

## Factors related to rural school administrators' satisfaction with distance education

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(Received 28 December 2011; final version received 4 July 2012)

The purpose of this study was to examine rural school district administrators' satisfaction with distance education in the United States and to identify factors that may contribute to their satisfaction. Telephone interviews were conducted with administrators in randomly selected rural districts across the country. Analyses revealed that students' preparation in their study and computer skills as well as the use of synchronous delivery formats were related to administrators' satisfaction with distance education. Results imply that students' study and computer skills should be addressed as needed and, when feasible, synchronous delivery formats used in order to possibly bolster districts' satisfaction with and effective use of distance education.

**Keywords:** distance education; rural; secondary education; administrator satisfaction

### Introduction

More than one in five children in the United States attends a rural school, and more than one third of public schools are in rural areas (Provasnik et al., 2007). Rural schools face a number of problems that hinder the education they can provide students. These problems include difficulties with recruiting and retaining highly qualified teachers, offering a comprehensive curriculum and advanced courses, small size, geographic isolation, shrinking local tax bases, and obtaining equitable federal and state funding (Jimerson, 2006; Monk, 2007). Consequently, many rural schools use distance education (DE) to compensate for such difficulties because DE can enable them to offer a course when they do not have qualified teachers, sufficient numbers of students, or funding constraints. Indeed, rural school district administrators in the United States report that they would not be able to offer a comprehensive curriculum including advanced courses without DE (Hannum, Irvin, Banks, & Farmer, 2009; Picciano & Seaman, 2009). Furthermore, 59% of rural school districts use DE whereas 37% of urban and 47% of suburban school districts use DE (Queen & Lewis, 2011). Additionally, a significantly higher proportion of rural

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district administrators than those from suburban and urban districts indicate that they need to expand their DE offerings (Tankersley & Burnham, 2007).

Though policymakers in some states have passed legislation requiring that all K–12 students have access to or take online courses, the focus in this study was on administrator satisfaction with DE in rural K–12 school districts because in rural districts administrators often make the decision about whether and which courses they offer via DE. Administrators have also often been vital to the quality of instruction received from DE because they typically have responsibility for ensuring that instructional standards are met and student performance is adequate (McFarlane, 2011). Several studies have addressed school administrators' role in the adoption of technology (Howley & Howley, 2007). However, to our knowledge, no studies have examined administrators' satisfaction with the DE that they are using, especially administrators in rural districts where there has been a greater need to employ and expand the use of DE. Previous research has examined barriers to DE (e.g., Berge & Muilenburg, 2000), including administrators' views of barriers to DE in rural school districts (Irvin, Hannum, de la Varre, & Farmer, 2010; Picciano & Seaman, 2009). Other studies have described the use of DE and technology in rural schools (Hannum et al., 2009; Howley, Wood, & Hough, 2011). Thus, the purpose and contribution of this study was to examine the satisfaction that rural school district administrators in the United States expressed with the DE they have used and to identify factors that may have contributed to their satisfaction with DE.

### **Review of literature**

Prior research on satisfaction with DE has focused on student or faculty satisfaction, not administrator satisfaction. While the results from studies of student or faculty satisfaction with DE may not be directly applicable for estimating administrator satisfaction, these studies were drawn on in part because they provided some basis for identifying factors that may influence satisfaction for administrators. For example, a study of barriers to DE use by Berge and Muilenburg (2000) demonstrated that school administrators identify similar barriers as teachers, students, researchers, and support staff. It is possible that administrators would likewise identify similar factors affecting their satisfaction with DE as teachers and students. Because this study was about administrators' satisfaction, when applicable findings on relevant aspects of administrators' perceptions of DE were available these were used and given precedence. Finally, the literature on DE in general was also used as needed. Based on the prior research and literature reviewed next, it was hypothesized that several factors may impact rural district administrators' satisfaction with DE. These included student preparation, delivery format, and choice of course provider.

### ***Student preparation***

Administrators may be more satisfied with the DE their district has used when students were adequately prepared for the DE they used. This is because if students were prepared then they may have done well and the DE that districts have used may have been seen as effectively meeting the needs of and helping their students learn. Therefore, the current study considered student preparation in terms of their academic, study, and computer skills.

