Technology Use in Rural and Urban Schools: Challenges and Opportunities in the Midwest

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Abstract

This article examines the availability, use, and integration of technology in rural schools versus technology in urban schools in Nebraska. Data was gathered through interviews with eleven schools in central and eastern Nebraska, seven rural and four urban. Representatives from schools were excited about implementing technology in the classroom but acknowledged a variety of problems ranging from insufficient funding to unwilling teachers. Though several significant differences were noted among availability and training opportunities, much of the data was similar between rural and urban schools. The key similarity found was the passion of educators, administrators, and specialists for the engagement and the individual learning that the implementation of technology in the classroom creates.

Introduction

In an age where social reforms and political battles are fought and won over social media, the number of articles reflecting the nation's public school system in a negative light is staggering, such as "Public Education's Biggest Problem Keeps Getting Worse" from the Washington Post (Strauss, 2013), "The Failure of American Schools" by Joel Klein from The Atlantic (2011), "How Bad Are the Public Schools?" from PBS (Galston), and "Top 5 Reasons Why Public Schools are Failing Our Children" from education-portal.com (2007). People post and share these articles across various forums and outlets with catchy hashtags like #EducationalReform, #FixOurSchools, and #FixOurPublicSchools proclaiming to their friends and followers of the need for an educational reform. Standardized tests, government policies, school administrations, and teachers are constantly criticized and demonized for every flaw in the system. Parents and concerned citizens are calling for reform, touting the catchphrase of getting "back to basics" to whoever will listen.

I recently encountered this same catchphrase during a heated "debate" between myself and a businesswoman referring to the use of spellcheck in her son's class. "Reading, writing, and 'rithmetic," she says, "need to be what our schools are focusing on. Let's get our system back to the basics. You teachers shouldn't be wasting so much class time with *technology*." When did technology become a dirty word?

The fact of the matter is that technology has become just that: a "basic." Technology has become an integral and ever-growing part of the education system today, particularly in rural schools. As such, it is important to understand the ramifications as well as the extensive benefits it can offer.

As Mathis (2003) stated, "rural concerns have special and unique dimensions" (p. 121). In order to fully understand the importance of technology in the rural setting and to appreciate the unique circumstances being a small, rural district poses to a school, it is important to define what constitutes a school as being rural. The United States Census Bureau (as cited in Khattri, Riley, & Kane, 1997) states that "if an area has a population of less than 2,500 people, it is defined as rural" (p. 80). This definition is further narrowed in a study done by Lippman, Burns, and McArthur (as cited in Khattri et al., 1997), who classify rural schools as being "located in a rural or farming community, a small city or town...,that is not a suburb of a larger city" (p. 81). Studies and an ever-growing body of literature show that attending small and community schools has a positive outcome on learning achievement, yet rural schools remain underrepresented (Mathis, 2003, p. 121). Consolidation and low scores on mandatory standardized testing can give small districts a bad name, though a progressive attitude towards technology can help to remedy that for rural schools.

In order to understand how technology can help small school districts compensate for a myriad of disadvantages, one must look at what is being used in schools, both urban and rural, and how it is being implemented in the classroom. In this paper, we analyze previous findings regarding the unique problems rural schools face, the use of technology in rural and urban schools, the way technology impacts classroom learning, and the importance of teacher preparation. We describe the methodology used in interviewing principals and technology specialists from 11 schools in central and eastern Nebraska, both rural and urban, and analyze the data and results received. Finally, we will discuss what was found through the study and consider how rural schools should proceed in order to continue to pursue equality through the progressive use of technology in the classrooms.

