# THE DIFFUSION OF INNOVATIONS IN URBAN AND SUBURBAN OKLAHOMA SCHOOL DISTRICTS

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Abstract:

There are many disparities between urban and suburban schools, including the adoption of innovations (Huberman & Miles, 2013). This study examined the Diffusion of Innovations theory (Rogers, 2003) and its potential application to urban and suburban Oklahoma schools. The purpose of the study was to identify key elements that indicate the diffusion of innovations in urban and suburban schools. The methods of data collection for the study were survey research and document analysis. Information related to the diffusion of innovations in urban and suburban Oklahoma schools, characteristics of innovative schools and descriptions of innovative teaching practices were gathered from 145 participants who completed the survey. A Kruskal-Wallis Test was conducted to examine the differences in Profile of Instructional Technology Use in Schools scores, levels of expertise with technology, and levels of importance of methods for learning about technology according to the district type and role of each participant. Significant differences were found between urban and suburban parents, teachers and staff ($\chi^2 = 66.81$, $p < .001$, $df = 5$). The results indicated that participants who regard themselves as being members of an urban school district had significantly lower Profile of Instructional Technology Use in Schools scores than Suburban members.

The results indicated that participants who identified themselves as Suburban Teachers had significantly higher Profile of Instructional Technology Use in Schools scores than participants in other roles and district types. There was also very strong evidence ($p < 0.001$, adjusted using the Bonferroni correction) of a difference between groups in Profile of Instructional Technology Use in Schools scores. Urban parents, teachers, and staff are significantly different from one another, and this finding suggests that innovations are diffusing at different rates in than with suburban parents, teachers, and staff. This is significant for urban schools because it speaks to the differences in innovations being diffused. Innovations are diffusing differently throughout urban school districts, which contrasts with how innovations are being diffused in suburban school districts. Characteristics of innovative schools, definitions of innovative teaching practices, levels of expertise with educational technologies used in schools, educational budgets and perceptions of the use of educational technologies by teachers are key elements that indicate the perceptions of the diffusion of innovations in selected Oklahoma urban and suburban schools.

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# CHAPTER I

# INTRODUCTION

The divide between urban and suburban schools in the United States has been explored since the mid-1950s from varied perspectives, including examining differences in enrollment and performance (Adkins, 1969; Nasir & Vakil, 2017). As Adkins (1969) noted, the place where a student lives makes a difference in terms of enrollment and performance, and often it is the suburban schools that are better off because "they typically have 'better-qualified' teachers, newer buildings, and 'higher' educational standards (p. 243)." One significant finding in the literature that may be a contributing factor to the divide is that a lack of confidence from parents has led to the moving of families with financial means out of urban school districts (Wells, Cordova-Cobo & Ready, 2017). Research also shows that middle- and upper-income parents have expressed doubts regarding the viability of urban schools as well, but they have done it much less volubly (Owens, 2018). With relatively minor controversy, instead of attending school board meetings to express criticisms or protesting, parents picked up and moved—departing from urban school systems at ever-greater rates to suburban school districts (Owens, 2018). One consequence of this is reshaped district demography (Wells, Cordova-Cobo & Ready, 2017). As a result, each school year, urban schools are left with fewer resources to serve more significant concentrations of poor students, racial minorities, and English-language learners (Keene & Padilla, 2010).

As time has progressed, the label urban school itself has become synonymous with adverse environments and often referenced as ghettos. Anyon (1997) describes *ghetto* as a word that means a part of an urban area, such as city, in which members of a minority group live, typically as a result of social, legal, or economic pressure. These areas have a stigma of being impoverished, neglected, or otherwise disadvantaged residential areas of a city, usually troubled by a disproportionately large amount of crime. For example, in her book, *Becoming*, First Lady of the United States Michelle Obama narrates the experiences she had attending an urban school. In her childhood neighborhood, Obama (2018) describes how the mention of the word *ghetto* being associated with an urban neighborhood caused stable, middle-class families to move preemptively to the suburbs, worried their property values would drop. Obama describes the label of the *ghetto* as one which demoralized urban schools and educators trying to instill self-worth in neighborhood kids.

Five decades after Adkins' (1969) study on educational demographics, it does not appear that much has changed. Research by Kormos (2018) supports Adkins' (1969) premise that where a student lives still makes a difference in his or her school enrollment and performance; moreover, urban schools continue to face major challenges. Some argue that this is in part due to the access to funding, which may also determine the resources that a school has (Roscigno, Tomaskovic-Devey & Crowley, 2006). Regardless of the differences that exist between urban and suburban schools however, the expectations of schools, particularly throughout the U.S., tend to be the same- which is to be innovative and successful. One way the differences between urban and suburban schools manifest is in access to educational technologies, such as mobile devices, and the ability to explore educational innovations, such as one-to-one computing and Open Educational Resources, all

which seem to differ between urban and suburban school districts (Warschauer, 2005; Pete, Mulder & Neto, 2017). The question that does not appear to have received much attention is how do the differences between urban and suburban schools manifest in areas of educational technology? Moreover, how do the differences impact innovations in urban and suburban schools?

Applying Adkin's (1968) argument, one question that may be asked is: Does the location of where students live affect if and how technologies are taken up in their school districts? The unequal access to education technologies between urban and suburban schools serves as the motivation for exploring this topic. This study identified key elements that indicate the diffusion of innovations, the process through which an innovation is communicated through specific channels over time among the members of a social system (Rogers, 2003), in urban and suburban schools in the state of Oklahoma.

## Background of the Study

During the 1940s, in the United States, a powerful interaction between segregation laws and racial differences concerning socioeconomic status caused white families to vacate inner, urban cities in favor of suburban living (Bogue & Siem, 1956). The first data set capable of substantiating *white flight* was the 1950 census. White flight is a term that originated in the United States in the 1950s and 1960s and it applied to the large-scale migration of people of various European ancestries from racially-mixed urban areas to more racially homogeneous suburban or exurban areas (Hanushek et al., 2003). White flight has more recently been used to describe additional migrations by whites, from older, inner

suburbs to rural areas, as well as from the U.S. Northeast and Midwest to the milder climate in the Southeast and Southwest (Schaefer, 2008). Migration of middle-class white populations was observed during the U.S. Civil Rights Movement in the 1950s and 1960s out of cities such as Cleveland, Detroit, Kansas City, and Oakland, although racial segregation of public schools had ended there long before the U.S. Supreme Court's decision of Brown v. Board of Education in 1954. In the 1970s, attempts to achieve effective desegregation using forced busing in some areas led to more affluent families moving out of urban areas (Clotfelter, 2011). The business practices of redlining, mortgage discrimination, and racially-restrictive neighborhood covenants contributed to the overcrowding and physical deterioration of areas where minorities lived (Kruse, 2013). Such conditions are considered to have added to the relocation of other populations (Thabit, 2005). It was rigorous reprocessing of the same raw data on the first commercial computer produced in the United States, led by Donald J. Bogue of the Scripps Foundation and Emerson Seim of the University of Chicago, that scientifically established the reality of white flight (Bogue & Siem, 1956). The federal government also contributed to white flight, and the early decay of non-white urban neighborhoods, by withholding maintenance capital mortgages, which challenged communities to either retain or attract middle-class residents (Wilson, 2011). The new suburban communities limited the emigration of poor and non-white residents from the city by restrictive zoning; thus, few lower-middle-class people could afford a house in the suburbs (Logan & Zhou, 1989). Many all-white suburbs were eventually annexed to the cities their residents had left (Logan & Zhou, 1989) causing race and ethnicity to be one of the most significant divides in social networks, a network of social interactions and personal relationships, in the United States (Scott, 1988; McPherson, Smith-Lovin & Cook, 2001).

The movement of families has had a significant impact on the composition of cities, which led to what is referred to as baseline homophily (Moody, 2001; McPherson, Smith-Lovin & Cook, 2001). The concept of baseline homophily states that people are much more likely to report that their friends are socially connected if these friends are the same race (Louch, 2000). People often mention spouses and other relatives as associates, so homogamy, the marriage between individuals who are culturally similar to each other, is an additional indicator of the socialization customs of particular groups where similar people tend to socialize with one another (Liao & Stevens, 1994). The baseline homophily created by groups of different sizes is combined with the differences in racial/ethnic groups' positions on other dimensions such as education, occupation, income, religion and personal prejudices. Demographic similarity may have contributed to the homophily that would eventually become a differentiator of the diffusion of innovations in schools, further explained in Chapter 2, and led to the categorizing of school districts as urban or suburban.

**School District Classification**

The National Center for Education Statistics (NCES) classifies school districts in the United States as city (urban), suburban, town, and rural. The NCES relies on standard urban and rural definitions developed by the U.S. Census Bureau, and each type of school district is either urban, suburban, or rural in its entirety. The NCES school district classifications can be fully collapsed into a fundamental urban-rural dichotomy or expanded into a more detailed collection of categories. These categories are differentiated by size, in the case of city (urban) and suburban assignments, and proximity, in the case of town and rural assignments.

Due to the No Child Left Behind Act of 2001 (NCLB), the public was provided access to performance data for all public elementary schools and high schools. The NCLB Act was a U.S. Act of Congress that reauthorized the Elementary and Secondary Education Act, which included Title I provisions applying to disadvantaged students. It supported standards-based education reform centered on the principle that setting high standards and establishing measurable goals would improve individual outcomes in education. The NCLB Act required states to develop assessments of basic educational skills. In order for states to receive federal school funding, states had to administer these assessments to all students at select grade levels. The data collected and reported, however, primarily consisted of student standardized test scores.

In addition to the NCLB Act, the State of Oklahoma implemented the A-F School Grading System. The A-F School Grading System was designed to incentivize schools to strive for and reach high levels of college- and career-readiness (Oklahoma State Department of Education, 2011). This initiative aimed to show how students within a school are meeting or advancing toward grade-level academic standards in an easily understandable framework. According to the Oklahoma State Department of Education (2011), the A-F Report Card is:

- An indicator of the percentage of students, regardless of background, within a school who are currently meeting or exceeding grade-level academic standards
- An indicator of the percentage of students (particularly the lower performing students) who are at least making significant progress toward meeting grade-level academic standards
- An indicator of whether schools are exceeding expectations regarding school attendance, high school graduation, etc. (via the awarding of bonus points)

The A-F Report Card, however, is not a measure of the "school" or "teacher" effect on student learning; nor is it a statement about a school's overall quality of services provided. The progress of students at a particular school may be seen in the growth section of the report card as the percentage of students who either moved toward or maintained grade-level proficiency.

Keene & Padilla (2010) suggest that test scores alone are not an accurate measure of school quality. The belief that test scores are an accurate measure of school quality shows that the greatest threat to urban schools is the reality that privileged families presume urban schools to be failing and, in transferring from them, bring about a true decline (Keene & Padilla, 2010). While there is an apparent disproportion between the test scores of urban and suburban schools, the discrepancies in test scores may indicate more about families and neighborhoods than they do about the work being done in schools (Keene & Padilla, 2010). Goldhader, Brewer & Anderson (2006) found that the influence of family and neighborhood factors account for nearly 60 percent of the variance in student test scores. Teachers, by contrast, account for only 10 percent. However, the differences between urban and suburban schools extend beyond test scores.

*Urban Schools*

Urban schools serve a different mix of young people. Two-thirds of urban students are nonwhite, and in the 20 largest school districts in the United States, that figure is 80 percent on average (NCES, 2007). The NCES defines urban schools as a territory inside an urbanized area and a principal city. An urban area or urban agglomeration is a human settlement with high population density and infrastructure of the built environment (Barnett, 2011). In the United States, a principal city is the central core city in a metropolitan area (Coleman-Jensen,

2012). The largest city in each metropolitan or micropolitan statistical area is designated the principal city.

Urban schools serve an increasing majority of young people from persistently disadvantaged households (Beegle, 2003). Such students are likely to be surrounded by adults with low levels of educational attainment and limited professional prospects—a social context that can have a powerful impact on how students approach school and envision their futures (MacLeod, 2018). Additionally, Brooks-Gunn & Markman (2005) found that compared to their more affluent peers, poor children are read to less frequently and exposed to less complicated language at home, inhibiting the early development of their cognitive skills. Not surprisingly, their scores tend to be lower (Ayoub, Bartless, Chazan-Cohen & Raikes, 2015). Urban schools also face challenges such as the inability to fill job vacancies or retain teachers, as well as higher numbers of teachers who are emergency certified or who teach in subjects outside of their fields. At the same time, urban schools may also serve communities of higher poverty rates, where classrooms are influenced by the difficulties of their students' lives. There is also evidence that minority children attend higher poverty schools, partly because higher poverty schools are more highly concentrated in inner cities (Saporito & Sohoni, 2007; Orfield & Lee, 2005; Logan, 2002).

*Suburban Schools*

The NCES defines suburban schools as a territory outside of a principal city and inside an urbanized area. Two-thirds of suburban students do not live in poverty (Lichter, Parisi & Taquino, 2017; Frey, 2018). Suburban students are also more likely than their urban counterparts to have parents with college degrees (NCES, 2013). Given this confluence of variables, suburban students tend to enter school with the early literacy and numeracy skills

necessary to learn the prescribed curriculum (Boyd-Zaharias & Pate-Bain, 2008). Equally important, it means that suburban students are likely to have absorbed school-ready behaviors and attitudes from role models at home and in the community (NRC, 2004). Students in suburban environments, on average, do not need to be explicitly taught the value of school. Positive attitudes toward education surround students. When it comes time to take standardized tests, such students tend to score quite well, and their schools tend to get the credit.

Middle-class parents, believing that they are fleeing bad schools, have inadvertently exacerbated segregation between urban and suburban school districts. Demographically integrated schools have been shown to foster a culture of success that can change a child's sense of academic self-efficacy and plans for the future (Rumberger & Palardy, 2005). This, in part, is due to the influence of a more varied group of peers in such schools (Rumberger & Palardy, 2005). However, it is also a result of the fact that integrated schools end up being organized and operated differently than segregated ones—focused less on compliance and discipline, and more on innovation and achievement (Rumberger & Palardy, 2005). Additionally, in diverse schools with smaller concentrations of high-poverty students, educators can devote extra attention to their neediest students—a practice that seems to facilitate the narrowing of learning gaps (Benner & Crosnoe, 2011).

Despite the departure of families, many urban schools remain socioeconomically diverse (Cahnmann & Remillard, 2002). However, this socioeconomic diversity is waning (Whipp & Geronime, 2017). Mistaking test results and school report cards for an accurate indicator of school quality, families of means are increasingly opting for districts with better scores and schools with better report card grades (Kane, Riegg & Staiger, 2006). The

publishing of test results was a direct result of the No Child Left Behind Act of 2001, a federal law that provides money for extra educational assistance for needy children in return for improvements in their academic progress. As families migrated from urban to suburban school districts, suburban school districts' student populations grew. A growing student population affords extra state funding and creates opportunities for experimentation and starting new schools within the district (Gill, Posamentier & Hill, 2016). In suburban school districts, it is possible to start a new school or instructional program without closing an existing one (Gill, Posamentier & Hill, 2016). However, growth requires new spending on everything from facilities construction to teacher hiring and program development. Any revenue increases linked to increased enrollment—whether from the state or local property taxes—are likely to come after, not before, new groups of students arrive. Moreover, extra funding for Free and Reduced Lunch students, or English-Language Learner students, often does not fully cover the costs of creating new schools or transforming existing ones (Gill, Posamentier & Hill, 2016).

By applying Adkin's (1969) argument, this dissertation examined the relationship between school districts located in various developed human settlements, such as urban and suburban areas and the educational innovations that have been diffused. The study identified the key elements that indicate the diffusion of innovations in urban and suburban schools in the state of Oklahoma.

