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EDITORIAL

This issue of DEOSNEWS presents a study of student expectations of and satisfaction with four high school distance learning courses taught via two-way interactive television. Student satisfaction has a significant influence on both achievement and persistence in distance education. Studies such as this one conducted by Jonathan Fyock and H. Dean Sutphin can offer course designers and instructors the information necessary to provide courses that are both satisfying and educationally effective.

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STUDENTS' PERCEPTIONS OF THE EFFECTIVENESS
OF TWO-WAY INTERACTIVE TELEVISION

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INTRODUCTION

Equity and access in education are major issues in rural and urban schools. Electronic technologies that facilitate distance learning with two-way interaction offer promise in these two areas. As Tift (1989) stated: "Technology-based education is maintaining the viability of small, rural schools through equitable access to a quality education by all students." Some of the underlying factors as noted by Barker (1990) include teacher availability, low student enrollments, and geographic location. Although there is a shortage of literature and research to address equity of educational opportunities to students in small rural schools, it is a priority concern. (Holt, 1991; Kober, 1990; Murphy 1991; Shapiro, Heck, & Fredenberg, 1992)

The literature favors the effectiveness of this technology as an instructional delivery method. "Well-designed distance education programs are equally effective in terms of learner outcomes with resident instruction, in general, and produce superior learning outcomes in specific applications" (Kelly, 1993, p. 76). Threlkeld (1991) analyzed six published reports and found extensive

evidence that courses delivered by a teacher at a distance were equally effective as those with the teacher in the classroom. Perhaps, as Wagner (1992) states, more time and care taken to develop materials for delivery over interactive television systems may be a contributing factor to superior learning outcomes. One limitation, however, is the effectiveness of distance education for some students who need direct interaction with a classroom instructor and with other students (Schmidt and Faulkner, 1989). Students who select advanced or enrichment courses taught through distance learning systems are self motivated and are already high achievers. These students are the ones who typically have positive educational outcomes (Schrum, 1991). Thus, while there is some controversy, experts in distance education believe it can be as effective an educational mode as traditional methods. This study will determine the expectations of students in distance learning courses with respect to the educational quality of the courses offered and their satisfaction with the educational experiences in the distance learning programs in three rural schools.

Newark Valley, Owego Apalachin, and Tioga Central are three rural schools in the Southern Tier of New York struggling to provide educational equity and access comparable to larger, more affluent districts. Because of their small size, (Newark Valley has 1,300 students, Tioga Central has 1,800, and Owego Apalachin has 2,800), these schools find it difficult to offer advanced placement and enrichment courses. Financial constraints make it impractical to offer courses that attract fewer than 10 students.

The distance learning system provides a way for the school districts to combine resources and pool students who are interested in classes that couldn't normally be offered. Examples are Spanish V, College Accounting, AP English, AP Mathematics or Calculus, Shorthand I, and Japanese I.

The system is two-way interactive television. Students and teachers at all locations can see, hear, and talk to each other over the system. There are two video cameras in each classroom; one camera is on the teacher's work station and the other camera is focused on the students. Each classroom has four television monitors in front of the room for the students and three monitors located on the ceiling over the students' desks for the teacher. One of the student monitors shows the teacher and/or visual aids and the other monitors show the students at each site. Every classroom has the same equipment and every school can be an originating site. Additionally, each site has facsimile machines, telephones, and computer terminals. The signals are transmitted between the schools over 18.3 miles of fiber optic cable overlashed to the existing cable TV coaxial cable system.

PURPOSE OF RESEARCH

The problem addressed in this study is a lack of knowledge and understanding about distance education in public schools and its impact on students' learning and their attitudes toward learning. The specific research question is: To what extent does distance education meet students' educational needs? Subquestions were: (1) gender differences in student perceptions of satisfied educational needs, (2) influence of distance learning class on students' perception, (3) differences in students' perception at the

remote sites and the home sites and, (4) effect of school districts on the degree of student satisfaction with the distance learning program.

Current research focuses on the financial feasibility and technological aspects of distance education as an educational delivery system. This study, by focusing on the learners' perception of the effectiveness of distance learning, adds to the growing knowledge base of this new and exciting educational technology. As Wagner (1990) noted, distance education provides an exceedingly rich research and application environment.

METHOD

Pilot studies were initially developed in 1991-92 to gain a perspective of the program and the system and to formulate research questions. Data were collected using a variety of techniques including: structured questionnaires, semi-structured interviews, review of student records, researcher observations, and a journal. The research method used was the descriptive or normative survey method or "observation with insight" (Leedy, 1989). While quantitative instruments provided some measurements of satisfaction and fulfillment of expectations, qualitative data added in-depth insights.