Numerous studies have shown that students' academic skills (e.g., prior grade-point average, class rank) predict completion in DE courses (Dupin-Bryant, 2004; Morris, Wu, & Finnegan, 2005). Some more directly related information has been obtained from administrators in rural schools. Specifically, Tankersley and Burnham (2007) collected survey data about DE from administrators in the state of Georgia. Though the focus was not on rural districts, 76% of respondents were administrators in rural schools. Several administrators' comments indicated that students' academic skills were an important issue in their use of DE.

Study skills may also be important because for the most part DE offerings have continued to target more self-directed and advanced students who have better study habits (Barbour & Reeves, 2009). Consistent with this, research in rural Canadian districts indicated that administrators, parents, and students have recognized that youth who were more motivated and hardworking were more successful in DE (Barbour, 2011). In addition, Wang and Newlin (2000) demonstrated that several measures of study habits were strongly correlated ( $r = .42-.66$ ) with total points earned in an online course.

Several findings have also suggested that student preparation in terms of computer skills could be important as well. For example, Dupin-Bryant (2004) showed that various indices of technology adeptness predicted course completion. Several other studies from various countries have also demonstrated that when students have better skills in and more experience with computers they are more satisfied in DE courses (Gülbahar & Madran, 2009; Koroghlanian & Brinkerhoff, 2007–2008; Sahin & Shelley, 2008), including research with college students in rural Australia (Owens, Hardcastle, & Richardson, 2009).

### *Asynchronous and synchronous delivery format*

DE instructional designers and researchers have noted the importance of interactivity and communication (e.g., Barbour, 2007b; Bernard et al., 2009; Davis et al., 2007). Though all forms of education have varying degrees of transactional distance, DE has a greater transactional distance, which stems from the additional limitations in communication and interactivity such as the absence of verbal or nonverbal cues and delays in responses (Moore, 1993; Moore & Kearsley, 1996). Furthermore, the delivery format may affect a key factor in DE and that is the instruction (Hannum, 2009). Teachers in asynchronous DE may seem less present because often they only monitor students' discussions and progress or provide assignments and assistance when needed (Barbour & Reeves, 2009).

District administrators in rural areas may be less satisfied with an asynchronous DE format because rural schools are by their nature often small and characterized by long-standing and close student-teacher relations (Hardré, Sullivan, & Roberts, 2008; Irvin, Hannum, Farmer, de la Varre, & Keane, 2009). An asynchronous DE format may not provide the level of interaction that rural administrators typically expect in a school setting. In contrast, synchronous DE may provide more interaction and as a result, rural administrators may be more satisfied with this delivery format. Indeed, rural administrators in Canada have expressed concerns about the more limited interactivity in DE (Barbour, 2011). Furthermore, they have also touted the benefits of technology enhancements that would allow synchronous interaction with DE teachers (Poscente, Rourke, & Anderson, 2006).

### ***Course provider***

Rural educators and scholars have contended that educational curricula, practices, and policies need to account for the uniqueness of rural youth and their experiences (Barbour, 2007a; Hardré, 2007). While most districts have used multiple providers to meet the needs of their students (Picciano & Seaman, 2009), local course providers may be better positioned to understand and attend to issues specific to a particular district. Local DE providers may develop and offer DE courses that better fit local circumstances and thus produce greater satisfaction at the district level. In fact, DE programs developed by a single district to meet the needs of their students have been the fastest growing form of DE (Watson, Murin, Vashaw, Gemin, & Rapp, 2011). Specifically, in our view it is likely that a regional consortium, state, or local course provider could have developed or modified DE courses to make them more suitable and meaningful to rural youth. As a result, we expected that rural districts would have been more satisfied with these types of providers.

### **Methods**

The data used in this study were collected via a telephone survey with administrators in a sample of randomly selected rural school districts in the United States. The survey was developed by research staff to measure several factors and issues related to DE in rural schools.

### ***Interviewer training***

Trained interviewers administered the survey over the phone. Each telephone interviewer participated in a half-day training session conducted by an experienced director of survey research projects who had both trained and managed telephone interviewers in large-scale studies for several years. During the training, numerous situations were used so that the telephone interviewers would learn to be consistent in how they recorded survey responses from the school administrators.