## Theoretical Framework

The theoretical framework of the study was the Diffusion of Innovations Theory (Rogers, 2003). Diffusion of Innovations is a theory that explains how, why, and at what rate new ideas and technology spread (Rogers, 2003). The innovation this study refers to is educational technology. Educational technologies are learning tools, such as media, machines, and networking hardware, used to improve education (Sandholtz, 1997). Rogers' (2003) Diffusion of Innovations Theory (DoI) is one of the most popular theories for studying adoption of technologies and understanding how innovations spread within and between communities (Rogers, 2003). According to Rogers (2003), innovation is perceived as an idea, process, or a technology that is new or unfamiliar to individuals within a particular area or social context. Diffusion is the process by which the information about the innovation flows from one person to another over time within the social system. Rogers (2003) argues that communication channels are a critical element to the diffusion of innovation. Communication channels refer to the avenue which individuals receive information about an innovation and perceive its usefulness. Communication channels refer to mass media and interpersonal communication. This study focuses on interpersonal communication. Rogers (2003) suggests that interpersonal communication among individuals of the same socioeconomic status and education level is more effective in persuading potential users to accept an innovation.

## Statement of the Problem

The Oklahoma public school system, which includes pre-kindergarten through grade 12, operates within school districts governed by locally elected school boards and superintendents. In the most recent finalized school district assessment of 2013, Oklahoma had 673,483 students enrolled in a total of 1,784 schools in 584 school districts (Common Core of Data, 2015). There were 41,775 teachers in the public schools, or roughly one teacher for every 16 students, which was the same as the national average (Common Core of Data, 2015). There was roughly one administrator for every 295 students, which was also the same as the national average (Common Core of Data, 2015). On average Oklahoma spent $7,672 per pupil in 2013, which ranked it 48th among the 50 states and the District of Columbia. The state's graduation rate was 84.8 percent in 2013, higher than the national average of 81.4 percent (Common Core of Data, 2015).

According to the National Center for Education Statistics, about 30 percent of all public-school students in the country attended urban schools during the 2012-2013 school year. About 40 percent attended suburban schools. Approximately 11.5 percent of all students attended schools in towns, while about 18.7 percent attended rural schools (NCES, 2013). Approximately 45 percent of the state's students attended urban or suburban schools (NCES, 2013).

With the premise of educational equality in Oklahoma being that every child has equal value, a child in a poorer school district should have the same educational opportunities as a child in an affluent school district — or at least as close to equal as possible with state funding as the tool. These educational opportunities include access to educational technologies. The state of Oklahoma builds an adjustment into appropriated state aid to

consider how much money school districts get from their local property taxpayers, petroleum taxes and other sources of revenue (Leachman & Mai, 2014). The state of Oklahoma appropriates funds based on local tax dollars (Card & Payne, 2002). If more local money goes into the school's operating budget, it counts against the money the school district receives in state aid (Card & Payne, 2002).

Thirty-eight school districts in the state of Oklahoma are supported well enough by their constituents that they do not receive aid from the State of Oklahoma (NCES, 2013). For example, Pryor Public Schools has the advantage of a Google data facility in its property tax base. From the time Google opened its data center in 2011, the school district's assessed property valuation grew by 168 percent. According to the Oklahoma Department of Education's records for last year, Pryor schools spent $10,047.64 per enrolled student (OCAS, 2018). However, most of that came from property taxes (OCAS, 2018). In Salina Public Schools, adjacent to Pryor, the same calculation came to $8,709.12 per student (OCAS, 2018). For the Freedom School District, the per-student funding was $30,922.45 (OCAS, 2018). In Tulsa Public Schools, the number was $9,303.62 (OCAS, 2018). At Union Public Schools, it was $8,338.97 (OCAS, 2018).

The differences in funding translate to education opportunities including access to educational technologies (Atkins & Vasu, 2000). The uneven distribution in the access to, use of, or impact of information and communication technologies (ICT) between groups is defined by the U.S. Department of Commerce as a digital divide. The gap in a digital divide may exist for a number of reasons. Obtaining access to ICTs and using them actively has been linked to a number of demographic and socio-economic characteristics including geographic location such as urban and suburban areas (Mossberger, Tolbert & Gilbert, 2006).

Multiple regression analysis across countries has shown that income levels and educational attainment are identified as providing the most powerful explanatory variables for ICT access and usage (Hillbert, 2010). The digital divide and its impact on education is further discussed in Chapter 2.

Unequal distribution of resources, as well as an inability to be innovative or embrace innovative practices, may privilege one school district over another. The line of thinking was, how could there be disparities between urban and suburban school districts, especially in Oklahoma, if they are all held to the same expectations?

## Purpose Statement

The purpose of the study was to identify key elements that indicate the diffusion of innovations in urban and suburban schools. Using a survey modeled on Hagenson & Castle's (2003) Survey of Technology Use in Education, the researcher explored the diffusion processes between urban and suburban parents, staff and teachers. Parents, staff, and teachers were chosen as representatives of urban and suburban districts because Bocchi et al. (2014) state that parents, teachers, and non-teaching staff are essential actors which indicate the climate of schools.

The first task was to categorize urban and suburban parents, staff and teachers by their level of knowledge about instructional technologies. There were many different forms of technology the survey explored to find out which technologies urban and suburban parents, staff and teachers were familiar with and supported being used in education. Sherry's (2000) Learning and Adoption Trajectory Model was used to analyze the categories in which urban and suburban teachers seem to fall according to the survey results. The

categories were: Stage 1- Teacher as Learner, Stage 2- Teacher as Adopter, Stage 3- Teacher as Co-learner, Stage 4- Teacher as Reaffirmer, and Stage 5- Teacher as Leader.

## Research Questions

Using Oklahoma as a context, the predominant question that guided this dissertation was: What are the key elements that indicate the diffusion of innovations in urban and suburban schools?

The main question was answered through the following sub-questions:

a) What are the levels of expertise with educational technologies used in selected urban and suburban Oklahoma schools?
b) How do parents, teachers, and staff of selected urban and suburban Oklahoma schools perceive the use of educational technologies by teachers in their schools?
c) What are the characteristics of innovative schools identified by parents, teachers, and staff in selected urban and suburban Oklahoma schools?
d) What are the differences between educational technology budgets between selected urban and suburban Oklahoma schools?
e) How do parents, teachers, and staff in selected urban and suburban Oklahoma schools define innovative teaching practices?

## Significance of the Study

All schools, regardless of where they are located, aim to produce the best students who are productive members of society (Donaldson, 2006). Unequal distribution of

resources, as well as an inability to be innovative or embrace innovative practices, may privilege one school over another. The assertion was, how could there be disparities between urban and suburban school districts, especially in Oklahoma, if they are all held to the same expectations? The significance of the study involved the opportunity to explore potential disparities between the diffusion of innovations in urban and suburban schools, which led to the determination of the research questions. If disparities exist, they should be divulged to support the education of students who may be at a disadvantage due to the school district in which they belong.

## Definition of Terms

- Diffusion of Innovations - a process by which the adoption of an innovation is communicated through specific channels over time among the members of a social system (Rogers, 2003).
- Innovation - an idea, practice, or object that is perceived as new by an individual (Rogers, 2003).
- Technology Integration - ability to form, coordinate, or blend into a functioning or unified whole (Merriam-Webster's Collegiate Dictionary, 2018).
- Educational Technology - Educational technology is the study and ethical practice of facilitating learning and improving performance by creating, using and managing appropriate technological processes and resources (AECT, 2008).

# CHAPTER II

# REVIEW OF LITERATURE

## Introduction

There are many disparities between urban and suburban schools, including the adoption of innovations (Huberman & Miles, 2013). This study used the Diffusion of Innovations theory (Rogers, 2003) as the theoretical framework and its application to urban and suburban Oklahoma schools. The review of literature situated the topics that were critical to understanding innovation and how the Diffusion of Innovations Theory has been used to explain the process of adopting new technology. This chapter discusses the topics of innovation, the Diffusion of Innovations Theory, the Learning and Adoption Trajectory Model, and educational technologies.

## Innovation

In its simplest form, innovation may be defined as ideas, products, and practices perceived as new by an individual (Rogers, 2003). An example of innovation is the transition of using personal computers as a means for communication rather than standalone items, and eventually using the Internet as a means for commerce as well as more general communication (Johnson, 2001). Rogers (2003) defines innovation as an idea, practice, or material artifact perceived to be new by the relevant unit of adoption.

## Diffusion of Innovations

The Diffusion of Innovations is a theory that seeks to explain how, why, and at what rate new ideas and technology spread (Rogers, 2003). Developed by E.M. Rogers in 1962, Diffusion of Innovations Theory, seeks to explain how innovations are taken up in a population. Diffusion of Innovations offers several valuable insights into the process of social change:

1. The qualities that make an innovation spread successfully
2. The importance of peer-to-peer conversations and peer networks
3. Understanding the needs of different user segments

These insights have been reviewed in more than 6,000 research studies and field tests, so these insights are amongst the most reliable in the social sciences. The Diffusion of Innovations Theory originated in the field of communication to describe how, over time, an idea or product gains momentum and diffuses, or spreads, through a specific population or social system (Rogers, 2003).

Diffusion occurs through a five-step decision-making process, as shown in Table 1. It happens through a series of communication channels over a period among the members of a similar social system. Ryan and Gross first identified adoption as a process in 1943 (Rogers, 1962). Rogers' five stages: awareness, interest, evaluation, trial, and adoption are integral to this theory. An individual might reject an innovation at any time during or after the adoption process. In later editions of the Diffusion of Innovations Theory, Rogers (1962) changes his terminology of the five stages to knowledge, persuasion, decision, implementation, and confirmation.

Table 1. Five Stages of the Adoption Process (Rogers, 1962)

| Stage | Definition | Element |
|---|---|---|
| Knowledge | The individual is first exposed to innovation but lacks information about the innovation. During this stage, the individual has not yet been inspired to find out more information about the innovation. | Awareness |
| Persuasion | The individual is interested in the innovation and actively seeks related information/details. | Interest |
| Decision | The individual takes the concept of the change and weighs the advantages and disadvantages of using the innovation and decides whether to adopt or reject the innovation. Due to the individualistic nature of this stage, Rogers notes that it is the most challenging stage in which to acquire empirical evidence. | Evaluation |
| Implementation | The individual employs the innovation to a varying degree depending on the situation. During this stage, the individual also determines the usefulness of the innovation and may search for further information about it. | Trial |
| Confirmation | The individual finalizes his/her decision to continue using the innovation. This stage is confirmation the group has made the right decision. | Adoption |

The Decision stage is where either the adoption or rejection of innovation occurs (Rogers, 2003). There are two factors which determine what type of innovation a decision is:

- Whether the decision is made freely and implemented voluntarily
- Moreover, who makes the decision.

Based on these considerations, three types of innovation-decisions have been identified (Rogers, 1995) as referenced in Table 2.

Table 2. Innovation-Decisions (Rogers, 1995)

| Type | Definition |
|---|---|
| Optional Innovation-Decision | Made by an individual who is in some way distinguished from others. |
| Collective Innovation-Decision | Made collectively by all participants. |
| Authority Innovation-Decision | Made for the entire social system by individuals in positions of influence or power. |

The result of the diffusion of an idea or product is that people adopt a new idea, behavior, or product. Individual people adopt different innovations and then spread them at different rates to other individuals. Some innovations are never adopted at all and stop at the Persuasion stage. Others are subsequently abandoned after passing the Decision stage.

Innovations that have a clear, unambiguous advantage in either effectiveness or cost-effectiveness are more readily implemented after reaching the Decision stage (Rogers, 1995; Dirksen, Ament & Go, 1996; Meyer, Johnson & Wethington, 1997). If potential users see no relative advantage in the innovation, they generally will not consider it further; in other words, relative advantage is essential for adoption (Rogers 1995). Nevertheless, relative advantage alone does not guarantee widespread adoption (Denis et al., 2002; Grimshaw et al., 2004). Even so-called evidence-based innovations undergo a lengthy period of negotiation among potential adopters, in which their meaning is discussed, contested, and reframed. Such discourse can increase or decrease the innovation's perceived relative advantage (Ferlie et al., 2001).

The Diffusion of Innovations Theory indicates that the first group of people to use a new product is called innovators, followed by early adopters. Next come the early majority, late majority and the last group to eventually adopt a product are called laggards (Rogers, 1962)

## Innovators

Innovators are willing to take risks, typically the youngest among those in other adoption categories, have the highest social class, have great economic liberty, are very social and have close contact to scientific sources and interaction with other innovators (Rogers, 1962). Risk tolerance has innovators adopting technologies which may ultimately fail. Financial resources help to absorb these failures (Rogers, 1962). These are people who want to be the first to try the innovation. They are venturesome and interested in new ideas. These people are very willing to take risks and are often the first to develop new ideas. Very little, if anything, needs to be done to appeal to this population. Innovators are the first individuals to adopt an innovation.

## Early Adopters

Early Adopters is the second fastest category of individuals who adopt an innovation (Rogers, 1962). Early adopters have the highest degree of opinion leadership (Rogers, 1962). Opinion leaders are individuals who are influential in spreading either positive or negative information about an innovation (Katz, 1970). Early adopters are typically younger (Kennedy & Funk, 2016), have higher social status, have more economic liberty, have advanced education, and are more socially forward than late adopters. Early adopters are more discrete in adoption choices than innovators. They realize that the informed choice of adoption will help them maintain a central communication position (Rogers, 1962). They enjoy leadership roles and embrace change opportunities. They are already aware of the need to change and so are very comfortable adopting new ideas. Strategies to appeal to this population include how-to manuals and

information sheets on implementation. They do not need information to convince them to change.

### Early Majority

Early Majority are individuals who adopt an innovation after a varying degree of time (Rogers, 1962). This time of adoption is significantly longer than the innovators and early adopters. Early Majority tend to be slower in the adoption process, have above average social status, contact with early adopters, and seldom hold positions of opinion leadership in a system (Rogers, 1962). These people are rarely leaders, but they do adopt new ideas before the average person. That said, they typically need to see evidence that the innovation works before they are willing to adopt it. Strategies to appeal to this population include success stories and evidence of the innovation's effectiveness.

### Late Majority

Late Majority are individuals who will adopt an innovation after the average member of society. These individuals approach an innovation with a high degree of skepticism and after most of society has adopted the innovation. Late Majority are typically skeptical about an innovation, have below average social status, have very little financial liberty, are in contact with others in late majority and early majority, and have very little opinion leadership (Rogers, 1962). These people are skeptical of change and will only adopt an innovation after the majority has tried it. Strategies to appeal to this population include information on how many other people have tried the innovation and have adopted it successfully.

## Laggards

Laggards are individuals who are the last to adopt an innovation. Unlike some of the previous categories, individuals in this category show little to no opinion leadership. These individuals typically have an aversion to change-agents and tend to be advanced in age. Laggards usually tend to be focused on traditions, are likely to have lowest social status, have the lowest economic liberty, are typically the oldest of all other adopters, are in contact with only family and close friends, and have very little to no opinion leadership (Rogers, 1962). These people are bound by tradition and very conservative. They are very skeptical of change and are the hardest group to bring on board. Strategies to appeal to this population include statistics, fear appeals, and pressure from people in the other adopter groups. Figure 1 represents the adoption groups and the market share, which reaches 100% following complete adoption (Moore, 2002). This is the point of market saturation (Moore, 2002).

