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Analysis of Distance Education Use in Rural Schools

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Abstract

This research was undertaken to determine how distance education is being used in rural schools throughout the United States and to identify the issues rural schools encounter when using distance education. This research explored several aspects of distance education use in rural schools including technology used, level of satisfaction, curriculum areas, preparation of students for distance education, completion rates, infrastructure issues, financing, and needs.

To address these issues we conducted a survey of distance education use in rural high schools using a national sample of 415 rural school districts selected at random from all rural school districts. Survey data were collected from 394 of these rural school districts (95% return rate) through telephone interviews using a questionnaire designed to document the use of distance education in rural high schools, the technologies used for distance education, the courses taught through distance education, satisfaction with distance education, district needs for distance education, and barriers to distance education use. Data indicated that the large majority of rural schools use distance education and are satisfied with distance education courses. The most common technologies used are web-based delivery and two-way video. Several barriers that limit further distance education use are discussed.

Introduction

Rural schools often experience difficulties offering a comprehensive curriculum, including advanced placement courses, because it is hard to recruit and retain qualified teachers for such courses. As a result, rural educators have embraced distance education as a way to bring greater educational opportunities to students in small, rural school systems. Aronson & Timms (2004) indicated that faculty in some high schools lack the expertise to teach specialized or advanced courses, especially advanced placement courses. Gruber et al. (2002) note about half of all U.S. high schools do not offer AP courses while those that do often offer only one or two courses. This situation is especially troublesome for rural schools that experience difficulty attracting and retaining experienced teachers. Among others, Cradler and Cradler (2002) note the challenges that the No Child Left Behind (NCLB) legislation has created for schools, and they suggest using technology for instruction as a way to meet these challenges. Besides problems associated with a teacher shortage, rural schools also face circumstances in which it is not practical to offer specialized or advanced courses because there may be an insufficient number of students in a school that are adequately prepared or interested in taking such courses. Many have suggested distance education – including the use of Internet and web-based materials, interactive television, computer conferencing, and multimedia modules – as at least a partial solution to some of the problems rural schools face.

The impact of teaching and learning with technology, including distance education technology, on student achievement has been investigated in numerous studies. In a review of studies on teaching with technology, Crandall et al. (2002) indicate that research findings are consistent in finding a positive impact on achievement in content area courses, higher order thinking and problem-solving, and workforce preparation from using technology in teaching. In a meta-analysis of 42 research studies that used technology for teaching, Waxman et al. (2003) report an overall effect size of 0.41 for affective, behavioral, and cognitive outcomes. In a meta-analysis of the effects of distance learning on K–12 students, Cavanaugh et al. (2004) reviewed 116 effect sizes and concluded that distance education was as effective as traditional, face-to-face instruction for K-12 students. They reported an overall mean effect size of -0.028 for all outcomes indicating little difference in the performance between students who participated in online programs and students who learned from traditional, face-to-face instruction. In a recent meta-analysis of the effects of distance learning at all levels, Bernard et al. (2004) report a small effect size of 0.0128 favoring distance education on learning achievement. They also found evidence that distance education using asynchronous learning methods was superior to synchronous learning methods overall although they indicated that K-12 students likely needed the structure of synchronous learning. Research to date has shown that students who learn through technology, including distance education, typically have learning outcomes at least as good as students who learn through face-to-face instruction. While there are calls for higher quality research and for more studies, there is evidence to support consideration of distance education as a way to address some of the common problems facing rural educators.

Although distance education could potentially address some of the issues rural schools face, the extent to which distance education is being used in rural schools is not well documented. Watson et al. (2004) reviewed state policies regarding the use of online learning in 11 states. While informative, their work did not focus specifically on rural schools nor did it document the use of distance education by school districts; rather they sought to examine the policy environment at the state level. In a recent report to Congress, Secretary Spellings and Stroup (2005) reported on a distance education demonstration project in terms of completion rates and students and financing, however this project was exclusively postsecondary. A recent study by Setzer, Lewis and Greene (2005) for the National Center for Educational Statistics reports on distance education use in elementary and secondary schools. This report indicated that about a third of school systems have some students enrolled in distance education courses. The majority of students who are taking distance education are enrolled in high schools. Only 1% of elementary schools and 4% of middle schools were using distance education. The report further documents the increased use of distance education programs in K-12 schools that Cavanaugh et al. (2004) reported. However the extent of use of distance education specifically in rural schools has not been documented. Distance education has been shown to be effective in terms of producing learning outcomes that are as good as those produced by traditional teaching methods, and distance education has the potential to address issues rural educators face when trying to offer a comprehensive curriculum to students. For these reasons the present research was undertaken to determine the extent to which distance education is being used in rural schools throughout the United States and to identify the issues rural schools encounter in using distance education. Several questions guided this research:

