<td>478</td>
</tr>
<tr>
<td>Psychology 53</td>
<td>5</td>
<td>Gen. Psychology</td>
<td>D. Stone</td>
<td>500</td>
</tr>
<tr>
<td>Physiology 4</td>
<td>5</td>
<td>Human Phys.</td>
<td>T. Bahler</td>
<td>325</td>
</tr>
<tr>
<td>Music 1</td>
<td>3</td>
<td>Intro. to Music</td>
<td>W. Burton</td>
<td>474</td>
</tr>
<tr>
<td>Sociology 70</td>
<td>5</td>
<td>Intro. to Soc.</td>
<td>J. Pennock</td>
<td>450</td>
</tr>
</tbody>
</table>

The courses selected met the criteria suggested by the subcommittee. With the courses chosen and moving toward production, the question now arose as to how they could be utilized both at USU and the Uintah Basin Center.
CHAPTER III
NEED FOR THE STUDY

The concept of a continuing education center as proposed by the Coordinating Council of Higher Education is new in the state of Utah. Therefore, there are no precedents or studies concerning or related to the innovation.

The television medium has been proposed as an effective means of instruction and could be a possible solution to some of the existing problems of the Uintah Basin Center. These problems include:

1. Inclement weather conditions for flying.
2. Professor's time in commuting to the Uintah Basin Center for lectures and make-up work.
3. Cost of travel.

At the present time the Uintah Basin Center is a college of "fly-in" professors. Approximately five times a week planes land at the Roosevelt Municipal Airport bringing professors from USU and other Utah universities. Cancellation of flights due to inclement weather is a major problem preventing continuity of classwork. The Uintah Basin area is particularly subject to difficult flying weather. The data in Table 3 show the flight cancellations required during the 1967-68 school year.

It takes approximately 2 1/2 hours round trip to make a flight between the Logan campus and the Uintah Basin. Professors leave the Logan Airport at 3:00 p.m. and return around 10:00 p.m. This takes all of the professor's afternoon and evening. If flights are cancelled and
Table 3. Flight cancellations to Uintah Basin due to weather conditions for the school year 1967-68.

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Flights per week</th>
<th>Total number flights cancelled</th>
<th>Percentage of flights cancelled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>5</td>
<td>17</td>
<td>38</td>
</tr>
<tr>
<td>Winter</td>
<td>3</td>
<td>7</td>
<td>26</td>
</tr>
<tr>
<td>Spring</td>
<td>4</td>
<td>8</td>
<td>22</td>
</tr>
</tbody>
</table>

A professor is forced to drive to the Uintah Basin, the investigator has found that it takes from 4 to 4 1/2 hours of steady driving one way. This requires a full day of the professor's time.

There is also the problem of travel expenses. The data in Table 4 indicate the travel costs for the 1967-68 school year. The table includes only flight costs and not automobile expenses.

Table 4. Flight costs to Uintah Basin Center for school year 1967-68.

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Average number of flights per week</th>
<th>Total cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>5</td>
<td>$8,517.64</td>
</tr>
<tr>
<td>Winter</td>
<td>3</td>
<td>4,636.70</td>
</tr>
<tr>
<td>Spring</td>
<td>4</td>
<td>6,586.26</td>
</tr>
</tbody>
</table>
These costs and number of flights are for the first year of the program that Mr. Purnell, coordinator for the Uintah Basin Center, pointed out is still an "infant yet to grow" (Purnell, 1968c).

Television can meet the "growing" problems at the Uintah Basin Center by providing:

1. Uninterrupted course instruction. With the television lesson at the Uintah Basin Center ahead of time, courses can be taught regardless of flying conditions.

2. Conservation of professor's time. Television will free the professor for other professional and academic responsibilities because once the course is recorded it can be re-shown to classes for a number of times. Only when it becomes dated or requires revision will the course be re-recorded.

3. Means of curbing growing travel costs. As the number of classes increases so will flight costs unless new teaching techniques such as television are used. Shipping a video tape and providing the equipment to run it are more economical than flying a professor.

In addition to meeting these three problems television can provide some additional advantages:

1. University caliber instruction. Through television the same qualified professor who flew to the Uintah Basin Center or the professor who had to send a graduate student because of the heavy demands on his schedule can teach the course.

2. New learning experiences. The television medium provides experiences to the classroom which are unattainable in any other way.
Lewis has indicated the experiences that television offers:

Almost anything that can be presented can be presented on television. Sound and picture can not only be transmitted as they originate--they can also be recorded simultaneously for subsequent dissemination or for future reference and later use. From a viewer's standpoint, television is intimate, instantaneous in area coverage. It is versatile and mobile--it can move in for a closer look, swing around for a better view, back away for a broader picture. (Lewis, 1961, p. 7)

Television can be used to solve the problems presented at the Uintah Basin Center. There is also a need to determine its effective utilization so that television will be par with other instructional methods.

Television can also be of benefit on the university campus. Some of the advantages it offers include:

1. Extension of quality university instruction to more students.
2. Meet teacher shortages and reduce teaching load for professors of lower division courses, thus providing more time for other academic pursuits such as research and publication.
3. Instruction of large groups most economically.

Television can provide the best instructor available at the university in a particular subject area. All students enrolled in the course can be taught by this one professor.

Television can help meet the problem of teacher shortages. Griffith and MacLennan quoted David Paden, Professor of economics at the University of Illinois, on this subject:

The possibilities presently offered through television of substituting capital for labor at a time when there is an acute teacher shortage are exciting. To take an example from a field with which I am familiar, economics, it is probably a conservative estimate to say that $3,000,000 is spent annually on a nationwide basis for the teaching of the beginning course in economics. Certainly, on any rational basis, several times this amount might be spent in the development of a single course in this area. With this kind of money invested wisely,
improvements in instruction seem highly probable. How to bring together the resources of hundreds of separate institutions and apply them to a single project is something of an unsolved riddle. (Griffith and MacLennan, 1964, p. 81)

There are additional problems in developing the nationwide programming recommended by Professor Paden, but Utah does have the problem of teacher shortages that he mentioned. "The simple answer to provide more teachers and more classroom space is not a realistic one. There are simply not enough faculty becoming available." (Master Plan Study Committee M, 1968, p.12) The courses being developed at USU are for statewide use and will definitely help relieve teacher shortages at continuing education centers and release the university professor from teaching multiple sections of lower division courses.

Television's economy is in the instruction of large classes. Carpenter and Greenhill (1958) reported on Pennsylvania State University's closed circuit television for teaching university courses. Figure 1 represents a plotting of costs per student-credit-unit in relation to assumed numbers of students taught by both conventional and closed circuit television procedures at Pennsylvania State University.

The plotting of this graph shows that the breakeven point, i.e., the point where the cost per student-credit-unit is the same for conventional and televised instruction, occurs at the level of about 190 students. The curves show that the economic advantage of using television begins with classes of 200 students and increases progressively from this point as the number of students in the television section increases. The curve for ITV costs increases and then decreases again in the range of 400-500 students. This is the result of an assumption that for every 400-500 students added to a television
Television instruction

Conventional instruction

Figure 1. Cost per student-credit-unit of televised and conventional methods of instruction.
section, the equivalent of one full-time academic position will be needed. This additional help could be provided in the form of a faculty member, and/or selected undergraduate or graduate students.

The relationship between the number of students in a course and net cost of instruction for both conventional and televised courses is shown in Table 5 and was obtained from Carpenter and Greenhill (1958).

Table 5. Estimated costs per student-credit-unit for varying course enrollments by conventional and televised methods of instruction.

<table>
<thead>
<tr>
<th>Presentation</th>
<th>Estimated student-credit-unit costs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average number in class</td>
</tr>
<tr>
<td></td>
<td>135</td>
</tr>
<tr>
<td>Conventional procedure</td>
<td>$8.86</td>
</tr>
<tr>
<td>Televised instruction</td>
<td>11.32</td>
</tr>
<tr>
<td>Differences</td>
<td>+$2.46</td>
</tr>
</tbody>
</table>

Erickson, as quoted by Diamond, has also reported the economy of television instruction:

Inventiveness and administrative flexibility can cut the admittedly high cost of TV instruction. The costs may now be spread over several teachers in a given department, or over departments within a school, or over schools cooperating with another, or over one region cooperating with another, or over nations. In Chicago we found that when we began, in 1956, the cost of televised instruction was high as compared with classroom costs. We found that the unit costs of teaching one student for one year was about one-third higher than the cost of teaching a classroom student for a year. But with growth in enrollment, increased knowledge of the medium, and administrative adjustments,
we are now able to offer credit instruction at a cost well below classroom cost—as a matter of fact, about $100 less than classroom instruction. How can we do this, even though we are using what is supposedly a high-cost medium? We spend one-third of a million dollars each year on television instruction. Yet we have enough students enrolled (an average of 700 to 800 full-time students per course) to bring our unit cost below classroom cost. (Diamond, 1964, p. 176)

Television, in the long run, can prove very economical.

In conclusion, television can help provide to the Uintah Basin Center and/or USU a number of advantages:

1. Uninterrupted course instruction.
2. Conservation of professor's time.
4. University caliber instruction.
5. Means of meeting teacher shortages.
6. Economical instruction of large groups of students.
7. Experiences and benefits provided only by the television medium.

Under some circumstances all these will be significant in deciding the relative emphasis to be placed on television as a means of instruction. In other circumstances one or more may be the deciding factor.

Since ITV is expected to be beneficial at both USU and the Uintah Basin Center, it is important that the two main aspects of the utilization of television be examined. These two aspects include:

1. The physical situation in which television will be used.
2. The method of presenting the televised course to the students.

These two utilization problems cannot wholly be separated because the viewing situation will determine the method of presentation. But having once determined the viewing situation as it now exists, it is then possible to determine the methods of presentation that will operate under these conditions. Effective learning by television and favorable student attitude toward television instruction hinges on utilization.
CHAPTER IV

REVIEW OF LITERATURE

The writer has reviewed literature which relates to the present study and examined in detail the problem of utilization of television for course presentation. Utilization includes student preparation, presentation of the lesson material, and follow-up as they are used traditionally in ITV. This review does not examine the requirements of physical facilities for ITV use. The literature pertaining to the use of physical facilities is reported in Chapter V, Method of Procedure.

The present survey of the use of television for higher education at USU and the Uintah Basin Center is new and unique. While the problems identified are unique, the means of surveying, the points to survey, and the methods of utilization which will be used in teaching with television have been researched and verified by other investigators and are reviewed in this chapter.

Part of the program of the Extension Services at USU is the development of continuing education courses to be offered throughout the state. Grinager (1964) reported in a survey of extension education via television that land grant colleges and universities were currently moving from strictly adult education courses toward the college level of instruction. This is concurrent with the goal of the USU program which is to develop college instructional television courses for USU and the Uintah Basin Continuing Education Center.
Starlin and Lallas (1960), after six years of study of inter-institutional teaching by television in the Oregon State System of Higher Education, concluded that students on all campuses learned equally well when taught by television from one campus. This type of programming of ITV courses to other centers of learning is what USU is now developing.

The adaption of television as a means of instruction has been slower at USU than at other universities in Utah. The University of Utah has been using closed circuit television to teach many subjects on the Utah campus since 1958. Brigham Young University has also used television, principally large screen projection, to teach large classes. Each university has adapted ITV to its own needs and unique facilities.

Many studies have been conducted dealing with the utilization of television as a teaching technique for effective learning. This review will first examine the three main areas of utilization: student preparation, presentation, and follow-up.

**Student Preparation**

Students may be prepared for the television presentation in either a general way at the beginning of the quarter or more specifically prior to each class presentation. Tarbet (1961) pointed out that the students should be adequately prepared with texts or additional references which supplement the lesson. They should also come prepared to take notes in order to participate better in the lecture. The class is traditionally prepared for the ITV lecture by proctors, graduate assistants, or possible the professor.
Starlin and Lallas (1960) reported that full-time faculty members disliked supervising duty in television classrooms and that graduate students were able to fulfill this assignment very well. Nelson (1958), Clevenger (1959), and Cobin (1961) all reported the effective use of graduate assistants in the television classroom.

Since there are few recorded discipline problems in higher education, these assistants need not be there just to keep order. Their function should be that of "preparing the student" to get full value from the television presentation. Carpenter and Greenhill (1958) conducted a survey on varied amounts of supervision in television classrooms for a general psychology course to see if there was a difference in student achievement with the amount of supervision. The survey was conducted at Pennsylvania State University. More than 200 students were randomly distributed into five classrooms under one of the three following conditions:

1. No supervision, except that the teaching assistant recorded attendance and then left the room.
2. Partial supervision by an assistant who monitored the class and recorded attendance during one-half of each class period.
3. Full-time supervision by an assistant who recorded attendance and remained with the class for the entire class period.

The assistants in each case recorded attendance and exercised supervision only to the extent of controlling student behavior that might interfere with other students' viewing of the television. They did not conduct discussion. There was no significant difference in student achievement in the three different situations.

There is no evidence for the need and justification of providing proctors for college students when the role of the proctor is merely that of keeping order, being present and recording attendance. (Carpenter and Greenhill, 1958, p. 24)
The attitude of the person in the classroom, whether he be a teacher aid, proctor, graduate student, or professor, has marked effect on the success of the television presentation and the acceptance it receives from the students. Diamond quoted Erickson concerning this:

Educational statesmanship enters the picture when we consider the problem posed by the classroom teacher. We know, from our experience, the key role played by the classroom teacher. On some occasions, when we have used direct TV instruction for classroom groups, we have found that the classroom teacher not properly oriented to the whole program can, by raising an eyebrow or making a casual derogatory remark, destroy the effectiveness of the television lesson. As a matter of fact, the negative attitude of the classroom teacher can destroy the effectiveness of a whole course of television instruction. (Diamond, 1964, p. 173)

For television to be effective and the students adequately prepared, the classroom teacher and the television instructor need to work together in a team teaching attitude.

If guides are used for preparing the classroom teacher, it is necessary that they be given two or three weeks ahead of time so that preparation can be made. One method of doing this was reported by Shanks in the Anaheim, California, Instructional Television Project:

Each classroom teacher receives a telelesson guidesheet about two or three weeks prior to each telelesson presentation. The telelesson guidesheet is prepared by the studio teacher under the direction of the project director and is approved by the project director before being mimeographed. It contains a statement of the lesson purpose, suggestions for classroom preparation prior to the telecast, a brief description of the nature of the telelesson presentation, and suggestions for related follow-up classroom instruction. (Diamond, 1964, p. 64)

In order for the classroom teacher to adequately prepare the class, the television lesson should present exactly what the guide says it will. Reid reported concerning the problem of incomplete, poorly organized, or misleading lesson guides:

The guide should fit the telecast. Some television lessons are produced with little reference to the contents predicted by
the lesson guide. Small wonder than that preliminary and followup discussions are ineffective or that teachers become exasperated with television presentations which do not mesh with their carefully conducted preview sessions. (Reid, 1967, p. 86)

The author of the quoted survey also indicated that the classroom assistants need to be instructed in the use of these guides. They should not incorporate into their preliminary discussions with the students items that the guide reserves for the television presentation. Students become bored by the repetition of the ITV lesson if this occurs. Some classroom assistants may not borrow material from the lesson guide, but may "steal the thunder" of the television teacher by doing his demonstrations or using his techniques. This might occur if the classroom assistant has had the class before or been involved with it before. As the classroom assistant learns, it may be necessary to change the lesson guides frequently so that he does not become bored with his assignment and possibly display his attitudes to the students.

The television instructor and the classroom assistant need to work closely together to minimize these problems.

To assist the student viewer in following the television instructor study guides, lesson outlines, or other handout material have proven useful. Meaney quoted Paden concerning student preparation for an ITV economics course:

For the course under discussion, a detailed lesson outline is prepared for each lecture for the student to follow as he watches the lecture. Topic headings, tables, charts, sometimes difficult notes, are reproduced in toto. The purpose is to relieve the student of an impossible job of note-taking and to free his mind for more constructive occupations...

We are also experimenting with a page or two of written material which the student is asked to read before the television lecture. Definitions, background informations, etc. are given to the student to provide a more or less common starting point and to relieve the lecturer of needless detailed explanations. The material is used to give students specific information necessary for the full understanding or appreciation of the lecture. (Meaney, 1962, p. 20)
Meaney also made his own report concerning study guide use for students. Seventy-six courses were conducted by television under a Ford Foundation grant:

Seventeen of the courses are accompanied by teachers' manuals for the use of the participating proctors in the classrooms, and forty-six have study guides for the students. These study guides, either mimeographed or printed, usually resemble an eighty or ninety page set of course notes, together with a course outline, assignments, and bibliography. Such materials may be designed for use with a specific textbook. (Meaney, 1962, p. 20)

Workbooks are another possible means of student preparation. Carpenter and Greenhill (1958) conducted an interesting survey concerning the use of workbooks by students in three different situations. The first group was given no workbooks. The second group was given a workbook which was to be completed during the course but which was never gathered or corrected. The third group was given a workbook which was corrected every week for completion and correctness. Testing throughout the course showed no significant difference in results in achievement among the three groups. Tests dealing specifically with items in the workbooks showed that the group that had the workbooks regularly checked did much better than either of the other groups. The workbook groups learned more specific material, but the group without workbooks did just as well on the general tests. Students who had the workbooks and had them checked regularly felt that the workbooks helped them in the course and that they got much more out of it.

Students must be prepared for ITV if they are to gain the most from the actual television presentation.
Presentation of the Television Lesson

One of the major concerns in utilization of television is the length of the presentation. In the elementary and secondary school the length of the television presentations vary from five minutes to one-half hour. Findings have shown that in higher education the 50-minute lecture period is desired. Carpenter and Greenhill (1958) reported that instructors who had given 35-minute television presentations felt too rushed and could not adequately cover the material.

Courses taught at the University of Utah are taught on a 50-minute basis. A five credit course has four full period television presentations and one discussion session. A three credit course has two full periods of television and one of discussion.

Meaney cited Paden on the length of television presentations in an economics course:

During the first two years of the experiment, the television classes were taught using three 30-minute television lectures, each followed by a 20-minute discussion period. Graduate teaching assistants conducted the discussion sessions. Several aspects of the arrangement became increasingly unsatisfactory. First, the discontinuity of instruction within each hour was time-consuming and somewhat awkward for the teaching assistants conducting the quiz sections. Second, the 20-minute discussion period frequently did not allow sufficient time for the development of points which arose in the discussion period or which needed to be elaborated as a supplement to the formal lectures. Third, the use of graduate teaching assistants as proctors for the 30-minute television lecture was uneconomical. For the past year the same material has been covered in two 50-minute television lectures per week, with one 50-minute discussion session, again conducted by teaching assistants. (Meaney, 1962, p. 67)

Using the full 50-minute class period for the television presentation has proven the most successful.
Another major concern is the number of times the television course should be presented. Should it be shown just once to the class? Should it be shown again for make-up work? Should it be shown for a review of the material? Ellis (1963) reported in a study on repeated telecasts that a second viewing of courses was used by 88 percent of the class for make-up during the quarter; 50 percent of the class used it for review for the examination; another 33 percent who were not registered viewed the telecourse. Janes and McIntyre (1964) reported that the social science lessons used in their study were run twice for the same reasons reported by Ellis. Schramm and Oberholtzer (1966) reported the retransmitting of lesson material over a broadcast channel for purposes of student reviewing.

Where the television presentation should be viewed is another aspect of utilization. The traditional viewing areas are the classroom and large auditoriums, but some institutions are experimenting with providing viewing areas in dormitories and homes. Meaney (1962) reported that the University of Illinois gave students free choice of viewing areas--classrooms, dormitories or other residences. Reactions favored the non-classroom situation:

The objections to classroom viewing--which disappeared in residence viewing--were these: dislike of large size of group, poor angles of vision to television set, inadequate ventilation, restrictions on smoking, uncomfortable seats, and distracting behavior of other students when no instructor was present in the room.