A structured questionnaire, the primary instrument, consisted of a series of 35 statements using a six point Likert scale and five open-ended questions to measure students' perceptions of the effectiveness of the distance learning courses.

The in-depth interviews were semi-structured using a concept map as a question guide. The concepts to be explored in the interviews were arranged as a logical sequential map to guide the interviewer. All of the students enrolled in the distance learning courses were invited to participate in audio taped half-hour interviews. The researcher also interviewed distance learning teachers and facilitators.

INSTRUMENTATION

A pilot survey was administered in November of 1992 in two schools to fourteen students taking the distance learning courses Spanish V and College Accounting. All respondents answered the survey at the same time under similar conditions. Immediately following the completion of the survey, the researcher conducted a debriefing that determined that the respondents understood and felt comfortable answering the questions. The sample was homogeneous by age and academic ability. All of the students were in college level courses, not representative of the typical high school student.

Content validity was established by having the pilot questionnaire reviewed by a panel of experts that included expertise in the areas of evaluation and measurement, statistics, and technology diffusion, classroom teaching, administration, and curriculum. Portions of the survey were adapted from the Mid-State Educational Telecommunications Cooperative in Minnesota (MSET, 1989).

The data from the pilot test of the questionnaire were analyzed for reliability. Cronbach's alpha and factor analysis using the Statistical Package for Social Sciences (SPSS) were used to establish reliability of the subscales. Modifications were made to enhance validity and reliability.

As a result of field testing, a structured questionnaire was developed for quantitative measures of students' perceptions of the effectiveness of the distance learning courses in which they were currently enrolled. A six point Likert scale included: strongly disagree (a value of 1), disagree (2), disagree somewhat (3), agree somewhat (4), agree (5), and strongly agree (6). The weighting was recoded with the values reversed for eight of the statements that were worded negatively. The weighted Likert scale gave an indication of the effectiveness of an item.

In cooperation with the Instructional Coordinator from the Board of Cooperative Educational Services, the revised questionnaire was administered to the distance learning students in January of 1993. This was part of the consortium's regular evaluation of the system at the end of each semester. Again, reliability and validity were affirmed. The two scales measured in the January survey had Cronbach alpha reliability coefficients of .6461 and .7737. The individual survey questions that reduced reliability were revised or dropped from the instrument.

Pilot interviews were conducted in November of 1992 with four students, two teachers, and a facilitator at one of the participating schools. A panel of experts judged the content validity of the pilot interviews effective. No major changes were deemed necessary; thus, the pilot interview format became the basis for the semi-structured interviews.

DATA COLLECTION

Data were collected from the students enrolled in the six distance learning courses offered by a consortium of three small rural schools located in South Central New York State.

The in-depth interviews were conducted over a six-day period in late March of 1993. Six students from Newark Valley, eight from Owego Apalachin, and six from Tioga Central volunteered to be interviewed. These students, who included the four interviewed at Owego Apalachin earlier as part of the pilot interviews, provided a sample of 24 students interviewed. The sample represents 52 % of the population of the students in the distance education program. Of those volunteering, 16 were female and eight were male students. In addition, two facilitators and three teachers were formally interviewed. The interviews provided quantitative and qualitative data to reinforce, supplement, and explain the information obtained from the structured questionnaire.

Forty-six students attending distance learning classes on May 3, 1993 completed the structured questionnaire. Six of the students were taking two distance learning courses and filled out separate questionnaires for each class. The 51 usable surveys were evenly distributed among the three schools with 17 each. Approximately two-thirds of the surveys were completed by females. The questionnaire was administered during class time using the two-way interactive television technology. The final revised

survey instrument had Chronbach alpha reliability scores of .7936 for the scale "Limit" and .8750 for the scale "Needs."

DATA ANALYSIS

The Statistical Package for the Social Sciences (SPSS) was used to determine inter-item correlation, factor analysis, frequencies, means, cross tabulations, chi square tests and T-Tests. The data analysis was reported in terms of means, standard deviations, grand means, ranges, mid points, percentages, observed chi-square statistics, degrees of freedom, p-values, z-scores, and T-values. A p-value under .05 alpha ($p < .05$) was the measure of independence used in this study.