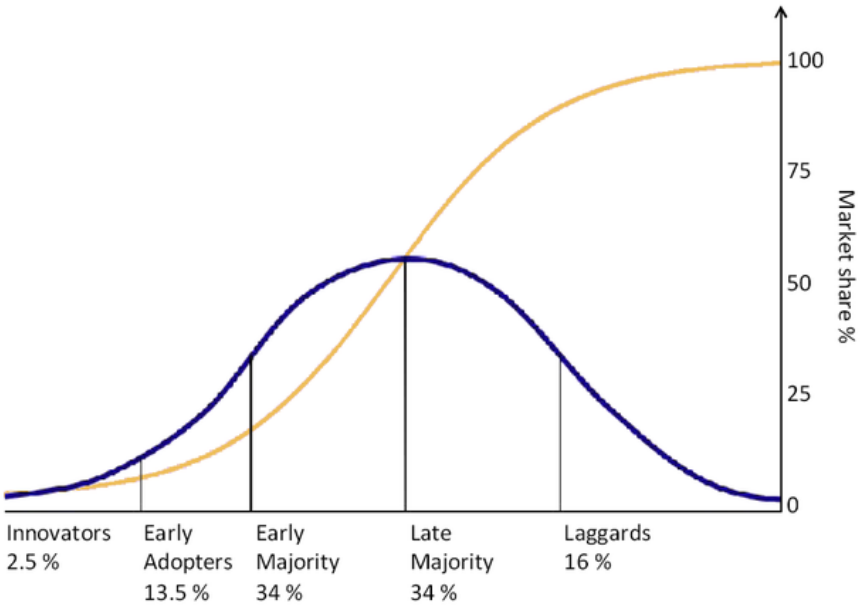


*Figure 1. Technology Adoption and Market Share (Moore, 2002)*

Diffusion manifests itself in different ways and is highly subject to the type of adopters and innovation-decision process (Rogers, 1962). The criterion for the adopter categorization is innovativeness, defined as the degree to which an individual adopts a new idea (Rogers, 1962).

## Learning and Adoption Trajectory Model

The Learning and Adoption Trajectory model is a research-based model established based on a five-year project with teachers in Colorado in the United States (Sahin, 2005) based on Rogers' (2003) Diffusion of Innovations theory. Throughout the project's five years, Boulder Valley Internet Project leaders introduced the use of telecommunications to teachers in the classroom to the Boulder Valley School District by training (Sherry, 1997). The stages of this model are described in Table 3.

Table 3. Learning and Adoption Trajectory Model (adapted from Sherry et al., 2000)

| Stage | Description |
|---|---|
| Stage 1. Teacher as Learner | In this information-gathering stage, teachers learn the knowledge and skills necessary for performing instructional tasks using technology. |
| Stage 2. Teacher as Adopter | In this stage, teachers progress through stages of personal and task management concern as they experiment with the technology, begin to try it out in their classrooms, and share their experiences with their peers. |
| Stage 3. Teacher as Co-Learner | In this stage, teachers focus on developing a clear relationship between technology and the curriculum, rather than concentrating on task management aspects. |
| Stage 4. Teacher as Reaffirmer/ Rejecter | In this stage, teachers develop a greater awareness of intermediate learning outcomes (i.e., increased time on tasks and greater student engagement) and begin to create new ways to observe and assess the impact on student products and performances and to disseminate exemplary student work to a broader audience. |
| Stage 5. Teacher as Leader | In this stage, experienced teachers expand their roles to become action researchers who carefully observe their practice, collect data, share the improvements in practice with peers, and teach new members. Their skills become portable. |

The first two stages of this process are rather straightforward (Sherry, 2000). Once teachers in the Boulder Valley Internet Project were informed about promising educational practices using technology in the classroom, and once they were given the opportunity to engage in professional development that matches their needs, the learning process began. As teachers experimented with multimedia workstations and telecommunications, they expressed a set of personal and task management concerns, such as: “Can I handle this?” “Will it make my job easier?”, and “Will I be replaced by a computer?” At this stage, they needed ready access to computers that would support the instructional activities that they wished to try out in the classroom. Ongoing, sympathetic, technical support and mentoring by trusted peers were critical facilitators (Sherry, 2000).

The results of the Boulder Valley Internet Project showed that given adequate training, mentoring, access, and technical support, teachers tend to be more willing to move to the next phase at which they become co-learners and co-explorers with their students (Sherry, 2000). Teachers must become expert learners along with their novice learners in a community of learning and practice that spans the classroom, the school, and the district (Sherry, 2000).

At this stage, some teachers believed that they were losing control of the instructional process and that the new generation of technology-savvy students was compromising their role in the classroom. Many teachers became rejecters of instructional technology at this point, saying, "I tried it, and it did not work for me," or "It increased my workload substantially," and similar statements. For example, an Education Week researcher quoted a teacher who considered himself a latecomer to the digital revolution as saying, "You have got to get the basics down before you even think of infusing technology into learning" (Bushweller, 2001).

In contrast, other teachers who became reaffirmers began to develop a greater awareness of intermediate learning outcomes. They began to create new ways to observe and assess the impact on student products and performances and to disseminate exemplary work to a broader audience (Sherry, Billig, Jesse & Acosta-Watson, 2001). As the boundaries of the classroom became more transparent to the reaffirmers, they also began to take a more systemic view of educational technology and its relationship to the educational organization of which they were an integral part.

As an innovation, technology is changing every day (Sahin, 2005). Thus, adopters must learn about an innovation in every stage of this model (Sherry et al., 2000).

Continuous technical support and mentoring by trusted peers are essential factors in the earlier stages of the Learning and Adoption Trajectory Model. If we want teachers to be more willing to move to the next phase at which they become co-learners and co-explorers with their students, we should provide them adequate training, mentoring, access, and technical support (Sherry & Gibson, 2002). The Learning and Adoption Trajectory Model provides a model for how teachers progress through stages of technology adoption. However, access to various technologies in schools and the advantages they offer are not universal and have led to what scholars have termed a digital divide.

## Digital Divide

A digital divide is an economic and social inequality about access to, use of, or impact of information and communication technologies (U.S. Department of Commerce, 1995). Existing literature indicates that the digital divide at the individual level springs from many different sources. Comparisons between educational and occupational groups, income brackets, age groups, and genders have revealed systematic variation in both Internet access and the frequency of its use (Hampton, 2010; Lehdonvirta and Räsänen, 2011; Rice and Katz, 2003; van Deursen and van Dijk, 2014). Economic or other resource gaps and differences in cultural tastes and preferences of different social classes are factors contributing to disparities in Internet use (Emmison and Frow, 1998; Hargittai and Hsieh, 2010). The digital divide arguably reflects structural elements in a society that gives rise to social inequalities.

The first significant step to moving the United States into the digital age was the passing of the High-Performance Computing Act of 1991. The High-Performance Computing Act has also been called the Gore Bill. This bill was created and introduced by then-Senator Al Gore, and led to the development of the National Information Infrastructure and the funding of the National Research and Education Network (NREN). The High-Performance Computing Act funded a high-speed fiber-optic network that would eventually become the Internet. (Internet History, 1992). The purpose of the NREN was to provide Internet access to all K-12 students. Al Gore was passionate about delivering the same research and information tools to students that were used by businesses and the government. It would have been used to conduct actual research, rather than simulate research in education.

Teachers could use it to share concepts, ideas, and methodologies with other teachers. Students could use it to communicate with other students and experts in various fields. Without the digital connectivity that the High-Performance Computing Act provided, home computers might still have been useful, but probably little more than glorified typewriters or expensive adding machines. Between 1991 and 1996, the number of personal computers in the United States jumped from 300,000 to over ten million. By the mid-1990s the development of Internet browsers like Mosaic and Netscape was leading more adventurous users out into a new realm called cyberspace. Email was becoming an increasingly useful application, and officials in the Clinton Administration were beginning to wonder if access to information technology was equitably distributed. In summer 1995, the new National Telecommunications & Information Administration

(NITA) prepared a report called Falling Through the Net: A Survey of the 'Have Nots' in Rural and Urban America (Selwyn, 2004).

In January 1996, the New York Times took up the call, running an article proclaiming, “A New Gulf in American Education, the Digital Divide." The story compared the availability of computers and Internet access at two nearby California Schools. Kids at the less affluent school had to make-do with a six-year-old IBM PC, while students at the other, more affluent, school were able to go home and work on their own Apple Macintosh's. By October 1996, the New York Times reported a story from Georgia titled, "A Nation Ponders Its Growing Digital Divide." The piece reported that only 9 percent of American classrooms have access to the Internet. It was soon also reported that the Reverend Jesse Jackson referred to the Digital Divide as "classic apartheid," while the NAACP's Kweisi Mfume called it technological segregation. Al Hammond and others at the NTIA took Digital Divide further, using the term electronic redlining (Rapaport, 2009).

The Pew Research Center’s Internet and American Life Project Online Survey of Teachers (2013) showed that Advanced Placement and National Writing Project teachers, teachers of students from higher income households are more likely to report that they or their students use tablet computers and e-readers as part of the learning process (Purcell, 2013). Advanced Placement (AP) is a program in the United States and Canada created by the College Board, which offers college-level curricula and examinations to high school students. American colleges and universities may grant placement and course credit to students who obtain high scores on the exams. The National Writing Project is a United States professional development network that serves teachers of writing at all

grade levels, primary through university, and in all subjects. The difference is particularly pronounced in the case of tablet computers, where more than half of teachers of upper-income students (56%) say these tools are used, compared with 37% of teachers of the lowest income students (Purcell, 2013). The difference in e-reader use among lower-income students and higher income students is also fairly pronounced, with a 14-percentage point difference between teachers of the highest and lowest income students (Purcell, 2013). The challenge of closing the ever-widening gap between the haves and have-nots may rest with the willingness of the education community to view education from a new perspective —and to innovate. This may include making use of affordable and accessible technologies to expand access to education (Amer & Peralez, 2014). It may require a shift in focus, to target educational and training programs to align more closely with what people identify as their most urgent needs (Tonduer et al., 2016). Providing education in new and unconventional ways is only one of several solutions, but it is through innovation that we can meet the challenges of improved efficiencies, lower costs, increasing accessibility, and greater success in achieving development goals through education (Blumenfield et al., 2000). Computer anxiety is also a significant barrier to computer and internet access, especially among seniors, people with a lower educational level, and are a part of the female population (Van Dijk, 2006). This phenomenon does not entirely disappear with a rise in computer experience or exposure to innovation (Van Dijk, 2006).

Literature shows that a lack of technology acceptance and readiness is a significant issue in education (Ismail, 2013). The intention of using technology in the classroom can be explained by the combination of the specific tool, the specific

instructional task, and a user interface (Schoonenboom, 2014). There is a significant and positive relationship among technology competence, attitude towards technology-assisted education, and intention to accept technology (Batutay, Gökçearslan & Ke, 2017). Technologies and goals for student learning, in general, and for the use of technology to support teaching and learning themselves have evolved over the past 20 years (Culp, et al., 2005). According to Lee (2001), without the increased expansion of secondary education, the acceleration of technology investment will not be of assistance in eliminating the digital divide. Not only should we make technology accessible but also education available and easily accessible to the worldwide community. Without improving the quantity, as well as the quality, of education, most of the developing countries will not be able to escape from the current low-level technology trap (Lee, 2001). Although teachers are guided by national and local policies to use technology in their classrooms, they spend much of their planning time to consider how technology could be harnessed for effective lesson delivery and assessment to be conducted (Teo, 2011).

For teachers already in the workforce, professional development has struggled to keep up with changes in technology. The percent of 4th grade students whose teachers report they have received training on how to integrate technology into their classroom instruction has remained flat since 2009 (NCES, 2017). Although professional development for teachers is wide-spread, inequities are also present. Teachers in high-poverty schools are consistently less likely than their counterparts to report that they have received technology-integration training (Jocson, 2018).

## Educational Technology

The Association for Educational Communications and Technology (AECT) defined educational technology as the study and ethical practice of facilitating learning and improving performance by creating, using and managing appropriate technological processes and resources (Richey, Silber & Ely, 2008). The AECT denoted instructional technology as the theory and practice of design, development, utilization, management, and evaluation of processes and resources for learning (Garrison & Anderson, 2003). As such, the term educational technology refers to applications of education sciences, such as equipment, as well as processes and procedures that are derived from scientific research, and in a given context may refer to theoretical, algorithmic or heuristic processes: it does not necessarily imply an actual technology. Educational technology is the process of integrating technology into education in a positive manner that promotes a more diverse learning environment and a way for students to learn how to use technology as well as their common assignments (Januszewski & Molenda, 2008). When it comes to educational technologies, it is not necessarily the selection of the device but rather the use of devices by engaged, supportive and prepared teachers within the context of a broader pedagogical change program for successfully integration. (Keane, Lang & Pilgrim, 2013).

According to Ally & Ebner (2014), the ubiquity of mobile technologies that are already present in classrooms makes education less dependent on one-to-one technology projects that require governments or organizations to provide the devices. Wolfenden (2012) suggests that an increased awareness of OER and the potential in education is a critical professional development topic for teachers. This section further discusses these examples of educational technologies.

## Mobile Phones

Mobile phones became a popular consumer technology during the early 2000s. According to data from the World Bank (See Figure 2), mobile cellular telephone subscriptions grew sharply beginning in the year 2000 in the United States.

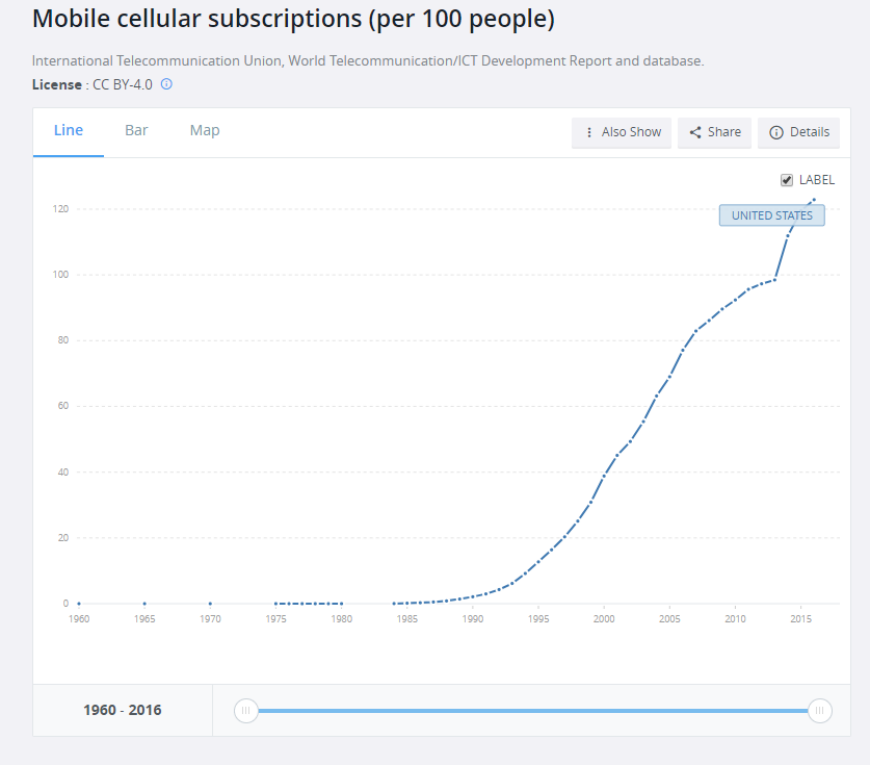


*Figure 2. Mobile Cellular Subscriptions per 100 people (World Bank, 2016)*

Mobile cellular telephone subscriptions, which are subscriptions to a public mobile telephone service that provides access using cellular technology for communications, rose sharply during this time as an indication of use (Lepp, Barkley & Karpinski, 2015). In the United States, the prevalence of mobile phone ownership increased, while the age of a child receiving his or her first mobile phone decreased. Research shows that 10-years-old was the average age of children who receive their first mobile phone in the

United States (Lee, Moon, Kim & Mun, 2015; Donavan, 2016). The ubiquity of mobile phones has reached a level of inundation that students are bringing them to school, where teachers are reporting mixed mobile phone use in their classrooms (McAllister, 2016; Ruston, Orlebeke, Friedman & Tabb, 2017).