Students who view the lectures at home find the family environment something of a problem. Telephone calls and other noise, competition for the set, and coping with the general lack of understanding of the family can require enormous student dedication and effort. (Meaney, 1962, p. 30)

Some critics of ITV have said that television is "non-involving" during the presentation. Meaney (1962) found that to meet this
challenge much emphasis was being devoted in the television lectures to involve the student in the lecture itself. Rather than being mere passive viewers, students were required to complete examples, finish analyses, work problems, draw diagrams, etc. Griffith and MacLennan (1964) quoted Haney concerning the lack of student involvement in television presentations. Haney agreed that television has often been criticized for keeping the talking face too long on the screen. To those critics who have felt that the answer lies in more variety in production, Haney has responded:

The solution lies, not in the principles of production but in the principles of learning, specifically those principles which form the basis for programmed instruction. . . . We have come to the conclusion that the best instructional television not only tells or shows something to the student, but directs his activity toward specified learning outcomes. We have evolved a kind of oral programed instruction in order to insure continuous or frequent responses, overt as well as covert, to require immediate application of information presented.

In different courses, this process takes different forms. In aeronautics, students answer questions and signal responses back to the television instructor; in political science, the students complete constructed notes; in reading and typing, the students perform under directions from the television instructor; all seek some interaction between material presented on the television screen and printed materials already in their hands. (Griffith and MacLennan, 1964, p. 74)

The problem of lack of involvement with the lesson material is closely related to another limitation often attributed to television--impersonalization. Dreher and Beatty (1958) reported that sociometric testing of students indicated that students tended to know each other more in face-to-face classes than in ITV. Off-campus ITV students tended to be favorable toward ITV, and on-campus ITV students tended not to be favorable toward ITV. Professors generally were less than enthusiastic toward ITV, mentioning lack of student contact as a main reason for this attitude. Starlin and Lallas (1960), Macomber (1957),
Carpenter and Greenhill (1958) and many others have reported that students and professors enjoyed ITV lectures but felt that student-teacher relationships were less adequate than in face-to-face classes.

Meaney reported that while students and professors favor television for many reasons,

most telecourse professors regret the loss of direct personal contact with students in the classroom. Lack of opportunity for immediate feedback of student reactions, classroom discussion, and questions is generally considered a very real handicap and disadvantage, both by the students and by professors. Students miss the opportunity to ask questions on the spot, although they may admit that they seldom use the privilege when they have it. Freshman and sophomore students particularly balk at the impersonality of the TV class—although they may feel that they know the professor on camera, he sometimes does not get to know them. (Meaney, 1962, p. 25)

The difficulty of personalizing the television presentation is one of the present challenges. Feedback, communication between the instructor and student, has been suggested as one possible means of overcoming the problem of impersonalization. Almstead and Graf (1960) reported that feedback was the "missing ingredient" of ITV. Students taught by ITV with a feedback system did significantly better on test scores than students taught face-to-face. Zettl reported that

some form of feedback is generally considered essential for any learning process. When television is used in the communication process, however, an immediate reaction of the viewer back to the communicator is not always possible, especially while the communication is taking place....

This lack of immediate feedback during telelectures has been considered a rather severe handicap for instructional television. (Zettl, 1967, p. 934)

Zettl presented three immediate feedback systems that are the most common variations: the telephone feedback, the microphone feedback, and the electrical-signal feedback.

In the telephone feedback system, the students have access to a telephone with which they can call the instructor during his lecture.
This type of feedback was reported by the Signal Corps Center in California (1955) which found that it made teaching easier for some instructors, and classroom response kept students on their toes.

The microphone feedback operates on the same principle, except that student reactions are carried through regular microphones and loudspeakers instead of the telephone headset. This type of system has been used at the University of Utah. Carpenter and Greenhill (1958) reported using the microphone system for feedback, and Griffith and MacLennan quoted Tuck on the use of this system at Michigan:

We have a direct audio link, called the big ear, between the classroom and the studio, over which we can effect two-way communication. The studio teacher and the director can hear all that transpires in the classroom. We keep tabs on the learning situation in the room. We know that the room is quiet and that the TV sets are turned on, for instance. We can stop, slow down, or repeat if the teachers at the other end so signal. We can call on individual students to recite about a visual, or they can question us if they desir. (Griffith and MacLennan, 1964, p. 107)

The electrical-signal feedback system ranges from simple light switches or signal buttons to rather complex computer arrangements. This system is designed to signal the instructor when some point in the lesson is not understood. Woodward (1965) reported on a study where selected students in a class responded to multiple choice questions during the lecture as a signal that they were understanding the instructor’s reasoning. This group of students did better on the lecture and reading tests than those students who did not have the feedback system. Wolgamuth (1961) reported on an electrical feedback system that provided each student with a box having four buttons to indicate various responses. Under this condition the teacher was made aware of student response only if one-fifth of all the buttons were pushed. Tharp reported on a more complicated system of electrical
signal feedback at the University of Miami:

The plan is to install at each seat an easily operated and easily concealed response station of five pushbuttons. The output of these response stations is fed into a relatively simple analog type computer-integrator, which in turn feeds into a readout device placed before the instructor. (Tharp, 1963, p. 18)

Zettl (1967), Almstead and Graf (1960) and others cited here have pointed out that theoretically feedback is extremely important to effective learning. However, most studies designed to test the effectiveness of feedback in television instruction end with the familiar "no significant difference" in learning achievement.

Carpenter and Greenhill (1958) reported on a group of students taking an economics course. The students were divided into a section that participated in feedback and a section that only listened to feedback from the other section. The test scores indicated no significant difference in achievement test scores. Students exchanged places during the middle of the course. An attitude survey at the end of the course indicated students liked a feedback system, said the system did not affect their achievement, thought it should be retained, but indicated they themselves almost never used it. "Apparently students want to have the opportunity of asking questions even though they may not do so." (Carpenter and Greenhill, 1958, p. 30)

Rock, Duva, and Murray (1951) reported the use of a feedback system in their study of ITV. The report showed that many of the questions asked by students over the system were trivial.

The experience of the University of Utah with a feedback system agrees with the findings of Rock, Duva, and Murray. The University of Utah can provide talkback systems for professors who desire them. As the university set up ITV, talkback systems were used in a majority
of the classrooms. The system was used to respond to student questions. Many of the questions began to become trivial and the professor could, after a few presentations, almost predict the questions the students would raise. The talkback system proved to be non-essential and is only used by one professor out of a total of eleven courses now taught by television. The questions raised by students could easily be discussed in the once-a-week discussion sections.

What then is the place of feedback in television? There do seem to be some definite advantages to using a talkback system as far as student attitude is concerned. Zettl indicated that perhaps educators have defined feedback in too limited a context. Feedback may take place even when the student and teacher do not communicate directly:

For example, one type of feedback may be the television viewer's reaction to a telelecture, not to the teleteacher at the station, but to a fellow student. A viewer who watches the reactions of an in-studio class to the teleteacher participates also in some form of feedback, as indirectly as it may be. Viewer participation during a telequiz constitutes another form of feedback, even if the viewer's answer never gets back to the television station. (Zettl, 1967, p. 934)

Zettl further stated the need to identify more precisely the various types of television feedback. The types he defined and the models he used to describe the various types of feedback are outlined in the Appendix. He concluded his report with the statement that "more precise research is badly needed in order to find the most effective television communication and feedback combination" (Zettl, 1967, p. 936).
Follow-up Activities

The third vital area in television utilization is follow-up. As has already been stated, the majority of universities involved in ITV use a 50-minute television lecture two to four times a week depending on the credit given for the course. The other class period is taken up with discussion sections which are, for the most part, conducted by graduate assistants. Scheller (1959), Seibert (1958), Meaney (1962), Dyer-Bennet (1958) and others have reported the effective use of graduate assistants in discussion follow-up activities. Occasionally the professor may meet with the discussion groups in person. Meaney (1962) indicated that this was especially true if all the instructor's television lectures were pre-recorded and he had more time available. However, graduate students were most often used and some institutions have attempted to encourage discussion leadership by the superior students in the class with or without faculty present.

Discussion groups are one way of providing follow-up and they are favored by students. Walton (1963) reported that from an attitude survey in closed circuit television, 89 percent of the respondents said a follow-up discussion after telecasts was helpful. Klapper (1958) reported that in the ITV courses he studied equal time was spent in telecast and discussion. Stuit (1956) reported that students taking an ITV course with discussion section felt that discussion was a great influence in motivating them to learn.

The method of setting up the discussion sections varies with the course. The general pattern is to have one discussion section a week along with the television presentations. The discussion section is of
the same length as the television lecture sessions. Meaney (1962) pointed out that some discussion sections met in large classrooms with many students participating and others were divided into small units for discussion purposes. Becker, Dunlap, and Gerber (1957) reported that discussion sections of about 20-39 students worked well. Lofthouse (1957) reported on discussion groups of 25 students. He indicated that the sections were only 20 minutes long and that students felt this was not long enough.

Dunham (1960) reported on discussion sections conducted via television. Some students had discussion sections in the traditional face-to-face manner while others participated in discussion through television. Although there was no significant difference in achievement scores, students in the face-to-face discussion sections favored the course much more than those in the other sections.

Mention has been made of the use of feedback during the presentation itself. Discussion may also take the form of feedback with the professor as a follow-up activity. This would be a "live" connection between the instructor and students in the classroom.

Buzz sessions, seminars, projects, and other activities are all useful follow-up activities in addition to discussions. Study guides provide follow-up activities such as assignments, outside reading, questions for thought, and written work.

Just as team work is vital in the preparation of the class and effective presentation of the course, it is also important in follow-up activities. Tarbet reported on team work for follow-up activities:

The telecast and the classroom follow-up should not be regarded as separate and distinct elements but rather as integral parts of a unified, meaningful whole. In this team approach, the studio teacher has the responsibility of presenting,
explaining, and demonstrating the major points of the lesson. This should furnish information, stimulate student interest, and raise provocative questions. The classroom teacher is responsible for clearing up misunderstandings, answering questions, leading discussions, making assignments, giving individual help where needed, and supervising testing. The follow-up should be a meaningful enlargement of the telecast, both as to substance and as to significance. (Tarbet, 1961, p. 57)

The three corners of effective television utilization are student preparation, presentation of the course, and follow-up activities.

Past Studies dealing with ITV Courses to be taught at Utah State University and the Uintah Basin Center

The aim of this section is to examine the relative effectiveness of ITV and face-to-face instruction and to report teaching utilization techniques which have been employed in the past for those courses selected to be taught by television at USU and the Uintah Basin Center. These courses include Political Science 10, English 24, Chemistry 10 and 11, Psychology 53, Physiology 4, Music 1, and Sociology 70.

Political Science

Carpenter and Greenhill (1958) reported on an introductory political science course. For the first part of the course, the 219 students received instruction by television. Then all students were moved to a large classroom and taught directly. At the end of this time, they were given two days to decide which type of instruction they would prefer for the rest of the course--television in smaller classrooms or direct teaching in a large auditorium. Seventy percent of the students returned to the television instruction while 27 percent remained in the direct teaching situation. No significant difference was reported in student achievement between the two groups.
Becker, Dunlap, and Gerber (1957) made a comparison of three methods of instruction in a literature course taught at the State University of Iowa. The three methods included a discussion section which met four days a week with one instructor, a lecture-discussion section which met twice a week for lectures and twice for discussion, and a television-discussion section which met twice a week for a lecture and two days a week in a situation in which part of the group discussed in the studio with the instructor while the rest of the group watched via television.

An attitude survey indicated that the television group was least favorable to the course and the discussion group most favorable. However, the television group was most favorable to the use of ITV. Discussion students felt they learned more and were stimulated to more thought than television students. Fifteen of 20 instructors were more negative toward a lecture only course than students were. There was no significant difference in achievement scores among the three groups of students.

Klapper (1958) reported on an English course in which ITV students were taught with a 45-minute television presentation and then a 30-minute face-to-face discussion. The face-to-face group was taught with a 90-minute class period. While there was no significant difference in test scores, students of some instructors improved significantly more than did those of other instructors. The study reported that some of the instructors were not too favorable toward ITV and that this affected their ITV presentation.

The study conducted by Starlin and Lallas (1960) on inter-
institutional teaching by television in the Oregon State System of Higher Education has direct bearing on the situation at USU. Four campuses received instruction via television from an originating institution. The subjects taught included literature appreciation, psychology, chemistry, and human development. Several of these courses are being taped for ITV presentations at USU and the Uintah Basin Center. After the first year of study it was found that the students at the originating institution did better on test scores than those at the receiving institutions, especially during the first two quarters. After the second year of study these score differences disappeared.

The authors felt that the score differences noted in the first year were due to a number of factors, including greater accessibility of the television instructor to the students, an ability developed through contact with the instructor by students to predict test questions, increased student motivation from contact with the television teacher, and greater student familiarity with the examination policies and procedures of the originating campus. As soon as students at the receiving institutions became familiar with these factors, score differences disappeared. From six years of study, the authors concluded that students on all campuses learned equally well when taught by television from one campus.

Chemistry

Carpenter and Greenhill (1958) reported on a chemistry course taught to five groups of students by television and three groups by face-to-face instruction in a large lecture hall. Cameras were in the large lecture hall to transmit the lecture to the television viewing rooms. There was an assistant in the viewing rooms who was to take
attendance, maintain order, and display chemical specimens when color was important. Discussion groups, laboratory exercises, and a textbook were used in both the ITV sections and the face-to-face sections. Results reported no significant difference in test scores. However, students who were sitting in the back of the large lecture hall had a definite behavioral pattern of selecting television as a means of instruction rather than direct teaching.

In another study conducted by Carpenter and Greenhill (1958), chemistry was taught in a large auditorium by an instructor in the front of the room. Television monitors were placed throughout the room and used to magnify experiments and small objects that the instructor referred to. It was concluded that lack of color was a problem in adequately demonstrating chemical experiments by television, but television as a magnifier was a useful apparatus and was especially helpful to those students in the rear of the room.

The quality of nearness is a real advantage which television can bring to the laboratory classroom. Diamond quoted Coleman concerning the use of television to bring details to the student:

Details can be observed by the entire audience in first-person viewing, as only the one demonstrating might see it under traditional techniques.

As an example, in a recent jewelry demonstration on the techniques of soldering, the author was able to present the clear and exact picture of all the visual items the craftsman sees—fluxing, positioning of the solder, and heating and flowing of the molten solder. This picture, in fact, was clearer than one viewed with the naked eye, for the zoom lens attachment enlarged the items sixty-four times. A piece of solder less than 1/16 inch square was enlarged to over 2 inches square on the viewers' screen. (Diamond, 1964, p. 26)

This technique can be useful in any laboratory presentation.
Dreher and Beatty (1958) conducted a survey on a psychology course in which students were confronted with one of three types of presentations. The first group had three hours a week of face-to-face instruction by the same professor who taught the course by ITV. The second group was an ITV on-campus group which viewed two 45-minute ITV classes a week and had biweekly two-hour discussion periods. The third group was an ITV off-campus group which viewed two 45-minute ITV classes and had biweekly two-hour discussion periods. Test scores indicated no significant differences for the three presentation methods.

Evans, Roney, and McAdams (1955) reported on a study concerning face-to-face and ITV in a basic psychology course. Ninety-six students were enrolled in a face-to-face section. Seventeen students were enrolled in a television section which received lectures over broadcast television off-campus and completed correspondence problems which were mailed to the instructor. Thirty were enrolled in a television section which received lectures via television off-campus but came to campus for two discussion sections per week. The same instructor was used for all sections and there was no significant difference in achievement scores. However, the television plus campus discussion was highest; television plus correspondence second; and face-to-face was third.

Evans (1956) in an attitude study of an ITV psychology course found that 70 percent of the students following the course said they would be interested in taking another course involving television instruction.

Husband (1954) reported on a different utilization method in teaching general psychology. Students were taught as follows: television at home where they viewed lectures broadcast over open-circuit television,
in-studio class seated either in the studio with the television instructor while the television lesson was presented or in an adjacent room watching the monitor, and kinescope recordings viewed as films followed by face-to-face discussion. Student learning showed no significant difference in the method used.

In a study dealing with basic psychology and recall Carpenter and Greenhill (1958) reported:

It can be concluded that those students who were taught by television not only recalled the course material equally as well at the close of the semester as did those students who were taught either by conventional teaching method or in the TV originating room but also the different groups retained approximately the same amount of course material after the two hundred eighteen day interval. (Carpenter and Greenhill, 1958, p. 12)

Carpenter and Greenhill (1958) also concluded that students achieved as well in an ITV class of over 100 as in an ITV class of 20. This study indicated that various methods of discussion following the 35-minute television presentation were arranged. In one method the lecture was followed by a discussion led by a graduate student. A second method involved a discussion led by the ITV instructor with a group of students in the television studio and all other students in television classrooms listening in but not participating. Students under the third condition were given the choice of leaving the class or of remaining and studying their notes following the lecture. They neither heard nor took part in discussions. All three groups did equally well on achievement scores. This raises the question of whether or nor the 50-minute class period is necessary for all college courses.
Physiology

Macomber (1956 and 1957) found that ITV was just as effective as face-to-face instruction in physiology, psychology, and sociology courses. He also concluded in his two year study that students reported instructors made a difference in the success of ITV presentations. Instructors felt that they could animate their presentations, make an impression on students' attitudes, and cover the course content just as well on television as in a face-to-face situation.

Greenhill, Rich, and Carpenter (1962) made a comparison between using a large screen Eidophor projector and a 24-inch monitor in teaching basic zoology courses. While there was no significant difference in achievement scores, 77 percent of the students in the course chose the large screen projection as the best while 23 percent chose the monitors. All students had been exposed to both methods for a number of weeks and then asked to make the choice. Students listed as important factors in their preference of large screen: television screen easier to watch; television screen size more desirable; blackboard, pictures, etc. easier to see; models and demonstrations easier to see; and seats more desirable.

Music

Carpenter and Greenhill (1958) reported on a music course that was taught three days a week for 50 minutes. Many adaptions were made for the music course to television and the instructor had had much experience with the medium, yet there proved to be no significant difference in the effectiveness of direct and televised instruction.
Sociology

Davies, Gross, and Short, Jr. (1958) studied various approached to an introductory course in sociology. The students were taught by lectures for four weeks, lectures with visuals for four weeks, and then by ITV. Students were assigned to one of the three groups and rotated. Three teachers were also rotated among the three groups. There was no significant difference in achievement scores. However, the students indicated that instructors made a difference in the effectiveness of the three approaches.

Pennsylvania State University divided an introductory sociology class of about 250 students into two equal groups. One group was taught directly in a large lecture hall. The lecture was televised from this lecture hall to the other group which was distributed in several television receiving rooms. Carpenter and Greenhill (1958) reported no significant difference in test scores and that students favored either ITV or direct teaching equally.

Most of these studies have indicated that ITV is just as effective as face-to-face instruction, but they have reported various methods which have been utilized in presenting these selected television courses.
CHAPTER V
METHOD OF PROCEDURE

The present survey for the planning and utilization of television arose out of the need of administrators, extension workers, and television instructors to know how selected television courses might be most effectively used at Utah State University and the Uintah Basin Center. How should video tapes be presented? What kind of equipment was available at the Uintah Basin Center and USU? Who should operate the equipment? How could discussion be used with a television lesson? Could telelecture be used with television? These are a few of the questions raised by persons concerned with the presentation of the ITV courses.

