

A Contemporary Overview of Online Education Use in Rural, K-12 Schools in the United States

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access to education

Digital Divide

Distance Education

Educational Technology

internet connectivity

Online Education

online education usage

Online Learning

rural K-12 schools.

rural schools

school size

socioeconomic status

This study explores contemporary trends in online education within rural K-12 schools in the U.S. by examining site characteristics, Internet connectivity, and smartphone usage in online learning. Despite nearly a century of discourse on rural education and distance learning, gaps in research persist. Through a mixed-methods approach, this study analyzes survey and focus group data to investigate variations in online education usage across different rural school types, with a focus on size- and income-related characteristics. Key findings reveal that larger, higher-income schools tend to use online education at higher rates, while smaller, lower-income schools face challenges such as unreliable Internet and staff limitations. The study also highlights the critical role of Internet connectivity and emerging relationships between smartphone usage and online education. These

results inform stakeholders about the unique challenges and opportunities rural schools face in integrating online education, emphasizing the need for context-specific solutions to improve access and equity.

Introduction

Rural schools in the U.S. have a long and interconnected history with distance education. Researchers, reformers, and policymakers alike have advocated for various solutions to address the scarcity of human capital in these areas (Biddle & Azano, 2016). Despite nearly a century of discourse, research on rural K-12 distance and online education remains historically underexplored (Barbour, 2010; Chen & Koricich, 2014; Hardy et al., 2019). The rapid evolution of online education in the 21st century, driven by technological advancements and changing educational landscapes, has significantly impacted how rural schools perceive, access, and utilize online learning. However, challenges persist, as rural students represent nearly 20% of K-12 enrollment in the U.S. (NCES, 2019), yet the existing literature reveals considerable gaps regarding rural K-12 online education (Johnson et al., 2022). This is further compounded by the diverse site characteristics that influence how online education is accessed and used in rural schools; both geography and poverty can make broadband Internet an expensive challenge for rural residents. Hampton et al. (2020) also identified outdated infrastructure, slow speeds, and unreliable cellular coverage as barriers to rural high-speed Internet. Although rural schools are increasingly dependent on technology, the use of online education may be constrained in schools and households where Internet access is expensive or slow, which may in turn render some disadvantaged rural groups at risk of exclusion from certain digital developments and educational opportunities (Statti & Torres, 2020). Despite these issues, the last comprehensive national study broadly examining trends in K-12 rural online education usage was conducted by Hannum et al. in 2009, leaving a considerable gap in the literature on this topic. This presentation followed a mixed-methods approach to explore contemporary trends in online education in rural K-12 settings, focusing on site characteristics, Internet connectivity, and smartphone usage.

Research Questions

To provide an updated overview of online education utilization in rural K-12 settings in the U.S., the following research questions guided the data collection and analysis:

1. How are rural K-12 schools using online education overall?
 - How does usage vary based on school size and/or socioeconomic status?
2. What is the relationship between Internet connectivity, smartphone use, and online education use in rural schools?

Research Methods

This study utilized a mixed-methods approach, integrating insights from focus groups (four sessions with nine participants total) and survey data (72 responses included in the final analysis). Focus group discussions provided valuable rural educator perspectives on the factors influencing online education practices, which informed the development of the survey instrument. Three rounds of iterative coding resulted in the identification of four main themes which guided the development of the survey: online education types and usage, internal factors influencing usage, external factors influencing usage, and student

experiences and learning outcomes. The survey, consisting of six sections and 94 questions, was constructed using the themes identified during the qualitative phase, and was designed to capture various aspects of online education usage, including formats of online schooling, types of online education offered, pandemic usage patterns, and stakeholder perceptions.

Survey responses were analyzed for general trends, as well as categorized into categories based on the U.S. Department of Education's Rural Education Achievement Program (REAP) categories, and included Small Rural School Achievement program-eligible (SRSA), Rural Low-Income School program-eligible (RLIS), Dual-Program-eligible, and None-eligible groups to analyze the use of online education in rural K-12 schools based on characteristics such as size and socioeconomic status. Per the U.S. Department of Education's (2023) REAP initiative definitions, the categories are described as follows:

- SRSA: Districts must have a total average daily attendance of under 600 students or exclusively serve schools that are in counties with a population density of <10 people/square mile.
- RLIS: Districts must serve a population in which >20% of children aged 5 - 17 are from families with incomes below the poverty line.
- Dual-Program: Dual-Program sites are districts that are eligible for both SRSA and RLIS funding.
- None: In this context, None sites are classified by their lack of income- or size-related characteristics. In general, they may be rural school districts or schools that have a larger student body or are located in a more population-dense area. Fewer than 20% of the population is below the poverty line in these areas.