## Open Educational Resources (OER)

Open educational resources (OER) are freely accessible, openly licensed text, media, and other digital assets that are useful for teaching, learning, and assessing, as well as for research purposes (Mtebe & Raisamo, 2014). There is no universal usage of open file formats in OER. The term OER describes publicly accessible materials and resources for any user to use, re-mix, improve and redistribute under some licenses (Downes, 2007). The development and promotion of open educational resources are often motivated by a desire to provide an alternate or enhanced educational paradigm (Sanchez, 2013).

One of the most frequently cited benefits of OER is their potential to reduce costs (Bliss, Hilton, Wiley & Thanos, 2013). While OER seem well placed to bring down total expenditures, they are not cost-free. New OER can be assembled or merely reused or repurposed from existing open resources. This is a primary strength of OER and, as such, can produce significant cost savings. OER need not be created from scratch. On the other hand, there are some costs in the assembly and adaptation process. Moreover, some OER must be created and produced originally at some time. While OER must be hosted and disseminated, and some require funding, OER development can take different routes, such as creation, adoption, adaptation, and curation (Marcus-Quinn & Diggins, 2013).

## One-to-One Computing

In the context of education, one-to-one computing (1:1) refers to academic institutions, such as schools or colleges, which allow each enrolled student to use an electronic device in order to access the Internet, digital course materials, and digital textbooks (Penuel, 2006). The concept has been actively explored and sporadically implemented since the late 1990s (Bebell & Kay, 2010). One-to-one computing used to be contrasted with a policy of bringing your own device (BYOD), which encourages, or requires, students to use their laptops, smartphones or other electronic devices in class (Bebell & Kay, 2010). The term one-to-one computing in education is now redefined to a situation where students have access to a device per individual that is used in teaching as a tool for learning. These devices may be the students' own device, or a device issued by the school. Historically, the programs have centered on the following devices (Heater, 2017):

- Laptops (with some competing MacBooks) 1990s-2010.
- Apple iPads (with some competing Android and Windows devices) 2010-2014
- Google Chromebooks (2015–present) (with iPad+keyboard and other laptop & tablet-computers competing).

The level of education will influence the type of adoption, through factors such as user-readiness, budget, expected merits, and cost-benefits (Paskevicius & Knaack, 2018).

- For young students, iPads and competing devices remain very popular, but they are not always 1:1 in all classrooms. Many affluent schools provide each of their students with an iPad to use throughout the school year, but urban schools may not have the funding to provide this access (Paskevicius & Knaack, 2018).

- For students who need to type more, Chromebooks are the most common. Middle and High Schools and, to some extent, colleges have been customers for Chromebooks (Paskevicius & Knaack, 2018).
- For mature/adult students in higher education, the BYOD approach is most employed. Institutions provide Wi-Fi and web-based LMS access. However, Chromebooks can be found in many libraries (Paskevicius & Knaack, 2018).

Because 1:1 computing program may have many goals, from improving educational outcomes to increasing equality, and are associated with such a wide range of teaching methods, it is also difficult to judge their overall success or value. One notable benefit that has been documented and researched is the potential for 1:1 computing initiatives to support the use of open educational resources (OER), available in digital form, for ubiquitous access by learners (Donovan, Green & Hartley, 2010).

In order to access the diffusion of innovative technologies, such as mobile phones, 1:1 computing and OER, many models have been developed and used to rate the ability of people to become innovative, adoptive, and then diffuse what they have learned about technology to others (Zhao & Frank, 2003). Depending on the characteristics of the school, and the individuals' ability to understand what is necessary for them to use technology within their classroom, an implementation may or may not be seen across the community, in this case, urban and suburban schools in Oklahoma (Inan & Lowther, 2010). Some teachers may be innovators, adopters, and even diffusers, but it depends on their own needs (Hagenson & Castle, 2003). Teachers may feel an obligation to use technology, but they must be innovative and confident enough to adopt it into their classroom (Inan & Lowther, 2010).

Various models, including the Teaching and Learning with Technology Survey (Jacobsen, 1998), the Learning and Adoption Trajectory Model (Sherry et al., 2000), and the Survey of Technology Use in Education (Hagenson & Castle, 2003), have been developed and used to rate the ability of people to become innovative, adoptive, and then diffuse what they have learned about technology to others. With minimal quantitative studies, some articles have low sample sizes, causing issues with generalizability (Karakaya & Hidalgo, 2014; Shelomi, 2015; Gomez & Fitzgerald, 2017). Also, articles may consist of reviews and critiques of the Diffusion of Innovations Theory but may not situate the theory in the context of urban and suburban schools (Lundbald, 2003; Dingfelder & Mandell, 2011; Scott & McGuire, 2017). The study filled this gap in the literature by focusing on the elements that indicate the diffusion of innovations in urban and suburban schools.

## Summary

This study examined the Diffusion of Innovations theory (Rogers, 2003) and its application to urban and suburban Oklahoma schools. The review of literature situated the topics that were critical to understanding innovation and how the Diffusion of Innovations Theory has been used to explain the process of adopting new technology. In this chapter the topics of innovation, the Diffusion of Innovations Theory, the Learning and Adoption Trajectory Model, the Digital Divide and educational technologies, were discussed. Various models, including the Teaching and Learning with Technology Survey (Jacobsen, 1998), the Learning and Adoption Trajectory Model (Sherry et al., 2000), and the Survey of Technology Use in Education (Hagenson & Castle, 2003), have

been developed and used to rate the ability of people to become innovative, adoptive, and then diffuse what they have learned about technology to others.

# CHAPTER III

# METHODOLOGY

## Introduction

This study focused on the diffusion of innovations in urban and suburban schools. This chapter presents the methods used to collect and analyze the data to answer the main research question. The chapter begins by presenting results of the pilot study, followed by sections on data collection, research design, and data analysis.

## Pilot Study

The objective of the pilot study was to increase the probability of success in the main study by testing the feasibility of the procedures for recruitment and retention of participants, testing for content validity and face validity of the questions, and assessing the usability (including ease of access and navigation) of the technology employed for administering the survey.

After data were collected, the participants' levels of expertise with technology and levels of importance of methods for learning about technology were analyzed. The researcher tested for internal consistency and reliability of the pilot study instrument by calculating Cronbach's alphas using SPSS. After the completion of the pilot study, the researcher retested for internal consistency and reliability.

## Pilot Study Method

The pilot study took the form of a quantitative, survey research study. The quantitative research method was used to quantify attitudes, opinions, and expertise in order to generalize results to a larger population (Babbie & Mouton, 1998). The study included a non-probability sample in the form of a convenience sample.

## Pilot Study Participants

Literature provides several guidelines to determine the number of participants to recruit for a pilot study. Isaac and Michael (1995), as well as Hill (1998) suggests 10 – 30 participants for pilots in survey research; Julious (2005) and van Belle (2002) suggest 12 participants. Treece and Treece (1982) suggests 10% of the project sample size. Since the project sample size was expected to be 150, invitations were sent to 20 potential participants using Treece and Treece's (1982) suggestion.

The target population of the study included parents, teachers, and staff at urban and suburban schools in Oklahoma. The demographics of the sample include participants who were aged 18-65 years old and participate in a variety of roles in their corresponding district. The participants were recruited through convenience sampling of the researcher's social network. The participants in the pilot study were excluded from the later dissertation data collection.

## Pilot Study Instrument

The survey instrument for the pilot study was adapted from Hagenson & Castle's (2003) Survey of Technology Use in Education, which was replicated and published by

Sahin & Thompson (2007). The original survey was used to determine how participants diffuse, adopt and integrate technology (Sherry et al., 2000; Jacobsen, 1998; Hagenson & Castle, 2003). The survey for the pilot study contained 55 items, divided into six sections of Likert-type and open-ended items. Questions were differentiated to be answered by teachers, parents, and staff. As reported by Sahin & Thompson (2007), the questions on the instrument had been tested for validity and reliability; however, the pilot study allowed for the testing of this survey for content and face validity in order to obtain feedback on the following:

- Clarity, errors, readability, impartiality, appropriateness of the type and format of questions
- The time required to complete the survey

The educational technologies that are used as answer choices in the survey were gathered from Wahyuni's (2018) list of educational innovations, as well as the digital tools in the Oklahoma State Department of Education (OSDE)'s Digital Teaching and Learning professional development course (Bernhardt, 2017). The survey also included questions of demographic data related to the length of service for teachers and staff, current grade of parents' oldest K-12 students, school district, and gender.

Attempts were made to eliminate bias and to systematically incorporate accepted best practices into the survey (Friedman, Friedman, & Gluck, 1988; Friedman & Amoo, 1999). The final version of the pilot survey was comprised of 55 questions on three, 5-point Likert-type scales that were anchored according to Vagias (2006):

- Level of expertise scale ranging from 0 (*None*) to 5 (*High Level- I have it mastered*)

- Level of importance scale ranging from 0 (*Not Important*) to 5 (*Highly Important- very, very important*)
- Profile of Instructional Technology Use in Schools scale ranging from 1 (*Teacher as Learner*) to 5 (*Teacher as Leader*)

The survey questions were imported to Qualtrics, a web-based survey tool to conduct survey research, evaluations and other data collection activities, using Likert-type rating scales and open-ended questions. The survey was used to collect information from urban and suburban school teachers, parents, and staff. Questions were differentiated for parents, teachers and staff. For example, questions about participants asking their children (parents) their students (teachers and staff) were differentiated. Participants who chose the parent role were provided the option for children. Participants who chose the teacher or staff role were provided the option for students.

## Pilot Study Process

### *Inclusion Criteria*

For participants to be recruited to participate in the study, they were required to be a parent, teacher, or staff member at a K12 school. The researcher's Facebook social network includes a network of professional contacts that includes educators for purposes of work. While many people use Facebook solely for the purpose of sharing with personal friends, the researcher keeps a network of educators for purposes of work and professional connections. Participants included those the researcher connected with through correspondence with nonprofit organizations ImpactTulsa, Growing Together Tulsa, Community Service Council Tulsa, Big Brothers Big Sisters of Oklahoma, and YMCA.

The survey process was tested to ensure that the relevant emails and social media messages were sent and received. This was done by using the researcher's Facebook Messenger app to ensure that the participants, who were recruited for the pilot study, were able to receive messages. According to Facebook's privacy policy, when a user is entirely blocked on Facebook Messenger and from their Facebook profile, the user will not be able to find the person he or she wishes to message in Facebook Messenger Search or on Facebook Search through the researcher's Facebook profile. If a user has been blocked in Facebook Messenger after a previous conversation, the next time the user tries to message or reply to the other person's last message, a message will appear saying, "Message Not Sent. This person is not receiving messages from you right now." The user may also receive an error icon with a red question mark on the left side of his or her message, indicating a problem. Each potential participant was tested to ensure that messages would be received.

Email addresses were tested using Email Checker. Email Checker is an email bounce processing tool which tests for soft bounce and hard bounce rates. A soft bounce means that the email address is valid and was delivered to the recipient's inbox, but it still bounces because the mailbox was full, the server was down, or the message was too large for the recipient's inbox (Ramanathan & Faulkner, 2015). A hard bounce happens when the email is permanently rejected because the email address is invalid or the email addresses do not exist (Ramanathan & Faulkner, 2015). Email Checker was chosen because of the site's privacy policy.

The accessibility of the survey was also tested. The survey link was accessed from various IP addresses, devices, and Internet Service Providers. The pre-pilot test data

was input to ensure that the answers were recorded correctly in Qualtrics. All pre-pilot test measures were successful. Approval for the study was previously granted through Oklahoma State University's Institutional Review Board (IRB) (see Appendix A). The invitation to participate was sent to 20 potential participants, including a statement that the survey link would remain active for three days to respond.

## Pilot Study Results

### *Response Rate and Pattern*

The total responses were varied between the three groups of teachers, parents, and staff members. The number of respondents was 15 (see Table 4) compared to the 20 invited to participate, with an overall acceptable response rate of 75%, as suggested by Nulty (2008).

Within hours after the initial email invitation, 15 respondents completed the survey. Galesic and Bosnjak (2009) argued that participants are likely to respond close to the time they receive the invitation. The average amount of time to complete the survey was 5.17 minutes (310.2 seconds).

*Table 4. Pilot Sample Demographics*

| Respondent | Role | School District |
|---|---|---|
| 1 | Parent | Broken Arrow |
| 2 | Staff | Tulsa Public Schools |
| 3 | Teacher | Broken Arrow |
| 4 | Teacher | Broken Arrow |
| 5 | Parent | Tulsa Public Schools |
| 6 | Teacher | Tulsa Public Schools |
| 7 | Parent | Jenks |
| 8 | Parent | Jenks |
| 9 | Parent | Jenks |
| 10 | Parent | Tulsa Public Schools |
| 11 | Teacher | Tulsa Public Schools |
| 12 | Teacher | Broken Arrow |
| 13 | Teacher | Tulsa Public Schools |
| 14 | Staff | Tulsa Public Schools |
| 15 | Parent | Broken Arrow |

*Internal Consistency Estimate of Reliability*

To evaluate internal consistency the researcher used Cronbach's alpha, the average correlation of a set of items is an accurate estimate of the average correlation of all items that pertain to a specific construct (Cronbach, 1951). Cronbach's alpha will generally increase as the intercorrelations among test items increase and is thus known as an internal consistency estimate of the reliability of test scores (Cronbach, 1951). The calculations of Cronbach's alphas for the survey instrument are displayed in Table 5.

*Table 5. Reliability Statistics*

| Items | Standardized Item Alpha |
|---|---|
| Technology Experience subscale (15 items) | .941 |
| Knowledge Acquisition subscale (28 items) | .942 |
| Profile of Instructional Technology Use subscale (5 items) | .945 |
| Survey of Technology Use in Education inventory (47 items) | .947 |

## Observations for Improving the Instrument and Methodology

### *Contacting Participants*

*Distribution using email and social media*. There were no returned emails, as the email addresses were verified before emailing the link to the survey. There were no unsuccessful Facebook messenger deliveries. All 20 messages were successfully delivered to each potential participant.

### *Instrument*

*Time to complete the survey*. The survey instructions indicated that the 55 questions, 18 questions for each role type, could be completed in 10 minutes. In the pilot study, however, the average time to complete the survey was approximately five minutes. The time it takes to complete a survey affects response rates (Cook, Heath, & Thompson, 2000; Walston, Lissitz, & Rudner, 2006); with the ideal duration to secure response rates among adult populations being approximately thirteen minutes or less (Fan & Yan, 2010). Koskey, Cain, Sondergeld, Alvim, and Slager (2015) found that participants reported that they would be likely to complete a survey if it is perceived to take less than 10 minutes to complete, but would not likely complete a survey if it was perceived to take more than 30 minutes to complete (p. 21).

*Revisions to the instrument*. Formal recommendations about the survey content and process were solicited from the pilot group and peers to provide suggestions to improve the instrument. In this study, a peer was defined as doctoral students who have taken research methods courses as part of their graduate program. The feedback included adding 'please specify' next to the Other option for choosing a role, as an example. Another participant recommended that the options for instructional technology used in

teaching should be organized as several columns, instead of a single column. A final recommendation stated that the randomization of answers for questions with more than four answer choices might cause extraneous cognitive load. The recommendation was to alphabetize answer choices when there are more than four. An example of an implemented change includes the alteration of the answer choice 'colleague(s) in your building' to 'parent(s) at your school' for the Parent role (see Appendix C for additional revisions).

### Pilot Study Limitations

The primary goal of the pilot study was to assess the feasibility of successfully recruiting participants for the study and evaluating the technical and navigational aspects of an online survey process and the instrument itself. The pilot provided an opportunity to improve the research process as a precursor to the main study. The pilot sample was limited to northeastern Oklahoma school districts; therefore, the data and findings were generated from participants within relative proximity in the state of Oklahoma. This aspect may limit the generalizability of the pilot findings to other populations. However, the conditions for the study were more identical regarding readability and survey completion across the various school-related roles, reducing threats to internal validity (Brewer, 2000).

