ABSTRACT
        A series of research studies completed during 1988
examined the efficacy of the use of satellite technology as a
delivery system of high school courses for credit from the
perspective of three different interest groups: school
superintendents, students, and leaders of teacher and school
administrator organizations. Data from each of the study groups were
gathered through the use of a unique survey instrument. The major
questions examined in the three-part study of school superintendents
related to the current status of the use of the technology; the
attitudes held by superintendents toward this particular application
of satellites; the immediate, short-term plans of the schools for
using satellites; and the ways in which satellite courses should be
administered. The student survey addressed such issues as
characteristics of students enrolling in satellite courses; the
reasons students have enrolled in these courses; their perceptions of
the strengths and weaknesses of interactive satellite instruction;
and the perceived difficulties and benefits of taking satellite
courses. The final study, which surveyed teachers and school
administrators, explored the appropriateness of the use of the
technology for this purpose; the probable impact on the teaching
profession and on the school curriculum; and the adequacy of quality
control when satellite courses are delivered. The results of all
three studies indicated that satellite technology generally received
a positive but cautious endorsement, and that it was felt to be
particularly practical in the distance education situation. (3
references) (CGD)

Title:

Satellite Communications and High School Education: Perceptions of Students, Teachers and Administrators

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TITLE: SATELLITE COMMUNICATIONS
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SATELLITE COMMUNICATION AND HIGH SCHOOL EDUCATION

Perceptions of Students, Teachers, and Administrators Toward the Use of Satellite Technology for Distance Education

Communications satellites in geosynchronous orbit above the earth in a horizon-to-horizon band called the Clarke Belt are routinely used to send televised high school courses to schools throughout the United States. Courses such as calculus, physics, and Japanese are being uplinked and relayed by satellites to high schools dispersed hundreds and even thousands of miles from originating sites. These courses are a regular component of the curriculum of the schools where they are received, even though students usually never see their "satellite" teacher or meet in a traditional classroom situation (Barker and Bechner, 1986).

Use of satellite technology for the delivery of regular high school course work is projected to increase as rural schools continue to decline in enrollment, and as standards for the approval of school curricula become more demanding (Barker, 1987). The U.S. Congress has even approved $20 million for the development of the STAR SCHOOLS Program which will fund the development of regional satellite uplink systems. The purpose of these "satellite star school centers" would be to deliver mathematics, science, and foreign language courses to any school where such courses were needed (Federal Register, 1988).

Purposes of the Paper

This paper will discuss three research studies evaluating the use of satellite technology when it was used for the delivery of high school courses. These studies were completed during 1988.

STUDY #1: This study evaluated the perceptions of school superintendents concerning the use of satellite technology to deliver high school courses for credit. Four research questions were examined.

1. What was the current status of the use of satellite technology in their school?

2. What were the attitudes held by superintendents toward the use of satellites to deliver high school courses for credit?

3. What were their school's immediate, short-term plans for the use of satellite technology?

4. How should satellite courses be administered?

   Specifically, what courses are needed, how long should courses last, how should courses be graded, and how much should satellite courses cost?

Superintendents were given background information about satellite technology in the survey form they completed. Two follow-up mailings were sent to non-responders to ensure a high rate of return. All 436 superintendents employed in Iowa during 1988 were sent the survey.

STUDY #2: Currently, several organizations are offering satellite courses for credit. The largest, the TI-IN network which originates its courses near Houston, TX, offers a nearly complete high school curr culum, and a considerable number of enrichment activities to supplement its courses for credit. Over 200 schools in 15 states subscribe to the TI-IN satellite network, and enrol their students in TI-IN courses (Barker, 1987).

Since the TI-IN network offered the most comprehensive secondary school program using satellite technology, its students were targeted for Phase II of this project. Twenty-four school districts from a half dozen states (Texas, Iowa, Kansas, West Virginia, Michigan, and California) were randomly selected from a list of TI-IN subscribers. The superintendents of these schools were called and asked if they would allow TI-IN students to respond to an anonymous questionnaire dealing with their opinions about learning over the satellite network. Eight research questions were used as the basis for the development of the questionnaire sent to these students.

1. What are the characteristics of students enrolled in satellite courses?

2. Why have students elected to enroll in satellite courses?

3. What are the students' perceptions of the strengths and weaknesses of interactive satellite instruction?

4. How do students view the difficulty of satellite courses?

5. From the students' perspective, do satellite courses offer other benefits beyond course content?

6. From the students' perspective, do satellite courses provide a sufficient level of interaction between students and teachers?