Literature Review

- According to Mathis (2003), one sixth of the children in the United States live in a town with less than 2,500 citizens.
- "244 of the 250 poorest counties in America are rural" 16% of urban students are poverty-stricken in the inner cities, yet lawmakers and media turn a blind eye to the 20% of rural students who live in poverty (Mathis, 2003, p. 119).
- According to Mathis (2003), rural schools spend, on average, approximately "$2,000 less per pupil than do schools in metropolitan areas" per year even though studies show that it costs more to educate students in a rural setting.
- School administrators of rural districts are heavily and actively pursuing ways to aid and further opportunities created by technology, and according to a study done by the National Center for Education, (as cited in Hawkes, Halverson, & Brockmueller, 2002) they are doing so at a greater rate than larger schools. They are more likely than urban schools to have computers in the classroom and small schools are more likely than large schools to have computers in the classroom.
- According to Barker and Hall (1994), "the use of telecommunicated distance learning has become increasingly popular in rural schools for providing curriculum equity to students" (p. 126).
- Initiatives for one-to-one computing or one-to-one devices put a portable device in the hands of every student in a particular school in particular grade levels. According to William J. Penuel (2006), "The decreasing costs, combined with the lighter weight of laptops and increasing availability of wireless connectivity, are all making such initiatives more feasible to implement on a broad scale" (p. 329).
- According to Penuel, teachers who spent as little as nine hours in educational technology professional development activities were more likely than teachers who did not to feel "well- or very well-prepared to use computers and Internet" for classroom purposes (2006, p. 333). It is not just showing teachers how to use the technology itself, however, though according to Davies et al. (as cited in Penuel, 2006, p. 338), that is what the majority of teacher workshops focus on.
- One of the most effective ways for teachers to learn to better integrate technology into their classrooms is when they are teaching each other. According to Penuel, "a number of researchers reported that they observed teachers helping each other with technology problems or engaging in curriculum planning" (2006, p. 338). This is more preferable for teachers and more cost-effective for schools and just as, if not more, effective at preparing teachers to use the technology given to them.
- Because of a variety of factors gifted students from rural school districts face distinct challenges. As professor of Education and Psychology Frank Belcastro (2002) acknowledges, "Although there are issues for all children in rural schools, the needs of rural gifted students are especially critical" (p. 14). The fact of the matter is rural schools have not been able to offer the same services to their gifted students as wealthier school districts in urban and suburban areas. As Belcastro (2002) stated, however, "electronic technology can be used to overcome many of the restrictive factors or barriers to delivering services to rural schools, and it can expand the world of rural gifted students" (p. 14).
- As Belcastro explains (2002), "The intent of electronic technology is not to be an alternative to a high quality teacher and classroom; the intent is to be an alternative to nothing, and that is what many gifted rural students are getting right now" (p. 14).

Methodology

Purpose of Study

The purpose of this study is to compare both the availability and the implementation and use of technology in teaching practices and learning activities in several rural and urban schools in Nebraska. This research will attempt to answer the following sub-questions:

1. What technology is currently available and how is it being used in the participating rural and urban schools?
2. How is professional development achieved at the participating schools?
3. How do teachers from these schools describe their experience using technology in teaching?

Methodology (continued)

Research Design and Procedure

A qualitative approach was used for data collection and analysis. Once the school principal or superintendent agreed to participate, the person indicated for contact, either the principal or a faculty member familiar with the technology, was contacted to schedule an in-person interview. Prior to the interview, the researcher sent an e-mail note to the interviewee containing general information about the study including the purpose of the research, the importance of the study, and the format of data collection. The signed informed consent form was obtained at the time of the interview. Several participants signed, scanned and returned the informed consent electronically. Additionally, permission was requested to audio record the interviews.

Data Collection

Data were collected via in-person interviews as well as through an email questionnaire. Once IRB approval was obtained, data collection began immediately. The interviews were conducted with staff (principals, teachers, and technology specialists) from several urban and rural schools across Nebraska. The interviewees were indicated by either the school principal or the school superintendent. The interviews lasted about thirty minutes at a place and time chosen by the participants. The researcher audio recorded the interviews and took extensive notes. No interviews were conducted at the schools and the study was conducted during summertime.

Data Analysis

The data were obtained as recorded statements or responses and were transcribed into a Microsoft Word file for analysis, which was conducted according to the general strategies proposed by Creswell (1998). The researcher reviewed participants' written responses to obtain the sense of overall data. After studying the recorded data, the researcher started the coding process. According to Stake (1995) and Creswell (1998), coding can be defined as the process of making a categorical aggregation of themes. An in vivo coding strategy was used. In vivo coding implies that each code comes from the exact words of the participants. Coding implies the process of grouping the evidence and labeling ideas. After coding was completed, the ideas were transformed into themes and sub-themes. The qualitative data are presented through visual graphs and findings were presented as an integral part of results and discussion as much as possible. After the study data were transcribed and analyzed, results are presented in the form of statements and tables.

Population and Sampling Procedures

The researchers used a non-probability voluntary sample. A voluntary sample is made up of people who self-select into the study. An e-mail invitation was sent to about thirty (N=30) rural and urban schools across the state of Nebraska and roughly eleven (n=11) schools agreed to participate.

Study Limitations

This research study is limited by the access to specific schools in the state of Nebraska for data collection. While every effort was made to recruit schools from a variety of locations across the state that was representative of the diversity of socio-economic and racial backgrounds, many of the schools were located in the central part of Nebraska. Data collection targets of schools from across the entire state were not met. The limited geographic diversity and small number of participant schools makes it difficult to generalize the findings to other states.

Ethical Considerations and IRB

Asking teachers and staff to discuss resources, professional development, and instructional procedures available at their schools could potentially raise ethical considerations such as preserving schools' identities. Data collection methods and procedures ensure protection of subjects and their schools' identity, anonymity of responses, and voluntarily participation. Data collection was conducted using strategies that ensured the anonymity of subjects and schools. Data presentation format ensured that subjects and their schools could not be identified.