- What is the extent of distance education usage in rural schools?
- What technologies are used to provide distance education in rural schools?
- For what courses is distance education being used in rural schools?
- How satisfied are rural schools with distance education?
- How many students take, and how many students complete, distance education courses?
- What barriers exist to distance education in rural schools?
- How prepare are students in rural schools for taking distance education courses?
- Who provides distance education courses for rural schools?
- How is distance education financed in rural schools?
- What infrastructure problems, if any, limit the ability of rural schools to use distance education?

Methods

Survey Instrument

A survey instrument on distance education use was created for this survey. The instrument was designed to assess the current and past use of distance education, the barriers to distance education use, and the need for distance education in rural schools. The survey instrument was designed for a phone interview and the responses were recorded by the interviewer using Microsoft Access. The instrument consists of forty-three open ended and forced choice questions.

Sample

A sample of 415 school districts from across the country was randomly selected for participation in the study. The population from which this sample was selected consisted of all the districts that qualified for the Rural Education Achievement Program (REAP) in the 2004-2005 school year. The REAP program is split into two parts, the Small Rural School Achievement program and the Rural, Low Income School program. To qualify for the Small Rural School Achievement program a districts must be located in a county with fewer than 10 people per square mile or have fewer than 600 students in average daily attendance and all schools in the district must be in communities with a local code of 7 or 8, i.e. have fewer than 2,500 residents. To qualify for the Rural, Low Income School program a school district must have at least 20% of the students from families below the poverty line and all schools in the district must receive a local code designation of 6, 7, or 8, ie. must be in a non-metropolitan town that has a population of less than 25,000 residents. These two categorizations of rural districts might face different problems in their schools. The Small Rural School Achievement schools face isolation issues that the Rural, Low Income Schools do not. Likewise the Rural, Low Income Schools potentially face more poverty issues than the Small Rural School Achievement schools. Due to the differences between these two groups it is conceivable that they may face different issues in implementation of distance education although distance education may be helpful for both of these groups for different reasons. A 10% sample was randomly selected from each of these programs. 100 Rural, Low Income schools were selected and 315 Small Rural Schools were selected.

Procedures

An individual in each district was determined by the researchers as the best person to contact regarding the survey. This determination was made either from the district website or by calling the district and asking who would be the best person to talk about distance education. Those individuals were then sent a letter describing the survey, informing them that there district had been randomly selected to participate in the survey, and that they would be receiving a call the following week. The districts were then contacted by a trained phone interview coordinator who asked if the had received the letter and if the had any questions; if the had not received the letter the coordinator described the survey. The individual was asked if they or another person would be most qualified to answer questions about distance education. If another person was recommended, they were contacted and the survey was described. Once the interview coordinator secured consent, they transferred the individual to a trained phone interviewer who completed the survey. A total of 394 (95%) districts gave their permission and completed the survey.

Data Collection

The survey was conducted via telephone in order to increase the participation rate.. A total of 9 different interviewers conducted all of the interviews. These interviewers were trained in conducting telephone interviewing by the Odom Institute at the University of North Carolina at Chapel Hill. A training session on proper technique in telephone interviewing was held and all of the interviewers attended. A training manual was produced for this training session. This manual contained a frequently asked questions section that the interviewers could have with them when they were conducting the interviews. Prior to conducting any interviews, the interviewers practiced interviewing each other, and they had to interview one of the researchers who had more experience in conducting interviews.

Results

Initial analyses were conducted to determine the prevelence of distance education. 84.5% of districts (333 districts) reported having used distance education at some point; while 69.8% of districts (275 districts) report that they are currently using distance education. In order to determine if distance education varied by region ,the districts were separated into 4 regions: Northeast, South, West, and Midwest. There was a significant effect of region on distance education use, $F(3, 393) = 5.672$, $p = .001$, with the Northeast (M = 57.9%) reporting significantly less use of distance education than the Midwest (M = 89.3%) $p=.002$ or the West (89.3%) $p= .003$.

Use of distance education also was significantly different between districts based on the REAP program that they qualify for, $F(1, 393) = 11.606$, $p = .001$, with 88% of SRSA districts reporting that they have used distance education while only 74% of RLIS districts reporting having used distance education.