## Data Collection for Main Study

Data collection for the study consisted of survey research and document analysis. Survey research is the collection of data attained by asking individuals questions either in

person, on paper, by phone or online (Fowler, 2013). Conducting surveys is one form of conducting primary research and is conducted by gathering of data first-hand from its source (Glass, 1976). The information collected may also be accessed subsequently by other parties in secondary research (Glass, 1976). Survey research is used to gather the opinions, beliefs, and feelings of selected groups of individuals, often chosen for demographic sampling. These demographics may include age, gender, ethnicity or income levels.

This study employed the same survey and method as the pilot study. The additional method of data collection for this study included document analysis. This method was appropriate because document analysis involves seeking out and extracting evidence from established records. These records may be held either in collecting institutions, such as libraries and museums, or in the custody of the organization, whether a government body, educational institution, business, family, or other agency, that originally generated or accumulated them (Ciscra, 2015). For the social scientist, document analysis can be defined as the locating, evaluating, and systematic interpretation and analysis of sources found in documentation (Lewis-Beck, Bryman & Futing Liao, 2004).

## Research Questions

Using Oklahoma as a context, the overarching question that guided this dissertation is: What are the key elements that indicate the diffusion of innovations in urban and suburban schools?

The main question was answered through the following sub-questions:

a) What are the levels of expertise with educational technologies used in selected urban and suburban Oklahoma schools?
b) How do parents, teachers, and staff of selected urban and suburban Oklahoma schools perceive the use of educational technologies by teachers in their schools?
c) What are the characteristics of innovative schools identified by parents, teachers, and staff in selected urban and suburban Oklahoma schools?
d) What are the differences between educational technology budgets between selected urban and suburban Oklahoma schools?
e) How do parents, teachers, and staff in selected urban and suburban Oklahoma schools define innovative teaching practices?

*Sampling*

The survey sample was recruited through convenience sampling. Convenience sampling is a non-probability sampling technique where subjects are selected because of their convenient accessibility and proximity to the researcher (Etikan et al., 2016). This method of sampling was the same method as the one used in the pilot study, with the added change of removing pilot study respondents from the sampling pool.

Approval for the study was granted through Oklahoma State University's Institutional Review Board (IRB) (Appendix A). Then, the invitation to participate in the survey was sent to 300 potential participants (150 through professional email contacts and 150 through Facebook Messenger to the researcher's professional network on Facebook).

*Administering the Survey*

The survey was administered using Qualtrics, which is an online survey platform that the researcher had access to as a student at the university. To incentivize participants to complete the survey, they were offered a chance to enter a drawing to win a gift card for participating in the survey. If a participant selected yes, they were taken to a second survey so that they could enter their email address and their survey responses will remain anonymous. If the participant selected no, they were also taken to a second survey so that they could enter their email address. The option to participate in the drawing was offered to everyone regardless of whether they chose to take part in the study. For the winner of the drawing, the compensation was awarded via email after the conclusion of the study.

*Participants*

The target population of the study included parents, teachers, and staff at urban and suburban schools in Oklahoma who were part of the researcher's social network. The survey instrument included a dropdown list of all public school districts in the State of Oklahoma. Participants were able to choose their school district's name from the list. When analyzing the data, the researcher classified each school district as urban or suburban using the National Center for Education Statistics Search for Public Schools tool. This tool identifies the school district type for each school district searched. The demographics of the sample anticipated to include participants who were aged 18-65 years old, all genders, and all ethnicities. Participants were then coded by joining their school district type and their role (ex: urban parent).

## Research Design

The study used an exploratory research design. An exploratory design is conducted about a research problem when there are few or no earlier studies to refer to or rely upon to predict an outcome (Stebbins, 2001). Hence, the focus is often on gaining insights and familiarity for later investigation or undertaken when research problems were in a preliminary stage of the investigation (Stebbins, 2001). Exploratory designs are used to establish an understanding of how best to proceed in studying an issue or what methodology would effectively apply to the gathering of information about the issue (Stebbins, 2001). This dissertation investigated the key elements that indicate the diffusion of innovations at urban and suburban Oklahoma schools by answering the research questions in Table 6.

*Table 6. Study Data Matrix*

| Research Question | Purpose | Data to Answer Question | Data Source | Contact for Access | Data Collection Timeline |
|---|---|---|---|---|---|
| RQ1: What are the levels of expertise with educational technologies used in selected urban and suburban schools? | To find out if the perceived indicators are influencing the diffusion process | Online survey | Surveys administered to parents/guardians, administrators/staff members, teachers | Obtained from statistical analysis | February 18 – March 4, 2019 |
| RQ2: How do parents, teachers, and staff of selected urban and suburban Oklahoma schools perceive the use of educational technologies by teachers in their schools? | To find out if the perceived indicators are influencing the diffusion process | Online survey | Surveys administered to parents/guardians, administrators/staff members, teachers | Obtained from statistical analysis | |
| RQ3: What are the characteristics of innovative schools identified by parents, teachers, and staff in selected urban and suburban Oklahoma schools? | To find out if the perceived indicators are influencing the diffusion process | Online survey | Surveys administered to parents/guardians, administrators/staff members, teachers | Obtained from thematic analysis | |
| RQ4: What are the differences between educational technology budgets between selected urban and suburban Oklahoma schools? | To learn of the barriers to the diffusion of innovations between urban and suburban schools | Document analysis | Public government documents | Obtained from the Oklahoma State Department of Education | |
| RQ5: How do parents, teachers, and staff in selected urban and suburban Oklahoma schools define innovative teaching practices? | To find out if the perceived indicators are influencing the diffusion process | Online survey | Surveys administered to parents/guardians, administrators/staff members, teachers | Obtained from thematic analysis | |

## Data Analysis

After the surveys were returned, the Likert-type scale responses were analyzed using a Kruskal-Wallis H test (sometimes also called the "one-way ANOVA on ranks") in SPSS 24 to answer RQ1 and RQ2. There were six separate groups of participants (Urban Parents, Urban Teachers, Urban Staff, Suburban Parents, Suburban Teachers and Suburban Staff), each of whom gave a single score on a rating scale. Ratings are examples of an ordinal scale of measurement, and so the data are not suitable for a parametric test. A Kruskal-Wallis test is a rank-based nonparametric test that can be used to determine if there are statistically significant differences between two or more groups of an independent variable on an ordinal dependent variable. It is considered the nonparametric alternative to the one-way ANOVA that sacrifices the precision of discriminating means for the discrimination of stochastic dominance, specifically the probability that a randomly drawn observation from one group will be higher. However, the test can do so regardless of how the measures are distributed in each group. The dependent variable was the Profile of Instructional Technology Use in Schools scores. The grouping variable was the category (district and role) of a participant. The independent variables were levels of experience with technology and levels of importance of methods for learning about technology.

Follow-up tests were conducted to evaluate pairwise differences among the six groups including a seventh group that compared all members of urban and suburban districts overall, controlling for Type I error across tests by using the Bonferroni approach. The analysis was complemented by using Dunn's multiple pairwise comparisons test due to the rejection of the null hypothesis. With Dunn's test, the

researcher conducted multiple pairwise comparisons for Dunn's test for stochastic dominance among multiple pairwise comparisons. The ranks of the data on which the tests are based on change if they are re-ranked in a pairwise fashion (Dinno, 2015). Dunn's (1964) insight was to retain the rank sums from the omnibus test and to approximate a z-test statistic to the exact rank-sum statistic. Dunn's test is the appropriate procedure following a Kruskal–Wallis test. Making multiple pairwise comparisons following an omnibus test redefines the meaning of α, which usually represents the probability of falsely rejecting the null hypothesis for one test, within the inferential framework of the hypothesis test (Dinno, 2015). Dunn (1964) described how to address this issue with a Bonferroni adjustment, which can modify the rejection level for any test by dividing alpha by the total number of tests and requires a much smaller p-value to reject any test. This adjustment leaves α numerically intact but multiplies the p-value.

After the survey data were analyzed, archival data were reviewed from the 2017-2018 Oklahoma State Department of Education Annual District Technology Survey report to answer RQ 4 by calculating the portion of school district budgets used for educational technology. The report contained district finance data for hardware, network hardware, network charges, instructional software, and student information systems. The report also provided data on all Oklahoma school districts regarding their wireless access, Local Area Network (LAN)/ethernet speeds, wireless internet speeds, and the number of teachers who report integrating technology into their curricula.

Finally, themes were generated from RQ3 and RQ5's opened-ended questions using the thematic analysis outlined by Braun and Clarke's (2006). The process consisted of the following six steps:

1. Familiarization with the data
2. Generation of the initial codes
3. Search for themes
4. Review of themes
5. Define themes
6. Reporting analysis

*Familiarization with the data*

This step required the researcher to be fully immersed and actively engaged in the data by reading the responses. Initial ideas were noted. It is important that the researcher has a comprehensive understanding of the content of the interaction and was familiar with all aspects of the data. This step provides the foundation for the subsequent analysis.

*Generation of the initial codes*

Once the researcher was familiar with the data, the researcher started to identify preliminary codes, which are the features of the data that appear interesting and meaningful. However, a challenge to coding and generating thematic analyses is that text entered by participants may have multiple meanings and always involved interpretation (Graneheim, & Lundman, 2004). To confirm that codes assigned were consistent with the text entered by participants the researcher completed the reflexivity process. Kleinsasser (2000) states that researcher reflexivity considers the impact of the researcher's perspectives, pre-existing thought, beliefs, knowledge, assumptions, personal characteristics on the process of data collection and analysis. A reflexive practice that may assist the researcher includes consulting with colleagues (Kleinsasser, 2000). The researcher reached out to colleagues familiar with qualitative methodology to audit the coding. The colleagues were graduate-level classmates of the researcher who had taken courses which focused on qualitative research methods. The colleagues were also

members of the researcher's professional network who use qualitative methodologies in their occupation. To review the codes determined by the researcher and the researcher's colleagues, the open-ended responses were converted into a tag cloud at www.wordclouds.com. Tags are single words, and the importance of each tag is shown with font size or color (Gottron, 2009). This format was useful for quickly perceiving the most prominent terms and for locating a term alphabetically to determine its relative prominence.

*Search for themes*

The third step in the process was the start of the interpretive analysis of the collated codes. Relevant data extracts were sorted according to overarching themes. The researcher's thought process denoted the relationship between codes, subthemes, and themes.

*Review of themes*

A deeper review of identified themes followed where the researcher determined the need combine, refine, separate, or discard initial themes. Data within themes should cohere together meaningfully, while there should be clear and identifiable distinctions between themes (Braun & Clark, 2006). This was done over two phases, where the themes were checked in relation to the coded extracts, then for the overall data set. A thematic map was generated from this step.

*Define themes*

This step involved refining and defining the themes and potential subthemes within the data. Ongoing analysis was conducted to further enhance the identified themes. The researcher formed theme names and clear working definitions that captured the essence of each theme in a concise and effective manner. At this point, a unified story of the data began to emerge from the themes.

*Reporting analysis*

Finally, the researcher transformed the analysis into interpretable answers to RQ3 and RQ5. The analysis was supported with empirical evidence that addresses the research question.

# CHAPTER IV

# FINDINGS

## Introduction

There are many disparities between urban and suburban schools, including the adoption of innovations (Huberman & Miles, 2013). This study aimed to identify key elements that indicate the diffusion of innovations in urban and suburban schools using Roger's (2003) Diffusion of Innovations Theory as a theoretical framework. This chapter presents the results of the study, beginning with a detailed review of the sample demographics and study results based on the research questions. Information related to the diffusion of innovations in urban and suburban Oklahoma schools, characteristics of innovative schools, descriptions of innovative teaching practices were gathered from 145 participants who completed the survey.

## Research Questions

Using Oklahoma as a context, the overarching question that guided this dissertation is: What are the key elements that indicate the diffusion of innovations in urban and suburban schools? The main question was answered through the following sub-questions:

a) What are the levels of expertise with educational technologies used in selected urban and suburban Oklahoma schools?
b) How do parents, teachers, and staff of selected urban and suburban Oklahoma schools perceive the use of educational technologies by teachers in their schools?
c) What are the characteristics of innovative schools identified by parents, teachers, and staff in selected urban and suburban Oklahoma schools?
d) What are the differences between educational technology budgets between selected urban and suburban Oklahoma schools?
e) How do parents, teachers, and staff in selected urban and suburban Oklahoma schools define innovative teaching practices?

## Demographics

A total of 163 participants responded to the recruitment email and social media messages. Participants consisted of staff members, parents, and teachers who responded to the instrument; however, 18 participants were excluded in the analysis because they did not answer all the items on the survey. Upon examination of the data, the researcher identified that the dataset also contained 26 respondents from other school district types in Oklahoma outside the focus of the study. Although this number is being reported here for transparency, the data that was analyzed only included people from urban and suburban Oklahoma schools. A total of 145 survey results were retained, but only 119 were included in the analyses, providing a 48.3% response rate. Demographics of participants are shown in Table 7.

*Table 7. Participant Demographics*

| | | Urban | | Suburban | | Total |
|---|---|---|---|---|---|---|
| | | N | % | N | % | N |
| **Role** | Parents | 26 | 40 | 22 | 34 | 65 |
| | Staff | 11 | 50 | 9 | 41 | 22 |
| | Teachers | 19 | 59 | 10 | 31 | 32 |
| **Gender** | Male | 16 | 17 | 17 | 35 | 48 |
| | Female | 30 | 23 | 23 | 32 | 72 |
| | Unidentified | 15 | 6 | 6 | 24 | 25 |

## Results

The purpose of collecting the data was to answer the research questions outlined in this dissertation. This section reports findings from the study. The research questions that guided the study were developed using Rogers' (2003) Diffusion of Innovations theory as the theoretical framework. Data to answer RQ1 were obtained from a Kruskal-Wallis test, the results of which are presented in Table 9 and Table 10.

### RQ1. What are the levels of familiarity with educational technologies used in schools?

This section of the survey instrument assessed the importance of methods of learning about technology, getting support, and accessing information about innovations. A Kruskal-Wallis test revealed that there was a significant effect for all five subscales of the survey (see Table 8).

*Table 8. Subscale Results*

| Subscale | Score | Significance Level |
|---|---|---|
| Operating Systems | 62.47 | P < .001 |
| Hardware Used in Teaching | 52.28 | P < .001 |
| Learning About Technology | 43.43 | P < .001 |
| Help with Technology | 57.26 | P < .001 |
| Keeping Up-to-date with Technology | 68.74 | P < .001 |

*Media and methods for acquiring new technology skills and knowledge*

There was moderate evidence (p = 0.007, adjusted using the Bonferroni correction) of a difference between groups in acquiring new technical skills and knowledge. For the dependent variable, *a mixture of manuals and hands-on-experience*, the mean rank of Urban Parents was 36.04, and the mean rank of Urban Teachers was 57.74. There were statistically significant differences between Urban Parents and Urban Teachers (p= 0.011) (See Figure 3).

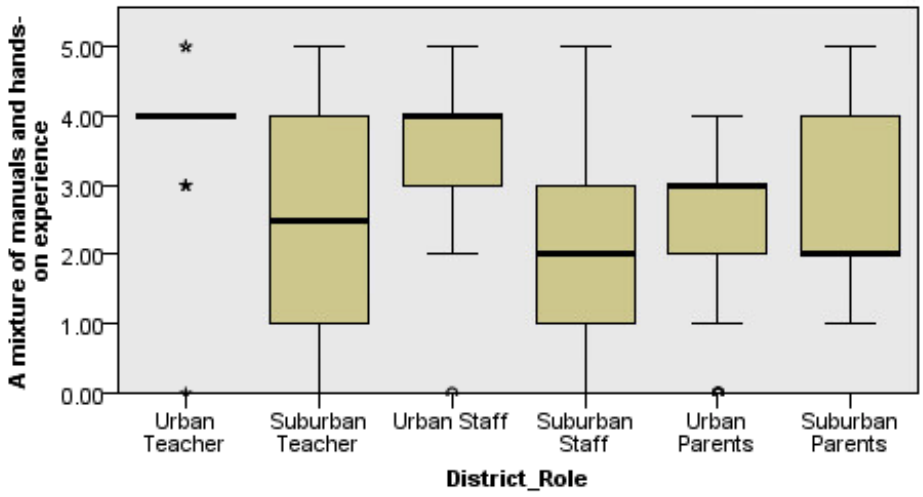


*Figure 3. Pairwise Comparisons of Role by District*

*Help or assistance with using technology*

There was moderate evidence ($p < 0.047$, adjusted using the Bonferroni correction) of a difference between groups in sources of help or assistance with using technology for the dependent variable, *outside professionals trained in technology use.* However, there were no significant pairwise comparisons (see Figure 4).