7. What ideas do students have that would improve satellite instruction?

8. To what degree do students support satellite instruction?

STUDY #3: Since distance education in general, and satellite course delivery specifically, have implications for both teachers and administrators, the third part of this project was designed to obtain opinions from leaders of teacher and school administrator organizations. Specifically, the current presidents of the fifty state teacher organizations and the presidents of the fifty state associations of school administrators were questioned concerning their attitudes toward the use of satellite technology to deliver high school courses.

A questionnaire was sent to each of these leaders. The questions included in the survey produced data related to these four research questions.

1. Is the use of satellites to deliver courses to high school students an appropriate idea?

2. Will the widespread use of satellite technology have a positive impact on the teaching profession?

3. Will the school curriculum be effected positively by the use of satellite technology?

4. Are adequate controls included when satellite courses are planned and delivered, in order to maintain quality of content?

RESULTS OF STUDY #1: Superintendent's Survey

Background

This study surveyed all of Iowa's school superintendents to query them about their receptiveness to the use of satellite technology for the delivery of junior and senior high school courses. A survey form was developed and mailed to 436 Iowa superintendents. Two hundred sixty-one (261) were returned. A second mailing was sent to the 175 who had not responded. Sixty-seven responded to the second mailing. The return totaled 328 (75.2%). Responses from all areas of the state were received.

Those who responded

The average daily attendance of the schools who responded was 900. Two hundred thirty-three (233) of those responding indicated that their enrollments were declining, and 37 indicated rising enrollment trends. Seventh through eighth grade was the most prevalent junior high school organization (147 of those responding, 44%), and 9-12th grades was the most common high school organizational pattern (261 of those responding, 77%).

Ninety-one (27%) of the superintendents who responded said that their schools were in communities of less than 1,000 population. Two hundred ten (210) superintendents (62%) indicated their communities ranged between 1,000 and 10,000. Twenty-five schools (7%) from which superintendents responded were from cities larger than 50,000.

Study #1 - Part #1: Status of Satellite Use

Twenty (5.9%) superintendents indicated their schools currently owned
satellite reception systems. Seventy-eight (23%) stated they had plans to
install systems in the immediate future.

Twelve superintendents said they were subscribers to TI-IN, the commercial
satellite course delivery network. Thirty-one superintendents indicated that
they were definitely considering subscribing to TI-IN. Twenty-one said they
were interested in subscribing, and eighty-seven said they were unsure. One
hundred twenty-seven (127) were definitely not interested in TI-IN. Responses
to this question were correlated to the perceived benefits superintendents
felt could be derived from using satellites to deliver courses (r=.43) and to
the question about the appropriateness of the use of satellites to deliver
courses (r=.39). In other words, those superintendents who where considering
subscribing to TI-IN were likely to be positive about the benefits of this
kind of course delivery. Certainly, this was to be expected. What was
somewhat unexpected was that the superintendents who felt this way did not
tend to be from any particular size of community (small or large).

Study #1 - Part #2: Attitudes held by Superintendents about Satellite Technology

Knowledge About Satellite Technology

In general, superintendents considered themselves not to be very knowledgeable
about satellite technology. Only ten felt they "knew a great deal, " and only
65 felt they "knew quite a bit". One hundred thirty-five (135) said they knew
a little. The correlation between answers to this question and the question
that asked about knowledge of TI-IN was a highly significant one (r=.60),
indicating that those superintendents who knew about satellites also knew
about TI-IN and vice-versa.

Superintendents said they learned about satellite technology from reading
(N=78), in-service sessions (N=135), and vendors (N=24). Forty-eight percent
of the superintendents considered that they were the most knowledgeable person
in their school concerning satellites. Other knowledgeable persons were
principals (12%) and media specialists (11%). Nineteen percent of the
superintendents said no one in their school was knowledgeable about
satellites.

Perceptions About Satellite Delivery of Courses

One hundred eighty-one of the superintendents (54%) reported that they saw
value in the use of satellite technology to deliver courses for credit. Two
hundred eighteen (65%) said they would allow students in their schools to take
courses delivered by satellite.

Superintendents seemed most positive about the use of home state teachers as part of a statewide system of satellite course delivery. One hundred and ninety said they would consider subscribing to such a system (56%). Only twenty (6%) were opposed to subscribing. Responses to this question were significantly correlated to answers to questions asking about perceived benefits of using satellites (r=.61) and about acceptance of the idea of using satellites (r=.57).

When asked about who should teach satellite courses, local state certified teachers were rated highest (82% positive), out-of-state certified teachers were rated second (54%), professors rated third (50% positive), and certified graduate students were rated least positively (44%).

One important question in this section of the survey asked "do you think courses for junior and senior high school students should be taught using satellite delivery systems?" It was answered positively by 218 superintendents (65%). Only fifty-two superintendents (15.4%) indicated that they were strongly or somewhat opposed to the use of satellites to deliver courses.