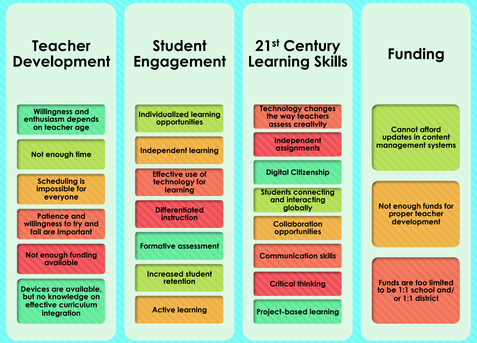
Results

During the interview process, the position held by the representative from each school interviewed varied from technology specialist to principal to teachers who are very tech-savvy at their school. These interviewees came from both very small, rural school districts to one of the largest districts in Nebraska, with anywhere from two to twenty-five years of experience at their current positions. Though the subjects varied greatly, their answers about technology often reflected common themes and sentiments with regards to providing the students of their school with the skills associated with and necessary for twenty-first century learning.

The days of wanting a "quiet and busy" classroom are long gone and the shift towards more involved learning is in part due to technology. Students of today are not only required to focus on academics in school in order to become successful later in life, they must also become proficient at a new set of skills commonly referred to as "21st-Century Skills" (Boss, 2012, p. 2). According to the Partnership for 21st Century Skills (As cited in Boss), there are four main competencies, or the "4C's" necessary for today's students to learn (2012, p.2). These are collaboration, creativity, communication, and critical thinking. According to Boss (2012), students today must be able to "work effectively with diverse groups and exercise flexibility" in order to work together and accomplish an end goal and be able to "generate and improve on original ideas" when working with others while incorporating creativity (p. 2). Students must also be able to "communicate effectively across multiple media and for various purposes" as well as know how to "analyze, evaluate, and understand complex systems" to strategically solve problems (Boss, 2012, p. 2).

When asked what excited them about technology in the school setting, many of the school representatives interviewed reflected the importance of the 4C's in their answers, a representative from School K even citing them specifically. As a representative from School J said, "As educators, we must meet the students where they are in today's world, and that is a technological world, or else we won't be able to make a meaningful connection and we've lost them."

Emerging Themes from Interviews



Discussion

Though technology in the classroom is not a new phenomenon, the role it has taken in recent years is revolutionary. It is technology not as a tool to replace pen and paper, but as a doorway to an entirely new and increasingly effective way for students to learn. Technology has the power to "level the playing field," a phrase thrown around so often in conjunction with technology it is almost a cliché. Not only does technology close the distance gap for students, but it provides rich opportunities otherwise unavailable. Technology allows special education students to participate at a level they may not have been able to engage in previously. It allows high-achieving students to learn and explore beyond the means of their school. It allows teachers to differentiate lessons according to the needs of their students in ways previously only dreamed of and it allows students to participate in their learning on a much deeper, more meaningful level of engagement.

Discussion (Continued)

Technology is not just the future of education, it is the now, and schools need to be able to respond accordingly. If schools are to prepare students for their futures as contributing, active members of an increasingly advanced and ever-evolving society, students need to be adept at their technology skills. They need to know how to use a device in order to produce creative results, in order to be able to collaborate with their peers, to think critically and use technology to effectively communicate with the world around them. These are the skills students need in order to be successful. The study has shown that technology is present everywhere, regardless of location. Rural and urban schools alike in Nebraska have technology present in the classroom, but it is not consistent.

The first difference the study has shown among technology in rural versus urban schools is the saturation of technology. Six out of the seven rural schools interviewed reported being at a ratio of 1:1 devices per students, while only two of the four urban schools reported the same ratio. While all of the urban schools most likely possess just as many devices, they are not to a 1:1 ratio due to the much larger number of students enrolled. In this respect, students of rural schools are at an advantage when it comes to available technology.

Where rural schools seem to be at a distinct disadvantage in regards to technology is with the maintenance and support of the technology. The urban schools discussed having not just one technology specialist, but an entire team devoted to the technical side of maintaining a smoothly-running school. Many of the rural schools, however, reported having only either one technology specialist for the district, who was in several cases a teacher as well, or simply having a teacher or the principal in charge of the technical aspects. This leads to not only more pressure on whatever individual is in charge of all of the technology-related responsibilities, but also to a school that is not run as smoothly and technology that is not able to be as effectively used.

Both general differences between rural schools and urban schools could be fixed by funding. As the representative from School C so accurately described it, "If all schools had adequate resources, on an equal scale, I am confident all schools would be able to offer the kind of education required for post-secondary success…However, as is often the case in Nebraska, some schools have more funding available to them while others have very little." Based on what the study showed, some schools simply are not given enough resources, both rural and urban. While this may not be an easy remedy, it is one that is much needed in order to achieve successful and equal learning environments for the students of Nebraska.