### ***Participants***

We randomly selected a 10% sample of 417 school districts from those qualifying for federal assistance because they were either a small rural school or because they were located in high poverty rural areas. These school districts were more likely to need DE to overcome staffing shortages and other challenges in providing a comprehensive curriculum.

### ***Measures***

The study utilized a survey developed for this project entitled the Rural Distance Education Survey (RDES). This 43-item questionnaire assessed various aspects of DE in rural schools. The RDES assessed the prevalence of DE in rural districts by course type (e.g., math, science, foreign language) and level (i.e., general and honors, advanced placement, credit recovery). The survey also examined general issues related to DE and district needs. Open- and closed-ended items were designed to identify DE delivery format (e.g., Web-based/online course, cable television,

two-way videoconferencing), providers (local, state, regional), barriers to DE (e.g., funding, connectivity, facilitators), and district needs (e.g., lack of advanced placement courses and foreign language).

For this study, school district administrators' satisfaction with DE was assessed by asking respondents to rate their satisfaction on a 4-point Likert-type scale (1 = *very dissatisfied* to 4 = *very satisfied*). Delivery formats were obtained and classified into asynchronous and synchronous. Student preparation was measured in terms of academic skills, study skills, and computer skills. Specifically, respondents were asked to indicate on a 4-point Likert-type scale (1 = *not very well* to 4 = *very well*) how prepared their high school students were for DE courses in each of these areas. Information on course providers was gathered by asking respondents whether (*yes* or *no*) each of the following was a primary provider of DE courses in their district: a regional consortium, the state, a local district, and a private provider.

Several additional measures from the RDES were used as control variables. These included the percentage of students who were African American, Hispanic/Latino(a), Native American/American Indian, who qualify for a free or reduced lunch, who take DE courses, and who complete the DE they take. These variables were included in the regression analysis to control for the characteristics of the student body in terms of ethnicity/race and poverty. The proportion of students in each district that enroll in and complete DE courses was also accounted for as these may have affected administrators' satisfaction.

### **Procedures**

A contact from the district web site or central office was identified and sent a letter describing the survey and indicating that the district had been randomly selected to participate. The letter stated that they would receive a call about participating in the study. Trained interview coordinators called to confirm receipt of the letter and to answer any questions. Contacts identified the most qualified administrator in the district to answer questions about DE. After informed consent was obtained from the most qualified administrator, the coordinator transferred the individual to a trained phone interviewer to conduct the interview. Interviews took an average of 20 min. A total of 394 district contacts completed the survey for a 95% participation rate.

Telephone interviewers entered responses to the survey directly into a Microsoft Access database as they administered the survey by telephone. The data were kept secure and were backed up each night. Once data collection was complete, the data were analyzed using SPSS.

## **Results**

### **Descriptive statistics**

The data on measures of administrators' satisfaction with DE were highly skewed. Specifically, 47% of respondents indicated that they were *very satisfied* and 45% were *somewhat satisfied*. Only 8% were *somewhat* or *very dissatisfied*. Therefore, a dichotomous variable was created to denote if administrators were *very satisfied* (value = 1) or *somewhat satisfied* (value = 0). Respondents who reported their

district was *somewhat dissatisfied* or *very dissatisfied* with DE were excluded from the final set of analyses due to the small sample size. However, analyses reported in the Results section were also undertaken with respondents stating their district was *somewhat dissatisfied* or *very dissatisfied* with DE and results were nearly identical. Respondents from administrators who had not used DE (16%) were not included in the analyses.

Final descriptive statistics are presented in Table 1. Complete data on all variables were available for 273 districts. Students attending participating districts were diverse in terms of ethnicity/race. In addition, 52% of students qualified for a free or reduced lunch. Approximately 13% of students had taken DE courses and 91% completed those DE courses. In terms of student preparation, descriptive statistics indicated that rural youth were well prepared. The average rating in all three areas (i.e., study, computer, and academic skills) was greater than 3, which equated to a rating between *somewhat well* and *very well* on the 4-point scale. However, results also suggest that rural students were more prepared in their computer skills and less so in their study skills while academic skills were in between. Administrators reported that the DE they used involved more asynchronous delivery formats than synchronous. The rank order of course providers used was as follows: regional consortium (25%), state (16%), local district (11%), and private (6%).