Teacher and Teacher Organization Reactions to Satellites

Superintendents felt that their teachers would positively react to the use of satellite delivery systems (156 yes; 57 no). They were also asked to assess the local teacher organization's reactions to the use of satellites. Superintendents felt that teacher organizations would react:

> Very Negatively = 8
> Negatively = 70
> Neutrally = 64
> Positively = 85
> Very Positively = 5

Study #1 - Part #3: Immediate Plans for Use of Satellite Technology

As was stated earlier, twenty superintendents reported that their schools owned satellite reception systems, and 78 said they planned to purchase satellite receivers in the near future. Several superintendents (twelve) stated that they planned to purchase more than one system.

The RF frequencies received by those systems already installed were split about in thirds. One-third were C-band, one-third were Ku-band and one-third of the systems were capable of receiving both bands.

Thirty-one superintendents said "yes" they were contemplating subscribing to TI-IN (answered 5 on a 5-point scale). The total number of positive responses to this question was 139 (42%).

A related question asked the superintendents if they would consider subscribing to a satellite system if it originated in their home state. One hundred ninety (58%) said they would consider subscribing (43=definitely yes; 147=yes), and 123 were unsure. Only one superintendent chose the definitely not option.

Table 1. Attitudes of Students Towards Satellite Instruction

Subtest	Number responding	Range of scores	Mean score *	SD	Highest possible score	Reliability of subtest
Strengths of satellite instruction	290	7–49	31.64 (2.88)	7.06 (.64)	55	.76
Adequacy of interaction level	290	3–40	25.75 (3.22)	5.33 (.67)	40	.72
Benefits beyond content of satellite courses	290	2–25	13.69 (2.74)	4.21 (.84)	25	.79
Satellite courses not too difficult	290	9–42	24.83 (2.76)	5.8? (.65)	45	.75
Support for use of satellite instruction	290	8–34	21.47 (3.07)	5.48 (.78)	35	.72

* Higher scores = more positive attitude.
  All statements were answered using a 5-point Likert Scale.

Number of Students in One Class

One hundred five (105) superintendents felt that one satellite teacher should have less than thirty students. Thirty-two felt a satellite teacher could handle up to forty students. Twenty-six thought fifty should be the enrollment cap, and only fourteen would want one satellite teacher to have as many as sixty students.

Grading

Superintendents were asked how they would want their students to be graded in a satellite course. Their responses were:

> 117 wanted an end of course grade only (A-F)
> 2 wanted an end of course percentile rank in class
> 6 wanted an anecdotal report
> 15 wanted grade and rank in class
> 18 wanted grade and anecdotal report
> 63 wanted grade, rank, and report

Other Satellite Offerings

One hundred sixty-seven (167) superintendents reported that they would like to see non-credit, enrichment courses offered by satellites. They were also very positive about using satellite technology to deliver graduate level courses for their teachers ($\bar{x}$=3.89, SD=.99; scale ranged from 1=definitely no, do not offer; 5=definitely yes, offer).

Funding

One hundred fifty-eight (158) of the superintendents felt that satellite courses, if offered, should be partially or totally funded by a state agency. Forty-one indicated that these courses should be funded by local districts.

Superintendents were asked how much their districts would pay to enroll one student for one semester:

> 108 would pay less than $200/student
> 89 would pay $200-400/student
> 9 would pay $400-600/student
> 2 would pay $600-800/student
> 2 would pay $800-1000/student

Study #1: Conclusions

A significantly large number of Iowa school superintendents were positive about the use of satellite technology to deliver courses for credit. While the superintendents who responded to this survey were far from unanimous in this positive attitude, it did not seem that any clearly identifiable subset of administrators wanted satellites to be used more or less than any other category. Positive (and to a less extent, negative) opinions seemed to proportionally distributed among the superintendents without correlation to school size, community size, or community location. While superintendents in general reported that they knew relatively little about satellite technology, there was a significant relationship between level of understanding and positive attitudes. While it was likely that those superintendents who knew the most were ones who either had already subscribed to, or were seriously considering subscribing to, the TI-IN network, it also seemed that these superintendents had these positive opinions because they felt satellites were a good idea and not as a way to rationalize their decisions.

According to the superintendents, characteristics of a satellite system should probably be as follows:

- offer foreign language, science and math
- offer semester-long (18 week) courses lasting forty-five minutes per day, probably during school hours in the afternoon
- cost less than $400 per student
- grade students with traditional letter grades (A-F) supported by anecdotal reports
- offer some enrichment programming
- offer after-school graduate-level professional courses for teachers

RESULTS OF STUDY #2: Student Survey

The purpose of this study was to describe the attitudes of high school students toward interactive satellite instruction; to identify, through student opinion, the unique qualities of interactive satellite instruction; and to suggest recommendations for improvement.