To survey these problems the investigator first looked at possible means of televising the lesson, i.e., should closed circuit or the broadcast method be used, or both? This was determined by research, surveys, and interviews and is reported in Chapter VI of this survey.

After the means of televising was determined, the survey took a four-step approach to find answers to the questions raised by both administrative and academic groups and to report other problems and questions that required further study and research. The four steps were:

1. A survey of the existing physical facilities to determine adaptability for television instruction.

2. The development of possible television teaching utilization models. The models were developed according to the recognized three-point utilization approach: student preparation, television
presentation, and follow-up.

3. An interview of persons responsible for the development of course subject matter to:
   
   a. Acquaint them with the facilities at the Uintah Basin Center and USU.
   
   b. Present the proposed television teaching utilization models.
   
   c. Discuss the models in terms of the problems they have in adapting their course to television.

4. A summary of all findings and report of developing problems and recommendations for further study and research.

Determining the Means of Televising the Courses

The investigator first looked at the open circuit or broadcast versus the closed circuit means of televising courses. He then examined the existing Utah educational microwave network and problems with this state system.

Determining Physical Facilities

What physical facilities were to be surveyed and how could they be adapted to the best utilization of television? The items finally selected were based on the investigator’s research and review of literature in this area. The investigator reported first a description of general items important in the adaptation of television to the Uintah Basin Center and USU. Because of the unique situations at the Uintah Basin Center and USU, these general items are different for each area. This section also includes a survey of specific items surveyed for the use of television in classrooms and auditoriums. Although some situations are unique to USU and the Uintah Basin Center, rooms at
both localities must meet the same specifications for effective
television utilization. For this reason the same items were surveyed
in rooms at both USU and the Uintah Basin Center.

**General items surveyed at the Uintah Basin Center**

Four major items were considered at the Uintah Basin Center:

1. A description of the instructional approach and procedures
   now being used and arrangements made with the facilities used for
   instruction.

2. A description of general and specific points concerning
   the physical plant, including:
   a. Placement of the plant in the community considering access
      to other educational resources, street noise, and parking facilities.
   b. Floor plan layout of the buildings including the number
      of classrooms and any specially equipped rooms.
   c. Material construction of the rooms and halls and other
      points about the physical plant which were important for the use of
      television.

3. A description of the existing television equipment.

4. A description of the telelecture equipment.

**General items surveyed at Utah State University**

The major items surveyed at USU included:

1. A description of the closed circuit facilities on the campus.

2. A survey of all classrooms and auditoriums which have a
   seating capacity of at least 100 but less than 300. The courses selected
   initially for ITV have an average enrollment of from 200 to over 500
   students per quarter. It would be uneconomical to teach television
courses to smaller groups because of the cost of equipment and the expense of replaying the tapes.

3. A survey of auditoriums on campus which hold over 300 students. These were examined for possible use with large screen projection. Because of the cost of large screen projectors and the technical help needed to operate them, a large viewing area is required for economy of operation.

Specific physical facilities surveyed for classrooms and auditoriums at Utah State University and the Uintah Basin Center

The list of items to be surveyed in each room and auditorium and a review of literature justifying their inclusion are reported.

Lighting. Items surveyed:

1. Does the room have natural lighting and can it be adequately controlled?

2. What type of artificial lighting does the room have and how is it controlled?

3. What is the normal light level in the room?

4. To what light level can the room be reduced during daylight?

A report from the Educational Facilities Laboratories indicated that the general light level in the room should be from 35-70 footcandles:

Is there such a thing as a general level of lighting for the classroom? In a sense, yes, since the major part of the student's time in regular classroom work is spent at the tasks of reading and writing. The consensus of lighting studies indicates that a room with illumination of 35-70 footcandles will provide adequate brightness to undertake these viewing tasks with a minimum of viewing effort or strain. (Educational Facilities Laboratories, 1960, p. 44)
The report also described the light needed for television viewing:

A measure of the average brightness of the black and white image on a television screen (taken from the "Indian head" test pattern used in the industry) offers a figure of 35-40 foot-lamberts. Areas around the task image should not contrast excessively with the task itself. On that basis general room lighting can be set at levels of approximately 30 footcandles or slightly higher. The face plate framing the picture tube should be light in value and matte finish to reduce contrast between the bright image and its frame and to avoid distracting reflections. The area adjacent to and behind the receiver should be lighted to levels just below the brightness of the frame to again avoid sharp contrasts with and around the viewing area. (Education Facilities Laboratories, 1960, p. 44)

The lighting in the room needs to be controlled so that there are not strong contrasts between the monitor light level and that of the room. This requires that there be some means provided for the control of natural light which is the cause of glare problems on the monitor screens, especially when they are arranged across the room from a window. Costello and Gordon (1961) have stated that it is desirable to have the monitors placed with their backs to the windows. However, if the best arrangement places the monitors on the opposite side of the room from the windows, glare becomes a problem and can only be eliminated by some type of window shading device.

Costello and Gordon reported that lighting in the room should be dim but not dark:

A rough rule of thumb is that the room should be bright enough to read a book without effort, but not much brighter.

1 The term footcandles is a measure of the amount of light falling on an object. How bright the object appears to the viewer is determined by how much of this light is reflected—a measurement called foot-lamberts. Since a television image is effected by light passing through the tube and seen directly by the viewer, its brightness is calculated in footlamberts.
When children are asked to follow a map or write during a televised lesson, however, the level of illumination may be increased. (Costello and Gordon, 1961, p. 126)

There are two main types of lighting found in most classrooms--fluorescent and incandescent. The report of the Educational Facilities Laboratories (1960) indicated that the incandescent bulb and the unprotected fluorescent tube can cause glare problems in television viewing. The diffused or indirect light of a properly covered fluorescent tube is best. It is advisable to have the artificial lighting in the room on dimmers so that the light level can be precisely controlled.

**Color of the room.** Items surveyed:
1. What is the color of the room?
2. Will the color be distracting for television viewing?

The color of the room should be a light neutral shade. Tarbet (1961) and the Educational Facilities Laboratories (1960) reported that a high contrast between the walls behind the monitors and the monitors caused a distraction to viewing.

**Seating.** Items surveyed:
1. What type of seating is in the room?
2. Is the seating movable or stationary?
3. How many seating stations are in the room and how are they arranged?
4. What is the distance between each seating station measured back to back?

The Educational Facilities Laboratories (1960) reported that seating arrangement and type of seats were two of the major determinants for the number of students that could be effectively grouped around the
television monitor. The three general types of seating used in the classroom are the chair, the table-arm chair, and the desk and chair combination. The data shown in Table 6 indicate the spacing required for each type. The measurements for the table-arm chair depend on whether the chairs are placed close together in rows and columns or whether there is an aisle between each row.

Table 6. Spacing required for the three types of seating common in most classrooms.

<table>
<thead>
<tr>
<th>Type of seating</th>
<th>Spacing required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chair</td>
<td>3' 0&quot;</td>
</tr>
<tr>
<td>Table-arm chair</td>
<td>3' 0&quot; to 4' 4&quot;</td>
</tr>
<tr>
<td>Desk and chair combination</td>
<td>5' 2&quot;</td>
</tr>
</tbody>
</table>

Tarbet (1961) reported that the movability of chairs for seating arrangement made it possible for the students to be arranged for the monitors at better viewing angles and to get the greatest number of students at each monitor. The best viewing angle for a monitor is 30-40 degrees off the center line of vision as reported by the Educational Facilities Laboratories (1960). The information in Figure 2 indicates that anything more than this results in objectionable distortion of the image.

The number of students that may be grouped around an individual monitor depends on the monitor size. The data in Table 7 indicate the
Beyond this point distortion normally becomes objectionable—legibility deteriorates.

Figure 2. Distortion of image at 0, 30, 45, and 60 degree viewing angles.
number of viewers recommended by the Educational Facilities Laboratories (1960) for an individual monitor based on the monitor's actual tube size. The actual tube size is the horizontal distance across the face of the tube. For example, the 23-inch television picture tube has a 19-inch horizontal measurement or actual tube size.

Table 7. Approximate number of viewers who can view a single monitor based on the size of the monitor tube and the distance between seating.

<table>
<thead>
<tr>
<th>Actual size of tv tube</th>
<th>Chair 3'0&quot; spacing</th>
<th>Table-arm chair 3'0&quot; spacing</th>
<th>Table-arm chair 4'4&quot; spacing</th>
<th>Desk and chair 5'2&quot; spacing</th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>32-34</td>
<td>21</td>
<td>20-23</td>
<td>16-18</td>
</tr>
<tr>
<td>19</td>
<td>36-38</td>
<td>22</td>
<td>20-26</td>
<td>20-21</td>
</tr>
<tr>
<td>21</td>
<td>52-54</td>
<td>31</td>
<td>31-36</td>
<td>24-29</td>
</tr>
<tr>
<td>23</td>
<td>54-56</td>
<td>31</td>
<td>36-38</td>
<td>24-29</td>
</tr>
<tr>
<td>24</td>
<td>64-72</td>
<td>39</td>
<td>41-52</td>
<td>33-34</td>
</tr>
</tbody>
</table>

Boyd Humphreys (1968a), chief engineer of Radio and Television at USU, stated that the 23-inch monitor (19-inch actual tube size) is the one generally used in the classroom. Lewis (1961) and Costello and Gordon (1961) reported that with this size monitor and using table-arm chairs, 15-20 students around each monitor was the realistic provision. This agrees with the figures given in Table 7. The number of students that can be placed around each monitor is reduced if the seating type is stationary.
Seating must also be arranged in terms of distance from the monitor. No student should sit further away than twelve times the actual screen width. For a 23-inch monitor with an actual screen width of 19 inches, a student should sit within 19 feet of the screen. Tarbet stated:

Some educators state that no student should sit closer than 3 3/4 times the width of the picture nor farther away than 15 times the width of the picture. Students should probably be at least six feet from the screen. (Tarbet, 1961, p. 183)

Lewis reported some further cautions in seating students properly for television viewing:

Where more than one receiver is operating in the same room, it is preferable to locate them so that students cannot observe more than a single screen at one time. If the classroom has fixed seats and desks, this objective is somewhat more difficult to achieve. Much can be accomplished, however, with imaginative experimentation and careful planning of units placement.

Classrooms with movable seats and desks offer a great variety of viewing arrangements. The desk units can be easily clustered around individual receivers to permit proper viewing angles and distances. If desired, it is possible for a student group to view television programs in a corner of a classroom equipped with headphone facilities. (Lewis, 1961, p. 135)

Seating arrangement, viewing angles, and distance from screen must all be considered in setting up the television presentation.

Ventilation. Items surveyed:

1. What type of heating does the room have?
2. What type of air circulating system does the room have?
3. Is the room air conditioned?

Since the room must be semi-darkened and natural light controlled by some means, circulation of air and heat in the room must be of a mechanical nature. The Educational Facilities Laboratories reported that designers of facilities for the use of television today recommend forced air ventilation for the room:
Books have been written on psychological and physical effects of thermal environment. Where air circulation is poor, air exchange inadequate, heat or cold in extreme, mental and physical efficiencies are impaired. Where properly balanced thermal systems have been installed in schools, offices and factories, there are repeated reports of increased efficiency and morale as well as bonus rewards in the purification and cleanliness of controlled air for both personal health and considerable building maintenance savings. (Educational Facilities Laboratories, 1960, p. 45)

Costello and Gordon (1961) and Tarbet (1961) concluded that a balanced thermal system may include not only forced air circulation but also air conditioning in cases where courses are taught in warm climates. With the windows closed and curtains drawn, the temperature in the room can rise quickly.

**Acoustics.** Items surveyed:

1. What type of ceiling does the room have?
2. What type of walls and floor covering does the room have?

Tarbet (1961) recommended that ceilings have acoustical tile on them. A report on ITV noted that while acoustical tile and panels were of value, "too much of a good thing can turn a benefit into a problem. Excessive acoustical absorption makes it unnecessarily difficult to make a voice heard across the room" (Educational Facilities Laboratories, 1960, p. 42). Other sound distractors may include the placement of the school plant or facility if it is situated near a busy highway or factory and intra-building noises caused by natural group activities occurring in the gymnasium, cafeteria, shop, or music room.

Any type of acoustical treatment that can meet some of the problems of noise outside the classroom and distractors inside the classroom during the television presentation are desirable.
Power outlets. Items surveyed:
1. How many alternating current (AC) power outlets are in the room?
2. Where are the power outlets located?

The location and number of power outlets are critical factors as far as arranging the monitors in the room is concerned. Costello and Gordon (1961) stated that the amount of seating in the room will determine the number of monitors needed and thus the number of outlets needed.

Audio-visual materials. Items surveyed:
1. Are there any audio-visual materials in the rooms?
2. If there is a screen, what type is it and what are its dimensions?

Tarbet (1961) suggested that additional teaching aids may be needed to help cement the learning concepts being taught by television. Diamond (1964) referred to Hassur's use of such other audio-visual materials as slides, film clips, and the overhead projector with the television medium. Since other audio-visual materials may be required, the equipment available was surveyed.

The key element in the use of audio-visual materials is the screen. Projection screens are used not only for audio-visual materials but also for large screen television projection in large auditoriums. The type and size of the screen determine the angle off the projection axis which is desirable for viewing. There are three types of front projection screens commonly used today. These are the matte, beaded, and silver lenticular.

Zeitler (1966) reported that the type of screen determined the viewing angle. Matte white is a smooth, non-gloss surface which reflects light evenly in all directions. It is the material that other screens are compared with for brightness evaluations. It is said to have
a "gain" of 1. A beaded screen may reflect four times as much light as
the matte white and has a gain of 4. A lenticular screen may appear
1.6 times as bright and have a gain of 1.6. Figure 3 outlines the gain
of the three types of screens, and the information given in the figure
also shows the viewing angle which may be reached with each type of
screen.

Figure 3. Gain of the matte, beaded, and lenticular screens and the
 viewing angle that may be reached with each type of screen.
Gain is not the only important thing to consider in selecting the right screen. Directionality must also be considered. The beaded screen is very directional and is brightest when viewed in a direct line with the projected light source. When viewed from an angle, the beaded screen shows a rapid fall-off in reflected light. Its gain is only 1 at 20 degrees off the projection axis and .4 for 45 degrees. This makes it unacceptable for wide-angle viewing. The audience must be seated 20 degrees from the center line of the screen.

The silver lenticular screen, on the other hand, controls the reflection and minimizes noticeable fall-off at the side. When viewed at any angle up to 30 degrees off the projected axis, the lenticular screen maintains a uniform 1.6 gain and does not become less bright than matte white until viewed at an angle greater than 60 degrees off the projected axis.

Not only the type, but also the size of the screen determines the effective viewing area that can be utilized in a room. The Society of Motion Pictures Television Engineers has established the "2 x 6" rule which identifies the essential viewing area for a projected picture. The rule states that

for maximum comfort, the minimum distance between the screen and the first row of seats should be 2 times the screen width. The distance between the screen and the last row of seats should be 6 times the screen width. (Zeitler, 1966, p. 10)

The Aperture (1968) concurred with the rule of the picture industry and suggested that viewing angles should be held to a maximum of 30 degrees on each side of the screen. The information in Table 8 shows the maximum number of people that can be seated in an audience according to the screen width and with no one sitting more than 30 degrees on either side of the screen. It should be remembered that at
45 degrees distortion makes viewing undesirable (Figure 2).

Table 8. Number of people who can be seated in an auditorium according to the screen width with no one sitting more than 30 degrees on either side of the screen.

<table>
<thead>
<tr>
<th>Screen width (inches)</th>
<th>Seating area (square feet)</th>
<th>Maximum number in audience (6 sq. ft. per person)</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>135</td>
<td>23</td>
</tr>
<tr>
<td>50</td>
<td>238</td>
<td>40</td>
</tr>
<tr>
<td>60</td>
<td>340</td>
<td>56</td>
</tr>
<tr>
<td>70</td>
<td>482</td>
<td>80</td>
</tr>
<tr>
<td>84</td>
<td>654</td>
<td>110</td>
</tr>
<tr>
<td>96</td>
<td>848</td>
<td>141</td>
</tr>
<tr>
<td>108</td>
<td>1074</td>
<td>180</td>
</tr>
<tr>
<td>120</td>
<td>1338</td>
<td>220</td>
</tr>
<tr>
<td>132</td>
<td>1650</td>
<td>276</td>
</tr>
<tr>
<td>144</td>
<td>2000</td>
<td>334</td>
</tr>
</tbody>
</table>

The size and type of screen must be considered to determine the angle at which students can sit and still see a picture and the distance at which they can sit.

Public address system. Items surveyed:

1. Does the room have a public address system?
2. What type of system is it?
If the room has a public address system, it may be desirable to have the sound for the television lesson run through this system. The Educational Facilities Laboratories (1960) and Jack Vetterlie (1968), closed circuit television engineer at the University of Utah, reported that a public address system would provide even sound throughout the room without creating echoes from monitors that are not properly adjusted.

**Equipment storage.** Items surveyed:

1. Are there provisions for storing the television equipment in the room?

2. Should monitors be placed on movable carts or hung from the ceiling?

If monitors are to be used for televised instruction, there must be provisions for storing them. In rooms with limited seating of about 30 students, the monitors may be placed on movable carts in front of the room and the carts properly arranged prior to the presentation. Costello and Gordon (1961) reported that the monitors should be mounted on sturdy stands equipped with casters so that they can be moved about easily. The sets should be about one foot above the heads of the students when they are seated.

For larger classrooms it is recommended that monitors be hung or suspended in some fashion from the ceiling. The report of the Educational Facilities Laboratories (1960) suggested that monitors may be hung from adjustable and pivoting ceiling and wall mounts.

The positioning of the monitor as it is suspended from the wall or ceiling is important. The Educational Facilities Laboratories (1960) indicated that the height of the image on the television screen should be adjusted so the student does not have to raise his normal line of sight.
sight more than 30 degrees. All receivers, whether they be mounted or on carts, should be tilted 10-15 degrees toward the students to minimize reflected glare. Costello and Gordon (1961) reported that some manufacturers were now putting the glass in the television monitor at a slight angle to help reduce glare.

**Distribution system.** Items surveyed:

1. Does the facility have any existing television distribution system?

2. Is the system a direct video or radio frequency system?

There are two types of distribution systems generally used for closed circuit television. These are the radio frequency system and the direct video line.

The radio frequency system converts the video and audio signals that make up the television program into a radio frequency. Lewis explained that the signals are then transmitted along coaxial-cable lines and cannot be received by television sets that are not directly connected to the cable. Such installations offer a great deal of management flexibility in arrangement and in usable channels. It is possible to plan for the simultaneous origination of multiple channels for different programming on a single cable. Additional channels may be incorporated through the use of special equipment. (Lewis, 1961, p. 112)

This special equipment referred to by Lewis modifies the television signals so that they correspond to one of the twelve channel frequencies on the television receiver.

There are advantages with the radio frequency system:

1. Unmodified commercial television receivers may be used to reproduce the image as well as the sound by turning the channel selector switch to the proper setting.
2. More than one signal can be transmitted at a time along the cable (presently up to twelve radio frequency signals plus other control signals if necessary). The cable is expensive so this is an economical use of it.

3. The signal can be distributed over great distance without undue signal loss, but it may require some amplification.

There are also disadvantages with the radio frequency system:

1. Lewis (1961) stated that the system usually resulted in a picture image "moderate to low" in definition characteristics because of the technical limitations of the regular television set. Special equipment is available, however, which can correct this.

2. It costs at present about $300 per channel for the special equipment required to convert the television signal into a radio frequency signal.

The direct video system can be most simply described as a direct line from the camera or video tape recorder to the monitor or receiving unit. The signal is distributed along a coaxial cable and is not modified in any way for transmission.