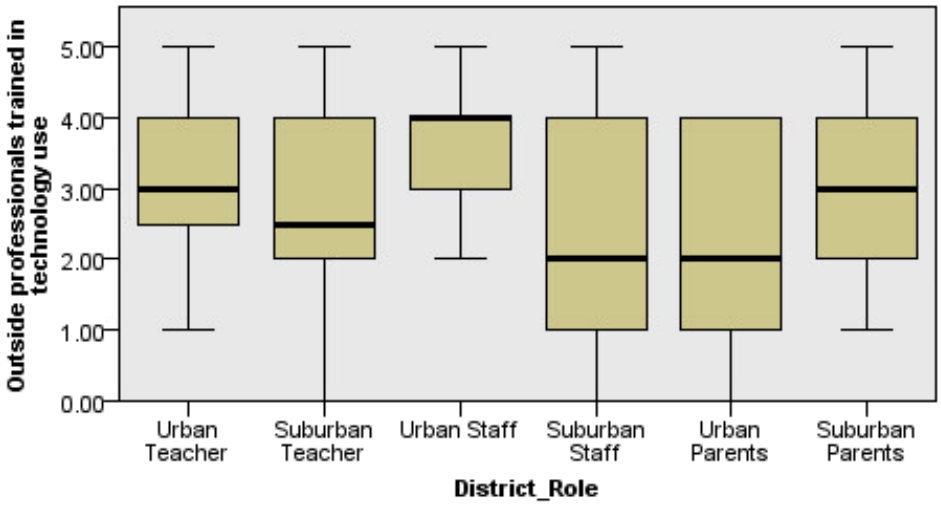


*Figure 4. Pairwise Comparisons Role by District*

There was moderate evidence ($p < 0.041$, adjusted using the Bonferroni correction) of a difference between groups in sources of help or assistance with using technology for the dependent variable, *parents in the community or colleagues at another school site.* However, there were no significant pairwise comparisons (see Figure 5).

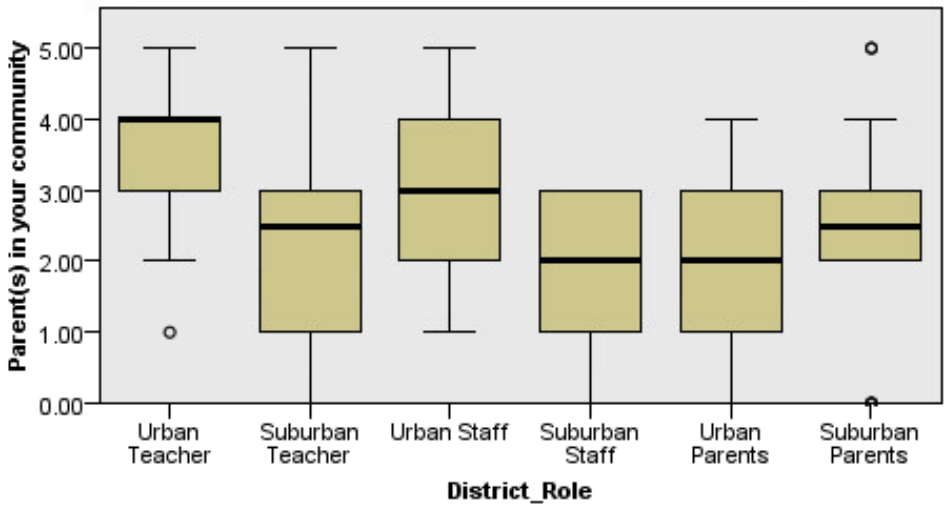


Figure 5. Pairwise Comparisons Role by District

There was moderate evidence ($p < 0.022$, adjusted using the Bonferroni correction) of a difference between groups in sources of help or assistance with using technology for the dependent variable, *a child/children or experienced students.* There was a statistically significant difference between Urban Parents and Urban Teachers ($p = 0.021$) (See Figure 6).

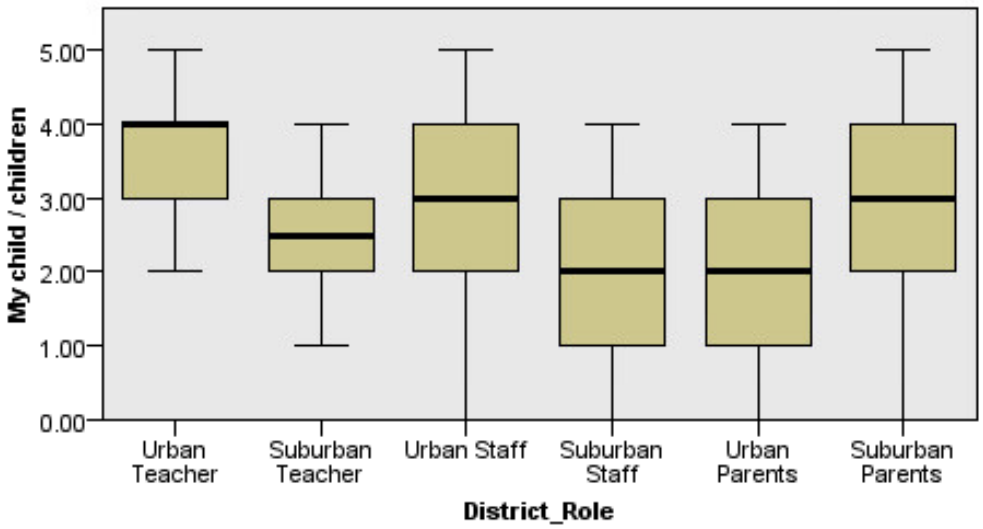


Figure 6. Pairwise Comparisons Role by District

*Source of Information for Updates in Technology*

There was very strong evidence (p= 0.002, adjusted using the Bonferroni correction) of a difference between groups in sources of information for updates in technology. For the dependent variable, *online computer newsgroups and websites*, there were statistically significant differences between Urban Parents and Urban Teachers (p= 0.003) and Urban Parents and Urban Staff (p= 0.017) (See Figure 7).

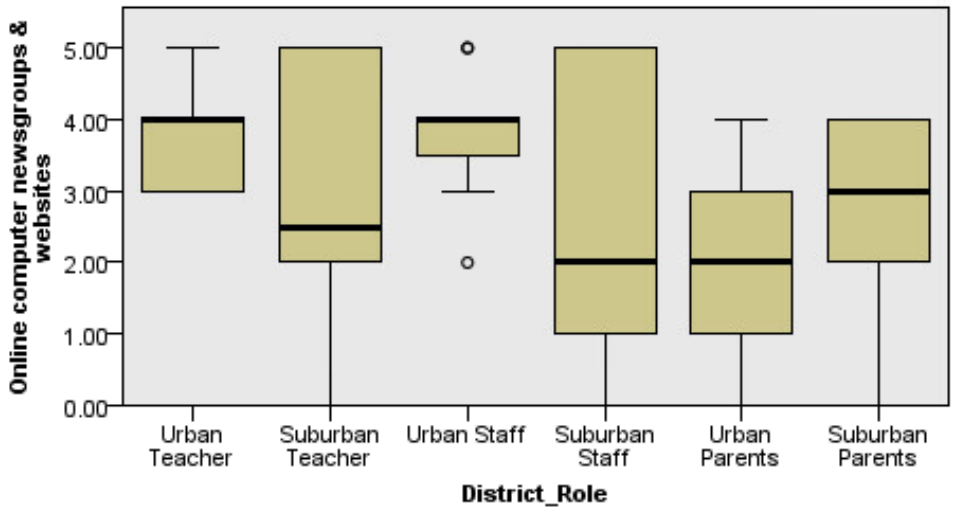


*Figure 7. Pairwise Comparisons Role by District*

There was very strong evidence (p= 0.022, adjusted using the Bonferroni correction) of a difference between groups in sources of information for updates in technology. For the dependent variable, *hardware and software stores, vendors, suppliers*, there were statistically significant differences between Urban Parents and Urban Teachers (p= 0.026) (See Figure 8).

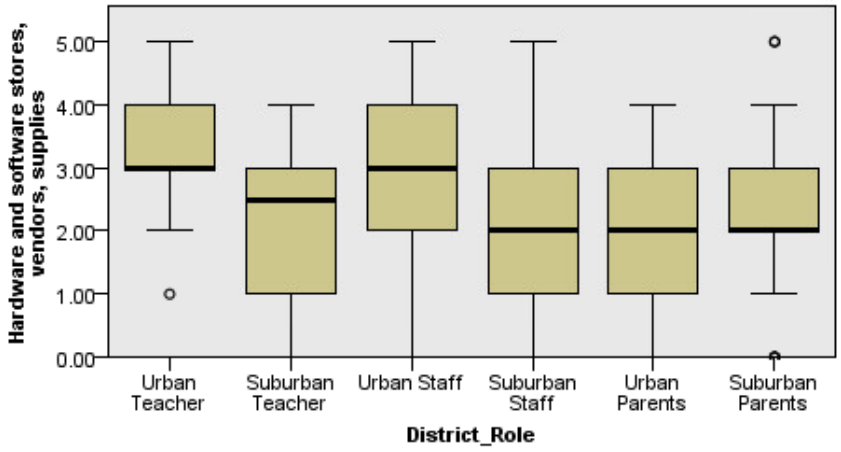


*Figure 8. Pairwise Comparisons Role by District*

**RQ2. How do parents, teachers, and staff perceive the use of educational technologies by teachers in their schools?**

A Kruskal-Wallis test revealed that there was a significant effect of Instructional Technology Use ($\chi^2$ (5) = 66.81, $p < .001$). $\eta^2 = 0.46$. Inspection of the groups' means revealed that Urban Teachers were classified as having the lowest scores for their use of instructional technology in their classrooms (Mdn=22.97), and Suburban Parents classified teachers in their suburban schools as having the highest scores (Mdn=83.30). The ranked scores of the groups are shown in Table 9.

*Table 9. Perceptions of Instructional Technology Use in Schools Scores*

| District_Role | N | Mean Rank |
|---|---|---|
| Urban District | 69 | 36.91 |
| Suburban District | 46 | 89.63 |
| Suburban Teacher | 10 | 83.30 |
| Suburban Parents | 22 | 72.41 |
| Suburban Staff | 9 | 72.33 |
| Urban Staff | 11 | 35.55 |
| Urban Parents | 26 | 32.63 |
| Urban Teacher | 19 | 22.97 |

**Post-Hoc Test**

A Kruskal-Wallis Test provided very strong evidence of a significant difference ($\chi^2$ (5) = 66.81, $p < .001$) between the mean ranks of at least one pair of the groups. Dunn's pairwise tests were carried out for the eight pairs of groups to test pairwise comparisons.

**Profile of Instructional Technology Use in Schools**

There was very strong evidence ($p < 0.001$, adjusted using the Bonferroni correction) of a difference between groups in perceived instructional technology use in the classroom. The post-hoc test identified statistically significant pairs of groups in Table 10 (Figure 9 and Figure 10). As multiple tests were being carried out, SPSS adjusted the p-value. The Bonferroni adjustment is to multiply each Dunn's p-value by the total number of tests being carried out. The pairwise comparisons below show the results of the Dunn-Bonferroni tests on each pair of groups. Analyses of the data also provided key elements related to the Instructional Technology Use scores of participants. This statistical analysis determined whether there are differences between groups of participants.

*Table 10. Pairwise Comparisons of Scores*

| Sample 1-Sample 2 | Test Statistic | Std. Error | Sig. | Adj. Sig. |
|---|---|---|---|---|
| Urban District-Suburban District | -66.87 | 7.80 | .000 | .000 |
| Urban Teachers-Suburban Staff | -76.69 | 16.58 | .000 | .000 |
| Urban Teachers-Suburban Parents | -76.84 | 12.84 | .000 | .000 |
| Urban Teachers-Suburban Teachers | -93.53 | 16.01 | .000 | .000 |
| Urban Parents-Suburban Parents | -62.11 | 11.87 | .000 | .002 |
| Urban Parents-Suburban Teachers | 78.79 | 15.25 | .000 | .000 |
| Urban Staff-Suburban Teachers | 74.50 | 17.91 | .000 | .001 |

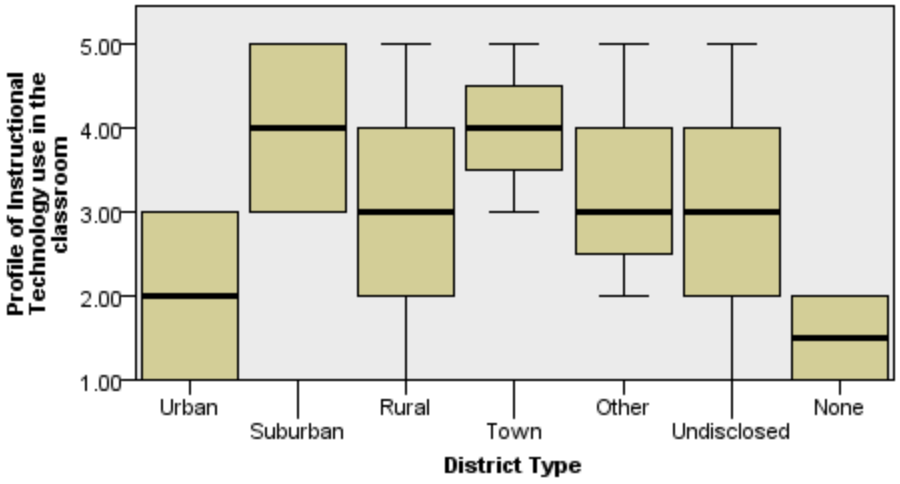


*Figure 9. Pairwise Comparisons by District Type*

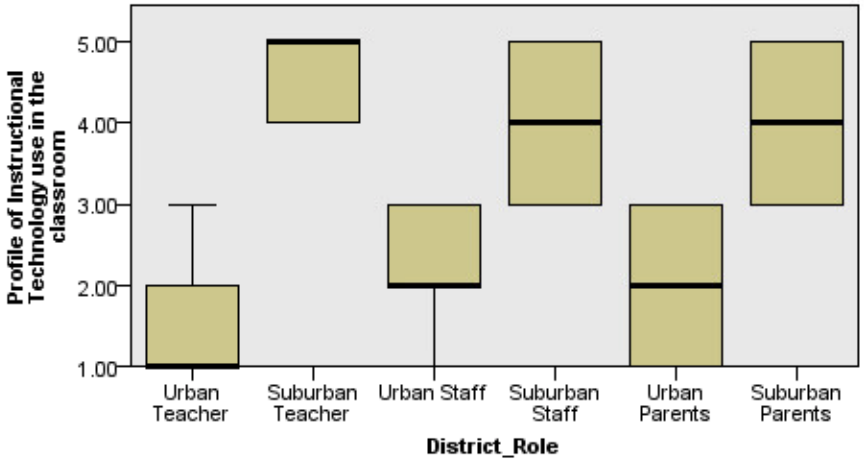


*Figure 10. Pairwise Comparisons of All Roles by District*

**RQ3: What are the characteristics of innovative schools identified by parents, teachers, and staff in selected urban and suburban Oklahoma schools?**

Data to answer RQ3 was obtained from responses provided by participants from the study. The responses to the open-ended questions were collapsed into one category and a thematic analysis was conducted as detailed in Chapter 3. The following themes, with corresponding examples of meaning units (i.e. examples of quotes that form the theme) were discerned from the data set which is presented in Appendix D:

- Theme 1 – Innovative schools are those that use technology for student focused instruction.
    - "A school that is willing to create and adopt different ideas with technology. The school's priority should be to jump-start the way students thinking critically and using technology to do so is innovative."
    - "Having current technology to benefit instruction."
- Theme 2 – Innovative schools train the use of technology for instruction through professional development
    - "Constantly learning and adapting to new technologies."
    - "Having a staff that is opened to new ideas and ready to implement technology in the classroom."