A two-part questionnaire, called the Study of Satellite Instruction (SSI) was designed to provide answers to the study's research questions. The purpose of Part One of the SSI was to obtain background information in order to establish a profile of characteristics of high school students enrolled in TI-IN courses and describe why students had enrolled in TI-IN course. The purpose of Part Two of the SSI was to describe the attitudes of high school students toward interactive satellite instruction and provide an opportunity for them to suggest recommendations for improvement of satellite courses.

A list of the names of TI-IN subscribers in six states was compiled from viewing TI-IN classes. Twenty-four school districts were randomly selected from this list and administrators were contacted by phone. Twenty-three school districts returned their student's surveys. The school district return rate was 96%. The return rate of students was 73%.

Part One of the SSI identified background information about the TI-IN students and their schools.

The students surveyed were characterized as follows:

- 57% were female and 43% were male.
- 31% were seniors, 28% were juniors, 27% were sophomores, 12% were freshmen, and 2% were 8th graders.
- 39% of the students considered themselves to be A students and 49% considered themselves B students
- 74% of the students thought they would receive a B or better in the TI-IN course they were taking.
- 95% were taking their first TI-IN course.
- 83% were enrolled in a foreign language course.

Additionally, students reported that:

- their high school was small ($\bar{x}$=149 students).
- their TI-IN class had 8 students enrolled, locally. (Range=1-21).
- they estimated their TI-IN class enrolled over 100 students, nationally.

Part Two of the questionnaire consisted of 40 statements that were answered using a Likert-like agreement scale. Each of the statements was placed into one of five individual subtests measuring a different attitude construct. Each attitude subtest related to a research question. A reliability coefficient of above .70 was reported for all subtests (See Table 1).

The results of responses from 290 students showed that on the whole students had positive attitudes toward satellite instruction. The students held positive attitudes toward satellite instruction ($\bar{x}$ = 2.88) and felt TI-IN teachers were a major strength. Specifically, students were positive ($\bar{x}$ = 3.22) in their attitude toward the level of interaction between student and instructor, yet mixed responses indicated that students would have liked more opportunities for communication. The results showed that students had only a slightly positive attitude ($\bar{x}$ = 2.74) toward the benefits of satellite instruction beyond course content. Students did not perceive the establishment of relationships with other students and the development of independent learning as major benefits of TI-IN. The data showed that students did not feel satellite courses were overly difficult ($\bar{x}$ = 2.76). Students favorably supported the use of satellite instruction ($\bar{x}$ = 3.07), even though they tended to prefer traditional courses over satellite courses.

The relationships and differences between variables were analyzed next (see Table 2). The number of students in the local class correlated positively with all attitude subtest scores, indicating that students tended to want the traditional "live" contact with other students, even though they had many TV classmates. The data indicated that students who took classes in the morning had a more positive attitude toward interactive satellite instruction than students who were taking classes in the afternoon.

Table 2. Correlation matrix: Degree of Relationship Between Characteristics of Students and Score of Subtests of Attitude Toward Satellite Instruction.

		A	B	C	D	E	F	G	H	I
A.	Ability of student	1.00	.50*	.~'	-.06	.13	.04	.11	.12	.15*
B.	Grade expected		1.00	.15	.04	.29*	.07	.26*	.37*	.35*
C.	Local number in class			1.00	.14	.36*	.22*	.46*	.14*	.44*
D.	Total number in class				1.00	.04	-.06	.10	.09	.05
E.	Strengths of satellite instruction					1.00	.55*	.66*	.47*	.76*
F.	Adequacy of interaction level						1.00	.30*	.25*	.41*
G.	Benefits beyond satellite course content							1.00	.38*	.74*
H.	Satellite courses not too difficult								1.00	.53*
I.	Support for use of Satellite instruction									1.00

The most frequent response given by the students about what influenced them to take a satellite course was "interest in the subject", yet the students who gave this reason for enrolling in a satellite course general] tended to have a low positive attitude toward interactive satellite instruct; Other factors besides their interest in the subject may have strong₁ ₋ected their attitude once the course was in progress. Students who named the principal or superintendent as the major influence for why they took a satellite course showed a more positive attitude than the students who named other influences. Support by the administration seemed to be a major factor in the success of an interactive satellite program.