The major advantage of the direct video system is that the picture image is a high quality and has good definition because the signal is not modified.

The disadvantages of the direct video system may be summarized as follows:

1. Because of the nature of the signal, only one signal can be sent on the cable at a time.

2. Viewing units must be either monitors which have no channel tuning or adapted television receivers. The regular television
receiver will not work.

3. This system must have a separate audio system for pick-up, distribution, and reproduction.

A personal interview with Dale Ogden (1968), chief closed circuit engineer at the University of Utah, revealed that the University of Utah has both direct video and radio frequency lines connecting the closed circuit television facility to six other buildings on campus. He stated that the radio frequency system was superior because the video system developed hums in it from electronic disturbances and that the difference in picture resolution and clarity between the two systems was hardly noticeable.

Lewis (1961) reported that some schools use both the radio frequency and the direct video system as does the University of Utah. This provides flexibility of operation. Humphreys (1968c) stated that the direct video line was desirable if the signal was to be recorded at the other end of the line. Lewis summarized the general opinion of these two systems:

Generally, opinion seems to favor the RF closed-circuit system for most educational applications because of its flexibility and economy, with direct video being preferred for special high-definition requirements. (Lewis, 1961, p. 113)

Procedures for surveying facilities

The survey was conducted in the following manner:

1. Facilities at the Uintah Basin Center and USU were thoroughly surveyed for the items listed in this section. A survey sheet was used to record the findings and insure uniform information from each area. The survey sheet is in the Appendix.

2. Personal observations and reporting of the existing conditions at the Uintah Basin Center and USU were made.
3. Information was gathered by trips to the Uintah Basin Center.

4. Floor plans for the large auditoriums at USU were employed to examine seating and viewing angles. A sample of the survey sheet used while surveying the auditoriums is in the Appendix.

5. Interviews were conducted with individuals responsible for expansion of television at USU and the Uintah Basin Center, television engineers having a technical television background, and persons responsible for television instruction at the University of Utah and Brigham Young University.

Determining Television Teaching Utilization Models

A television course must have a three point approach to course material: student preparation, presentation of the material, and follow-up. This, combined with properly working equipment and desirable classroom setting are the requirements of effective television utilization.

In order to determine possible teaching utilization models, interviews were conducted with educators, administrators, and television engineers. These people were directly involved in developing the use of television at USU and the Uintah Basin Center. The teaching models were considered for use at USU, the Uintah Basin Center, and other continuing education centers as they may develop in the state.

These resource people developed the criteria for the teaching models and suggested feasible working arrangements for the models which were then developed by the investigator.
Interview of Person Responsible for Development of Course Subject Matter

An interview was conducted with either the professor assigned by the department to teach the television course, committee members who had been appointed to develop the television course, or the head of the department offering the television course. This interview took the form of:

1. A briefing to acquaint the person involved with the development of the course with the facilities as they now exist at USU and the Uintah Basin Center.

2. A presentation of television teaching utilization models as proposed ways of effectively utilizing their television course. These models were not proposed as the answer but as suggested ideas that could be adapted to individual courses and circumstances.

3. A discussion of the problems which were apparent in adapting the course to television.

From these discussions and interviews the investigator determined specific problems in individual courses, especially problems in utilization. The type of model that may be used for each course was determined so that preparation could be made and every facet of utilization would "dovetail" as a unit at the time of presentation.
CHAPTER VI
FINDINGS AND DISCUSSION OF CLOSED CIRCUIT AND BROADCAST MEANS OF INSTRUCTION

Televised course material may be presented either by a broadcast system or through a closed circuit system. Broadcasting of the course involves the use of a licensed educational television station in which the signal is broadcast to the commercial television receivers within transmitting range. The closed circuit is a private communication system. This can take the form of microwaving the program from a production studio to the instructional institution, distributing the program from within the school to rooms through a radio frequency or video system, or playing a tape of the program in a classroom from a video tape recorder to a receiver in the classroom.

One form or another of the closed circuit method rather than the broadcast method is employed at most institutions of higher learning. As reported by Tarbet (1961) and others there are a number of advantages of closed circuit television:

1. It is possible to broadcast several programs simultaneously.
2. It provides versatility and flexibility in planning the use of the program.
3. It does not require a licensed television station to relay the program.
4. The equipment used is much cheaper than broadcast equipment which must meet Federal Communications Commission (FCC) specifications.
5. Only those persons for whom the course is intended see the
presentation.

The major disadvantages of closed circuit television are:

1. There are no established standards for closed circuit television equipment. Because there is a large variety of equipment available, the compatibility of the recorder and playback equipment are a major concern.

2. There must be an operator to run the playback equipment at the receiving institution.

In comparison, the broadcast system for ITV offers some advantages:

1. It reaches a large number of people either through very-high frequency or ultra-high frequency commercial television receivers.

2. No operator is needed to run the equipment at the receiving end.

3. It meets FCC standards of quality equipment.

The major disadvantages of the broadcast system include:

1. The equipment required is costly.

2. Classes must be taught according to the broadcast schedule which limits flexibility of programming.

3. Only one course can be broadcast at a time.

4. There is additional expense involved in maintaining a broadcast station.

With the advantages and disadvantages of both systems understood, the investigator examined the use of the two systems at the Uintah Basin Center and USU. There is no direct broadcast or closed circuit connection between the Uintah Basin Center and USU. There is a proposal which would make it possible for the Uintah Basin Center to receive programs transmitted from USU at designated times during the day over a broadcast system. Utah State University's KUSU-TV would be
connected to KUED-TV, a licensed educational broadcast station owned by the University of Utah. Through the translator network operated by KUED, USU's signal would be broadcast throughout the state of Utah.

The reception of KUED is adequate at Roosevelt, but at Vernal there is a line which runs repeatedly through the picture. Television reception at Vernal is via a community cable system and the television signal pickup equipment receives interference from another channel on the KUED frequency. There is presently nothing being done to correct this problem.

Even if it were possible to broadcast over the state translator network, the present hours of instruction at the Uintah Basin Center are in direct conflict with the existing programming of both KUED and KUSU-TV.

Would broadcasting ever be a desirable method at the continuing education centers? Yes, if the number of continuing education centers reached the point where it would be very expensive to duplicate the course on tapes and ship the tapes to the centers. By using a broadcast method, the programs could be beamed to the centers in the early morning hours and technicians at the centers could record the program on video tape. These programs could then be replayed at the scheduled course time. However, at the present time even this proposal has some disadvantages. Unless all signal translators were working to perfection, the picture quality could be reduced. In addition, the broadcasting and re-recording of a television presentation reduces picture quality.

Since the broadcast system is not completely operational and there are not enough continuing education centers to warrant the cost of broadcasting, its use is not currently practical. With the problems noted in the broadcast system, it seems desirable that a closed
circuit method be used at the Uintah Basin Center. The Uintah Basin Center will then have flexibility of scheduling and the other benefits noted for closed circuit television.

Closed circuit is also the method being developed at USU. The university recognized that this is the best way of overcoming scheduling problems.
CHAPTER VII

FINDINGS AND DISCUSSION CONCERNING THE UTILIZATION OF TELEVISION AT THE UINTAH BASIN CONTINUING EDUCATION CENTER

The following points will be discussed concerning the Uintah Basin Center:

1. The present instructional procedures at the Uintah Basin Center.
2. Existing physical facilities at Roosevelt.
3. Existing physical facilities at Vernal.
4. Conclusion of the physical facilities at the Uintah Basin Center.
5. The teaching utilization models for the Uintah Basin Center.

Present Instructional Procedures

Having determined that the closed circuit method was best for the present, the investigator interviewed Mr. Delbert Purnell (1968b), coordinator of the Uintah Basin Center, and determined the present instructional procedures needed for background to develop closed circuit courses.

Mr. Purnell's office at Roosevelt provides the public relations program of the Uintah Basin Center, is responsible for registration of students, and supervises and coordinates classroom instruction. Mr. Purnell has organized a public relations program to promote course registration. Each course must meet the minimum student enrollment of ten before it is finally offered.

Presently the courses are taught by professors who "fly-in" from USU and other contracted universities or by resident teachers. The
1967-68 resident staff was composed of two USU graduate students and two resident teachers. The resident instructors begin teaching their courses at 4:00 p.m. at the Roosevelt and Vernal high schools. The professors flying in do not arrive until shortly after 4:00 p.m. at the Roosevelt Municipal Airport. Professors teaching courses at Vernal then take a waiting car and drive the 27 miles to Vernal where they eat and begin teaching their classes at 5:30 p.m. Professors teaching at Roosevelt also eat and begin teaching at 5:30 p.m.

Classes are presently taught in the following manner. A five credit course is taught twice a week for the equivalent of 2 1/2 hours at each meeting. This time includes two 10-minute breaks. A four credit course is taught once a week for four hours. A three credit course is taught once a week for three hours. One credit courses are taught once a week for one 50-minute period.

Mr. Purnell schedules the classes to allow the greatest number of students to take the courses offered. If the need arises, a second session of instruction can begin at 8:00 or 8:30 p.m. when the 5:30 session concludes. When there is approximately an equal number of students enrolled in a course from both the Vernal and Roosevelt areas, it is sometimes the policy to have the class meet half the time in each community.

The present system was adopted because it did not require the students or professors to meet every night of the week. It also provided the students with the opportunity of taking a full load of courses if so desired.

Mr. Purnell's office also coordinates and acts as a liaison between professors and students. For example, if the professor cannot
fly in for a course presentation, Mr. Purnell's office calls certain students in the class and they use a pre-designed call list to notify all other students in the class. Mr. Purnell works with a citizens' committee that advises the Uintah Basin Center and discusses problems and innovations with them.

The courses have been taught principally at the Union High School in Roosevelt and the Uintah High School in Vernal. The rooms used in these buildings are rented from the school districts by the Uintah Basin Center for $1.50 per room per hour. The head custodians at each school are contracted to prepare the rooms needed.

The present agreement with the school districts provides for use of the general audio-visual equipment in the building. Persons needed to operate this equipment have, on occasion, been supplied through the head custodian. The custodian at Vernal is responsible for the stage crew and part of their assigned duties is to learn how to operate the audio-visual equipment for teachers at the high school. For $1.25 per hour these students can come in the evening to provide these services for the Uintah Basin Center.

In the present agreement with the school districts, no consideration is made for the use of television, even though both high schools have some equipment. Present class scheduling practices and the fact that courses are taught in two locations 27 miles apart are points to be weighed in developing a closed circuit instructional program.
Existing Physical Facilities at Roosevelt

The physical plant

Union High School was built in 1951. It is located in the east end of town three blocks off Main Street. The north side of the building runs parallel to Highway 40. The building is 1/4 block off the road and even heavy truck traffic does not produce a disturbance in the classroom. There is adequate parking for a large number of cars, but parking could be a problem if high school athletic events were scheduled at the same time as continuing education classes. The building has 15 classrooms, a library, and a gymnasium (Figure 4). In addition to this main building, three other buildings are located on the campus. These include a shop building, a temporary building used as the cafeteria, and a building presently under construction which will house courses in business, automotive technology, electronics, and other trades.

The main building is basically a block structure. Tiled hallways have ceilings several feet lower than the ceilings in the rooms. The space above the hall ceilings can be used as a cable duct to string cables to individual classrooms. Walls in the classrooms are of wood and plaster, and each room has one wall of windows ten feet high. The continuing education program has used most classrooms in the building.

Existing television equipment

Union High School has two 23-inch television receivers modified to receive either an off-the-air broadcast signal or video signals from a video tape recorder. One of the receivers is located in the audio-visual room and the other is used by the special education department.
Figure 3. Floor plan of Union High School
The school has two movable television carts on which the bottom of the television monitors stand 52 inches from the floor. A shelf on the carts below the monitors provides a place for a video tape recorder. Having the video tape recorder and monitor together simplifies the wiring system and means less jostling and moving of the equipment which might cause it to malfunction.

The school has three television antennas and a console television receiver. A small television camera with a zoom lens is also part of the equipment. The school also has one Ampex 6000 video tape recorder. There is another video tape recorder in the school district.

At present the athletic department is the principal user of the equipment. The coach for basketball and track has trained a student to assist in taping athletic events and to help in the training of athletes. The speech department also tapes student speeches for training purposes. Although this equipment is not heavily used, scheduling of use would be needed to avoid conflicts.

Arrangements for the use of the television equipment need to be made if it is to be used by the Uintah Basin Center.

**Existing telelecture equipment**

During the fall of 1967, telelecture equipment was installed in room 24 of the high school. Telelecture is an amplified telephone lecture. In other words, it is a lecture given by a speaker or lecturer into a telephone system and amplified to an audience on the listening end of the line. It is possible for those in the audience to respond in two-way communication with the lecturer. Telelecture may be used for feedback purposes with television also.
The equipment was installed in room 24 because there was already a phone connection and the telephone company used this line for the telelecture equipment. The equipment consists of a telelecture portable conference set, two eight-inch speakers, and a control unit which are rented from the telephone company for $35 per month. The present microphone is an Electravoice 642 which is highly directional and is rented for an additional cost of $3.00 per month.

With this equipment a professor located on the USU campus, for example, can conduct a class with students in Roosevelt. Further details on telelecture at the Uintah Basin Center can be found in "Telelecture and its Problems at the Uintah Basin Continuing Education Center," unpublished report by Gordon M. Taylor (1968a). Copies are in the hands of Jerry Allen, manager of KUSU-TV at USU; Dr. Lloyd Drury, associate director of continuing education of the Extension Department at USU; Mr. Delbert Purnell, coordinator of the Uintah Basin Center; Dr. Owen Rich, member of the Utah Coordinating Council of Higher Education; and Mr. Dan Higgs, employee of the telephone company in Salt Lake City, Utah. A further publication by Taylor (1968b) entitled Let's Try Telelecture at Continuing Education Centers describes effective ways of using telelecture and suggests ideas for using it in connection with television.

One of the present problems with the telelecture equipment at Roosevelt is its location. The information in Figure 4 indicates that room 24 is directly across the hall from the gymnasium. The noise from events taking place in the gymnasium disturbs the courses taught across the hall. It is recommended that the telelecture equipment be moved to
the north end of the building to either room 7 or 8. It may also be desirable to wire either of the science rooms—chemistry or biology—for telelecture so it can be used with science courses. If the telelecture system can be perfected, it can provide a very vital and immediate means of feedback, and feedback has been tagged the "missing ingredient" in many television courses.

With a background on the general description of the plant and the existing television and telelecture equipment, the investigator surveyed the physical facilities in the individual rooms at Union High School to determine the rooms which can be most easily adapted for television course presentation.

Physical facilities of individual classrooms

The survey results of physical facilities in individual classrooms are reported in Table 9. Room 1 was not surveyed for television because this is the cooking laboratory and with no regular seating is undesirable for television instruction. Room 13, the special education room, also was not surveyed. This is a small classroom and because of its present use could not be used regularly for a television classroom.

Each of the key points of the physical survey has been rated in Table 9 as adequate, inadequate, or non-existent. An "x" signifies the type of lighting, type of seating, or other special problem.

Natural light control. All of the rooms have adequate control for television viewing except room 9 which is the band room and room 14 which is the art room. These rooms have no means of shielding natural light coming into the rooms. All of the other rooms have venetian blinds that can easily be adjusted to control natural light. With the artificial lights turned off, daytime light can be reduced to the
Table 9. Results of physical facilities survey of individual classrooms at Union High School.

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<tr>
<th>Building</th>
<th>Room number</th>
<th>Natural light control</th>
<th>Artificial light control</th>
<th>Fluorescent</th>
<th>Incandescence</th>
<th>Color of room</th>
<th>Number</th>
<th>Chair</th>
<th>Table-arm chair</th>
<th>Table and chair</th>
<th>Fixed</th>
<th>Movable</th>
<th>Ventilation</th>
<th>Acoustics</th>
<th>AC outlets</th>
<th>AV materials</th>
<th>PA system</th>
<th>Storage</th>
<th>Direct video</th>
<th>Radio freq.</th>
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</table>

Key: A = adequate  I = inadequate  N = none  x = type or other
Artificial light control. Inadequate artificial light control appears to be in direct correlation with those rooms which have fluorescent light. The rooms with fluorescent lights are rooms 2, 22, and 12, the audio-visual room. All of the lights turned on in these rooms produce an illumination of 125 footcandles. In the audio-visual room one bank of lights in the front can be turned off, which reduces the light level in this area to 16 footcandles. The light level remains high in the rear of the room. This would permit television use as long as there was not high contrast around the television monitor and there were no glare problems.

The incandescent light in the rest of the rooms produces a general light level of 32 footcandles with the lights turned on and the blinds pulled. All of the rooms with incandescent lighting have adequate light control. However, these incandescent bulbs are being replaced with fluorescent fixtures as funds are available. This will raise the light level in these rooms and the control of artificial light will then become a major problem.

Color of the room. All of the rooms at the school were light in color. This would be excellent for television viewing because a high contrast between the picture on the monitor and the surrounding walls would not be produced.

Seating. Most of the rooms surveyed had a seating capacity of 30-40 students. Room 9, the music room, holds 80 chairs and room 12 seats 72. The type of seating in the individual rooms determines how many monitors should be used. The table-arm chair is most common at the high school. With a 23-inch monitor, a maximum of 22 students could be arranged around the monitor (Table 7). For classes up to
this size one monitor would be sufficient, but beyond this point another monitor needs to be added. Room 9 has movable chairs and two monitors would be adequate here with the chairs properly arranged. Two monitors would also be adequate in rooms 22 and 23 which have tables and chairs. This is possible because all of the seating is movable. The only seating that is fixed is that in the audio-visual room, but this is arranged in a semicircle facing one corner of the room. The seats are elevated as they extend to the rear and the room is designed for a clear line of vision for each student.

Ventilation. Room 3 was the only room with air conditioning. The rest of the rooms have forced air ventilator-heaters. These ventilators do move some air, but when the sun is shining in the west windows of rooms 14, 16, 18, 20, 22, 24, and 26, the temperature reaches 80 degrees. Ventilation can be aided by opening the windows, which open out. Because of the venetian blinds air can circulate much more readily throughout the room than if heavy drapes were used. However, when a breeze is not blowing, the rooms can become uncomfortably hot. Careful supervision of the rooms to control ventilation would be necessary.

Acoustics. All of the rooms had adequate acoustics. All had tile on the ceilings and room 12 had tile extending part way down the walls.

AC power outlets. Each room received a rating of "adequate" if it had a single outlet at the front of the room. The two monitors needed can receive enough power from one outlet. Monitors can be arranged properly for all students to have a good viewing angle by using extension cords.

Audio-visual materials. Rooms received an "inadequate" rating because they did not have a screen in the room. Most audio-visual aids require screens for viewing. However, portable screens are available.
Public address system. None of the rooms had a complete or adequate sound system. The audio-visual room did have speakers in the ceiling for motion picture sound projection. However, with only two monitors, it is not necessary to have a sound system. The sound can be fed directly from the speakers in the video tape recorder at the front of the room.

Equipment storage. There is no equipment storage space in any of the rooms. Most of the existing equipment is stored in the front of the audio-visual room. Any additional monitors would have to be stored on carts in the classrooms where they would be subject to handling by the high school students. It is absolutely necessary that the sensitive and expensive video tape recording equipment be properly stored.

Distribution system. The building has no television distribution of any type except for the four antennas on the roof, which provide a signal to four separate rooms.

Summary. Rooms 1 and 13 are inadequate for television use. Rooms 9 and 14 must be considered undesirable because the natural light cannot be controlled. Rooms 2 and 22 which have fluorescent lights that cannot be controlled must be considered questionable. Since room 2 is the chemistry room and has 18 laboratory stations, it might be a valuable room for television instruction. But adaptations would have to be made for the control of artificial light.