**RQ4: What are the differences between educational technology budgets between selected urban and suburban Oklahoma schools?**

To obtain the differences between educational technology budgets between selected urban and suburban Oklahoma schools, technology budgets from Oklahoma urban and suburban school districts were collected from Oklahoma State Department of Education records. The difference between selected urban and suburban school districts'

technology budgets was 17.63%. Table 11 shows a breakdown of the technology budgets from the included school districts.

*Table 11. Oklahoma Technology Budgets*

| District | District Type | Technology Budget | Annual Budget | % Spent on Technology |
|---|---|---|---|---|
| Berryhill | Suburban | $52,000 | $7,280,266 | 0.71% |
| Broken Arrow | Suburban | Not Reported | $125,695,894 | Not Reported |
| Edmond | Suburban | Not Reported | $151,400,000 | Not Reported |
| Glenpool | Suburban | $133,183 | $24,000,000 | 0.55% |
| Jenks | Suburban | Not Reported | $97,280,000 | Not Reported |
| Norman | Suburban | $5,508,828 | $24,205,150 | 22.76% |
| Oklahoma City | Urban | $4,200,000 | $597,736,102 | 0.70% |
| Sand Springs | Suburban | $917,175 | $32,556,757 | 2.82% |
| Tulsa | Urban | $17,579,235 | $294,722,304 | 5.96% |
| Union | Urban | $2,196,942 | $86,010,000 | 2.55% |

*Table 12. Percentage Spent on Technology by District Type*

| District Type | % Spent on Technology |
|---|---|
| Urban | 9.22% |
| Suburban | 26.85% |

The amount of the total budget for technology of selected urban school districts was 9.22%. The amount of the total budget for technology of selected suburban school

districts was 26.85%. The percentages were the ratio of the district's technology budget to its total annual budget.

**RQ5: How do parents, teachers, and staff in selected urban and suburban Oklahoma schools define innovative teaching practices?**

Data to answer RQ5 was obtained from responses provided by participants from the study. A thematic analysis was conducted as detailed in Chapter 3. The following themes, with corresponding examples of meaning units, were discerned from the data set which is presented in Appendix E:

- Theme 1 – Innovative teaching practices are those which use technology for student focused instruction.
    - "Having a meaningful relationship with students in order to better understand how to make huge impacts on their lives."
    -
- Theme 2 – Innovative teaching practices are supported by training from professional development on the use of technology for instruction.
    - "Continuously growing and learning new technology and practices."

## Summary of Results

This chapter provided an overview of this study's results by presenting data results for each research question. The results determined that statistically significant differences occurred among several demographic variables and the diffusion of innovation in schools. Results showed the most substantial relationship for perceptions of instructional technology use in the classroom among groups relating to district type and

role. The Kruskal-Wallis test results showed that differences exist between urban and suburban district types. Thematic analysis showed there are differences between urban and suburban parents, teachers, and staff in the characteristics of innovative schools and innovative teaching practices. Chapter 5 provides a discussion of the study's findings, conclusions based on these findings and recommendations based on these findings.

# CHAPTER V

# DISCUSSION

## Introduction

This chapter provides a summary of the study, discussions of the findings and recommendations for future study. Information related to the Diffusion of Innovations in selected urban and suburban Oklahoma schools, characteristics of innovative schools, and descriptions of innovative teaching practices are discussed. This chapter includes a discussion of significant findings as related to the definitions of innovation, differences between educational technology budgets, and definitions of innovative teaching. The chapter concludes with a discussion of the limitations of the study, areas for future research, and a summary.

## Discussion of the Findings

The data presented in Chapter 5 aimed to answer the main research question: *What are the key elements that indicate the diffusion of innovations in urban and suburban schools?* In this section, the findings of the study are discussed, and explanations are given to interpret the data as well as establish the findings within relevant literature. Research questions are discussed in the same order that they are presented in Chapter 5 and not necessarily by importance of the findings.

This chapter also contains discussions and future research possibilities to help answer the research questions:

- (R1): What are the levels of expertise with educational technologies used in selected urban and suburban Oklahoma schools?

- (R2): How do parents, teachers and staff of selected urban and suburban Oklahoma perceive the use of educational technologies by teachers in their schools?

- (R3): What are the characteristics of innovative schools identified by parents, teachers and staff in selected Oklahoma urban and suburban schools?

- (R4): What are the differences between educational technology budgets between selected Oklahoma urban and suburban schools?

- (R5): How do parents, teachers, and staff in selected Oklahoma urban and suburban schools define innovative teaching practices?

## Conclusions

*(R1): What are the levels of expertise with educational technologies used in selected urban and suburban Oklahoma schools?*

Technology use varies from school to school. The use of technology includes integrating educational technology into classroom teaching, instructional technology access, and technology availability in general at an institution. Depending on the characteristics of the school, the ability of teachers to understand what is necessary for them to use technology within their classroom, and the knowledge of technology use by other members of the school community, innovations may or may not be diffused across the school district. The Diffusion of Innovations Theory was used as a framework to define the instructional technology use in the classroom in selected Oklahoma urban and suburban schools.

The differences in rank scores between urban and suburban parents, teachers and staff show the diffusion of innovations between members of urban and suburban school districts have diverged. Analysis of the ways in which participants acquire new technology skills and knowledge, sources of help or assistance for participants, and sources for updates in technology showed that urban and suburban parents, teachers and staff differed from one another- supporting the hypothesis of innovations diffusing differently between urban and suburban school districts.

The study assessed the importance of various sources that participants may acquire new technology skills and knowledge. The results of the study showed that Urban Parents and Urban Teachers were the most statistically different groups for the importance of media and methods for acquiring new technology skills and knowledge. Urban Parents stated that a mixture of manuals and hands-on experience was substantially important as sources for acquiring new technology skills and knowledge. In contrast, Urban Teachers stated that a mixture of manuals and hands-on experience was extensively important for being sources for acquiring new technology skills and knowledge. This finding suggests that Urban Teachers are more likely to find manuals and hands-on experience more important for acquiring new technology skills and experience than Urban Parents.

When it comes to receiving help or assistance with using technology, Urban Parents and Urban Teachers were the most statistically different groups for being able to use their children or students for assistance. This question was differentiated for parents and teachers. Participants who chose the parent role were provided the option for children. Participants who chose the teacher role were provided the option for students.

Urban Parents stated that their children were moderately important for being sources of support for using technology, in contrast Urban Teaches stated that their experienced students were extensively important for being sources of support for using technology. This finding suggests that Urban Teachers may be more reliant on assistance from children than Urban Parents. This suggests that there may be a gap in the diffusion of technology use. One reason for the gap could be due to Urban Parents feeling more confident in their ability to use technology than Urban Teachers. Another reason could be parents rely on children less due to more simplistic needs for technology assistance. For Suburban Parents, Teachers, and Staff, there were no differences from one another on importance of sources of help or assistance. This suggests that Suburban Parents, Teachers, and Staff feel similarly about the importance of all sources of help or assistance presented in the survey.

Lastly, Urban Parents, Teachers, and Staff were the most statistically different groups for the importance of sources of information for updates in technology. This is important because it showcases another difference in how innovations are diffusing in urban school districts.

There was also another statistically different group. Urban Parents and Urban Staff also differed in their view of the importance of online computer newsgroups and websites as sources of information for updates in technology. Urban Staff stated that online computer newsgroups and websites were extensively important for staying up-to-date of changes or adoptions in the area of technology. However, Urban Parents felt that online computer newsgroups and websites were only moderately important.

The findings of this study support levels of expertise with educational technologies used in schools as a key element that indicates the diffusion of innovations in urban and suburban schools. The Diffusion of Innovations Theory describes how, over time, an idea or product gains momentum and diffuses, or spreads, through a specific population or social system (Rogers, 2003). Rogers (2003) suggests that interpersonal communication among individuals of the same socioeconomic status and education level is more effective in persuading potential users to accept an innovation.

*(R2): How do parents, teachers, and staff perceive the use of educational technologies by teachers in their schools?*

The results indicated that participants who regarded themselves as being members of an urban school district had significantly lower Profile of Instructional Technology Use in Schools scores than suburban members. The perceptions of urban parents, teachers and staff show that teachers in their schools are adopters (Stage 2) of technology use in their classrooms. In Stage 2, teachers progress through stages of personal and task management concern as they experiment with the technology, begin to try it out in their classrooms, and share their experiences with their peers. Suburban school district members viewed their teachers as reaffirmers (Stage 4) of technology use in their classrooms. In Stage 4, teachers have developed a greater awareness of how technology use in the classroom affects intermediate learning outcomes (i.e., increased time on tasks and greater student engagement) and they have begun to create new ways to observe and assess the impact on student products and performances and to disseminate exemplary student work to a larger audience.

The results also indicated that participants who regarded themselves as Suburban Teachers had significantly higher Profile of Instructional Technology Use in Schools scores than participants in other roles and district types. Specifically, Suburban Teachers ranked themselves as being leaders (Stage 5) in technology use in their classrooms. In Stage 5, experienced teachers expand their roles to become action researchers who carefully observe their practice, collect data, share the improvements in practice with peers, and teach new members. While this could be due to illusory superiority, a condition of cognitive bias wherein a person overestimates their own qualities and abilities, in relation to the same qualities and abilities of other persons (Hoorens, 1993), Suburban Staff and Suburban Parents categorized Suburban Teachers as being in Stage 4.

While the results of the Kruskal-Wallis test suggest that there are statistically significant differences between urban and suburban parents, teachers and staff, this does not indicate how significant the effect may be. The effect size of a statistical test suggests the proportion of variance in the dependent variable that is attributable to each effect. The effect size of $\eta^2 = 0.46$ was computed directly from the reported chi-square value for the Kruskal-Wallis test. Following the interpretation guidelines of effect size by Cohen (1988), the effect size of the Kruskal-Wallis test was interpreted as large ($\eta^2 > 0.14$). 69% of the variance in Profile of Instructional Technology Use scores is explained by the Urban District Type and Suburban District Type conditions. The findings of this study support the perceptions of the use of educational technologies by teachers in schools as a key element that indicates ta difference in the diffusion of innovations in urban and suburban schools.

*(R3): What are the characteristics of innovative schools identified by parents, teacher, and staff in selected Oklahoma urban and suburban schools?*

Parents, teachers, and staff in urban and suburban schools provided characteristics of innovative schools that were very similar. Parents, teachers, and staff in urban and suburban schools listed innovative/different, technology implementation, prioritization of learning, and a student-focused culture as the most important characteristics of an innovative school. The definitions of the characteristics provided by parents, teachers, and staff in urban and suburban schools were consistent with definitions of innovative schools in the literature explained below.

*Theme 1. Innovative schools are those that use technology for student focused instruction.*

Technology was defined by the researcher as media used in the classroom to support learning. This definition makes an important distinction because the term technology is diverse. The definition of technology depends on the field and context, but parents, teachers, and staff in urban and suburban schools situated the context of technology in this study to be consistent with Smaldine et al (2008)'s definition of technology.

Technology can be used for many learning purposes, but innovative schools make sure the tools are used the right way (Chen, 2012). At innovative schools, learning may be self-guided, with each child receiving an iPad pre-loaded with educational apps and games. While parents may offer guidance, the children are encouraged to choose what they want to learn and when. This approach has shown to increase attention, motivation,

and improve learning (Chen, 2012). Innovative instruction was defined as incorporating newer technology in education by participants. An Urban Teacher stated that a school is innovative when it is "a pioneer in education and finding different ways to teach/reach/meet different student needs." Another Urban Teacher stated that an innovative school has "current technology to benefit instruction."

Parents, teachers, and staff in urban and suburban schools were also particular about student culture as a characteristic of an innovative school. A Suburban Parent stated an innovative school is "one that takes the best practices and continually puts them into their school culture." An Urban Staff member stated that an innovative school is "student-centered." The definition of a school being student-centered agreed with Peterson & Deal (1998)'s definition, which states that student-centered culture includes pedagogy and curricular choices designed to make learning meaningful, relevant, engaging, and responsive to students' needs at a school.

Participants defined an innovative school as being different. Rogers (2003) defines an innovation as any idea, practice, or object that is perceived as new. Furthermore, instruction/learning was defined by the participants as incorporating newer technology in education. This coincides with Gross (2015)'s definition, which describes instruction and learning as the process of acquiring new, or modifying existing, knowledge, behaviors, skills, values, or preferences in a K-12 classroom. An Urban Parent identified an innovative school as a school which is "always changing and learning new concepts to help children learn." This was reinforced by a Suburban Teacher who said that an innovative school is a school which is "adopting and learning how to use technology to create meaningful change."

*Theme 2. Innovative schools train the use of technology for instruction through professional development.*

While many of the urban school parents, teachers, and staff members shared the same sentiments as their suburban counterparts, there was one particular distinction. Professional development was defined as specialized training, formal education, or advanced professional learning intended to help administrators, teachers, and other educators improve their professional knowledge, competence, skill, and effectiveness Avalos (2011). An Urban Teacher stated that a characteristic of an innovative school is "having a staff that is opened to new ideas and ready to implement technology in the classroom." This statement suggests that urban schools may have teachers who do not feel adequately prepared to use technology in their classrooms. Lawless & Pellegrino (2007) suggest that low professional development is a crucial reason for the lack of confidence in technology use in the classroom. Due to school district budget restraints, professional development may be sporadic in scope and quality.

The findings support characteristics of innovative schools as a key element that indicates the diffusion of innovations in urban and suburban schools. While parents, teachers, and staff in urban and suburban schools agree on the characteristics of innovative schools, this is a variation which suggests that urban schools may have teachers who do not feel adequately prepared to use technology in their classrooms.

*(R4): What are the differences between educational technology budgets between selected urban and suburban Oklahoma schools?*

Literature states that school funding is a principal barrier for the diffusion of technology (Kormos, 2018; Swinton & Williams, 2018). Although professional development for teachers is wide-spread, inequities are also present. Teachers in high-poverty schools are consistently less likely than their counterparts to report that they have received technology-integration training (Jocson, 2018). However, every school district wants to offer its students the best, most current, most meaningful learning opportunities. Unfortunately, technology can also be very expensive. Each year, school budgets are becoming increasingly restrictive and continue to decrease by significant amounts. According to Tarbor, Capraro & Yalvac (2017), suburban school districts have the perception that their higher district budgets falsely equate to increased technology budgets.

In the United States, a study conducted by Baker (2018), which analyzed more than 180 million data points collected via a national survey, evaluated educational technology access, use, and effectiveness across 8,558 U.S. schools. The Technology & Learning module captured data and aligned results across CASE, a research-based framework that informs the data analytics used to measure the climate of technology across the domains of Classroom, Access, Skills, and Environment.

The study compared characteristics of the top 5 percent and bottom 5 percent of schools and looked at factors that impact technology access and use. The results showed a disproportionate representation of suburban schools in the bottom 5% of Access at School scores, which may indicate that having more students in an individual school

makes it more difficult to put a device in every student's hands. Baker (2018) suggests that leaders across suburban schools can ensure better access at school by allowing students from suburban districts, settings with high Access at Home scores, to bring personal devices from home to school.