To determine if ethnicity affected the use of distance education, districts were categorized based upon the majority ethnicity in the districts. Districts were categorized as majority Caucasian ($n = 300$), African American ($n = 28$), Hispanic or Latino ($n = 25$), or American Indian ($n = 23$). To be placed into one of these categories the district must have more than 50% of its students in one of these categories. If a district did not have a 50% majority they were placed into a mixed/ no majority category ($n = 18$). There was a significant difference on distance education use based on ethnic majority of the districts, F (4, 389) = 7.625, $p < .001$. Districts with no majority ethnicity used significantly less distance education (m = 44.4) that either districts that had a majority of Caucasian (m = 88.0), a majority of Hispanic or Latino (m=84.0), or a majority of American Indian students (m = 87.0), $p < .001$, $p = .003$, and $p = .001$ respectively.

Poverty was examined to determine if it had an effect on distance education use. The percentage of students receiving free and reduced lunch was used as an indicator of poverty. The districts were divided into 4 groups based on the percentages of students receiving free and reduced lunch. There was no significant difference in use of distance education between these groups based on free and reduced lunch, F (3, 372) = .855, $p = .465$.

An analysis was conducted to explore the types and levels of courses that were being offered by the participating districts. Of the districts that offered distance education courses, the number offered ranged from 1 to 15 courses with the mean number of courses being 2.8829 with a SD = 2.4176. Descriptive information regarding the percentage of schools using distance education and the average number of courses by subject area can be found in Table 1.

Table1. Districts Offering Distance Education by Subject Area

Subject Area	Districts Offering Distance Education	Mean Number of Courses Offered	Range	SD
Science	23.35% (n = 92)	1.55	1-5	.95
Math	40.36% (n = 159)	1.28	1-4	.58
English	36.80% (n = 145)	1.28	1-4	.57
Foreign Language	34.26% (n = 135)	1.04	1-2	.21
History	23.86% (n = 94)	1.33	1-3	.58
Psychology/ Sociology	17.51% (n = 69)	1.04	1-2	.20
Other	23.35% (n = 92)	1.01	1-2	.10

The level of courses that were being offered was also an area of interest. The descriptive data regarding this can be found in Table 2. As shown in this table, the majority of districts offered general or honors courses.

Table 2. Districts Offering Distance Education by Type of Course

Course Level	Districts Offering Distance Education	Mean Number of Courses	Range	SD
General/ Honors	72.46% (n = 242)	2.31	1-15	1.95
Advanced Placement	24.32% (n = 81)	1.74	1-7	1.13
Recovery	9.31% (n = 31)	3	1-9	2.56
Other	18.92% (n = 63)	2.49	1-11	1.80

This survey asked respondents several questions in order to identify barriers to distance education use. The barriers of interest in this survey included financial, technological, and those addressing beliefs about distance education. The respondents were asked 13 questions to address potential barriers. The responses to these questions can be found in Table 3.

Table 3. Barriers to Distance Education Use

Barrier	Frequency	Percentage of Districts	Percentage of SRSA Districts	Percentage of RLIS Districts	*F*	*p*
Lack of Instructional Support	131	33.2%	28.57%	47.00%	11.699	.001
Lack of Sufficient Funding	247	62.7%	60.88%	68.00%	1.614	.205
Lack of Necessary Technical Expertise	67	17.0%	15.65%	21.00%	1.514	.219
Lack of Technology Enhanced Classrooms or Labs	59	15.0%	13.61%	19.00%	1.704	.192
Lack of Sufficient Connectivity	29	7.4%	7.14%	8.00%	.080	.777
Technology Not Adequately Maintained, Long Down Times	37	9.4%	8.84%	11.00%	.406	.524
Distance Education Not Seen as a Priority	209	53.0%	50.68%	60.00%	2.606	.107
Distance Education Seen as Difficult to Implement	173	43.9%	40.82%	53.00%	4.526	.034
Difficulty Finding the Distance Education Courses	116	29.4%	30.27%	27.00%	.383	.536
Do Not Need Distance Education to Meet Requirements	264	67.0%	65.31%	72.00%	1.510	.220
Distance Education Is Not Part of Their Strategic Plan	109	27.7%	23.81%	39.00%	8.752	.003
Instructional Personnel Are Not Trained to Use Distance Education	182	46.2%	41.16%	61.00%	12.125	.001
Problems Scheduling Distance Education Courses	226	57.4%	57.48%	57.00%	.007	.933

There were significant differences found on many barriers between SRSA and RLIS districts. RLIS districts reported a significantly greater percentage of districts reporting issues with four barriers than the SRSA districts. These four barriers that RLIS districts are having greater problems with are: A lack of support personnel to support distance education, such as teachers or monitors, F (1, 392) = 11.699, *p* = .001, seeing distance education as difficult to implement, F (3, 392) = 4.526, *p* = .034, Distance education not being a part of their strategic plan, F (3, 392) = 1.722, *p* = .003, and instructional personnel not being trained to used distance education, F (3, 392) = 12.125, *p* = .001.