A list of what students liked best and least about their satellite course and a list of suggestions for improvement of interactive satellite instruction was complied from three open-ended questions (Tables #3, #4, and #5). Although generally students had positive attitudes toward instruction via satellite, the development of more interesting methods to present course material and the reduction of total class size in order to provide more student-teacher interaction and remedy the congested phone system were recommendations made to improve interactive satellite instruction.

RESULTS OF STUDY #3: Teacher and Administrator Leader Survey

The responses from the questionnaire, Opinions of Teacher Leaders and School Administrators Toward Satellite Delivery of Instruction (OTLSA), were used to describe the attitudes of these individuals toward satellite delivery of courses for high school credit. The data were collected from the OTLSA and statistically analyzed.

This section of this paper contains the results of the statistical procedures used to: (1) provide a descriptive profile of the participating respondents, (2) present a brief description of the respondent's school district, (3) provide a summary of the attitudes of respondents toward interactive satellite instruction, (4) provide an examination of relevant relationships among variables used in the study, and (5) present a summary of potential problems foreseen and additional comments about the use of satellite courses.

The rate of return for the OTLSA was good. The return rate of the teacher leaders' and school administrators' questionnaires was calculated using 100 as the number of individuals sampled and 80 as the number of returned questionnaires, so the overall return rate was eighty percent. Teacher leaders returned 36 surveys for a return rate of seventy-two percent, and the school administrators returned 44 surveys for a return rate of eighty-eight percent.

Profile of Respondents

The purpose of Part One of the OTLSA was to proved a descriptive profile of the sample. Frequency distributions were computed for each item in Part One of the OTLSA in order to describe characteristics of the sample.

The characteristics of the sample are described and reported in the same order that the question relating to that characteristic appeared in Part One of the OTLSA:

Table 3. What Students Liked Best About Their Satellite Course

Response	Number of responses
Subject was interesting	64
Good teacher; good personality	37
Easier than traditional	34
Meet and talk to other students	33
Nothing	28
Different; change in routine	22
Relaxed, fun	20
Teacher not present	17
Opportunity to take course not offered; needed for college	17
Interesting specials	12
Challenging; learning more	11
Fosters independent learning	11
Chance to call in	9
Everything	5
Total	320

Table 4. What Students Liked Least About Their Satellite Course

Response	Number of responses
Boring; uninteresting	53
Hard to understand	35
Too much homework and labs	35
Calling is difficult	27
Instructor unorganized and hard to understand	26
Lack of communication	21
Scheduled at a poor time of day	20
Tests too difficult	14
Unable to ask questions; feel uncomfortable	11
Everything	10
Hard to make up work from vacations or absences	9
OK the way it is	9
Poor TV reception	8
Not challenging	6
Impersonal and not enough interaction with other students	5
Poor phone connections	4
Subject matter	3
Total	296

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Table 5. Student Suggestions for Improvement of Satellite Courses

Response	Number of responses
More variety	33
More student-teacher interaction	30
More organization	25
Improve phone system	18
Reduce class size	17
More involvement with other students	14
Schedule at a different time	14
Better TV reception	13
More courses and different course levels	12
Eliminate satellite courses	12
Improve tests and grading methods	8
Facilitators receive more training	7
More handouts and study guides	5
Total	208

(1) Overall, sixty-four percent (63.75%) of the respondents were male, and approximately thirty-six percent (36.25%) of the respondents were female. Teacher leaders were sixty-one percent (61.11%) female and thirty-nine percent (38.89%) male. School administrators who returned to OTLSA were eighty-four percent (84.09%) male and sixteen percent (15.91%) female.

(2) Overall, the average age of the respondents was found to be 47.31 years. teacher leaders' average age was 43.53 years. Females and males averaged 44.05 and 452.71 years of age, respectively. School administrators' averaged 50.41 years of age. Female administrators averaged 44.57 years, and males averaged 51.51 years of age.

(3) All of the respondents were asked to indicate the highest academic degree they had successfully completed, or credits they had toward the next highest degree. All had credits beyond an undergraduate college degree. Approximately twenty-six percent (26.25%) had received a Doctorate and thirty-three percent (32.50%) had credits towards a Doctorate. Thirty-four percent (33.75%) of all the respondents had received a master's degree and eight percent (7.50%) had credits toward a master's degree. Approximately six percent (5.56%) of teacher leaders had a Doctorate and twenty-two percent (22.22%) had credits towards a Doctorate. Fifty-six percent (55.56%) of teacher leaders had received a master's degree and seventeen percent (16.67%) had credits toward a master's degree. Forty-three percent (43.18%) had received a Doctorate, forty-one percent (40.91%) had credits toward a Doctorate, and sixteen percent (15.91%) had a master's degree.