Two approaches were taken to answer the research question. The first approach was a statistical analysis of the data collected from the survey. The second approach was a descriptive analysis that included the sorting and classifying of the answers to the open-ended questions on the instrument. Also included were records in the researcher's journal and data collected from the in-depth interviews.

RESULTS

Extent That Student Educational Needs Are Met

The research question "To what extent does distance learning meet students' educational needs?" was addressed by nine survey items. Two pressing areas of concern were (1) the quality of the educational experience and the value of the distance learning course beyond graduation, and (2) satisfaction with the distance learning program. The items were arranged in two subscales.

The first subscale addressed students' perceptions of the quality of education and the benefits of distance learning courses beyond graduation. The subscale had a grand mean of 4.7 on a six-point Likert scale, which would indicate favorable opinions about the quality and value of the distance learning courses. Positive student reactions to televised classes, of course, cannot be construed as a guarantee that learning has taken place. On the other hand, negative reactions can both undermine support for the program and detrimentally affect learning. (Biner, 1993, p. 63).

The mean for the survey item "This course will help me after graduation" was a favorable 4.8 with a standard deviation of 1.2. Chi-square tests of the survey item and gender produced an observed chi-square statistic value (X^2 statistic value) of 11.7 with 5 degrees of freedom (DF) and a p-value of .04. Chi-square tests of the survey item and class had a X^2 statistic value of 44.7 with 25 DF and a p-value of .01. Both chi-square tests were less than .05 alpha ($p < .05$); thus, the null hypothesis of independence between the statement and gender and class can be rejected. Male students felt more strongly that the course would help them after graduation than did females. Ninety-four percent of the males agreed with the statement for a mean of 5.1. Eighty-seven percent of the females agreed with the statement for a mean of 4.7. All of the students in AP English and Japanese I, 92% of the AP Math and College Accounting classes, and 83% of the Spanish V and Shorthand I classes agreed with the survey item. The home site and the remote sites both recorded means of

4.8. Newark Valley students recorded the highest school mean (5.1), agreeing with the statement that the course would help them after graduation. Chi-square tests of the statement and the variables, site and school, produced p-values of .40 and .10. Thus, the null hypothesis of independence cannot be rejected at .05 alpha.

Several students responded to the open-ended questions on the value of the courses beyond graduation.

"I think it helps me understand technology and prepares me for the future."

"A person is able to take a college level course without leaving the high school."

"Yes, I really learned a lot, now when I go to college I will be ahead in the game."

Two of the students commented that, even though the college they plan to attend may not give them advanced credit for the course, they will be much further ahead academically for having taken the distance learning course. Most students plan to list their distance learning experiences on their college applications.

The survey item "I am receiving a quality education in this DL class" had a mean of 4.7 and a standard deviation of 1.2. Chi-square tests between the item and the variables gender, class, site, and school had p-values of .15, .07, .40, and .50 respectively which indicates the variables were independent at .05 alpha. College Accounting class had an exceptionally positive mean of 5.6 (z-score +.75). Spanish V students recorded the least degree of agreement with the statement with a mean of 3.7 and a z-score of -.83. The means for gender, site, and school were either 4.7, the norm, or 4.8.

Five students commented on the high quality education they were receiving through distance learning classes. Typical statements included:

"The high level courses that are offered. The technology."

"Harder courses, better behavior, smaller classes."

"They are more challenging and you go faster and learn more."

The survey item "I would have learned better if this course had been taught by traditional means" was recoded to be a positive statement. The frequencies in Table 1 are the students' actual responses. The recoded statement had a mean of 4.5 and a standard deviation of 1.2 which indicates satisfaction with the statement. Chi-square analysis of the statement and gender resulted in an X² statistic value of 11.5 with 4 DF and a p-value of .02 which indicates the variables are not independent. Female students registered more positive agreement with the statement with a mean of 4.8 (z-score of +.25) compared to a mean of 4.0 (z-score of -.42) for the male students. Chi-square tests of the item by class, site, and school produced p-values of .81, .60 and .41. Thus, the null hypothesis of independence cannot be rejected at .05 alpha.

Several students made positive statements about the comparison between distance learning classes and traditional classes on the open-ended portion of the questionnaire.

"You learn something you wouldn't learn as well in another class."

"The learning is somewhat easier than [in] a traditional classroom setting."

The students believe they are receiving a high quality education and that the distance learning experience will benefit them in college. With only a few exceptions, students stated they would not have done any better in the courses if taken in a regular classroom.