The only significant difference between regions of the country in terms of the barriers was related to whether distance education was not needed to meet the districts curriculum requirements, F (3, 390) = 2.733, *p* = .044. When post hoc analysis was conducted no significant differences between regions was found.

Three barriers were found to be significantly different between districts with different ethic majorities. Lack of instructional personnel varied significantly, F (4, 389) = 2.766, *p* = .027, as did the view that distance education is difficult to implement, F (4, 389) = 2.437, *p* = .047, and whether distance education was part of the strategic plan, F (4, 389) = 3.188, *p* = .014. post hoc analysis revealed that only for the barrier of lack of distance education as part of the districts was there a significant difference with Mixed-No Majority ethnicity districts reporting this barriers less than districts that are a majority Hispanic or Latino, *p* = .016.

Two barriers were found to be significantly different based on level of free or reduced lunch. These two barriers were not seeing distance education as a priority of the district, F (3, 369) = 2.705, *p* = .045 and needing distance education to meet your curriculum requirements, F (3, 369) = 5.065, *p* = .002. Post hoc analysis for not seeing distance education as a priority revealed that districts in the 1st Quartile were less likely to have said that distance education was a priority than those in the 3rd quartile of free and reduced lunch classification, *p* = .031. Post hoc analysis also revealed that districts in the 3rd quartile responded that were more likely to need distance education courses to meet there curriculum requirements than districts in the 1st or 2nd quartiles of free or reduced lunch category, *p* = .009 and *p* = .048 respectively.

Analysis was conducted to determine if there was a significant difference between the districts that are using distance education or have used distance education in the past and those districts that have never used distance education in terms of the barriers that they reported. Seven of the barriers that were included in the survey varied significantly between districts that have never used distance education and those who currently or in the past have used distance education. These barriers are: Lack of sufficient funding, F (1, 392) = 5.031, *p* = .025, Lack of necessary technical expertise to support distance education, F (1, 392) = 10.448, *p* = .001, Lack of technology enhanced classrooms or labs, F (1, 392) = 12.286, *p* = .001, District not viewing distance education as a priority, F (1, 392) = 10.791, *p* = .001, Distance education being seen as hard to implement, F (1, 392) = 6.770, *p* = .010, Distance education not a part of your strategic plan, F (1, 392) = 23.374, *p* < .001, Instructional personnel not trained to use distance education, F (1, 392) = 40.825, *p* < .001. For all of these barriers the districts that had never used distance education were more likely to report them as barriers than districts that had used or currently were using distance education.

To have a better understanding of the types of technologies that are being used the survey asked the districts which types of distance education technologies they were using. The responses can be seen in Table 4.

Table 4. Types of Technology Used

Type of Technology	Frequency	Percentage of Districts Using	Percentage of SRSA Districts	Percentage of RLIS Districts	*F*	*p*
Correspondence by Mail	121	36.3%	38%	31%	1.133	.288
Correspondence by Email	142	42.6%	44%	38%	.895	.345
Cable TV	44	13.2%	11%	20%	4.159	.042
Satellite	70	21.0%	17%	34%	9.546	.002
Self- Instructed Computer- Based Tutorials	127	38.1%	39%	35%	.362	.548
One-Way Videoconferencing	32	9.6%	8%	16%	4.821	.029
Two-Way Videoconferencing	182	54.7%	56%	50%	.829	.363
Web-based or Online	195	58.6%	58%	61%	.198	.657
Other	31	1%	10%	7%	.731	.393

The types of technology that was being used was then analyzed to determine if there was an difference between RLIS and SRSA districts in the types of technology that was being used. There were only significant differences between the two groups regarding the use of cable TV, satellite and one-way video conferencing technology to provide distance education, F (1, 331) = 4.159, p = .042; F (1, 331) = 9.546, p = .002; F (1, 331) = 4.821, p = .029, respectively. For all three types of technology there were a great percentage of RLIS districts using them than SRSA districts as can be see in Table 4.