(4) Overall the average number of years employed in education for the entire group of those responding (combination of years as teacher and/or administrator) was 23.50 years. Teacher leaders averaged 20.03 years in education. Females averaged 19.05 years and males averaged 21.57 years of experience. School administrator leaders averaged 20.43 and 27.46 years, respectively.

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Description of Respondents' School Districts

Each respondent was asked to answer questions concerning the school district where they were currently or most recently employed. The school districts were located across the United States. Questions about the school district's enrollment size, recent fluctuations in enrollment, and use of satellite reception systems were asked, also.

(1) As expected, the size of the school districts varied. The percentages of each category were:

Less than 1,000	-	9%
1,000-5,000	-	38%
5,000-15,000	-	38%
15,000-25,000	-	9%
25,000-45,000	-	6%
over 45,000	-	6%

(2) Forty percent of the respondents indicated that their school district had recently increased in enrollment. Thirty-six (36.25%) said that their school district had stayed about the same size, and twenty-four percent (23.75%) said their districts had decreased in enrollment.

(3) The majority (83.75%) of the respondents indicated that their school district was doing little with satellite delivery systems. Nine percent (8.75%) were considering implementing a satellite reception system for courses, and eight percent (7.50%) were currently using a satellite reception system for courses.

Attitudes of Teacher Leaders and School Administrators

The primary purpose of this study was to describe the attitudes of teacher leaders and school administrators toward delivery of interactive satellite instruction. The teacher leaders and school administrators were asked to choose the response that best described how they felt about each of the 30 statements in Part II of the OTLSA. The respondents used the following Likert-like scale:

> SA = Strongly Agree
> A = Agree
> U = Undecided
> D = Disagree
> SD = Strongly Disagree

In order to answer the research questions, each of the 30 statements in Part II of the OTLSA was placed into one of four attitude categories or subtests. Each subtest was relevant to one of the research questions. Each subtest was considered an individual measure of an attitude construct and was examined separately.

The reliability of each subtest was computed. A reliability coefficient of above .70 was reported for all but one subtest.

An indication of favorable positive attitude, or an unfavorable negative attitude was determined by the following statistical procedures:

(1) The mean for each subtest was computed. A score at or above the midpoint of total possible points was considered a favorable attitude. A score below this midpoint was considered an unfavorable attitude.

(2) The average score (mean) was found for each item to allow the researcher to examine each subtest item separately. A score of 2.50 or above was considered to indicate a favorable attitude for each item. A score of less than 2.50 was considered a negative attitude (Table 7).

Satellite instruction is considered appropriate

Subtest: What is the appropriateness of using satellites to deliver courses for credit to high school students (Appropriateness of Satellite Instruction)?

Table 7 indicates that teacher leaders and school administrators hold a generally neutral but positive attitude ($\bar{x}$=24.35) toward the appropriateness of satellite instruction. The subtest, Appropriateness of Satellite Instruction, had a possible total score of 40. A score of 21 or above indicated a positive attitude. An analysis of the subtest's items showed that teacher leaders and school administrators generally did not consider satellite delivery of instruction the same as TV courses ($\bar{x}$=3.69), and that satellite courses probably would motivate and hold the interest of students ($\bar{x}$=3.16).

Satellite instruction has positive effects on the teaching profession

Subtest: What is the effect on the teaching profession if satellite course delivery becomes widespread (Effect on Teaching Profession)?

The average of the subtest, Effect on Teaching Profession ($\bar{x}$=25.25), indicated that teacher leaders and school administrators generally held a positive attitude toward the effect that satellite instruction had, or would have, on the teaching profession. The highest possible score was 35. A positive score was 18 or above. An analysis of the subtests' items indicated that teacher leaders and school administrators believed that teachers' job opportunities would probably not be reduced because of satellite delivery of instruction ($\bar{x}$=3.68).

Table 6. Study 3 - Description of Those Responding

Gender	Teacher Leaders	Administrative Leaders	Totals
Female	61% (22)	16% (7)	36% (29)
Male	39% (15)	84% (37)	64% (51)

Approximate Age	Teacher Leaders	Adminstrative Leaders	Averages
	43	50	47

Formal Education	Teacher Leaders	Administrative Leaders
Doctorate	6%	43%
Masters +	22%	41%
Masters	56%	16%
Bachelor +	16%	

Years of Experience	Teacher Leaders	Administrative Leaders	Average
	20	26	23.5

School Size	Less than 1000	1000-5000	5000-15000	15000-25000	25000-45000	more than 45000
	9%	35%	35%	9%	6%	6%

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Table 7. Attitudes toward satellite instruction: subtest scores

Subtest	Number Responding	Range of Scores	Mean Score*	SD	Highest Possible Score	Reliability of Subtest
Appropriateness of Satellite Instruction	80	13-31	24.35 (3.04)	3.92 (.49)	40	.75
Effect on the Teaching Profession	80	15-33	25.25 (3.61)	3.72 (.53)	35	.72
Effect on the School Curriculum	80	15-32	22.95 (3.28)	3.46 (.49)	35	.72
Perceptions of Needed Controls	80	16-35	24.95 (3.12)	3.59 (.45)	40	.64

*Higher scores = more positive attitude.