Rooms 3, 5, and 7 could all be used for television. In addition, room 7 has 15 language lab stations that could be used for teaching languages or other courses requiring special audio facilities. Room 12 could be used but lighting needs to be carefully checked. Rooms 16, 18, 20, 22, 24, and 26, although adequate in most categories, can be uncomfortably warm and should be regarded as second choices. However,
room 16 has 12 biology lab stations that may be needed in some television courses. Rooms 22, 24, and 26 are situated near the gymnasium and courses could be disrupted by high school events carried out during the same time as continuing education classes.

The facilities at Roosevelt need only minor adaptations for the initial use of television. As the program expands, however, further improvements will be necessary. The present facilities can be further adapted to the use of television at a nominal cost.

**Existing Physical Facilities at Vernal**

**The physical plant**

Uintah High School at Vernal is located at the extreme west end of town. It is two blocks north of Highway 40. There is no other housing west of the building so classes are not disturbed by traffic noise. The building has a large amount of parking but this is all used during major athletic events. However, immediately across the street from the school is a Church of Jesus Christ of Latter-day Saints Stake Center which can provide additional parking area. Parking need not be a problem for students attending classes during high school athletic events.

The entire building including the hallways and walls in the classrooms is made of brick. Each room has one wall of windows extending from the ceiling to three feet from the floor. The heating and ventilating system is directly below these windows. The heating tunnel runs around the outer perimeter of all the rooms and may be valuable for installation of cables.

The building has two wings used for general classrooms (Figure 5). There are 28 classrooms in the building. The north wing is used for
* Cable connection

Figure 5. Floor plan of the Uintah High School
evening vocational training classes and the south wing is used by the Uintah Basin Center. The regular high school vocational courses are taught in a third wing located in the northwest area of the plant. Rooms 18 and 19 are used by the homemaking department. Room 20 is the health room. Rooms 3, 4, and 5 are the chemistry, biology, and electronics classroom-laboratories. Room 12 has a 30-station portable language laboratory in it.

Existing television equipment

Vernal receives its broadcast television signal by cable. The city is situated in a valley and cannot receive good signals by conventional television antennas. A cable is used to bring the television signal to the city. A coaxial cable was installed by the Community Cable Company and the high school was wired with cable. There are 26 rooms in the high school that have been wired to the cable and these are shown in Figure 5. The cable extends from a box in the center front of the wired room enabling easy attachment of the television receiver.

The school has five 23-inch monitors adapted for use with the cable and five carts of the identical type used in Roosevelt. Four of the five monitor and cart units are housed with individual departments. The other unit is in the custodian's office and is a "floating" set which can be used by any department as needed. The community cable and the school distribution system connect in a custodian's supply closet just south of the faculty room.

The television receivers are not used extensively within the school because the reception of the education channel KUED has an objectionable band which runs repeatedly through the picture. Before the translator network discussed earlier can be used at Vernal, this
The community cable system at Vernal operates via a radio frequency system to transmit various broadcasts. For the present a broadcast system will not be used at the school, and the cable cannot be utilized. However, if the number of courses taught by television at the Uintah Basin Center increases, it would be practical to have one distribution point. This can be accomplished by disconnecting the school system from the community cable system. Radio frequency modulators could then be attached to the school line and video tape recorders connected to the line at a cost of $300 each. The same cable which now exists could then be used to teach ITV.

Further television equipment within the school district includes a camera and Ampex 6000 video tape recorder. A television receiver travels with the equipment. None of this equipment is stored at the high school. It is used principally for athletic events and is used throughout the district. It is available at the high school only on special request.

Some arrangements must be made with the Uintah School District for the use of the video tape recorder and the receiver that goes with it or the Uintah Basin Center must purchase equipment if television courses are to be taught.

Although the existing television receivers in the rooms are adequate for off-the-air reception, they would not work unless modifiers were purchased to change the direct video signal of the video tape recorder to a radio frequency signal. As stated before, this modifying equipment would cost about $300. This same $300 would purchase two 23-inch monitors to use with the video tape recorder without
modification. Until the need arises to teach a number of courses at the same time, it is not desirable to use the existing television receiver and cable. A video tape recorder and monitor are the best answer.

**Existing telelecture equipment**

Room 1 is wired for telelecture. The telephone wire connecting the telelecture equipment was strung through an air duct which runs around the outside perimeter of the building. It would be easy to expand this system to other rooms via the duct. The equipment at Vernal consists of a speaker-phone system unlike that at Roosevelt. There are two small two-inch speakers that are set out on desks in front of the students and four small microphones connected in a series that are strung around the room. The equipment has a small control box which has an on-off switch and a volume control knob. Finally, the equipment has a jack plug to connect the telephone and a 110 volt AC line to provide power to the speakers and microphones. Approximately three students can use each microphone effectively. Further details are found in the unpublished report by the author referred to earlier (Taylor, 1968a).

**Physical facilities of individual classrooms**

There are 28 rooms in use at the high school but only 21 of these were surveyed for possible use by television. Rooms that were not included were those in the northwest vocational wing including rooms 21, 22, 23, 24, and 25. Room 18 was not included because it has the kitchen facilities. The band and choral rooms also were not included. Emphasis was placed on the south classroom wing which is presently assigned to the Uintah Basin Center. The north wing was also examined.
The results of the physical facilities survey for individual classrooms are reported in Table 10.

**Natural light control.** All of the classrooms in the south wing had adequate natural light control. Venetian blinds were used. However, the classrooms in the north wing had only tinted glass, and although this limits the light glare, it is not enough control for television viewing.

**Artificial light control.** The artificial light control was rated "inadequate" because fluorescent tubes used in the entire building produce an illumination of from 64-175 footcandles. The rooms surveyed had two switches to control artificial lights. By shutting off part of the lights, monitors could be arranged in the subdued area of light and used for viewing. The rooms should be examined carefully with the monitors turned on to find the best placement for them. The audio-visual room had this same problem with control of artificial lighting.

**Color of room.** All of the rooms were in pastel shades which would provide adequate background for monitors.

**Seating.** The seating capacity in the rooms ranged from 30-40. Most of the seating took the form of movable table-arm chairs, while some of the arms took the form of a small desk which was an attached unit. Rooms 1, 13, 20, and the art room had movable table and chair combinations. The seating in the audio-visual room was fixed as were the desks and chairs in room 20.

**Ventilation.** Each of the rooms was given an "adequate" rating because the heater-ventilation system used in the rooms moved an adequate amount of air. However, if the rooms did become hot, the windows opened out and enough air could be circulated in the rooms.
Table 10. Results of physical facilities survey for individual classrooms at Uintah High School.

<table>
<thead>
<tr>
<th>Building</th>
<th>Room number</th>
<th>Lighting</th>
<th>Seating</th>
<th>Seating</th>
<th>Ventilation</th>
<th>Acoustics</th>
<th>AV outlets</th>
<th>AV materials</th>
<th>PA system</th>
<th>Storage</th>
<th>Direct video</th>
<th>Radio freq.</th>
<th>Other</th>
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Key: A = adequate  I = inadequate  N = none  x = type or other
without affecting natural light control.

**Acoustics.** All of the rooms had acoustical tile on the ceilings. The floors were cement covered with linoleum.

**Audio-visual materials.** About half of the rooms had screen, but the custodian said that the school had screen available for any room.

**Public address system.** The building has no public address system except for the school intercom for which the rooms were especially equipped.

**Equipment storage.** None of the rooms had adequate storage for monitors. Those rooms that had monitors in them had them standing in a corner on movable carts with their backs to the classroom.

**Distribution system.** There was a radio frequency distribution system wired into the school. As has been explained, this system could be used if modified.

**Summary.** Rooms 11-17 should be eliminated from television consideration because of lack of natural light control. Rooms 19 and 20 could be used but they are located near the gymnasium and would be subject to interruption by events carried on in this area. This leaves rooms 1-10, the audio-visual room, and the art room as the best locations for television viewing, although monitors must be carefully placed because of the partially controllable artificial lighting. These rooms hold a maximum of 40 students, and two 23-inch monitors would be sufficient for each room. One television monitor may be all that is necessary as long as class enrollment does not go beyond 20 students.
Conclusion of the Physical Facilities at the Uintah Basin Center

The facilities at both Roosevelt and Vernal had some rooms that could be used for television with only minor adaptations. The video tape recorder and two monitors at Roosevelt could be used. None of the equipment at Vernal could be used in its present state without modification. The obtaining and testing of proper equipment are major problems. Equipment must be evaluated well ahead of the television presentation date.

Responsible persons must be provided to set up the equipment and arrange the rooms prior to the telecourses. Room arrangement is especially important at Vernal where seating would have to be adjusted because of the present lighting conditions. There is no one presently assigned from USU or the Uintah Basin Center to check out equipment or room arrangement.

The Teaching Utilization Models for the Uintah Basin Center

Technical problems considered in developing the models

A closed circuit system incorporating the use of a video tape recorder and monitors is proposed as the best means of televising courses at the Uintah Basin Center at present. Humphreys (1968b), chief engineer of the Radio and Television Center at USU, identified a number of technical problems in setting up the equipment for the Uintah Basin Center.

The first problem, Mr. Humphreys indicated, is that of the equipment needed at each facility at the Uintah Basin Center. Two
video tape recorders and two adapted television receivers must be provided, one for each high school. The necessary coaxial cables must be provided between the video tape recorder and the adapted television receiver.

Without special modification equipment, it is impossible to run the sound from the video tape recorder into the television monitor. It is, therefore, more economical to use the speakers in the video tape recorder for playback purposes. As long as the classes remain small, no more than two receivers will be needed in any one room and sound playback from the video tape recorder will be adequate.

A stand-by video tape recorder and receiver for each high school is recommended. An additional video tape recorder which could "float" from one facility to another to provide further back-up when one of the machines is being repaired also needs to be purchased. As the number of televised courses increases, the number of receivers and playback units should also increase.

The second problem in setting up an effective closed circuit system is purchasing and checking the equipment. All of the equipment should be purchased several months prior to its actual use to provide time to make necessary connections between the video tape recorder and the receivers.

A third problem involves the operators of the equipment. Mr. Humphreys emphasized that there must be trained television equipment operators to manage the equipment. The operators do not need the background of technical engineers, but they do need some special instruction. The manufacturers of the machines offer a six month training course on the technical aspect of the equipment. The Elsco
Company of Salt Lake City, Utah, offers a training course on the fundamentals of closed circuit television. This course is not a technical course but is designed for persons who will be operating television playback units. The course outline includes television fundamentals, television video tape recording, audio systems, video systems, and a workshop. The course costs $25 and is conducted for two days in Salt Lake City. Another possibility for training would be to offer workshops conducted by the television engineers at USU to persons who will operate television equipment. The person operating the equipment must be trained, whether it be by the manufacturer, through a course similar to the one offered by Elsco, or in a workshop conducted at USU.

One person should be responsible for the equipment. In addition, there may be other trained operators who can run the equipment for a particular course. For the good of the equipment it is not desirable to have the operators changing constantly.

The final problem deals with the repair and upkeep of the intricate equipment. Mr. Humphreys feels that it would be highly unlikely that a person qualified to work on video tape recorders could be found in remote areas of the state. If a machine does not work properly, it should be sent to Salt Lake City. This further supports the need for a back-up machine if one is not operating properly.

The teaching models

With an understanding of the technical problems of operating a video tape recorder, the investigator made a trip to the Uintah Basin Center to visit with Mr. Purnell (1968b) and to discuss possible teaching utilization models.
Mr. Purnell suggested to the investigator a number of ways of handling the course as he saw them from his position as coordinator of the Uintah Basin Center. He and the investigator then developed possible teaching utilization models that could be used with closed circuit television at the Uintah Basin Center. The models included:

1. Professor traveling to the Uintah Basin Center to use television to supplement his own television course. The tapes would be on file at the Uintah Basin Center so that class could be held if he could not attend.

2. Use of a graduate student in the subject area of the course to discuss problems and answer questions in relation to the video tape. The graduate student must be of a mature and academic caliber. Students are looking for instructors who have a professional air and conduct.

3. Resident teacher aids who would serve as the assistant in the classroom when the televised lesson was presented. These residents may be one of the following types:

   a. A person who is qualified to teach the course in the subject area and is teaching at the present. For example, a high school mathematics teacher could aid with a lower division mathematics course taught by television.

   b. A person who is qualified in the subject area and has had teaching experience but is not teaching at the present time. An example would be a mother with a degree in English who was interested in part-time work.

   c. A person who has teaching experience but would be teaching out of his subject area. An example might be a coach serving as a teacher's aid in a sociology course.
d. A person with no teaching experience but highly trained in the subject area. An example would be a geologist to serve as a teacher's aid in a geology course.

e. A retired teacher who may or may not be in the subject area of the course.

f. A resident who has already had the course, or a designated class leader.

4. Equipment operator who would simply turn on the tape and make sure the equipment was operating.

Mr. Purnell recognized that all of these people, from the professor to the equipment operator, must be trained through some type of special instruction. Following the interview, the investigator analyzed the advantages and disadvantages of the models as they were developed in light of the teaching situation and good learning techniques.

Professor and television course. The advantages of the professor traveling to the Uintah Basin Center to work with his own course are summarized as follows:

1. There would be personal contact with the students.

2. The professor has on hand the resource material on the television tape which he could not bring to the students otherwise. An example would be a microscopic specimen for a discussion in physiology.

3. If the professor could not make it to the class, the tape would be there so that continuity of course instruction would not be interrupted. This, however, would require a trained equipment operator who could handle the emergency situation.

4. The professor knows what he would like done in discussion and follow-up activities and would not have to instruct someone else on these points. If the professor cannot travel to the Uintah Basin
Center, the telelecture equipment may be used for discussion purposes.

The disadvantages of the professor traveling to the Uintah Basin Center include:

1. The professor must be trained to use the video tape recorder or an equipment operator must be hired to run the equipment.

2. The Uintah Basin Center would have to assume the cost of both recording and playback of the tape and travel expenses of the professor.

3. Economy of the professor's time is not realized. In fact, it would likely require more time to tape the television presentation plus conduct follow-up activities at the Uintah Basin Center with each class.

This model has been discussed only in terms of the professor being with the tape. Another possibility would be to design the course material so that the professor could visit the class once a week to carry on class discussion rather than be there every time. Advantages to this would be that the professor could see how his course was being accepted by the students and get feedback as to how the students were understanding the concepts presented. A disadvantage would be found in the present teaching situation used at the Uintah Basin Center. For a 2 1/2 hour presentation two 50-minute tapes would be used. This would leave an extra one-half hour without anyone to instruct the class. A solution may be to have the class meet to see two tapes one day and then meet for three hours the second day to see two tapes and have a discussion with the professor.

Mr. Purnell feels that it is very important to have the professor meet with the students. He should come at least the first one or two meetings of the course. Mr. Purnell explained that the Uintah Basin Center was extension continuing education. The people at the present
time are registering by choice. If they do not like the course, they can as easily drop it as take it. The professor has a certain responsibility to see that the course is started in the most effective manner and that the students accept it.

**Graduate student and television course.** The second model involved the use of a graduate student to work with the television teacher. The graduate student could either commute to the Uintah Basin Center or reside there. Mr. Purnell would prefer to have the graduate student reside there to eliminate the problems of interrupted continuity due to cancellation of airplane flights. Dr. Lloyd Drury (1968), associate director of extension continuing education, favors using graduate students because he feels this is excellent experience for them. He also recognizes that it would be costly to have a graduate student reside at the Uintah Basin Center to teach a single course.

There are a number of advantages in using a graduate student:

1. He will presumably know the professor and how the professor conducts a course, thereby providing an effective team member.

2. He probably will have had the course himself and will be able to carry on discussions better than someone who has had no experience with the course material.

3. If the graduate student resides at the Uintah Basin Center, course continuity will be assumed.

4. He may be able to conduct graduate research in subjects relating to the Uintah Basin Center or other areas unique to the locality.

There are also disadvantages to be considered in using a graduate student:
1. It may be difficult to find someone qualified in the area and also capable of presenting the academic image that Mr. Purnell feels is so important.

2. The graduate student should be qualified to teach more than one course to justify the cost of living there. It would be uneconomical to pay him to teach one course unless his graduate thesis could be carried on at the same time.

3. Because of the graduate student's inexperience with television, he must be trained through seminars how to work effectively with television and the operation of equipment. The attitude of the team teacher in the classroom has marked effect on the acceptance of the televised presentation by the students.

4. The graduate student would probably be assigned for a year or less. This would require continuous training of these aids to utilize both instructional material and equipment.

**Resident teacher aid and television course.** There were several forms of resident teacher's aids developed as the third model. The advantages of these persons are considered together:

1. The aid resides in the area and would be able to provide continuous instruction.

2. In most cases, the aid would be qualified in the subject matter of the course.

3. This experience would provide part-time work for these aids and may serve as a stimulus to keep better trained and qualified teachers in these outlying areas.

4. These aids know the people of the area and how best to communicate with them.
5. This would be an opportunity for them to work with a new medium and may possibly aid them in their regular teaching profession.

There are also disadvantages of using residents as teacher's aids:

1. These aids may not be looked upon as the "professor" type by others in the community.

2. The aid may not always be qualified in the subject area.

3. The aid may not know the professor or his method of instruction.

4. The aid may not be familiar with the utilization of television in course instruction. He could be trained as the graduate student is trained through seminars conducted at USU. This would provide the resident the opportunity of meeting and working with the professor of the televised course so they could work together as a team.

**Equipment operator and television course.** The fourth model consisted simply of an equipment operator, and there are some advantages to this situation:

1. The operator knows the equipment and is trained in using it.

2. If the course outline does not require a discussion leader or a person for follow-up activities, the equipment operator would be sufficient.

There are disadvantages to using the equipment operator only:

1. He is not qualified to aid in instruction of students. He could perform only non-instructional tasks such as collecting papers, passing out handouts, or taking roll.

2. His job is to see that the equipment works and may, unless cautioned, display attitudes that would not provide a positive learning situation for students.
These are four model approaches to the utilization of the television course at the Uintah Basin Center. Any of the four could be used, as well as adaptations or combinations of them. For example, the equipment operator may be used and on certain occasions the professor may travel to the Uintah Basin Center in person. Another possibility would be for the professor and graduate student to alternate in traveling to the area and still have the equipment operator there to run the video tape recorder.

Mr. Purnell indicated that he would be happy to promote the use of television as a means of instruction. He spoke of the merit of television in providing a continuity of course instruction which has been difficult this year. But he has some reservations on the use of television. One of these is that people at the Uintah Basin Center have never had any formal course instruction by television, and they do not know what to expect from it. An orientation and public relations program needs to be organized in relation to television. Mr. Purnell would like to see a demonstration or discussion outlining the advantages of television and its proposed use at the Uintah Basin Center. This would include a presentation of the utilization models which have been developed.

Mr. Purnell would like to see each televised course evaluated and tested at the Uintah Basin Center. The method of utilization as well as course material should be evaluated.
CHAPTER VIII
FINDINGS AND DISCUSSION CONCERNING THE UTILIZATION OF
TELEVISION AT UTAH STATE UNIVERSITY

The following points will be discussed:

1. The closed circuit television facilities at USU.

2. Physical facilities of classrooms with a seating capacity of at least 100 but less than 300.

3. Physical facilities of auditoriums with a seating capacity of at least 300.

4. Teaching utilization models for USU.

Closed Circuit Television Facilities

The closed circuit facilities at USU are operated by the Radio and Television Center. The equipment includes a production studio housed in rooms 373, 376, and 378 of the USU library. These rooms house two cameras, a telelectern, a slide and film chain, and most of the equipment necessary to record televised courses.