There was a significant difference in use of self instructed computer-based, one-way and two-way videoconferencing, and web-based technology by region of the county, F (3, 329) = 4.601, p = .004; F (3, 329) = 2.687, p = .046; F (3, 329) = 4.718, p = .003; F (3, 329) = 4.367, p = .005, respectively. Self instructed computer-based technologies were reported to be used significantly more in the West (56% mean) than the Midwest (31% mean) or the South (35%), p = .002 and p = .017 respectively. Post Hoc tests did not reveal any significant differences between regions for One-way video conferencing despite the overall effect. Two-Way videoconferencing use was significantly greater in Midwest (60% mean) and the South (60% mean) than the West (36% mean), p = .004 and p = .006 respectively. There was a significantly greater use of web-based courses in the West (76% mean) than in the Midwest (52% mean) or the South (56% mean), p = .005 and p = .033 respectively.

Type of technology used to provide distance education did not differ significantly based on majority ethnicity of the district. There was no significant difference in the use of types of technology to deliver distance education in terms of poverty as measured by free and reduced lunch eligibility as defined previously.

There are many different providers of distance education, and one goal of this study was to determine how many types of providers were being used in rural areas. Table 5 shows the number districts using each type of provider.

Table 5. Providers of Distance Education Courses

Providers	Frequency	Percentage of Districts Using	Percentage of SRSA Districts	Percentage of RLIS Districts	*F*	*p*
Local District	41	12.3%	12%	15%	.572	.450
Regional Consortium	78	23.4%	26%	14%	5.260	.022
State	51	15.3%	11%	30%	15.877	<.001
Private	21	6.3%	7%	3%	2.092	.149
Private Out-of-State Virtual High School	10	3.0%	3%	3%	.029	.864
Public Out-of-State Virtual High School	17	5.1%	4%	9%	3.743	.054
Other	197	59.2%	60%	55%	.552	.458

There was a significant difference found for two types of providers in terms of RLSI or SRSA classification. SRSA districts were significantly more likely to use a course from a regional consortium than RLIS districts, $F(1,331) = 5.260$, $p = .022$. RLIS districts were significantly more likely to use course from a state provider than SRSA districts, $F(1,331) = 15.877$, $p < .001$.

Region of the country was analyzed to determine if there were any significant differences in providers based on region. The only type of provider that varied significantly by region was the use of a regional consortium, $F(3,329) = 12.599$, $p <$

.001. A Regional Consortium was more likely to be used in Midwest (40% mean) than in the South (13% mean) or the West (9% mean), *p's* <.001.

There was no significant difference in provider selection based on the majority ethnicity category of the district. There were significant differences between the uses of two providers based on level of poverty in the district. Districts that use regional consortiums and those who used courses that were provided by the state, $F(3, 316) = 3.021$, $p = .030$; $F(3, 316) = 5.627$, $p = .001$, respectively. Districts with free or reduced lunch eligibility in the 25% to 50% range were significantly more likely to use a regional consortium than those in the 75% to 100% range, $p = .046$. District in the 3rd quartile (50-75% Free and reduced lunch) were significantly more likely to use a state provided course than those in the 1st (0-25%) or the 2nd (25%-50%) quartile, $p = .004$, and $p = .026$, respectively. The districts in the 4th quartile (75%-100%) were a significantly more likely to use a state provided courses than those in the 1st Quartile (0-25%), $p = .032$, but no significant difference was found between districts in the 4th quartile and districts in the 2nd quartile.

The study investigated who determined what distance education would be provided in the school. To address this question the districts were asked two questions. The first question was to determine who selected the provider. They were asked whether the district has local flexibility to select providers of distance education courses, or was that decision made externally. The responses to this question can be found in Table 6.

Table 6. Selection of Distance Education Providers

Who Selects the Provider	Frequency	Percentage	Percentage of SRSA Districts	Percentage of RLIS Districts	F	*p*
District Selects	201	51%	58%	32%	20.607	<.001
District Selects from Approved Provider	77	19.5%	17%	27%	4.703	.031
Externally Selected	50	12.7%	14%	10%	.893	.345

There was a significant difference found between SRSA and RLIS districts for those districts that are able to select their own provider, with a greater percentage of SRSA districts (58%) being able to select their own provider than RLIS districts (32%), $F(1, 391) = 20.607$, $p < .001$.