It is imperative that the students of today are given every opportunity to acquire and build upon the skills they will need in order to excel in the technologically-driven world in which we live. It is the duty of educators to strive towards preparing students for the ever-changing future. It is the time for educators and administrators alike to be forward-thinkers, to pursue the future of technology in education and to not simply follow the trends. It may well be time to get "back to basics" as some are saying, but the basics of today have evolved. Society is changing, and education must change with it.

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Data Analysis

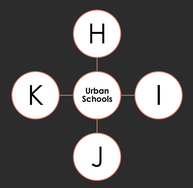

Table 1: Identification of Schools as Rural or Urban

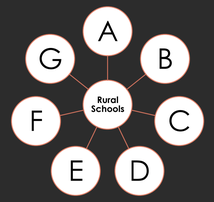

Table 2: Technologies Available as Reported by School Representative

Technologies	Number of Rural Schools	Number of Urban Schools
Laptops	7	2
MacBooks	2	2
Google Chromebooks	1	1
Mac/PC Desktop Computers	5	3
iPads/iPad Minis	6	3
PC Tablets	0	1
SmartBoard	5	1
AppleTV	3	0
Schoology	3	0
Mimeos	1	1
WIFI Printers	1	0
Elmo Projector/Document Cameras	2	2
Jot Pro	1	0
Digital Microscopes	1	0
e-Textbooks	1	1
Digital Graphing Calculators	1	0
Robotics	1	0
iPods	0	1
Clickers	0	2
Wireless Sound System	0	1
LCD Projector	0	3
Video Cameras	0	1

Table 3: Teachers' Reaction to Technology as Reported by School Representative

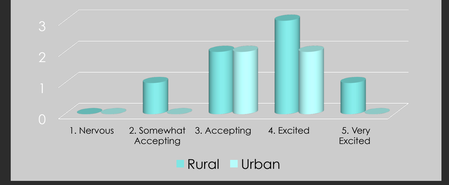

Table 4: Level of Technology Integration as Reported by School Representative

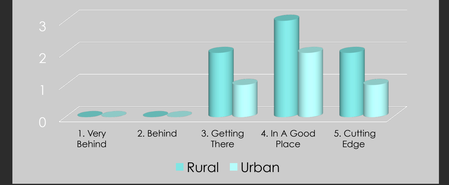

Table 5A: Methods of Teacher Training as Reported by School Representative

Method	Number of Rural Schools	Number of Urban Schools
ESU	7	0
In-Service Professional Development	3	3
Technology Specialist	3	1
Summer Workshops	2	1
Teaching Themselves	3	0
Teacher-to-Teacher Sharing	3	0
Regional/State Conventions/Conferences	3	0
NETA	2	0
Google Summit	1	0
Learning Coach	0	1
District Provided Training	0	1
Online Video Training Courses	0	1

Table 5B: Frequency of Teacher Training as Reported by School Representative

Frequency	Number of Rural Schools	Number of Urban Schools
Continually	0	1
Once A Week	1	0
Once A Month	1	1
Several Times A Semester	1	0
Whenever A New Device is Introduced	0	1
Not Often Enough	1	0
Didn't Say	3	1

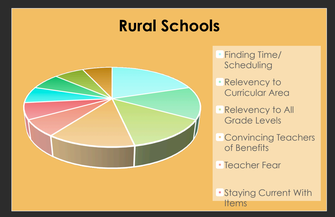

Table 6: Challenges of Teacher Training as Reported by School Representative

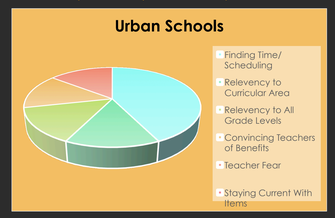

Table 7: Challenges of Technology Integration as Reported by School Representative

Challenge	Number of Rural Schools	Number of Urban Schools
Staff Willingness	2	1
Student Behavior/Misuse	2	1
Monitoring/Restricting Device Usage	2	1
Parental Acceptance	2	1
Insufficient Funds	1	2
Adequate Infrastructure	1	1
Basic Care of Devices	2	0
Staff Preparedness	2	0
Allowing Students Equal Time/ Access	0	1
No Challenges	1	0

Table 8: Technology "Wish List" of Schools over Next Two Years

Desired Technologies	Number of Rural Schools	Number of Urban Schools
No "Wish List" Items	3	1
1:1 iPads/Devices	2	2
Additional iPads	3	0
e-Textbooks	1	1
More Mobile Labs	1	1
Filters for Devices	1	0
Flat Screen TVs	1	0
3D Opportunities	1	0
New Management System	1	0