### Correlations

The correlations among variables are presented in Table 2. As a purpose of this study was to identify factors that may contribute to rural school administrators' satisfaction with DE, only the correlations between satisfaction and predictors are discussed in this section. As shown in Table 2, the variables that were included as predictors were also interrelated as is typical. In terms of control variables, administrators' satisfaction was not related to the ethnic/racial composition of students but there was a small association with the proportion of students that qualified for a free or reduced lunch. Administrators' satisfaction was also related to the proportion of

Table 1. Mean and standard deviation for variables in study.

	<i>M</i>	<i>SD</i>
Very satisfied with DE	.52	.50
% students African American	6.88	19.04
% students Hispanic/Latino(a)	9.23	18.63
% students Native American/American Indian	6.91	17.87
% students qualify free/reduced lunch	52.69	22.41
% students take DE courses	12.51	16.31
% students in DE complete	90.54	22.30
Student preparation: study skills	3.16	0.63
Student preparation: computer skills	3.78	0.42
Student preparation: academic skills	3.46	0.58
Synchronous delivery format	1.01	0.88
Asynchronous delivery format	1.77	1.24
Course provider: local district	.11	.31
Course provider: regional consortium	.25	.43
Course provider: state	.16	.37
Course provider: private	.06	.24

Table 2. Bivariate correlations between variables.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
1. Very satisfied with DE	.07															
2. % students African American	.10	.08														
3. % students Hispanic/Latino(a)	.03	.10	.11													
4. % students Native American/American Indian				.37*												
5. % students qualify free/reduced lunch	.13*	.32*	.26*	.15*												
6. % students take DE courses	.19*	.05	.05	<.01	.15*											
7. % students in DE complete	.17*	.02	.03	.07	.01	.07										
8. Student preparation: study skills	.25*	<.01	.04	.11	.12	<.01	.24*									
9. Student preparation: computer skills	.21*	.01	.04	.15*	.07	.03	.10	.27*								
10. Student preparation: academic skills	.14*	.08	.03	.16*	.11	.11	.19*	.54*	.34*							
11. Synchronous delivery format	.26*	.06	.08	.05	.12*	.22*	.08	.07	.10	.07						
12. Asynchronous delivery format	<.01	.03	.09	.03	.04	.12*	.11	.01	<.01	.02	.03					
13. Course provider: local district	.06	.03	.06	.05	.02	.15*	.08	.02	.07	.04	.14*	.15*				
14. Course provider: regional consortium	.02	.04	<.01	.09	.10	.15*	.09	.13	.05	.09	.24*	.12*	.12*			
15. Course provider: state	.09	.12*	.04	.03	.18*	<.01	.11	.05	.08	.14*	.04	.08	.06	.16*		
16. Course provider: private	.09	.02	.06	.04	.08	.20*	.08	.04	.06	.06	.02	.07	.01	.14*	.02	

\* $p < .05$ .



students taking and completing DE courses. Specifically, results indicated that administrators were more often very satisfied when more students were taking and completing DE courses. All aspects of student preparation were related to administrators' satisfaction such that administrators were more satisfied when students were more prepared for DE and vice versa. Furthermore, students' study skills were more strongly related, followed by computer skills and then academic skills. Synchronous delivery format was related to increased satisfaction; asynchronous delivery format was not related. Lastly, none of the variables capturing the various types of course providers was related to administrators' satisfaction.