An overall effect for region was found for districts that were able to select their own provider and for districts that selected a provider from an approved list, $F(3, 389) = 4.632$, $p = .003$; $F(3, 389) = 4.061$, $p = .007$, respectively. There were significantly more districts that were able to select there own provider in the Midwest (61%) than in the South (40%), $p = .002$. There were significantly more districts that selected a provider from an approved list in the South (26%) than in the Northeast (0%), $p = .039$.

An overall effect for ethnicity was found for districts that select their own providers, $F(4, 388) = 5.781$, $p < .001$. Significantly more districts classified as majority white were able to choose there own provider (57%) than districts that were classified as majority African-American (18%) or districts with no majority ethnicity (22%), $p = .001$ and $p = .040$; respectively.

An overall effect for poverty was found for those districts that select their own providers, $F(3, 368) = 6.073$, $p < .001$, and for those who select from an approved list of providers, $F(3, 368) = 4.513$, $p = .004$. The districts in the 1st and 2nd quartile, those in the bottom 50% of free and reduced lunch offerings, were significantly more likely to choose their own provider than those in the 4th quartile of free and reduced lunch classification, $p < .001$ and $p = .039$ respectively. The districts in the 4th quartile were significantly more likely to choose their provider from an approved list than the districts in the 1st quartile, $p = .002$.

Another issue of interest was who in the school district decides which courses to offer by distance education. A survey question was designed to determine who was selecting the courses. They were asked who decided which distance education courses are offered in their district. The responses to this question can be found in Table 7.

Table 7. Selection of Distance Education Courses

Who Determines the Courses	Frequency	Percentage	Percentage of SRSA Districts	Percentage of RLIS Districts	F	*p*
Superintendent/ Assistant Superintendent	138	35%	35%	36%	.046	.830
School Board	39	9.9%	9%	12%	.645	.423
High School Principal	243	61.7%	60%	68%	2.163	.142
Guidance Counselor	131	33.2%	34%	32%	.107	.744
Teacher	40	10.2%	9%	13%	1.166	.281
Other	104	26.4%	27%	26%	.015	.904

The school principal is the person who most often makes decisions regarding which distance education courses to offer. There were no significant differences between SRSA and RLIS districts on any of the possible decision makers.

There was an overall difference found for districts in which the teacher selects the courses based on region of the country, $F(3, 389) = 6.787$, $p < .001$. A far greater percentage of districts in the West reported that teachers were able to select the courses (23%) than those districts in the Midwest (5%) or the South (9%), $p < .001$ and $p = .004$ respectively.

Analysis to determine if ethnicity was related to any of the courses decision makers revealed an overall difference for a decision maker other than the ones that we had listed, $F(4, 388) = 2.619$, $p = .035$. Districts whose majority ethnicity was Hispanic or Latino reported a significantly higher rate of “other” decision makers (52%) than White (25%) or African American decision makers (18%), $p = .030$ and $p = .049$.

No significant differences were found for who determined which courses were offered based on poverty, as measured by free and reduced lunch.

The next item that the survey addressed was determining who was responsible for paying for the distance education courses. Results can be found in Table 8.

Table 8. Source of Funding for Distance Education Courses

Who Pays for the Courses	Frequency	Percentage	Percentage of SRSA Districts	Percentage of RLIS Districts	F	*P*
District	186	55.9%	58%	47%	2.833	.093
Students	144	43.2%	45%	36%	1.769	.184
State	13	3.9%	3%	7%	2.064	.152
Other	37	11.1%	11%	11%	.009	.926

There were no significant differences between RLIS districts and SRSA districts in terms of who pays for the distance education courses. There was also no significant difference in who pays for courses between regions of the country or ethnicity majority classification based on who pays for the courses. There were also no significant differences in districts poverty level, based on free and reduced lunch grouping, based on who pays for the course.

The level of satisfaction with the distance education courses was also an important question. The survey asked how satisfied the district was with the distance education that they have used. The results can be found in Table 9.

Table 9. Satisfaction with Distance Education

Level of Satisfaction	Frequency	Percentage
Very Satisfied	155	46.5%
Somewhat Satisfied	149	44.7%
Somewhat Dissatisfied	19	5.7%
Very Dissatisfied	6	1.8%
Don't Know	2	0.6%

The majority of districts responded that they were satisfied with the distance education that they were offering. A large majority (91.2 %) of districts reported that they were satisfied with the distance education that they were offering. There were no significant differences in level of satisfaction based on RLIS or SRSA categorization, F (1, 327) = .315, p = .575, region, F (3, 325) = 1.625, p = .183, or level of free or reduced lunch, F (3, 312) = .993, p = .396. The only significant difference that was found with relationship to satisfaction with distance education was ethnic majority classification of the district, F (4, 324) = 2.692, p = .031. Districts whose majority ethnicity was American Indian were significantly less satisfied with the distance education that they had used than White or African American districts, p = .045 and p = .024, respectively.