The closed circuit equipment can presently be tied to the university's cable system, which is a direct video distribution system. The cable system consists of two cables, one for audio and one for video transmission. This cable system is diagramed in Figure 6. The present distribution system can be fed from either the library production studio or the Radio and Television production studio. Therefore, productions can be recorded in either location and relayed to the other studio. This cable system is extended to nearly every major building on campus, but none of the buildings through which it
Figure 6. Existing video distribution system at Utah State University
is extended has any facilities to view ITV.

Since this system is direct video, only one signal can be sent at a time. If television classes were taught extensively on campus, the existing cable system could not be used because more than one signal would need to be sent at a time. In fact, the cables are presently used for the recording of televised courses and sending the relayed picture and sound from the studio in the library to the Radio and Television Center. This ties up the existing cable and leaves none for relaying television courses to classrooms. Humphreys (1968c) recommends the installation of an additional cable to develop a radio frequency system. The recommendation has been presented to the university administration and calls for the system to be installed to the Forestry-Zoology, Old Main, and Agricultural-Science buildings. Until this cable is installed, it may be necessary to take a video tape recorder into the classroom and feed the signal into the receiving units there.

The use of video tape recorders may be the most economical initially, as long as the university is using only one room for televised courses. The cable costs 15 to 18 cents a foot and it would have to be run from the library to the desired building. For example, to extend the cable from the library to the Forestry-Zoology Building through existing cable runs would require about 1500 feet of cable or a cost of $250, not including installation charges. In addition, a $300 radio frequency modulator would have to be purchased to modify the direct video signal of the video tape recorder into a radio frequency signal.

The purchase and installation of the radio frequency equipment should be progressing because the need for it could arise by the fall
of 1968 and no later than the spring of 1969.

**Physical Facilities of Classrooms with a Seating Capacity of at least 100 but less than 300**

The courses selected for ITV at USU have an enrollment of between 200 and 500 students per quarter in each course. The tapes should be shown to as large a group as possible to reduce the number of playbacks required, the number of technicians required to run the tapes, and classroom teacher aids. Installation of the monitors should also be considered. Initially, it would be more economical to equip large rooms or auditoriums with monitors than to so equip the small classrooms. The expense of cable runs between classrooms also needs to be considered. Since it is the intention of the university to install closed circuit television by the fall of 1968, time is a critical factor. To equip classrooms with a seating capacity of at least 100 would be faster than equipping a number of small classrooms. It may be desirable in the future to wire smaller classrooms for television if the students prefer the smaller groupings. But for the present, economy and time dictate the use of larger classrooms.

The University of Utah has classes of various sizes using television monitors. The class sizes vary from 30 to 120 students. Classrooms with 30 students use two monitors; those with 60-80 students use four monitors; and those with an enrollment up to 120 use six monitors.

**Results of physical facilities survey**

Utah State University had 16 rooms with a seating capacity of 100 but less than 300 in the spring of 1968. The highest number of students these rooms held was 192 and most of them were just over the hundred mark. Table 11 is a compilation of the various survey points for the
Table 11. Results of physical facilities survey of classrooms at Utah State University with a seating capacity of at least 100 but less than 300.

<table>
<thead>
<tr>
<th>Building</th>
<th>Room number</th>
<th>Lighting</th>
<th>Seating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ag. Science</td>
<td>202</td>
<td>A I x</td>
<td>A 100 x</td>
</tr>
<tr>
<td></td>
<td>234</td>
<td>A I x</td>
<td>A 100 x</td>
</tr>
<tr>
<td></td>
<td>302</td>
<td>A I x</td>
<td>A 100 x</td>
</tr>
<tr>
<td></td>
<td>338</td>
<td>A I x</td>
<td>A 100 x</td>
</tr>
<tr>
<td>Edith Bowen</td>
<td>105</td>
<td>A A x</td>
<td>A 189 x</td>
</tr>
<tr>
<td>Education</td>
<td>214</td>
<td>A I x</td>
<td>A 192 x</td>
</tr>
<tr>
<td>Engineering</td>
<td>101</td>
<td>A I x</td>
<td>A 102 x</td>
</tr>
<tr>
<td></td>
<td>107</td>
<td>A I x</td>
<td>A 100 x</td>
</tr>
<tr>
<td>Family Life</td>
<td>216</td>
<td>A I x</td>
<td>A 112 x</td>
</tr>
<tr>
<td>For.-Zoology</td>
<td>204</td>
<td>A I x</td>
<td>A 100 x</td>
</tr>
<tr>
<td></td>
<td>206</td>
<td>A I x</td>
<td>A 180 x</td>
</tr>
<tr>
<td></td>
<td>302</td>
<td>A I x</td>
<td>A 109 x</td>
</tr>
<tr>
<td>Old Main</td>
<td>252</td>
<td>A A x</td>
<td>I 100 x</td>
</tr>
<tr>
<td>Plant Ind.</td>
<td>105</td>
<td>A I x</td>
<td>A 130 x</td>
</tr>
<tr>
<td>Widtsoe Hall</td>
<td>109</td>
<td>A I x</td>
<td>A 113 x</td>
</tr>
<tr>
<td></td>
<td>205</td>
<td>A I x</td>
<td>A 125 x</td>
</tr>
</tbody>
</table>

Key: A = adequate  I = inadequate  N = none  x = type or other
rooms. The same descriptive key is true for this table as for those tables which present information on Roosevelt and Vernal.

All rooms had adequate means of controlling natural light to eliminate glare problems. They either had no windows or windows equipped with pull blinds, venetian blinds, or door-shutters.

All of the rooms had fluorescent lighting, but this lighting in all but Edith Bowen 105 could not be adequately controlled to reduce the light level to that desired for television viewing.

All rooms except Old Main 252 had neutral coloring which was good for television viewing.

All rooms with the exception of Edith Bowen 105 had table-arm chair combinations for seating. The table-arm chairs were either movable or fixed, depending on the room.

Ventilation was adequate in the rooms except for Old Main 252 and Family Life 216.

The acoustics were generally adequate for television. All rooms except Old Main 252 had acoustical ceilings and some of the larger rooms had acoustical tile part way down the walls.

Rooms were rated "adequate" if they had a screen because the screen is the critical factor for the use of most audio-visual materials.

Many of the rooms did not have a public address system. Some had a lavaliere and single amplifier which could be used by the professor. In only Edith Bowen 105 would the present sound system be adequate for television. In other cases amplifiers would need to be enlarged and additional controls added.

There was no adequate storage space for television receivers in any of the rooms. Two of the rooms in Forestry-Zoology, 206 and 302,
have storage off the teacher's platform, but they are not large enough
to store all the monitors needed in rooms of this seating capacity.

None of the rooms have been connected to any type of distribution
system.

**Special problems in adapting television
to each building**

A summary of the facilities of each building pointed out those
special problems in the rooms which have some bearing on utilizing the
room for closed circuit television monitor use.

**Agricultural-Science Building.** This building has four rooms of
identical size and equipment that could be used for television. There
is fluorescent lighting in the rooms, but it cannot be adequately
controlled for television. For example, there are four controls which
control four different banks of lights running from the front of the
room to the back. The general light level in the rooms with all of the
banks turned on runs from 32 footcandles in the front to 125 footcandles
in the rear. By turning off the front bank of lights, the light level
was reduced to 16 footcandles which was still adequate for taking notes
in the first row of seats. This means that monitors could be placed
in the front of the room, but only one-third of the rooms could be
used for viewing. To use the rest of the room more banks of light
would have to be shut off. Students in the front would then not have
enough light to take notes or read any handout materials. Lighting
must be controlled by dimmers in order to reduce the general light
level in the room rather than the light level at specific areas. Even
though these rooms hold 100 students and chairs are movable, the 11-step
rising floors would make it difficult to arrange the students around
the monitors to the best advantage.

Six monitors are recommended for each room, two in the front and four hung throughout the room. The monitors must be mounted because there is not room for monitors in the aisles. There are no outlets for these monitors. There were two outlets in the front of the room and one in mid-floor that is used for a projector. These four rooms could only be used by adapting the lights and using hanging monitors.

Edith Bowen. Edith Bowen 105 is adequate for television and is the only room at USU that is wired specifically for television. The auditorium presently has four monitors which are mounted from the walls with two on each side. Figures in Table 7 indicate that with chairs, 36-38 students could be arranged around each monitor. The four monitors in the auditorium could seat a maximum 150 students if the chairs were movable. The seats, however, are fixed and the seating capacity of the auditorium is 189. It would be desirable to hang additional monitors from the middle of the room to bring the receiver-viewer ratio to recommended standards. There is no storage for receivers, but one or two monitors on carts could be kept in the front of the room.

At present the auditorium is not connected to the USU cable distribution system, but it does have its own playback and camera equipment operated from a room in the rear of the auditorium.

The main problem with this auditorium is that it is in the Edith Bowen Laboratory School and the school used it from 8:00 a.m. until 3:00 p.m. It could not be used for any continuous daytime classes, and the elementary school may also require its use on special occasions in the afternoon and evening. Scheduling of television classes would be almost impossible in this building.
Education Building. In Education 214 artificial lighting cannot be adequately controlled for all seats in the room. By shutting off one of the two switches in the room, part of the area can be used for viewing.

This room does not have any power outlets along the walls or in back of the room. It has an electrical outlet in the front with a strip running from it along the front. This is not adequate for the six monitors needed to accommodate 192 students in fixed seats. Storage of the monitors would be a problem. Two could be placed on carts in the front stage area, but the others would have to be hung. The sound system is a small unit that could be adapted if needed, and there are ceiling speakers in the room.

Engineering Building. The two classrooms in the Engineering Building, 101 and 107, cannot be used with their present lighting facilities. The lights are wired in parallel strips from front to back. When both strips are on, a reading of 125 footcandles is obtained. When one is turned off, there are 125 footcandles on one side and 30 footcandles on the other. Therefore, only half of the room could be used and seating is fixed so students would have to turn nearly to a 45-degree angle to watch the monitors. These rooms also lack screen, sound systems, storage, and a distribution system.

Family Life Building. Family Life has the same artificial light control problem reported in the Agricultural-Science Building. Two monitors could be used in the front, but the whole room could not be utilized under present lighting conditions. Ventilation in the room is inadequate. There is a forced air system, but the windows are also used for ventilation and they have wood shutters which must be closed.
to control natural light.

The room has only two outlets at the front which are not enough to support the five monitors needed for a class of 112. The sound system is a simple lavaliere and amplifier that would have to be enlarged if used to modify the sound of the television lecture.

**Forestry-Zoology Building.** Rooms 204, 206, and 302 in this building have the prevalent artificial light control problem. Shutting off part of the lights would enable the use of only two monitors. Room 302 has no screen. Rooms 204 and 206 have a sound system, but they need to be modified. Rooms 206 and 302 have some storage off either side of the lecture podium, but it would not be adequate for six to eight monitors on carts. If the lighting problem could be solved, these rooms would serve as adequate viewing rooms.

**Old Main Building.** Old Main 252 has adequate artificial light control by default because the light level in the room with all the fluorescent lights on is so low that it meets television standards. The reading is 32 footcandles at midday with the windows shut. The color of the room is dark and a lighter shade would eliminate contrast problems with the monitor.

Ventilation is not adequate because the windows are used for ventilation and these need to be shut to control natural light. Afternoon classes would be uncomfortable because the room is situated on the west side of the building. Acoustics may be a problem because the room has wood floors which may result in noise in the rooms below when the monitors are turned on.

The room only has two power outlets in the front and the monitors must be arranged in areas in addition to the front. There is a screen but it is only 4 feet wide, not large enough to allow all students to
view at recommended angle. The width of the room indicates the need for a lenticular screen.

**Plant Industry Building.** Plant Industry 105 has the prevalent light problem with fluorescent tubes which need to be controlled in order to use the full room for television. The room has two power outlets, one in the rear and one in the front. This is not enough for the six monitors needed for 130 students. There is no place for storage, but one or two monitors may be placed in a corner of the room. The rest would have to be hung.

**Widtsoe Hall Building.** Widtsoe Hall 109 and 205 could be used as viewing rooms provided the lighting was controlled and enough power outlets were installed throughout the room. Monitors would have to be hung, as there is no storage space and the floor rises in step-elevations.

**Conclusions**

In conclusion, it should be noted that not a single classroom other than Edith Bowen 105 is presently suitable for television monitor use. Control of artificial light in the rooms is the major problem. The goal of instructing large numbers of students by television is defeated when seats are eliminated by lighting problems.

The rooms must be connected to a distribution system so they can be fed the picture. Only Edith Bowen 105 has space available for a video tape recorder to play the tape into the room. Another problem is lack of storage for monitors. Monitors would have to be hung to alleviate this problem. Lack of power outlets is another problem and, in addition, a coaxial cable must be strung from monitor to monitor.
The most desirable situation would be to have all of the viewing rooms located in the same general vicinity. This would cut the cable costs required for installing a radio frequency system and would also reduce the costs of the maintenance of the cable and monitor systems.

It therefore appears that the best buildings to use would be the Forestry-Zoology Building and the Agricultural-Science Building. They are located near each other and have a number of rooms that could be used for television.

The technical problem of upkeep of equipment is one of the major factors in using monitors. Because there would be a number of sets operating in each room, there is a greater chance that either the video or audio unit might malfunction. George Taylor, chief electrical engineer of the Maintenance Department, is assuming the responsibility for the upkeep of the video tape recorders and monitors. However, the department using the monitors should provide some responsible person to see that the monitors are adjusted prior to each television presentation.

Putting monitors in any one of the classrooms surveyed would require continual repetition of televised programs in order to meet student enrollment. For example, using a classroom seating 100 for a course with an enrollment of 500 would require the showing of a single televised program five times a day in order for all the students to see it. Two five-hour televised courses with enrollment of 500 students would require ten hours of operation. Adding one more course extends beyond the limits for one room and more rooms must be added. There are also costs in repeated playbacks including such items as technicians to operate and maintain the equipment and wear on machinery and tapes. The best answer for these problems would be to use a large screen
projector in a larger auditorium.

Physical Facilities of Auditoriums with a Seating Capacity of at least 300

To teach a class with an enrollment of 500 students in a large auditorium by using monitors would require

25 mobile stands, 25 individual sets of controls, power outlet provisions for each receiver and a distribution maze of video or r-f cable. If the auditorium is to be used for purposes other than TV teaching, these TV receivers create a physical obstacle and provisions for their removal and storage must be made. (Zeitler, 1966, p. 10)

Zeitler goes on to point out:

In contrast, one large-screen TV projector, one power outlet, and one r-f or video input cable can easily accommodate the same 500 viewers with a projected television image 9' x 12' in size at a lower equipment and installation cost. [This depends on the projection equipment.] And, if the auditorium is used for other purposes, the TV projector can either be ceiling mounted or located on a mobile cart which can easily be stored. (Zeitler, 1966, p. 10)

The large screen projection has several advantages, including the one just mentioned of teaching a large number of students without the clutter of a lot of monitors. The large screen projector directs all of the students' attention toward one area and can easily be viewed in large, existing auditoriums provided the arrangements are made to meet the physical needs of the projector. Seating does not have to be arranged and by using a screen which will make the student viewing area as large as possible, nearly all seats in the auditorium can be used. Another advantage is that students, as reported by Greenhill, Rich, and Carpenter (1962), prefer the large screen projector over individual monitors.
Zeitler suggested five rules for the effective use of large screen projection:

1. Reduce the ambient light level to less than 1 footcandle at the screen.
2. Avoid the use of a matte white screen. This caution is mentioned because this screen has a low reflective power or gain.
3. Use a glass-beaded screen for head-on viewing when the audience is within 20 degrees from the projection axis.
4. Use a lenticular screen where any part of the viewing audience is seated beyond the maximum limit of 20 degrees from the projection axis.
5. When in doubt, use a lenticular screen. (Zeitler, 1966, p. 10)

In addition, it should be remembered that seating must be within the essential viewing area. No one should sit closer than two screen widths from the screen or farther back than six screen widths.

There are several companies that make large screen projectors. The investigator had the opportunity of observing a demonstration of an inexpensive model at USU on January 8, 1968 in the Old Main Auditorium. This $2,500 model was very ineffective in producing a picture 9' x 12'. The lighting in the auditorium was not designed for large screen projection and may have been partly at fault. But even with the lights off the picture did not have good contrast and lacked clear definition of picture. This problem is inherent in the projector itself. As the size of the picture increases, the light level reflected from the screen falls off. It would, therefore, be much more desirable to have a more powerful projector to produce a clear picture of at least 9' x 12'.

Humphreys (1968a) has recommended that the university purchase projectors ranging in price from $12,000 to $42,000. The most expensive is the Eidophor projector. This can produce a picture in 30 footcandles of light, provided that only a small amount of light falls on the screen.
The size of the equipment will determine the quality of the picture projected and under what lighting conditions it can be projected.

A smaller unit can be fastened to the ceiling of a room and controlled remotely from another area in the room. A larger unit, such as the Eidophor, may be used in an auditorium. However, it does produce some noise and must be vented.

Brigham Young University used large screen projection in teaching several courses. On April 5, 1968, the investigator viewed the facilities for large screen projection in the Joseph Smith Building on the campus of BYU. The picture was thrown 126 feet from a projection booth in the rear of the large auditorium to a large screen in the front. The Eidophor produced an excellent picture. Indirect lighting was used in front of the screen and even with this light on there was no difference in picture contrast. The university also had a backup projection unit which was much smaller. Because of its size, it did not produce the same quality picture even though it was fastened from the ceiling closer to the screen. The investigator was told by Val Ogden (1968), television engineer at BYU, that the professors on the campus prefer not to use television when the larger Eidophor unit breaks down because the small unit does not produce an adequate picture.

Humphreys (1968a) has indicated that because of the cost of the projection equipment it is not recommended to put it in auditoriums that seat less than 300. The larger the classroom, the better the economy of teaching with a large screen projector. The investigator, therefore, surveyed only those auditoriums with seating capacity of 300 or more for possible use with large screen projection. These auditoriums include Engineering C106, Fine Arts 125, Fine Arts 155B, Union Building
227, Old Main 113, and Forestry-Zoology 102. A summary of their acceptability for large screen projection is shown in Table 12.

All of these auditoriums have adequate control of natural light. There is no natural light that would reach the screen if controlled. The fixed seating is not a problem with large screen projection. Some of the auditoriums have table-arm chair combinations for seating, but most are chairs and some type of writing tablet would have to be provided for students. Nearly all of these auditoriums have adequate ventilation and all have acoustical treatment on the ceilings with some extending down the walls.

All of the auditoriums but those in the Fine Arts Building have screens. Since the type and size of the screen is so critical for large screen projection, they have been carefully reviewed for each auditorium.

Each of the auditoriums except Engineering C106 has an adequate sound system for the amplification of the sound of the televised courses. At present only Union Building 227 is connected to the campus direct video distribution system.

There are special problems in adapting each auditorium for large screen projection.

**Fine Arts Theater 155B**

Although this auditorium holds 750 persons, seats are arranged in a semicircle. The investigator discourages use of this theater principally because the Theater Arts Department is presently doing all of their major productions from this stage. The stage is used for rehearsals and scenery must be left on the stage when it is placed there.
Table 12. Results of physical facilities survey of auditoriums at Utah State University with seating capacity of at least 300.