### Regression analysis

Because the variable capturing whether or not administrators were very satisfied with DE was dichotomous, logistic regression analysis was used to examine which variables may uniquely contribute to administrators' satisfaction. Logistic regression analysis is analogous to multiple regression analysis and is used when an outcome variable is dichotomous rather than continuous. Nonetheless, logistic regression analysis utilizes some statistics that are different from but similar in purpose to those in multiple regression analysis. These employ distinct statistics because the underlying approach to estimating the model differs in logistic regression analysis, that is, maximum likelihood estimation, and multiple regression analysis, that is, least squares estimation. For more details, see Long and Freese (2006). These different statistics include the use of chi-square and Hosmer–Lemeshow tests to determine model fit rather than an  $F$ -test and the Wald statistic versus a  $t$ -test to determine if individual predictors are significant. Logistic regression analysis also relies upon Cox and Snell's  $R^2$  ( $R_{CS}^2$ ) and Nagelkerke's  $R^2$  ( $R_N^2$ ) to evaluate model fit and approximate the amount of variance accounted for by the model rather than  $R^2$ . Both  $R_{CS}^2$  and  $R_N^2$  are known as *pseudo- $R^2$*  because they are similar in range (i.e., from 0 to 1) and meaning (i.e., higher is better) to  $R^2$ . However,  $R_{CS}^2$  and  $R_N^2$

Table 3. Prediction of rural administrators' satisfaction with distance education.

Variable	<i>B</i>	<i>SE</i>	Odds ratio	<i>d</i>
% students African American	0.008	.009	1.008	
% students Hispanic/Latino(a)	0.008	.008	1.008	
% students Native American/American Indian	0.001	.010	0.999	
% students qualify free/reduced lunch	0.005	.008	1.005	
% students take DE courses	0.025*	.011	1.025	0.014
% students in DE complete	0.014	.007	1.014	
Student preparation: study skills	0.854**	.284	2.349	0.471
Student preparation: computer skills	0.867*	.357	2.379	0.478
Student preparation: academic skills	0.191	.294	0.826	
Synchronous delivery format	0.641***	.180	1.898	0.353
Asynchronous delivery format	0.015	.117	0.985	
Course provider: local district	1.083*	.484	0.339	0.596
Course provider: regional consortium	0.402	.355	0.669	
Course provider: state	0.478	.409	1.613	
Course provider: private	0.773	.651	2.167	

Note. *B* = unstandardized regression coefficient; *d* = effect size.  
\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .



are not completely synonymous, they can produce a different *pseudo-R*<sup>2</sup> from each other, and this stems from the previously discussed different approaches the logistic and multiple regression analysis use in estimating models.

Results from the logistic regression analysis are summarized in Table 3. Overall, results indicated that the model with the predictors was a significant improvement in fit over the constant-only model without any predictors,  $\chi^2(15) = 60.03, p < .001$ . However, the Hosmer–Lemeshow test was significant, which signified that the model was not a good fit and was different from the data,  $\chi^2(8) = 17.37, p < .05$ . The Hosmer–Lemeshow test may have been biased towards non-significance as only 90% of cells had an expected frequency greater than five. Specifically, it has been recommended that 95% of cells have an expected frequency greater than five in order for the Hosmer–Lemeshow test to be accurate. The overall percentage of cases that were correctly classified was 72.2%. The model accounted for approximately 22% according to  $R^2_{CS}$  and 29% of the variance according to  $R^2_N$ .

As is apparent in Table 3, the percentage of students taking DE courses was the only control variable that uniquely predicted administrators' satisfaction. The odds ratio and estimated effect size revealed that the contribution of this variable was likely small. That is, while accounting for all other variables in the model, results indicate that an increase of 1% in the proportion of students taking DE may have increased the likelihood that administrators were very satisfied with DE by 2.5%. In terms of student preparation, students' study and computer skills were predictive of administrators' satisfaction but students' academic skills were not. The odds ratio demonstrated that the potential contribution of these variables to administrators' satisfaction may have been substantial. The estimates of effect size also showed that these variables provided the largest contribution to increasing administrators' satisfaction. Specifically, after controlling for all other variables every one unit increase in students' study skills administrators were 1.35 times (or 135%) more likely to be very satisfied with DE. Likewise, for every one unit increase in students' computer skills administrators were 1.38 times (or 138%) more likely to be very satisfied with DE. Synchronous delivery format was also predictive. The effect size estimate revealed that synchronous format may have provided the next largest contribution to increasing administrators' satisfaction. In particular, the odds ratio indicated that after accounting for other variables that the use of synchronous delivery formats increased the chance administrators were very satisfied with DE by 0.898 times (or 89.8%). Having a local district as the course provider was predictive of administrators' satisfaction but this was an inverse relationship. That is, using a local district predicted that administrators were less likely to be very satisfied with DE. The odds ratio revealed that after controlling for other variables a local district course provider reduced the likelihood that administrators were very satisfied by 0.661 times (or 66.1%).