<u>Satellite instruction has a positive effect on the school curriculum</u>

Subtest: What will be the effect on the school curriculum in order to accommodate satellite courses (Effect on the School Curriculum)?

Table 8 shows the subtest, Effect on the School Curriculum, had a possible total score of 35. A favorable attitude score was 18 or above. The average score was found to be 22.95 and indicated that teacher leaders and school administrators had a generally positive opinion toward the effect that satellite instruction would have on the school curriculum.

<u>Satellite instruction has the needed controls</u>

Subtest: What are the teacher leaders' and school administrators' perceptions of the controls that will be needed when satellite courses are planned and delivered in order to maintain quality of content (Perceptions of Needed Controls)?

The mean of the subtest, perceptions of needed controls ($\bar{x}$ 24.95), indicated that teacher leaders and school administrators favored the controls currently in place for satellite instruction. The subtest had a possible score of 40. A positive score was 21 or more. An item analysis of the teacher leaders' and school administrators' subtest responses showed that they felt satellite course instructors should be certified in the receiving state ($\bar{x}$=3.55).

Additional Analysis

Descriptive statistics of all student characteristics and subtest scores were examined to determine if further analyses were appropriate. The data were analyzed using Pearson product moment correlation and t-tests.

<u>Correlation</u>

The Pearson product moment correlation technique was used to determine the strength of the relationship between the characteristics of teacher leaders and school administrators and the subtests. The characteristics examined were (1) sex of respondent, (2) the highest degree received, or credits towards one (degree), (3) the number of years the respondents had been employed in education, (4) the respondents' school district's enrollment for K-12, (5) their district's enrollment fluctuations, and (6) their district's current usage of satellite reception systems (current satellite usage).

The most interesting observation derived from the analysis of the correlations was that while there were a number of statistically significant correlations, there were few practically significant relationships.

Table 8. Correlation matrix: Degree of relationship between characteristics
of Study #3 sample and attitude subtest scores.

	Sex of Respondent	Highest Degree Received	Years Employed in Education	School District's Enrollment
Sex of respondent	.27	.44	.43	
Highest degree		.33	-.13	
Years employed in education			-.29	
School district's enrollment				
Enrollment fluctuations				
School district's current satellite usage				
Appropriateness of satellite instruction				
Effect on the teaching profession				
Effect on the school curriculum				
Perceptions of needed controls				

Table 8. Correlation matrix - continued.

	Enrollment Fluctuations	School District's Current Satellite Usage	Appropriateness of Satellite Instruction	Effect on the Teaching Profession
Sex of respondent	.14	-.01	.28	-.09
Highest degree	-.13	-.10	.27	-.19
Years employed in education	-.29	-.16	.44	-.01
School district's enrollment	.34	-.02	-.02	.24
Enrollment fluctuations		.03	-.07	-.04
School district's current satellite usage			-.22	.03
Appropriateness of satellite instruction				.12
Effect on the teaching profession				
Effect on the school curriculum				
Perceptions of needed controls				

Table 8. Correlations matrix - continued.

	Effect on the School Curriculum	Perceptions of Needed Controls
Sex of respondent	.20	.20
Highest degree	.19	.17
Years employed in education	.14	-.21
School district's enrollment	.30	.48
Enrollment fluctuations	-.25	.11
School district's current satellite usage	-.15	-.01
Appropriateness of satellite instruction	.38	.63
Effect on the teaching profession	.35	.24
Effect on the school curriculum		.24
Perceptions of needed controls		

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<u>t-tests</u>

The t-test was used to determine if there was a significant difference between teacher leader's and school administrator's subtest scores. Table 9 shows that the average scores of teacher leaders and school administrators for the subtest, Effect on the Teaching Profession, were almost identical. All other subtest scores were quite different. The level of significance (p) for two subtests, Appropriateness of Satellite Instruction
($p < .0001$) and Perceptions of Need Controls subtest results ($p < .01$), showed that there was a highly significant difference between the attitudes of teachers and administrators. In other words, administrator leaders tended to have more positive attitudes than teacher leaders about the use of satellite technology. Also, administrators seemed to be less in favor of more controls on the use of satellite technology in the schools than were teachers.