This study was also interested in determining how the district felt that distance education meets the needs of their students. The districts were asked to rate how they felt that their current distance education met the needs of their students. The responses can be seen in Table 10.

Table 10. Distance Education Meeting Student Needs

How DE Meet Students Needs	Frequency	Percentage
Very Well	123	36.9%
Somewhat Well	170	51.1%
Not Very Well	23	6.9%
Not Well At All	8	2.4%
Don’t Know	8	2.4%

The majority of the districts (88%) responded that distance education either meet their students needs very well or somewhat well. This response is not all that surprising considering the high level of satisfaction that the districts have with distance education. There was no difference between districts in how well distance education meets the needs of their students based on RLIS or SRSA classification, F (1, 330) = 2.602, *p* = .108, region of the county, F (3, 328) = 1.123, *p* = .340, majority ethnicity of the district, F (4, 327) = 2.298, *p* = .059, or free or reduced lunch classification, F (3, 315) = .473, *p* = .702.

In order to determine how prepared the students were to take distance education courses the survey asked three different questions. The first question was designed to address students’ academic background. The respondents were asked how prepared their high school students were for taking distance education courses in terms of their academic background. The second question was to address how prepared the students were in terms of their study skills. They were asked how prepared were their high school students for taking distance education courses in terms of their study skills. The third question involving student preparation was designed to address computer skills. The respondent was asked how prepared their high school students were for taking distance education courses in terms of their computer skills. The responses can be found in Table 11.

Table 11. Student Preparation for Distance Education in Terms of Academic Background, Study Skills and Computer Skills

Response	Academic Background Frequency (Percentage)	Study Skills Frequency (Percentage)	Computer Skills Frequency (Percentage)
Very Well	167 (50.2%)	93 (27.9%)	250 (75.1%)
Somewhat Well	151 (45.3%)	195 (58.6 %)	75 (22.5%)
Not Very Well	13 (3.9%)	37 (11.1%)	2 (.6%)
Not Well At All	1 (.3%)	3 (.9%)	0 (0%)

The respondents rated the students' academic background as positive overall with 95.5 % of the respondents indicating their students were very well or somewhat well prepared academically for distance education courses. There were no significant differences between districts ratings of their students academic background based on SRSA or RLIS classification, F (1, 330) = 2.102, p = .148, region of the country, F (3, 328) = .421, p = .738, or level of free or reduced lunch classification, F (3, 315) = 2.330, p = .074. There was a significant overall effect based on majority ethnicity of the district, F (4, 327) = 3.991, p = .004. The districts whose majority ethnicity is white rated their students academic background significantly higher than districts whose majority ethnicity is American Indian, p = .002.

The respondents also rated preparation for distance education courses highly in terms of their study skills. 86.5% of districts rated their students' preparation in terms of study skills as very well or somewhat well. There were no significant differences between districts ratings of their students study skills based on SRSA or RLIS classification F (1, 329) = .118, p = .732 or by region of the country, F (3, 327) = 1.701, p = .167. There were significant differences between districts ratings of their students preparation for distance education courses in terms of their study skills based on the majority ethnicity of the district, F (4, 326) = 4.468, p = .002. The districts whose majority ethnicity was White rated their students preparation in terms of their study skills significantly higher than districts whose majority ethnicity was American Indian, p = .007. There was also a significant difference between districts ratings of their students preparation for distance education courses in terms of their study skills for level of free and reduce lunch classification, F (3, 314) = 5.676, p = .001. Districts that were in the 2nd quartile rated their students preparation in terms of study skills significantly higher than districts that were in the 4th quartile, p <.001.

The respondents rated their student's preparation for distance education course in terms of their computer skills very highly. 97.6 % of the districts rated their students' preparation for distance education courses in terms of their computer skill as somewhat well or very well. 75% of districts rated the students as very well prepared. There were no significant differences between districts rating of their students computer skills based on SRSA or RLIS classification, F (1, 329) = .793, p = .374, majority ethnicity of the district, F (4, 326) = 1.776, p = .133, or free and reduced lunch status, F (3, 314) = 1.340, p = .261. There was a significant difference between districts ratings of their students preparation for distance education courses in terms of their computer skills based on region of the country, F (3, 327) = 3.385, p = .018. The districts in the Northeast rated their students significantly lower in terms of preparation of distance education courses in terms of their computer skills than districts in the Midwest, South , or West, $p = .039$, $p = .011$, $p = .027$, respectively.