<table>
<thead>
<tr>
<th>Building</th>
<th>Room number</th>
<th>Lighting</th>
<th>Seating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Natural light control</td>
<td>Artificial light control</td>
</tr>
<tr>
<td>Engineering</td>
<td>C106</td>
<td>A</td>
<td>I x</td>
</tr>
<tr>
<td>Fine Arts Auditorium</td>
<td>125</td>
<td>A</td>
<td>A x</td>
</tr>
<tr>
<td>Theater</td>
<td>155B</td>
<td>A</td>
<td>A x</td>
</tr>
<tr>
<td>Old Main</td>
<td>113</td>
<td>A</td>
<td>I x x i</td>
</tr>
<tr>
<td>Union Bldg.</td>
<td>227</td>
<td>A</td>
<td>A x</td>
</tr>
<tr>
<td>For.-Zoology</td>
<td>102</td>
<td>A</td>
<td>I x</td>
</tr>
</tbody>
</table>

Key: A = adequate  I = inadequate  N = none  x = type or other
The scenery cannot be concealed behind curtains and would be in the way of a hanging screen. Therefore, because of seat arrangement and scheduled use of the theater, no floor plan or detailed seating study for this theater was included in this survey.

**Engineering Auditorium C106**

This auditorium has inadequate control of artificial light for large screen projection (Table 12). There are two types of fluorescent lighting in the auditorium. One is large fluorescent lights for the general lighting of the room. The other consists of two indirect lighting strips recessed in the ceiling. With the general lights off and only the indirect lighting on, four footcandles of light fall on the screen. This could be corrected by putting shields to cover the indirect light rays falling on the screen. The indirect light is designed to shine toward the front of the room rather than to the rear which is the opposite of the ideal for large screen projection. Reflecting the light to the rear would also give needed light to students sitting in the back.

The next question involves the screen. Zeitler (1966) has given five rules for using large screen projection. Using these rules, the rule for essential viewing area, and keeping in mind the distortion of images past the 45-degree angle (Figure 2), the investigator developed Table 13. The seating capacity of the five auditoriums surveyed and seats lost at 30, 45, and 60 degrees in the essential viewing area of the screen are shown in this table. Thirty degrees is the absolute maximum viewing angle for a beaded screen. The 45-degree angle is the maximum recommended viewing angle for television without distortion,
and the 60-degree angle is the maximum viewing angle for a lenticular screen.

The Engineering Auditorium presently has a 12-foot matte screen which is not recommended for large screen projection because of low gain. A beaded screen is not recommended for this auditorium because of a loss of over 142 seats. With a lenticular screen at a 45-degree angle only 22 seats are lost. At 60 degrees the loss is only six seats with a lenticular screen (Table 13).

Students in the front of the auditorium would only be 1 1/2 screen widths from the screen, but those in the back would be the recommended six screen widths. This is nearly the recommended essential viewing area. The screen in the auditorium is the right size but should be changed to a lenticular. The number of seats lost at various angles and essential viewing area are shown in Figure 7.

There is inadequate storage space for large screen equipment in the auditorium. There is no projection room at the back of the hall, and the only room of close access is the preparation room behind the front of the room. The control could be placed here. If a projection booth were built, it would have to be enclosed and this would eliminate some of the seating in the room. Figure 7 shows an exit path in the rear of the auditorium. This exit has such a descent that a booth could be built above the exit and portals cut in the existing wall for projection. There is a 110 volt power outlet in the rear of the auditorium, but this is not adequate to operate a large projector.
Table 13. Seating capacity of the auditoriums surveyed at Utah State University and seats lost at 30, 45, and 60 degrees in the essential viewing area.

<table>
<thead>
<tr>
<th>Building</th>
<th>Room</th>
<th>30 degrees</th>
<th>45 degrees</th>
<th>60 degrees</th>
<th>Seats lost</th>
<th>Seats lost</th>
<th>Seats lost</th>
<th>Seats lost</th>
<th>Seats lost</th>
<th>Seats lost</th>
<th>Seats lost</th>
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<th>Seats lost</th>
<th>Seats lost</th>
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</thead>
<tbody>
<tr>
<td>Engineering</td>
<td>C106</td>
<td>402</td>
<td>142</td>
<td>260</td>
<td>22</td>
<td>380</td>
<td>6</td>
<td>396</td>
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<tr>
<td>Fine Arts</td>
<td>125</td>
<td>1018</td>
<td>264</td>
<td>754</td>
<td>40</td>
<td>978</td>
<td>0</td>
<td>1018</td>
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<tr>
<td>Old Main #1</td>
<td>113</td>
<td>692</td>
<td>360</td>
<td>332</td>
<td>110</td>
<td>782</td>
<td>12</td>
<td>680</td>
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<tr>
<td>Old Main #2</td>
<td>113</td>
<td>692</td>
<td>216</td>
<td>476</td>
<td>46</td>
<td>646</td>
<td>0</td>
<td>692</td>
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<tr>
<td>Union Bldg.</td>
<td>227</td>
<td>316</td>
<td>20</td>
<td>296</td>
<td>0</td>
<td>316</td>
<td>0</td>
<td>316</td>
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<tr>
<td>For.-Zoology</td>
<td>102</td>
<td>327</td>
<td>14</td>
<td>313</td>
<td>0</td>
<td>327</td>
<td>0</td>
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</tr>
</tbody>
</table>
Scale: 1" = 10'

Key: Angles: 
- 30 degrees
- 45 degrees
- 60 degrees

Essential viewing area:

Figure 7. Floor plan of Engineering Auditorium C106 showing 30, 45, and 60 degree viewing angles and essential viewing area.
Fine Arts Auditorium 125

This auditorium has adequate lighting control with incandescent light. The chairs are fixed, and if the hall was used, some type of writing board would have to be provided. It has no screen at present.

The investigator recommends for maximum viewing a 16-foot silver lenticular screen placed 29 feet back from the front of the orchestra pit (Figure 8). This could include in the essential viewing area 1,018 seats of a possible 2,100. Of the 1,018 only 40 would be lost at 45-degree angle and none at 60 degrees. For comparison, a beaded screen at 30 degrees would mean a loss of 264 seats (Table 13).

The auditorium has a projection booth which could house a large screen projector and there is power available to meet the needs of any type of projector.

Old Main Auditorium 113

This room has a critical problem in the control of artificial light. It has incandescent bulbs in the balcony and main floor. There is also a bare strip of fluorescent tubes running around the bottom edge of the balcony. The total light level in the room with the natural light controlled and all artificial lights on is only 16 footcandles. This is too low for reading and writing for extended periods. The arrangements of these lights cast some shadows on the screen. Even shutting off all the lights but a row in the back produces a footcandle of light on the bottom of the screen. This also leaves no light for the students sitting on the first six rows.

Ventilation has not been a serious problem in the past. However, the only way to provide ventilation is to open the shutters about the windows. This would let in a certain amount of diffused light that
Scale: 1" = 20'

Key: Angles:
- 30 degrees
- 45 degrees
- 60 degrees

Figure 8. Floor plan of Fine Arts Auditorium 125 showing 30, 45, and 60 degree viewing angles and essential viewing area.
might fall on the screen.

There is no area for a projection booth, and the balcony would have to be structurally examined to see if it could hold an 800-pound Eidophor. There is adequate power for any type of a projector but it would have to be specially wired.

Viewing angles and seating loss are outlined in Table 13. The investigator outlined two localities for the screen. The first is where the existing screen is now placed 11 feet back from the front of the stage. The second is 26 feet back from the front of the stage. The second locality would maximize essential viewing area as is shown in Figure 9.

The present screen is a 10-foot matte screen and is 1 1/2 screen widths from the first row of seats, and a little less than six screen widths from the back of the auditorium. Table 13 shows the total seating in the essential viewing area at the given angles for the main floor and balcony for both screen points. An 11-foot lenticular screen placed 26 feet back from the front of the stage would provide maximum seating.

Union Building Auditorium 227

In the investigator's opinion, this auditorium is the most adequate for large screen projection. It has adequate artificial lighting control with dimmers that can control the amount of light falling on the screen. At the same time adequate general light is provided in the room. The auditorium has a direct video line into the projection booth which is above and to the rear of the room.

There is presently a 32-foot beaded screen in the auditorium. However, the largest picture that needs to be projected to reach the
Scale: 1" = 10'

Key: Angles:
- 30 degrees ————
- 45 degrees ————
- 60 degrees ————

Essential viewing area:

Figure 9. Floor plan of Old Main Auditorium showing 30, 45, and 60 degree viewing angles and essential viewing area.
six screen widths is a 10-foot picture. This would place the front row of seats a little over 1 1/2 screen widths from the picture and the back row exactly six screen widths from the picture. Because of the structure of this auditorium, a beaded screen 30 degrees off the projection axis produces a loss of only 20 seats. With a lenticular screen no seats are lost at either 45 or 60 degrees (Figure 10 and Table 13).

The problem with this auditorium is that it is not scheduled for class instruction. It is used for movies, student activities, workshops, seminars, and other special meetings held on the campus.

**Forestry-Zoology Auditorium 102**

The main problem in this room is the control of artificial light. One set of lights along the sides of the hall is on dimmers. The lights in the middle must be either on or off. Even with the side lights on and the center lights off, four footcandles of light fall on the screen. This leaves inadequate light level in the middle of the room with no footcandle reading at all. Before this room can be used, lighting needs to be modified so that light will not fall on the screen but will be directed toward the students.

The auditorium presently has a 10-foot beaded screen. With this screen at a maximum 30-degree angle only 14 seats are lost. No seats would be lost with the lenticular screen as is noted in Figure 11 and Table 13. The screen is of recommended width for the room to provide maximum essential viewing area.

There is no projection booth in the rear. The ceiling may be used for hanging some type of rear screen projector of light weight. The projector may be put on wheels and brought to the rear of the room. On the left side of the auditorium, as one faces the screen, is a
Scale: 1" = 10'

Key: Angles:

30 degrees ---- ---- ----
45 degrees ------ ------
60 degrees ---- ---- ----

Essential viewing area:

Figure 10. Floor plan of Union Building Auditorium 227 showing 30, 45, and 60 degree viewing angles and essential viewing area.
Scale: 1" = 10'

Key: Angles:
- 30 degrees
- 45 degrees
- 60 degrees

Essential viewing area:

Figure 11. Floor plan of Forestry-Zoology Auditorium 102 showing 30, 45, and 60 degree viewing angles and essential viewing area.
preparation room that could provide storage for the equipment.

Conclusions

In conclusion, the best auditorium for large screen projection bases on this survey is the Union Building Auditorium. However, the room is not presently scheduled for student classwork. It would be the easiest to adapt to large screen projection.

The next recommended auditorium would be the Fine Arts Auditorium because it has good lighting control. Most of the characteristics of the auditorium make it desirable except for the fact that it has no screen. However, a 16-foot lenticular screen could be tension mounted and flown in the flies of the stage and raised and lowered as needed. This auditorium is used for concerts and special events during the year, and arrangements would have to be made for the use of the facility.

The third choice would be either the Forestry-Zoology Auditorium or the Engineering Auditorium. Although lighting control is a problem in the Forestry-Zoology Auditorium, all the seats can be utilized with a lenticular screen and only 14 seats are lost with the screen already in the room. The Engineering Auditorium also needs more effective artificial light control. A lenticular screen would have to be purchased but it would increase seating 67 over the Forestry-Zoology Auditorium.

Old Main Auditorium is rated last because the lighting would have to be completely remodeled. While the incandescent bulbs are on dimmers, the problem is not with the amount of light but with the placement of light that falls on the screen.

Investigation indicates that none of these rooms would be good for using television monitors.
The seating in the Engineering Auditorium is fixed and 16 monitors would be required to give all students adequate viewing. Monitors could not be hung from the ceiling because it is high and suspension would be costly. Some monitors could be mounted on the side walls but this would not provide viewing for the middle of the room. The floor slants so that movable carts could not be used without some type of support. There is no storage for this number of monitors and moving carts and monitors in and out of the room leads to mechanical failures.

The Fine Arts Auditorium would require 40 monitors. The ceiling height makes it impractical to hang monitors. Monitors placed on the side walls would still eliminate viewing for the large middle sections. The floor is also at a slant and storage for monitors would be nearly impossible.

Old Main Auditorium has a high ceiling but some of the 25 monitors required could be mounted on the back ceiling under the balcony. Monitors may also be mounted on some type of retractable stand which may be located in the seating area and raised and lowered when needed. Any monitors mounted on the side walls would not accommodate those students in the middle. The seats are arranged in a circular fashion facing the stage which would make viewing of monitors on side walls awkward. However, monitors may be used in this auditorium better than any of the others. The auditorium is used for a classroom and monitors would probably not have to be moved after every viewing. The general structure of the auditorium makes it easier to install monitors here as opposed to mounting them in brick walls, cement ceilings, and slant floors.

The Union Building Auditorium has a high ceiling and brick walls.
Monitors may be mounted on the walls but students in the center could not see. Monitors on carts are a possibility but there is no storage for the 12 monitors required.

The Forestry-Zoology Auditorium could only have monitors hung from the ceiling because the walls have an acoustical treatment which would not support monitors. However, the ceiling is hanging suspended from a vaulted cement floor above. The monitors would have to be hung from the floor above and this would be an expensive task. Twelve monitors would be required, and, if used with carts, no storage is available.

Administrators feel that the monitors are an eyesore when not in use. Monitors suspended or placed around the room break up the design of the classroom. If they are not moved out, for discussion or other regular classroom lectures, the monitors can be in the students' line of vision. Upkeep of a large number of monitors is another problem.

Factors including simplicity of set-up, ease of control, lack of clutter, single focus of all students, and student preference give the large screen projector definite advantages over a large number of monitors.

The Teaching Utilization Models for Utah State University

Having determined the possible locations of televised courses at USU, the next step in the utilization process was to determine how television might be used to provide concrete learning experiences for students. Several teaching utilization models are presented here that may be used at USU. The model to be used will depend on the course material. The models include:
1. The television presentation with classroom activities conducted by the television professor.

2. The television presentation with classroom activities supervised by a graduate student.

3. The television presentation with utilization activities supervised by a teacher's aid. This aid could be someone who has graduated from a university and who is presently unemployed by choice or due to other circumstances, but who is interested in part-time work. It would be advisable to have someone who has majored in the subject area. The teacher aid might come from the ranks of married students, townspeople, retired persons, or a top student in the department who has taken or is presently taking the course.

4. The television presentation with an equipment operator to make sure that the instructional equipment is working properly. He would have no other teaching responsibility to the course.

Any discussion of these teaching utilization models must be approached with the full realization that there are a number of ways that a televised course may be taught as cited in the Review of Literature. Students do not like the impersonalization of television. They like to know the professor who is teaching them. Students like to communicate and have feedback with the person responsible for teaching the course. Students prefer large screen instruction over monitors. With these in mind the investigator examined the advantages and disadvantages of each suggested model.

Professor and television course

The advantages of the professor appearing in the classroom with his television tape are summarized as follows:
1. The students can personally identify with the television instructor. The professor would not have to be in the room when the televised material was being presented, but could come after to carry on a discussion. This would be possible if the class were taught in a large section.

2. With the advancements of closed circuit system at USU, it would be possible for the professor to do part of his lecture "live" on television with the remaining part on tape. A feedback system could be employed to provide more personal contact.

3. The professor knows best how his course presentation and follow-up activities should be directed and does not need to instruct someone else.

There are also disadvantages of the professor being personally involved with every classroom presentation of his televised course:

1. If multiple sections of his televised course are taught at the same time, he could not make personal visits to all classrooms.

2. One of the advantages of television is to release the professor for other academic pursuits. Personal visits to each class would tie him to the classroom.

It is reported by the University of Utah that, although the professors are not responsible for the utilization of their televised course in the classroom, they make it a habit to visit one or more times during the quarter to carry on discussions with the students. The University of Utah's largest class for television is only 120 students. For a professor to try to visit each class in a single day for a five hour course would be practically impossible, especially with his other academic responsibilities.
Graduate student and television course

There are some advantages of using a graduate student at USU:

1. Graduate students operate just as effectively in discussion sections as the professor. Professors do not want to be bothered by such tasks as taking roll, passing out papers, or collecting assignments. Graduate students serve just as well.

2. The graduate student should know the subject area and possibly have already had the course. If the course were taught in a single large viewing area and the students divided into smaller sections for discussion, several graduate students would be necessary.

3. The graduate student could provide feedback to the professor concerning student reaction to the course.

4. The graduate student gains experience in teaching at a college level that may help qualify him for further academic assignments.

Among the disadvantages to be considered in using a graduate student are the following:

1. The graduate student may not understand exactly the television instructor's teaching methods. His approach to the subject matter and that of the professor may have to be developed into a working team.

2. His inexperience with teaching may also create a problem. Seminars involving the art of teaching and utilization of television may help solve this problem.

Teacher's aid and television course

The advantages of the several types of teacher's aids developed as the third model are considered together:

1. Additional help would be provided to a department which had
an insufficient number of graduate students.

2. Most of these aids would have a knowledge of the subject area, and the television teaching experience could be valuable for future responsibilities.

3. The interaction between teacher aid and students could provide indirect feedback to the professor.

There are also disadvantages of using teacher's aids:

1. They need training in the methods designed by the professor and in the ability to use television effectively.

2. They may not be as highly qualified as a graduate student or professor.

Equipment operator and television course

The fourth model considered using just an equipment operator and there are advantages to this situation:

1. He knows the equipment and can operate it effectively.

2. If no follow-up or other teaching activities are needed, he is the only person necessary to be with the class.

There are two important disadvantages of using just the equipment operator:

1. His responsibility is to operate the machines. He would not be responsible for any tasks such as taking roll, passing out papers, etc. He would not be responsible for teaching the course at all.

2. The equipment operator would have no personal contact with the professor to provide any kind of feedback.

Each of these models is a suggested way of helping to provide personnel to combine with the television instruction to utilize the course to best advantage. Combinations and modifications of the models
may be best according to the course outline. For example, the equipment operator may be used twice a week and a graduate student serve as a lab instructor or discussion leader for the other three meetings of the class. A resident teacher aid may handle the class during the televised lesson and the television professor or graduate student could lead the discussion sections. The model or combination of models used depends on course material and professional preference which has as part of its basis the three corners of effective utilization--student orientation, telecast, and follow-up. It should also be remembered that the course needs to be personalized and provide a means of feedback, whether it be direct or indirect.
CHAPTER IX
RESULTS AND DISCUSSION OF INTERVIEWS WITH
PERSON RESPONSIBLE FOR DEVELOPMENT OF
PROPOSED TELEVISION COURSES

Recording the course on tape is only part of the ITV experience. How the material recorded on tape will be presented to the students and who will aid in the follow-up of its utilization must also be considered. With a knowledge of the existing facilities and the developed teaching models for both USU and the Uintah Basin Center, the investigator approached the person or persons responsible for the development of course material. The interviews were carried on in an informal manner and followed the three steps outlined in Methods of Procedure. First, the person was made aware of the facilities as they now exist at USU and the Uintah Basin Center. Next, he was presented with the possible teaching utilization models to consider as a spring board for the final part of the interview, which was a discussion of the problems of the particular course being developed for television. The report of the interviews includes the problems as seen by the professor in adapting his course to television. These interviews represent only presently selected ITV courses, but they are exemplary of the problems encountered in developing effective utilization of ITV.

Dr. JeDon Emenheiser (1968), head of the Department of Political Science, is taking responsibility for the Political Science 10 course. Following the discussion and presentation of points one and two, Dr. Emenheiser indicated that this course on American National
Government would be taught in a team teaching approach with each professor in the department discussing his special subject area. As for utilizing the course within the classroom, Dr. Emenheiser said that the class was designed to be taught with four 50-minute lectures four times a week and one live discussion period a week. For the discussion period at the Uintah Basin Center, he felt that he would like to use the telelecture system. The class was to be divided into groups of about 20 students which is the size of a typical class presently taught at the Uintah Basin Center. The students are then to have a discussion of various points which would be furnished them in a study guide. Dr. Emenheiser felt that it would not be necessary for a professor to be present for the discussions if he could listen to student discussions and direct via telelecture.