Data collected via the Qualtrics platform were imported into SPSS for comparative analysis and descriptive statistics across nominal, ordinal, and interval scales. Research questions focused on overall online education usage and variations by school characteristics, with scores derived from Likert-scale questions and averaged for composite scores. These scores were categorized into levels of perceived influence on online education, and ANOVA was used to compare different school types. Additionally, a chi-square test analyzed the relationship between Internet connectivity, smartphone use, and online education.

Findings and Discussion

The format of online education has largely remained consistent, with most rural schools favoring in-school, asynchronous offerings. Usage of online education increases with grade level and may serve various purposes, such as reducing student absences, general education, and dual credit courses, with core subjects like math, foreign language, English, and science being the most frequently offered. Internet connectivity presents challenges in certain rural areas. Schools often provide accommodations, such as mobile hotspots or physical materials, for students with limited home Internet access. Online education tools, particularly learning management systems, are extensively utilized for organization and communication. Diverse sources supply online education services, and staff responsibilities vary based on school size, with key decisions typically made by administrators and guidance counselors. The COVID-19 pandemic significantly influenced online education usage, prompting most rural schools to participate in remote learning. However, many schools did not optimize online content for mobile users, likely due to limited training in online content development. Post-pandemic usage varied, with increased utilization often linked to individual student needs, while decreased usage was frequently attributed to lack of need or reliable Internet access.

The study identified six key variables influencing online education use from focus group sessions: site implementation, staff integration, Internet connectivity, site-based external influences, perceived student outcomes, and site smartphone usage. While site implementation and smartphone usage were perceived as having low influence on online education use, staff integration, Internet connectivity, site-based external influences, and perceived student outcomes showed moderate influence. Notably, internet connectivity emerged as the most significant factor, underscoring its critical role in online education. Site-based external influences, including enrollment competition and bureaucratic policies, also proved significant.

The findings were further analyzed based on rural school characteristics, including size and socioeconomic status. Differences in online education usage patterns were observed across four eligibility categories for Rural Education Achievement Program initiatives: rural alone (None), low-income and rural (RLIS), small and rural (SRSA), and small, low-income, and rural (Dual-Program). Larger schools and those with higher socioeconomic status demonstrated greater diversity and utilization of online education, as well as more positive attitudes towards online education usage. Conversely, small schools and those with lower socioeconomic status reported lesser overall utilization of online education, and issues such as internet connectivity and compression of staff duties were indicated more frequently as challenges. Staff from these schools also tended to report less positive attitudes towards online education usage in general.

Finally, the relationship between internet connectivity, smartphone usage, and online education use was examined. Confirmed relationships existed between internet connectivity and online education usage, as well as between smartphone usage and internet connectivity. Additionally, a previously unknown relationship emerged between smartphone usage and online education utilization, suggesting a need for further research to investigate the strength and nature of this relationship.

Conclusion

This presentation covered a broad spectrum of national findings regarding online education use in rural K-12 settings, and the findings are particularly relevant for policymakers, researchers, and stakeholders involved in shaping rural education. While larger schools with greater resources generally exhibit more diversified online education offerings and more positive attitudes toward online learning, challenges such as limited internet connectivity and resource constraints continue to impede online education use in certain rural schools. The study highlights the importance of considering site characteristics, such as size and socioeconomic status, when designing and implementing online education in rural settings. For example, when developing online education content, it may be worth considering the internet connectivity in rural settings and whether a bandwidth-heavy lesson could be successfully utilized by students with limited Internet access. Those involved with the creation of online curricula may benefit from the inclusion of alternative resources such as mobile-friendly sites or printable materials, which could allow for greater access for students both in and out of the classroom. Policymakers and researchers should take extra care to ensure that their assumptions regarding online education in rural settings are not too broad and that considerations for school size and socioeconomic setting are taken into account when developing online education research or policies that apply to rural school settings. To-date, we are unaware of any published research which offers guidance based on REAP school designation; however, the report by Gemin et al. (2018) offers a comprehensive overview of rural online education which includes profiles organized by state, program, and policy that could offer concrete examples for stakeholders in this field. By understanding the specific challenges and opportunities related to online education in rural schools, these stakeholders can foster further research, develop policies, and initiate programs aimed at enhancing access to online learning resources and addressing the needs of this historically understudied area.

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