Discussion

This survey was conducted to examine distance education use and related issues in a national sample of rural schools. The findings not only present a detailed picture of distance education use in rural schools, but also reveal some important areas for further research. Because this study distinguished between very small rural schools (SRSA) and rural low-income schools (RLIS), it is possible to identify the different challenges faced by these two types of schools and develop new directions for future work in this area. For example, data indicated that 68.9% of rural schools used distance education in the 2004/2005 school year. This indicates broad acceptance of distance education among rural educators. However, there are still barriers to successful distance education implementation which are different for low-income schools than for very small schools. Low-income schools were more likely to report personnel-related barriers such as a lack of trained staff members or a lack of support personnel. The low-income schools were also less likely to use distance education, possibly because of these staffing issues. Given the potential benefits of distance education, further research is needed in this area to determine conclusively what factors account for the difference in distance education use between the SRSA schools and the RLIS schools.

The most common subject taught by distance education is mathematics with 40.63% of the districts reporting offering mathematics courses by distance education. The next two most common subject areas taught by distance education are English (36.80%) and foreign language (34.26%) followed by history (23.86%), science (23.35%), and psychology/sociology (17.51%). Since both mathematics and English are core courses, it is not surprising these are among the most commonly offered distance education courses. While science is also a core course, it is possible some districts do not offer science by distance education due to the difficulty of including a lab component. History might be offered less by distance education as a result of state specific curriculum requirements. Psychology and sociology courses are typically electives and therefore it is expected that these courses would not be offered as much as other courses whether face-to-face or by distance education. Foreign language via distance education seems particularly appropriate for rural schools, since many rural schools have difficulty attracting and retaining foreign language teachers. The type of technology used to provide a foreign language course likely impacts student success since learning spoken foreign language requires audio capabilities. This would generally eliminate email and correspondence courses as desirable choices. One-way videoconferencing, cable TV, and satellite courses allow students to hear spoken foreign language but not to interact verbally with their instructor. Two-way videoconferencing and web-based courses, if they use VoIP, could allow students to interact verbally with their instructor.

A second important finding along these lines is the difference in technology used by very small rural schools and rural low-income schools. The low-income schools were more likely to use cable TV, satellite broadcasts, and one-way video programs to deliver distance education course content. All three of these technologies can be implemented using televisions and other equipment generally already present in most schools. For low-income schools with funding difficulties, distance education technologies that require new installations of costly equipment may not be realistic. However, methods such as cable and satellite TV broadcasts are inherently one-way and therefore lack the potential for simultaneous interaction between the student and instructor. Given the benefits of student-instructor interaction, further research is needed to evaluate the extent to which funding issues contribute to low-income schools being more likely to rely on one-way technologies. A third subject that can inform future studies is the topic of barriers to distance education use among schools that do not currently use distance education. Distance education has the potential to provide rural schools with access to qualified instructors and expanded course offerings, so it is particularly important to understand what barriers exist that prevent some rural schools for implementing any form of distance education. This study indicates that schools which have not used distance education report not doing so generally for reasons that could be considered “start-up barriers”. These are problems associated with starting a distance education program, but problems which would need to be resolved only once. Examples of start-up barriers include lacking technology enhanced classrooms, lacking trained personnel, and distance education being viewed as difficult to implement. Further research is needed to understand how to best overcome these types of start-up barriers in order to expand the use of distance education among rural schools.

Finally, it is important to note that this study found overwhelmingly positive support for distance education. The vast majority of rural school administrators were satisfied with the district education programs provided by their districts, and they felt that these programs met the needs of their students. On a related note, almost all school administrators felt that the students in their school districts were well-prepared for their distance education courses in terms of having the necessary academic background, study skills, and technological skills to be successful. Caution should be taken in interpreting these results because it is possible that only students who are performing well in traditional classrooms are given the opportunity to take distance education courses. If most rural students have the background skills needed to learn successfully via distance education, and most rural school administrators feel that students benefit from these programs then expanding distance education in rural schools is clearly important. This further demonstrates the need to focus on research that can identify barriers to more extensive distance education implementation in rural schools. Given the potential benefits of distance education to rural students across the country, the findings from this survey should be seen not only as a valuable overview of distance education use in rural environments, but also as indicators of important directions for future research.

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