## Discussion

The results of this study extended previous research by examining and identifying factors that may have contributed to rural school district administrators' satisfaction with DE. To our knowledge, previous research had not investigated rural administrators' satisfaction with the DE that their district was using. Toward that end, several focal variables were correlated with and uniquely predictive of administrators' satisfaction. However, among all the variables examined in this study the best

predictors of rural administrators' satisfaction with DE were students' preparation in study and computer skills. Though descriptive statistics indicated that rural youth were most prepared in their computer skills, the regression analysis demonstrated that this was the single strongest predictor of administrators' satisfaction. Rural youth were least prepared in their study skills, and this was strongly correlated with and predictive of administrators' satisfaction in the regression analysis. These findings were consistent with expectations and previous research with rural administrators indicating that student preparation was important (Barbour, 2011; Tankersley & Burnham, 2007).

To some extent, results concerning students' academic skills contradicted expectations. In particular, while students' preparation in their academic skills was correlated with administrators' satisfaction, it was not predictive beyond and after accounting for other variables. These findings suggested that students' academic skills may not have contributed as much to administrators' satisfaction. Perhaps this was because rural districts primarily used DE to provide students advanced or enrichment courses (Hannum et al., 2009; Picciano & Seaman, 2009). Therefore, students' academic skills may have been less of an issue because the DE courses that rural districts offered were largely intended for those with more advanced academic skills. It is possible that school personnel selected better-prepared students for these DE courses or only suggested these DE courses to students who are better prepared academically. If rural districts were using DE for average to below average students then perhaps students' academic skills would have played more of a role.

As expected, synchronous delivery format was correlated with and uniquely predicted administrators' satisfaction. Moreover, synchronous delivery format was the second most robust predictor of administrators' satisfaction. Descriptive statistics indicated that an asynchronous format was the more frequently used delivery format. However, contrary to expectations asynchronous delivery format was not related to administrators' satisfaction. Nonetheless, the lack of a relationship between asynchronous delivery format and administrators' satisfaction was important. This lack of relationship indicated that utilizing an asynchronous delivery format may not lower administrators' satisfaction with DE. It is possible that this reflected the fact that rural districts more often used an asynchronous delivery format and 48% were very satisfied with the DE they used.

Likewise, administrators may have favored synchronous DE for similar reasons, that is, synchronous DE is more like a traditional teacher-centered course. While synchronous DE classes may have caused scheduling conflicts for school administrators, K–12 students could have been assigned a synchronous DE course to be taken during a regularly scheduled class period during the school day. This feature may have contributed to rural administrators' satisfaction with synchronous DE because it was a better fit within the constraints of a normal school day for K–12 students and traditional concepts of instruction. Furthermore, synchronous DE may have provided more interactivity and, thus, were more congruent with the close student–teacher relations that typify many rural schools (Hardré et al., 2008; Irvin et al., 2009).

Contrary to expectations, having a course provider that was more local to the school district was not related to an increase in administrators' satisfaction. Furthermore, the use of a local district course provider was predictive of lower satisfaction among rural administrators in the regression analysis. These differing results may have stemmed from the more precise estimate of the unique relationship between a

local district course provider and administrators' satisfaction in the regression analysis as other variables were controlled. Perhaps this result was due to the more limited instructional and other resources that local district course providers may have had. These results may also have suggested that there was an interaction between the use of a local district course provider and another predictor that was not examined in the current study. Regardless, some caution is warranted given these issues.

### ***Limitations***

There were some limitations in this study that should be considered. First and foremost, causality and directionality cannot be inferred directly from the data because this study was correlational and cross-sectional. It may be that as students increased their computer skills school administrators saw more opportunity for using DE and did so. Conversely, it may be that the computer skills of students increased because administrators who had rising satisfaction with DE were likely to have used DE more often and thus provided students with more opportunities to increase their computer skills. A cross-sectional correlation study cannot detect this.