STUDENT SATISFACTION WITH DISTANCE LEARNING

The second subscale asks the questions "To what extent are the students satisfied with the distance learning program? Have the courses lived up to the students' and their parents' expectations? Are the students proud to be active participants in this technology?" The six survey items had a grand mean of 4.6 indicating student satisfaction with the program.

The first survey item in this subscale, "I like being part of this new DL technology," had a mean of 4.8 and a standard deviation of 1.0. Chi-square analysis of the survey item and the variables gender, class, site, and school generated p-values of .32, .26, .66, and .25 respectively. Thus, the null hypothesis of independence cannot be rejected. Only 6 out of the 51 respondents (12%) disagreed somewhat with the statement. The remainder of the students agreed that they liked being part of distance learning technology. As one student commented, "The classes are great, but I've found I really like this technology."

"My parents think the DL classes are a good addition to the curriculum" received an approval rating (mean) of 4.7 with a standard deviation of .9. The responses to the statement were independent of the variables gender, class, site, and school with p-values $>.05$ of .41, .19, .31, and .33. The only noticeable difference was the AP English class with a mean of 5.4 and a z-score of +.78. Table 2 shows that only 5 out of the 51 students (10%) disagree with the statement. There were no comments or statements about the parents' opinions of the distance learning classes in either the open-ended questions or during the interviews.

The survey item "The course has lived up to my expectations" had a favorable mean of 4.6 and a standard deviation of 1.2. Chi-square tests between the survey item and gender, class, site, and school indicated the variables were independent at .05 alpha with p-values of .39, .79, .37, and .67, respectively. The range of means was from a high of 5.0 (z-score of +.33) to a low of 3.8 (z-score of -.67). The students were unanimous with their comments that the course had lived up to their expectations. Several students commented that it turned out to be much better than they had expected.

The questionnaire statement "I am proud to be part of the DL program" registered a mean of 4.5 and a standard deviation of 1.3. Chi-square analysis of the statement and gender produced an observed X^2 statistic value of 9.1 with 4 DF and a p-

value of .06, indicating the variables were independent at .05 alpha. All of the 32 female students agreed with the statement that they were proud to be part of the distance learning program. Four of the 19 males (21%) disagreed with the statement. The AP Math class had a mean of 3.6 with a z-score of $-.69$. The highest mean was the Shorthand I class with 5.3 and a z-score of $+.62$. Chi-square analysis of the statement and class, site and school with p-values of .17, .12, and .32 indicated the null hypothesis of independence could not be rejected.

None of the students mentioned pride in the open-ended questions and less than half of the students indicated they were "proud to be part of the distance learning program" when asked directly by the interviewer. One student stated that she didn't mention being part of the program because she didn't want her peers to call her a "brain" or a "nerd."

Most students were satisfied with the distance learning program. They liked being part of the technology, their parents thought the classes were good, the courses had lived up to their expectations, and they were proud to be part of the program.

DISCUSSION

Gender differences in student perceptions of satisfied educational needs concerned the value of the distance learning courses beyond graduation and whether they would have learned better in a conventional classroom. The null hypothesis of independence between gender and the survey items can be rejected. Crosstabs indicated that male students were more satisfied with the statement "This course will help me after graduation"; female students were more satisfied with the recoded statement "I would learn better if this course had been taught by traditional means."

The variable class and the statement "This course will help me after graduation" were dependent ($p = <.05$), indicating that particular distance learning classes influence students' perceptions.

There were no noticeable differences in the opinions of the students at the remote sites and the home sites. Individual schools did not affect the degree of student satisfaction with the distance learning program.

Students were satisfied with the quality of distance learning, believed these courses lived up to their expectations, as well as the expectations of their parents, and that the experience will benefit them after graduation. Students believe they do as well in distance learning classes as in a conventional classroom.

Most of the students liked being part of this new "cutting edge" technology, but stopped short of being proud to be part of the distance learning system. Students use distance learning as a regular part of their education and do not want to be singled out as special. Like exceptional students in other classes, they prefer to keep a low profile rather than call attention to attributes that distinguish them from their peers.

Students believe that distance learning utilizing two-way interactive television is an effective way to teach advanced placement and enrichment courses in small rural schools where

geographic location, adequate funding, and student enrollment are limiting factors. There is face-to-face, fully interactive teaching and learning taking place in a warm and caring environment that is as effective as traditional methods.

A longitudinal research study exploring the effect of high school distance learning on students' performance during and after completing related courses at the college or university level would be valuable. As well as adding to the knowledge base it would aid in determining the effectiveness of distance education as an instructional mode to provide educational equity to rural schools.

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