The t-test was also used to determine if there was a significant difference between males' and females' subtest scores. The t-test indicted that males had more favorable attitude scores on all but one subtest (Perceptions of Needed Controls) than females (Table 4). In other words, males generally tended to be more positive than females about the use of satellite technology, and males tended to be less in favor of more controls than females.

Suggested Improvements

A second purpose of this study was to identify, by using teacher leaders' and school administrators' opinions, potential problems that might occur with the routine use of satellite courses. This information was obtained in Part Two of the OTLSA.

These questions were stated in an open-ended format so that respondents could express their opinions and give unprompted responses. Similar responses were grouped. The responses were ranked from the most frequent response to the least frequent response.

The first question asked the respondents to describe what potential problems they anticipated if school districts began to routinely use satellite courses for credit. The most frequent responses in descending order were:

(1) Satellite courses would not provide for the individualization of teaching or learning (n=13).
(2) There would be a problem in scheduling (n=9).
(3) Local curriculum vs. a standardized curriculum might be a problem (n=9).
(4) Teacher employment opportunities would be reduced (n=8).
(5) Certification of satellite teacher and local monitor was a concern (n=7).
(6) The cost of the initial installation would be high (n=5).
(7) Satellite courses would not be motivating to students (n=5).

Table 9. t-tests - Attitudes Toward Satellite Instruction: Teachers vs. Administrators

Subtest	N	x	SD	t-value	p
Appropriateness of Satellite Instruction:					
Teacher Leaders	36	22.14 (2.77)	4.21 (.53)	-4.39	.01
School Administrators	44	26.16 (3.27)	2.52 (.32)		
Effect on the Teaching Profession:					
Teacher Leaders	36	25.44 (3.63)	3.44 (.49)	.23	.82
School Administrators	44	25.09 (3.58)	3.98 (.56)		
Effect on the School Curriculum:					
Teacher Leaders	36	21.97 (3.14)	3.94 (.56)	-1.85	.07
School Administrators	44	23.75 (3.39)	2.81 (.40)		
Perceptions of Needed Controls:					
Teacher Leaders	36	26.50 (3.31)	3.54 (.44)	2.80	.01*
School Administrators	44	23.68 (2.96)	3.12 (.39)		

*Higher scores = more positive attitudes.

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Table 10. Potential problems.

Responses	Number of Responses
Lack of individualization	13
Scheduling	9
Local curriculum vs. standardized curriculum	9
Teacher jobs reduced	8
Certification of satellite teacher and monitor	7
Cost	5
Lack of motivation for students	5
Teacher union opposition	3
Quality of satellite instruction	3
Commitment for all involved	1
Total	63

The second question asked the teacher leaders and school administrators to give additional comments about the use of satellites to deliver courses for credit (see Table 11). Their responses, in descending order of frequency, were:

(1) Satellite instruction is a plus for small and rural schools (n=8).
(2) Satellite delivery of courses offers many curriculum enhancement opportunities (n=7).
(3) Quality of the satellite course is important. Teacher leaders and school administrators felt that the courses needed to provide immediate feedback and the satellite teacher needed to be very knowledgeable (n=5).
(4) The monitor's (teacher in the downlink school) role must be clarified (n=3).

Conclusions

It was hoped that the results of these three studies would yield a somewhat comprehensive picture of the perceptions of administrators, teachers, and students toward satellite technology. While it is certainly difficult to arrive at conclusions from survey research, there are trends and implications that seem obvious when the results of each study are evaluated.

● Superintendents were generally in favor of the use of satellite technology to deliver courses for credit, and many had plans to install satellite reception systems in their school districts.

● Students who were currently enrolled in a course being delivered by satellite technology were generally positive about the experience. Students tended to be more positive if they had a number of local classmates taking their course with them.

● Students suggested that more variety was needed to make satellite delivered courses more interesting.

● Generally, leaders of state teacher and administrator associations were positive about the use of satellite technology, although administrator leaders tended to be more positive than teachers and tended to expect fewer controls on those using this technology.

Most notable was the generally reported positive attitude toward the use of this new technology in a distance education situation. Certainly, satellite technology is not opening to "rave reviews." Just as certainly, it is a technology with considerable potential that at worst invokes a "wait-and-see" attitude. At best, satellite technology is being positively, if somewhat cautiously, endorsed.

Table 11. Additional comments.

Response	Number of Responses
Satellite instruction is a strength in small and rural schools	8
Satellite delivery of courses offers many enhancement opportunities	4
Enrichment courses	2
Instruction should provide feedback	2
Quality of satellite course	2
Clarification of monitor's role	2
Advanced level courses	1
Satellite teacher needs to be knowledgeable	1
Monitor needs to be a teacher	1
Total	33

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