Another limitation is that other factors that may affect administrators' satisfaction with DE were not examined. For example, barriers to DE have been well documented (Berge & Muilenburg, 2000). Some barriers to DE that have been identified may have lowered rural administrators' satisfaction with DE (Irvin et al., 2010; Picciano & Seaman, 2009). Other possible limitations are related to measurement issues. Administrators' satisfaction with DE was captured by a scale that had only four response options, as were most items on the RDES in order that the survey could be completed in a relatively short time period. The data on administrators' satisfaction with DE were highly skewed, which led us to dichotomize the measure. Statistical power to detect relationships and the strength of those associations were likely attenuated by this limited variability and dichotomization. In addition, the data were primarily self-report. Such data may have involved memory inaccuracies, perception biases, and social acquiescence. Finally, the findings may not generalize to administrators in urban or suburban districts or rural districts outside of the United States.

### ***Suggestions for future research***

Future research could examine additional factors that may be associated with satisfaction with DE and could employ different designs to explore causality in more depth. Carefully controlled experimental studies could provide better information about causal relationships. The use of longitudinal designs and more advanced analytic techniques may also provide more information about potential causal relationships and underlying mechanisms. Such analytic approaches include path analysis, structural equations modeling, and propensity score matching.

Developing multiple item scales to form a composite measure or using several indicators to create a latent variable of administrators' satisfaction may also increase the variability of this construct. Subsequent research could also explore multiple sources of information and perspectives regarding satisfaction with DE and related factors, not just the perceptions of district administrators. This could include school observations and interviews with teachers, guidance counselors, students, and parents.

Studies could seek to explore school administrators' understanding of what makes DE courses effective. While DE use has become more widespread among rural K–12 schools, decision-makers at the school and district level may not be aware of what constitutes quality in a DE course and thus may be making decisions on the basis of factors other than course quality. It would be interesting to see if administrators who are aware of course quality indicators make the same decisions about offering DE courses as those administrators who are not aware. Perhaps school administrators also require some additional knowledge or skill when using DE in their schools. Their satisfaction with DE may be different if they had a different, or modified, frame of reference for considering DE courses.

An issue that has been raised in DE research is that of examining the underlying pedagogy rather than the more obvious technology-related factors in explaining effectiveness, attrition, and satisfaction with DE (Bernard et al., 2009; Hannum, 2009). As these authors and others have suggested, pedagogy may play a larger role in DE than factors such as what technology was used or whether a course was synchronous or asynchronous. It would be interesting to determine the extent to which administrators in K–12 schools who make decisions about using DE courses are aware of the pedagogy used in the DE courses they choose to make available to their students. It could be that administrators would have different levels of satisfaction and would make different decisions if they knew more about the specific pedagogy used in different DE courses and if they had standards of quality for DE courses against which to compare. Without this specific knowledge regarding success factors in DE courses, they may rely on more obvious surface factors such as whether it is a synchronous or asynchronous course or who provides the course. Another approach would be to collect data from K–12 administrators that ask them specifically to rank the importance of a number of potential factors they consider when making decisions about DE courses.

### ***Implications***

There are some important implications apparent in the present study. Results suggest that there is a need to consider students' study and computer skills. Ensuring that students' preparation in study and computer skills is appropriate for the DE courses that are already being offered or are being considered may bolster administrators' satisfaction with and effective use of DE. Specifically, rural administrators may want to formally or informally assess students' preparation and take steps to improve students' study and computer skills as needed. The results indicate that using a synchronous delivery format may also be beneficial in terms of satisfaction at the district level. Of course, there may be other reasons that synchronous delivery may not be feasible, such as scheduling conflicts. The results also suggest that use of asynchronous delivery, which is associated with higher learning outcomes, may not be detrimental in terms of administrators' satisfaction. Policymakers may help rural administrators be more satisfied with the DE they use by enacting policies and providing funds intended to support the assessment and development of students' study and computer skills as well as the technologies and other factors that may facilitate the use of a synchronous delivery format.

### **Acknowledgements**

This study was supported by grant R305A04056 from the Institute of Education Sciences.

### Notes on contributors

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