The professor was considering using a similar method for the course at USU. A class of approximately 450 students per quarter would be divided into small discussion sections with the television professors leading a discussion session once a week. If necessary, graduate students could carry on these discussion sessions. Since Dr. Emenheiser has had previous television experience, he was aware of the necessity of follow-up activities and study guides for students in preparing for class assignments. He was very anxious to work with the course in developing something worthwhile. He raised the question of some type of evaluation of the course and the possibility of someone to assist his department in evaluating what was being done. At present there is no one assigned to this responsibility for the Uintah Basin Center or USU. He was informed of the desirability of the professor's visiting the classrooms at the Uintah Basin Center initially to help promote the
course. He was in agreement with this idea and realized that it was an extension course and that the people lacked experience in ITV. He suggested that although telelecture was being proposed for his course, some of the discussion sessions could be conducted by the professor actually traveling to the Uintah Basin Center.

English 24, Introduction to Literature, is assigned to Mr. Thomas Lyon. Mr. Lyon (1968) has not had experience with television teaching. He said that the English Department would probably use a graduate student to aid in the discussions in connection with the television lectures. During the 1967-68 school year the department had used a graduate student at the Uintah Basin Center to teach a number of English courses. Mr. Lyons was of the opinion that this would continue next year and that this graduate student would be trained to operate the equipment and conduct follow-up activities for the course.

Dr. Garth L. Lee (1968), acting head of the Department of Chemistry, is assuming responsibility for the Chemistry 10 and 11 courses. Dr. Lee was unaware of the situation at the Uintah Basin Center. His department has not started work on the ITV courses but has discussed the matter. Dr. Lee said that his staff is committed now on the USU campus and that it would be impossible for a professor to be at the Uintah Basin Center all of the time. He felt that the professor could visit the classroom if the beginning of course work at USU and the beginning of classes at the Uintah Basin Center could be a week or two apart. This would give the professor time to organize one course before beginning another. Dr. Lee said that there were several ways that General Chemistry could be taught. Presently the 10, 11, 12 series is taught with three lectures a week which are about half lecture and the rest a discussion
of points which the students did not understand. The course has one recitation period a week in which the students work formulas and problems. There is also one three hour lab a week.

Graduate students are used to assist in the laboratory sessions, but the department has found it difficult to find qualified graduate students to work with the recitation sessions. Dr. Lee said that the course at the Uintah Basin Center might be divided into one meeting in which two ITV presentations are given and one meeting for recitation. This would be effective if a qualified person could be found at the Uintah Basin Center to aid in the recitation sessions. There would also be one lab a week. Dr. Lee was concerned about the lab sessions. While the experiments are not difficult, special equipment is required such as a balance scale which costs $1400. Dr. Lee said that the equipment needed at the Uintah Basin Center would have to be determined and purchases made. He pointed out that a competent graduate student or high school chemistry teacher could handle the lab sessions.

Dr. David Stone (1968) is one of the television instructors for Psychology 53, General Psychology. He was intensely interested in the discussion of the teaching utilization models. Although the psychology course is still in the developmental stages, Dr. Stone was interested in having a resident aid at the Uintah Basin Center to help with the course. While the resident aid would not be responsible for the course, he could set up the audio-visual equipment needed and collect and hand out papers. Dr. Stone explained that the plan for the course is to have student involving activities during the television presentation and the resident aid would be needed.

He agreed that the professor teaching the course should be at the Uintah Basin Center to introduce the use of television. Dr. Stone
said that his department would like to try a number of different student activities during and after the telecourse.

The professor wished that a large screen projector could be used at the Uintah Basin Center. He prefers this type of projection over monitors and definitely feels that large screen projection should be used at USU.

Dr. Thomas Bahler (1968) is planning to teach Physiology 4 by ITV. He was not aware of the teaching situation at the Uintah Basin Center and pointed out a number of special problems relating to his course.

The course meets five hours a week for lecture and has an additional three hour lab session. Dr. Bahler said that he had not thought of breaking the class time into two equal parts and felt that possibly the classes at the Uintah Basin Center could meet two hours for one session and three hours for the other. Dr. Bahler could see the desirability of the professor introducing the use of ITV and visiting the Uintah Basin classes occasionally.

Since he had not begun developing the Human Physiology course for ITV, he did not know which model would be best but felt a qualified resident aid would work well. He was most concerned about the lab session. What type of equipment did the Uintah Basin Center have and what had to be purchased? He said that a microscope was needed for every two or three students. Who would teach the lab sessions? Dr. Bahler said that at USU an upper division student or graduate student teaches the lab and that this instructor has had advanced physiology courses. If a person from the Uintah Basin area could not be found with the right qualifications, a lab instructor would have to be flown in.
Dr. Bahler was anxious to develop a quality ITV course that could be used at both USU and the Uintah Basin area.

Professor Warren Burton (1968) is the present instructor of the Music I course and is the television instructor responsible for the taping of the course. Mr. Burton has had several years of experience in working with television. He was pleased to know more about the situation as it exists, particularly at the Uintah Basin Center, because he said he was preparing courses for people he did not know and for situations he had never seen. Professor Burton said that he was presently teaching Introduction to Music to nearly 500 students at once in the concert hall of the Fine Arts Building. He had little opportunity for student discussion with the class members. However, they seemed to enjoy the course and did well on examinations. Therefore, he would like to provide on tape the same course that he is now conducting on campus. From the interview the investigator learned that the professor's lectures were very well illustrated including films, demonstrations of instruments, and listening activities for the students. It was a very animated lecture. Professor Burton felt that he would need principally at the Uintah Basin Center an equipment operator and someone to take roll. He realized that it would be important for him to make a personal visit to the area at the beginning of the quarter to help promote ITV.

Professor Burton brought up another special problem. Students in his course are required to listen to nine hours of music. Facilities for music listening are available at USU but he was concerned as to what could be used at the Uintah Basin Center. It was pointed out to him that both plants surveyed by the investigator
had language labs, and he indicated that these would be excellent. Professor Burton has the listening music tapes which he can provide to the classes. However, someone would have to be in the labs about two hours a week beyond the regular scheduled class time to operate this equipment. Professor Burton said that since there was no one else to take this problem to, would the investigator present it to Mr. Purnell in Roosevelt?

Mr. Burton was very anxious to produce a workable television course. He concluded with the statement, "I hope that what I am planning will work, and that we will have some way of finding out if it will. We need some type of evaluation and if it doesn't work, we'll change it." (Burton, 1968)

The Sociology 70 course, Introduction to Sociology, is the responsibility of Dr. John Pennock. Dr. Pennock (1968) has a committee assigned by the head of the department, Dr. Therel Black, working with him. The discussion with the committee opened with a brief description of the situation at USU and the Uintah Basin Center followed by a description of the models proposed for teaching the courses. The Sociology Department has had instructors teach at the Uintah Basin Center and the committee was aware of some of the problems. The members were appreciative of the information and said they would take the models in mind in developing the television course.

The investigator was faced with a number of problems as a result of these interviews. First, the majority of the professors did not have an understanding of the situation the courses would be used in at the Uintah Basin Center. They did understand the situation at USU and had been making plans for using the material on the college campus.
Second, the professors did not know to whom to go to discuss the problems of utilization of their course at the Uintah Basin Center. The investigator came to the realization that he was the only one who understood the situation at the Uintah Basin Center in relation to utilization of television. Dr. Booth of the English Department asked the investigator, "Who shall we talk to about the utilization of television at the regional centers?" (Booth, 1968) The investigator did not have an answer for him.

Third, every professor was interested in evaluating the work he was doing in television. He wanted to know how the students felt about it, whether they were learning from it, and whether the approach to the course was correct for television. Mr. Purnell (1968c) has indicated that the tapes should not be sent to the Uintah Basin Center with the idea that this was final and conclusive. They should be viewed as experimental and with the thought that perhaps new approaches could be adopted to improve the courses. As a further emphasis to this point, Dr. Emenheiser said (1968), "Is there anyone available who can help us evaluate our courses?" Again the investigator had no answer.
CHAPTER X
SUMMARY AND RECOMMENDATIONS

Summary

The present survey had a threefold purpose:

1. To survey the facilities at both the Uintah Basin Center and USU and show how they could be used for television, pointing out any problems inherent in the present situation.

2. To develop suggested models of teaching utilization techniques which could be adapted to both the Uintah Basin Center and USU.

3. To identify problems and recommend areas that need further study and coordination.

The investigator found that there exist classrooms at the Union High School at Roosevelt and the Uintah High School at Vernal which are adequate or nearly adequate for the use of ITV. There are also classrooms and auditoriums at USU which can be adapted for the use of television. However, in both localities equipment must be purchased. The Uintah Basin Center could begin operation with four video tape recorders and four monitors. A fifth monitor and video tape recorder would be desirable for back up purposes. The Uintah Basin Center must also have a trained technician responsible for the upkeep and operation of this equipment. This need not be a full-time job. The trained technician may operate the equipment himself or supervise others.

At USU closed circuit equipment must be purchased. In view of the large number of students taking the televised courses each quarter,
the investigator recommends the use of large screen projectors rather than filling rooms with monitors. One large screen projector in an auditorium seating 300-500 students can reach more students better than a number of monitors. While a large screen projector is more expensive initially, economy in upkeep and operation in the long run will prove to be a savings. This is not to say that courses taught by television with smaller enrollments per quarter should not use monitors. For large classes, large screen projection is definitely more advantageous.

The teaching utilization models developed by the investigator for the Uintah Basin Center and USU turned out to be similar in nature. But each meets the unique problems for the institution for which it was designed. There are two main problems facing any person working with television at the Uintah Basin Center. First, he must be trained in operation of the television equipment. Second, he must be able to operate effectively as a member of the team presenting the television course material whether he be a professor, graduate student, resident aid, or equipment operator.

At USU the team member in the classroom must also work in close cooperation with the television instructor. The very attitude of these persons in the room affect how the students receive the television course.

Recommendations

Appointment of a coordinator

This investigator recommends an instructional television coordinator for the whole project of determining the effective utilization of television at USU, the Uintah Basin Center, and other continuing education centers as they may develop.
The coordinator would have a number of duties:

1. He would prepare the television facilities at the continuing education centers for use. This would include surveying the present facilities, advising the coordinator of the center of needed changes and adaptations for the use of television, seeing that these changes are met, and checking to ensure that equipment is secured and tested and that someone is at the center to operate the equipment efficiently.

2. The coordinator would work with the institution preparing the television course to make it aware of the unique problems of each continuing education center participating in the televised course instruction.

3. The coordinator would work with the Extension Division of USU to help it use the televised course in the most economical manner at the continuing education centers by securing proper utilization personnel to work with the course. For example, he might arrange for the resident aid or trained equipment operators.

4. The coordinator would test and evaluate the proposed television courses in terms of their effectiveness. He may be responsible for further development of ITV courses that could be used at institutions of higher learning and continuing education centers. It appears that one course of instruction can do the job equally well in both places, but this must be determined.

**Development of a public relations program**

A public relations program is needed to stimulate interest in ITV among citizens, professors, and students. This is particularly needed in areas, such as the Uintah Basin, where people have never been taught by television and where their inexperience could cause problems in its
acceptance as an instructional tool. Mr. Purnell, coordinator of the Uintah Basin Center, is prepared to work with anyone sent to help him promote television to potential students. It would be desirable to have the public relations program in operation prior to the presentation of any televised course.

This program could include, in addition to handouts outlining the advantages of ITV, a 10-20 minute demonstration showing how television can encompass the good points of traditional instruction. An instructor with assistants could teach a 5-10 minute segment of course material using media other than television for this discussion. Media which could be used include slides, movies, overhead projections, blackboard, and/or small specimen drawings. Following this presentation, the same material would be shown by the same instructor using a television receiver and video tape recorder. No professor has the time, facilities, or manpower available to aid him in the first discussion, but with television this is the expected quality of ITV presentation.

Development of utilization seminars

The investigator recommends the establishment of a seminar or class to instruct professors who have taught television courses and are planning to teach television courses. This instruction would deal with utilization techniques that can be useful in developing and improving course material. Persons working on the professor's team who handle utilization activities in the classroom should also be required to receive this course instruction.
Points for Further Study

Further research may be conducted on the present survey. This may take the form of:

1. Evaluation of the teaching utilization models developed by the investigator for USU and the Uintah Basin Center.

2. Evaluation of student reaction to the instructional television courses.

Other studies may develop as the continuing education concept develops which relate to the present study. These may include:

1. The effect of a continuing education center on a community.

2. Study of length of instructional period and class scheduling.

It is the opinion of this investigator that the use of television instruction at continuing education centers and institutions of higher learning can be as good as it is planned to be. The success of these televised presentations is based upon the coordination of the entire television package. This coordination includes the detailed preparation of the physical classroom setting and courses of instruction designed to be effectively utilized in this classroom situation. The inter-weaving of these elements can provide effective student learning through instructional television.
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Interviews with Members of Citizens' Committee of Uintah Basin
Continuing Education Center

The investigator interviewed members of the Citizens' Committee on February 16, 1968. The remarks these citizens made concerning the Uintah Basin Center were recorded exactly and are reported here.

Hollis Hollinger made the following comments concerning the impact of the Uintah Basin Center in the area:

I'm sure there are various items that we could discuss, but I think that one important thing is the fact that so many people are having the opportunity to attend college courses that have never had this opportunity before. In surveys that we have made in our area, we find that of whole audiences only a few have gone to college and less than that have graduated. I'm sure that the numbers of people that have registered for these classes are an indication of how many of them really want to get a higher education.

Then I think that the special courses we have are having a real impact upon the community. Various agriculture courses, feeding, and livestock. We also had an alcoholic clinic and those who were associated with it said that it was the largest clinic we have had in the state of Utah. Another item is the cultural development. We had the Delta Phi Kappa Chorus here and there were 2,000 people through the communities that were able to see the chorus and appreciate the things they have done. I'm sure that people as a whole are feeling the impact of this educational program and we hope that it can continue.

Keith Berquist also gave his remarks concerning the impact of the Uintah Basin Center on the Roosevelt area:

The people out here have felt that there was no opportunity to raise themselves educationally or culturally and now they have an opportunity. Those who have recently graduated from high school and not gone to college, many of the adults that have had some college but have not been able to continue are now taking a great interest and can see some possibilities for developing their education and possibly improving their occupational income and their vocation.

Dale Franzen gave similar comments about the Uintah Basin Center:

I think, perhaps, one of the greatest impacts is on our young people who are now going away to school but are now taking a second look at coming back and going to school here.
This is something that they can well afford and it will give them economic advantages they otherwise wouldn't have. Some of them have enough money to go to school for perhaps one-half to one year. They can now come home and continue their education. We have talked to students coming home over the weekend and they expressed the desire to take the classes here in the coming year now that they know it is going to be a success.

Dan Dennis told how he felt the Uintah Basin Center had changed and improved the educational opportunities in the area:

    In my profession I travel up and down the length of the Uintah Basin and I have understood the plight that we were in by not having the opportunity for higher education, especially from a financial point of view. I have learned from comments of the people that the Center has provided them with more opportunity for advancement, not only for themselves but for their young people. This is primarily because of the savings they will gain by not having to go to the Wasatch Front for an education. I think this program has had the greatest impact on the people who have children. I might also say that the adults who have taken the classes have been more than thrilled for the opportunities.

Max Collier, an educational administrator from the area, gave some interesting comments concerning the impact of the Uintah Basin Center:

    With the youth of the Basin--those that are anticipating going to college--we find an attitude that has not heretofore been. The students in our school hallways used to say, "Where are you going to college or are you going to college?" Now the questions have become, "What are you taking in college or what are you going to study in college?" Many of us who are in the educational field found our wives in college and we interrupted their education. Since we have been further from a college than it has been feasible for them to travel, our wives are now able to continue and perhaps finish their degrees.
Types of Television Feedback as Described by Zettl (1967)

Zettl feels that feedback is defined in too limited a context. He feels that feedback takes place even when the receiver of the communication does not communicate back directly to the communication source. He established three general types of feedback—direct, indirect, and displaced. All three types can be immediate or delayed. Figures 12 through 17 are intended to serve as models of the various types of feedback.

Direct feedback is when the viewer reacts directly to the originator or the communication, such as the television teacher. Direct immediate feedback (Figure 12) occurs when the viewer has a chance to ask the teleteacher questions during the televised presentation. Direct delayed feedback (Figure 13) occurs when the student has to wait until the end of the televised presentation before reacting to the communication source.

Indirect feedback occurs when the viewer does not react back to the originator of the communication, but observes direct feedback. Examples would be when rhetorical questions are asked by the teleteacher or when questions are asked by a studio class. Indirect immediate feedback (Figure 14) occurs when the viewer observes a studio class react immediately to the television teacher during the televised program. Indirect delayed feedback (Figure 15) occurs when the teacher asks the viewer to engage in specific learning activities after the televised lesson, such as reading additional material or following with a specifically programmed teaching machine.

Displaced feedback means that the reaction of the viewers takes place independently of the communication source. A discussion among
Figure 12. Direct immediate feedback.

Figure 13. Direct delayed feedback.

Figure 14. Indirect immediate feedback.
Figure 15. Indirect delayed feedback.

Figure 16. Displaced immediate feedback.

Figure 17. Displaced delayed feedback.
the viewers after a telecast is an example. Displaced feedback is always directed to people other than those connected with the origination of the program. Displaced immediate feedback (Figure 16) occurs when the viewer, during the telecast, asks questions of an expert who is watching the presentation with the class. A typical case of displaced immediate feedback is when the student asks the teacher who is watching the program with the class for a clarification during the program. Displaced delayed feedback (Figure 17) occurs when the program is discussed by the teacher or aid in the classroom after the telecast has ended.

Without a precise classification of the various types of television feedback, it is of little surprise to find either nonsignificant or inconclusive results from the several feedback studies. A reclassification of television feedback into several types may help the researcher to construct more precise research designs that actually measure what they set out to measure. More precise research is needed to find the best type of feedback in given situations.
Survey Sheet for Physical Facilities of Individual Classrooms

Room number ______________ General use of room ______________

1. Natural lighting and control
2. Artificial lighting and control
3. Light level reading
4. Color of room
5. Type and number of seats
6. Fixed or movable seating
7. Heating and air circulating systems
8. Acoustical treatments--ceiling, wall, floor
9. Power outlets, number and location
10. Audio-visual material in room
11. Screen
12. Sound system
13. Equipment storage
14. Placement of monitors, hung or on carts
15. Distribution system
16. Other special problems
Survey Sheet for Large Auditoriums

<table>
<thead>
<tr>
<th>Building</th>
<th>Room</th>
<th>Total seats in essential viewing area</th>
<th>30 degrees</th>
<th>45 degrees</th>
<th>60 degrees</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>total seats remaining</td>
<td>seats lost</td>
<td>total seats lost</td>
<td>seats lost</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>remaining</td>
<td></td>
<td>remaining</td>
</tr>
</tbody>
</table>
VITA

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Master of Science

Thesis: A Survey for the Planning and Utilization of the Television Medium in Teaching Selected Courses at Utah State University and Continuing Education Centers in Utah

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Professional Experience: Graduate assistant at KUSU-TV, 1966-68; 1967-68, facilities manager at KUSU-TV; 1967, producer-director of "Long, Long Corridor," 30-minute documentary which received national recognition from Institute of Lifetime Learning; 1967, wrote and received a $12,000 grant from the Utah Council on Aging for ten television productions; 1968, supervisor of closed circuit operations at KUSU-TV.