Across Access at Home, the top 5% of schools are mostly suburban with many urban schools in the bottom 5% of access. Baker (2018) suggests that educators in urban schools can shift policies to allow students to bring home devices or ensure that students have access to technology after school by providing extended computer lab hours or neighborhood hotspots in places like school parking lots or school buses.

When exploring the educational technology budgets in a subset of Oklahoma urban and suburban schools, there were differences between the percentages of the school districts' budgets used on technology and the diffusion of innovation by parents, teachers, and staff of urban and suburban schools. Urban school districts spent 6.66% of their budgets on technology, while suburban school districts spent 8.88% of their budgets on technology. The findings of this study support educational technology spending by urban and suburban school districts as a key element that indicates the diffusion of innovations in urban and suburban schools. The percentage of school district budgets spent on technology varied between urban and suburban school districts, and findings from RQ1 show that parents, teachers and staff in urban schools rank their perceptions of technology use in the classroom by their teachers lower than suburban parents, teachers and staff.

*(R5): How do parents, teachers, and staff in selected urban and suburban Oklahoma schools define innovative teaching practices?*

Parents, teachers, and staff in urban and suburban schools define innovative teaching as teaching which mixes traditional with new but makes sure it incorporates the student's needs and level, meeting children where they are, and creating their ways of learning and sharing it with other teachers. Parents, teachers, and staff in urban and suburban schools also believe that innovative schools are those who are willing to create and adopt different ideas with technology. They also believe that a school's priority should be to jump-start the way students think critically and use technology to do so. The thematic analysis of the responses for RQ5 revealed the same themes as RQ3: use of technology, instruction/learning, student-focused, innovative/ different and professional development.

The findings of this study support definitions of innovative teaching practices as a key element that indicates the diffusion of innovations in urban and suburban schools. Parents, teachers, and staff in urban and suburban schools agreed on the definition of innovative teaching practices.

**Implications**

When comparing urban and suburban districts overall, the districts were statistically different from each other. This information provided the foundation for identifying the key elements that indicate the diffusion of innovations in urban and suburban schools. Analyses of suburban parents, teachers, and staff showed that there were no statistically significant differences on any survey measures between Suburban

Parents, Suburban Teachers, and Suburban Staff members. Parents, teachers and staff within the urban district were more different from each other when compared to any suburban role. Urban parents, teachers, and staff are significantly different from one another, and this finding suggests that innovations are diffusing at different rates in than with suburban parents, teachers, and staff. This is significant for urban schools because it speaks to the differences in innovations being diffused. Innovations are diffusing differently throughout urban school districts, which contrasts with how innovations are being diffused in suburban school districts. Uncovering the differences in the diffusion of innovations shows that key elements which indicate the diffusion of innovations in urban and suburban schools include characteristics of innovative schools, definitions of innovative teaching practices, levels of expertise with educational technologies used in schools, educational technology budgets and perceptions of the use of educational technologies by teachers.

**Limitations of the Study**

Limitations of the study included the possibility that participants might have had difficulty understanding the terminology used throughout the survey if they had limited knowledge of the technology examples used. There are many different discourses relating to technology (technological jargon), which cause a discourse barrier between users and non-users of certain technologies. Also, some participants may have had an acquiescence bias, due to the belief that were being tested by the school district, or the school administration, and may have responded differently. Acquiescence bias in responses to questions relating to school districts in which participants belong was identified as a

limitation by Hagenson & Castle (2003). Finally, more support would be given to this study if coupled with qualitative research. For example, interviews with participants may offer more evidence to strengthen the data discovered using quantitative research tools.

**Recommendation for Future Research**

This study had 145 participants, therefore limiting the opportunity to generalize the findings to a greater number of parents, teachers, and staff in Oklahoma urban and suburban schools. It would be helpful in future research to have more participant involvement to explore any statistically signifiant differences in the data or groups further. Cooperating with school districts to disseminate the survey to parents, teachers, and staff could substantially increase the sample size.

Future research could involve students as well. Helping to identify whether students value technology as much as teachers, parents, and staff could expand the considerations of the findings. With this future research, there could be a deeper dive into the differences between the diffusion of innovations at home versus at school within a school district.

Finally, further research may be conducted to explore the factors that are contributing to innovations diffusing differently throughout urban school districts, when compared to suburban school districts.

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APPENDICES

# Appendix A

## Institutional Review Board Approval

**Approval of Exempt IRB Application ED-19-11**

irb@okstate.edu
Mon 2/4/2019 1:31 PM

**To:** Asino, Tutaleni I. <tutaleni.asino@okstate.edu>; Brown, Wilmon <wilmon.brown@okstate.edu>; Brown, Wilmon <wilmon.brown@okstate.edu>

Dear Wilmon Brown,

The Oklahoma State University Institutional Review Board (IRB) has approved the following application:

Application Number: ED-19-11
PI: Wilmon Brown
Title: The Diffusion of Innovations in Urban and Suburban Oklahoma Schools
Review Level: Exempt

You will find a copy of your Approval Letter in IRBManager. Click IRB - Initial Submission to go directly to the event page. Please click attachments in the upper left of the screen. The approval letter is under "Generated Docs." Stamped recruitment and consent documents can also be found in this location under "Attachments". Only the approved versions of these documents may be used during the conduct of your research.

As Principal Investigator, it is your responsibility to do the following:

- Conduct this study exactly as it has been approved. Any modifications to the research protocol must be submitted for IRB approval before implementation.
- Submit a request for continuation if the study extends beyond the approval period.
- Report any adverse events to the IRB Chair within 5 days. Adverse events are those which are unanticipated and impact the subjects during the course of the research; and
- Notify the IRB office when your research project is complete by submitting a closure form via IRBManager.

Please note that approved protocols are subject to monitoring by the IRB and that the IRB office has the authority to inspect research records associated with this protocol at any time. If you have questions about the IRB procedures or need any assistance from the Board, please contact the IRB office at 405-744-3377 or irb@okstate.edu.

Best of luck with your research,

Sincerely,

Dawnett Watkins, CIP
Whitney McAllister, MS

Oklahoma State University
Institutional Review Board

# Appendix B

## Survey Instrument

Which option(s) best define your role regarding Oklahoma schools?

- ☐ Parent / Guardian (1)
- ☐ Administrator / Staff (4)
- ☐ Teacher (5)
- ☐ Not associated with a school (6)
- ☐ Other (please specify) (3) _____

Do your children attend where you work?

- ○ Yes (1)
- ○ No (2)

In which Oklahoma public school district do you work?

Please select from the drop-down list below.

▼ 2117 (2117) ... Zion Public School (2644)

Which Oklahoma public school district does your children attend?

Please select from the drop-down list below.

▼ 2117 (2117) ... Zion Public School (2644)

What is your specific role? (Ex: Current title, grades/subjects taught, etc.)

_____

What is your gender?

- ○ Male (1)
- ○ Female (2)
- ○ Other (3) _____
- ○ I choose not to identify (4)

**End of Block: Role**

**Start of Block: Parents**

What is the current grade of your oldest K-12 student?

▼ Pre-K (140) ... 12th (153)

Which Oklahoma public school district are you affiliated with?

Please select from the drop-down list below.

▼ 2117 (2117) ... Zion Public School (2644)

Which Oklahoma public school district are you affiliated with?

Please type your answer below.

_____

**Technology Experience**. For each of the following examples of instructional technology platforms, please indicate your current level of expertise

Operating Systems

| | |
|---|---|
| Android 9.0 Pie (17) | ▼ (0) None (7) ... (5) High Level- I have it mastered (12) |
| Apple iOS 12 (18) | ▼ (0) None (7) ... (5) High Level- I have it mastered (12) |
| Apple macOS Mojave (19) | ▼ (0) None (7) ... (5) High Level- I have it mastered (12) |
| Chrome OS (20) | ▼ (0) None (7) ... (5) High Level- I have it mastered (12) |
| Windows 10 (21) | ▼ (0) None (7) ... (5) High Level- I have it mastered (12) |
| Windows 7 (22) | ▼ (0) None (7) ... (5) High Level- I have it mastered (12) |
| Windows 8 (23) | ▼ (0) None (7) ... (5) High Level- I have it mastered (12) |
| Other (24) | ▼ (0) None (7) ... (5) High Level- I have it mastered (12) |

**Instructional Technology Used in Teaching**. For each of the following examples of instructional technologies, please indicate which you are in support of being used by your school's teachers.

- ☐ Blackboard (154)
- ☐ BrainPOP (155)
- ☐ ClassCraft (156)
- ☐ Code.org (157)

- [ ] Dash & Dot (158)
- [ ] Edmodo (159)
- [ ] English Central (160)
- [ ] Facebook (161)
- [ ] Google Classroom (162)
- [ ] Google Earth (163)
- [ ] Google Expeditions (164)
- [ ] Instagram (165)
- [ ] Kahoot! (166)
- [ ] KerbalEDU (167)
- [ ] Khan Academy (168)
- [ ] Lego Mindstorms (169)
- [ ] MinecraftEDU (170)
- [ ] Mystery Skype (171)
- [ ] NearPod VR (172)
- [ ] Plickers (173)

- [ ] Prezi (174)
- [ ] Quipper School (175)
- [ ] Quizlet (176)
- [ ] Schoology (177)
- [ ] Scratch, Scratch Jr. (178)
- [ ] Seesaw Portfolio (179)
- [ ] Socrative (180)
- [ ] Sphero (181)
- [ ] Swift Playgrounds (182)
- [ ] Twitter (183)
- [ ] WhatsApp (184)
- [ ] Wikipedia (185)
- [ ] YouTube (186)
- [ ] Other (187) _____

**Instructional Hardware Used in Teaching** For each of the following examples of instructional hardware, please indicate your current level of expertise.

Instructional Hardware Used in Teaching

| | |
|---|---|
| PC Desktops and Laptops (1) | ▼ (0) None (7) ... (5) High Level- I have it mastered (12) |
| Projector Screens (2) | ▼ (0) None (7) ... (5) High Level- I have it mastered (12) |
| Electronic Whiteboards (3) | ▼ (0) None (7) ... (5) High Level- I have it mastered (12) |
| Mobile devices (4) | ▼ (0) None (7) ... (5) High Level- I have it mastered (12) |
| Television (6) | ▼ (0) None (7) ... (5) High Level- I have it mastered (12) |
| 3D Printers (8) | ▼ (0) None (7) ... (5) High Level- I have it mastered (12) |
| Other (9) | ▼ (0) None (7) ... (5) High Level- I have it mastered (12) |

**Learning about Technology.** Individuals tend to have preferred methods for learning more about technology. In the following questions, please indicate the importance of each of the following methods to you for learning about technology, getting support, and accessing information about innovations.

Regarding media and methods for acquiring **NEW** technology skills and knowledge, how important are the following to you?

| | |
|---|---|
| Online manuals (1) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Hard copy materials (books, etc.) (2) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Hands-on experimenting & troubleshooting (3) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| A mixture of manuals and hands-on experience (4) | ▼ (0) Not Important (1) **...** (5) Highly Important - very, very important (6) |
| Workshops and presentations (5) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Structured courses and guidance (6) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |

Regarding **HELP OR ASSISTANCE** with using technology, how important are each of the following sources of support to you?

| | |
|---|---|
| My child / children (1) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Parent(s) at your school (2) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Parent(s) in your community (3) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Outside professionals trained in technology use (4) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Media center support staff (5) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Telephone assistance (6) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| One-on-one assistance (7) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |

How important are the following sources of information to you for keeping **up-to-date** of changes/adoptions in the area of technology?

| | |
|---|---|
| An informal network of family and friends (1) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Parent(s) at your school (2) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Parent(s) in your community (3) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Customer service (4) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| School staff (5) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| My child / children (6) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Popular newspapers and television (7) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Popular computer magazines (8) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Refereed computer journals (9) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Conferences, demonstrations, and workshops (10) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Online computer newsgroups & websites (11) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Online computer journals (12) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Publications from major computer vendors (13) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |

| | |
|---|---|
| Hardware and software catalogs and brochures (14) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Hardware and software stores, vendors, supplies (15) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |

**Profile of Instructional Technology use in the classroom**

| | Please select the stage that best describes **teachers using technology** in your school. (1) |
|---|---|
| **Stage 1. Teacher as Learner** In this information-gathering stage, teachers learn the knowledge and skills necessary for performing instructional tasks using technology. (1) | ○ |
| **Stage 2. Teacher as Adopter** In this stage, teachers progress through stages of personal and task management concern as they experiment with the technology, begin to try it out in their classrooms, and share their experiences with their peers. (2) | ○ |
| **Stage 3. Teacher as Co-Learner** In this stage, teachers focus on developing a clear relationship between technology and the curriculum, rather than concentrating on task management aspects. (3) | ○ |
| **Stage 4. Teacher as Reaffirmer/ Rejecter** In this stage, teachers develop a greater awareness of intermediate learning outcomes (i.e., increased time on tasks and greater student engagement) and begin to create new ways to observe and assess the impact on student products and performances and to disseminate exemplary student work to a larger audience. (4) | ○ |
| **Stage 5. Teacher as Leader** In this stage, experienced teachers expand their roles to become action researchers who carefully observe their practice, collect data, share the improvements in practice with peers, and teach new members. Their skills become portable. (5) | ○ |

Please give the reason for the stage you have selected.

_____

What do you believe are characteristics of an innovative school?

_____

How do you define innovative teaching practices?

_____

**End of Block: Parents**

**Start of Block: Administrators**

How many years have you been an administrator / staff member?

- ○ Less than 1 year (1)
- ○ 1 to 3 years (2)
- ○ 4 to 6 years (3)
- ○ 7 years or more (4)

Which Oklahoma public school district are you affiliated with?

Please select from the drop-down list below.

▼ Other (3681) ... Zion Public School (4206)

Which Oklahoma public school district are you affiliated with?

Please type your answer below.

_____

**Technology Experience.** For each of the following examples of instructional technology platforms, please indicate your current level of expertise.

Operating Systems

| | |
|---|---|
| Android 9.0 Pie (34) | ▼ (0) None (19) ... (5) High Level- I have it mastered (24) |
| Apple iOS 12 (35) | ▼ (0) None (19) ... (5) High Level- I have it mastered (24) |
| Apple macOS Mojave (36) | ▼ (0) None (19) ... (5) High Level- I have it mastered (24) |
| Chrome OS (37) | ▼ (0) None (19) ... (5) High Level- I have it mastered (24) |
| Windows 10 (38) | ▼ (0) None (19) ... (5) High Level- I have it mastered (24) |
| Windows 7 (39) | ▼ (0) None (19) ... (5) High Level- I have it mastered (24) |
| Windows 8 (40) | ▼ (0) None (19) ... (5) High Level- I have it mastered (24) |
| Other (41) | ▼ (0) None (19) ... (5) High Level- I have it mastered (24) |

**Instructional Technology Used in Teaching** For each of the following examples of instructional technologies, please indicate which you are in support of being used by your school's teachers.

- ☐ Blackboard (127)
- ☐ BrainPOP (128)
- ☐ ClassCraft (129)

- [ ] Code.org (130)
- [ ] Dash & Dot (131)
- [ ] Edmodo (132)
- [ ] English Central (133)
- [ ] Facebook (134)
- [ ] Google Classroom (135)
- [ ] Google Earth (136)
- [ ] Google Expeditions (137)
- [ ] Instagram (138)
- [ ] Kahoot! (139)
- [ ] KerbalEDU (140)
- [ ] Khan Academy (141)
- [ ] Lego Mindstorms (142)
- [ ] MinecraftEDU (143)
- [ ] Mystery Skype (144)
- [ ] NearPod VR (145)

- [ ] Plickers (146)
- [ ] Prezi (147)
- [ ] Quipper School (148)
- [ ] Quizlet (149)
- [ ] Schoology (150)
- [ ] Scratch, Scratch Jr. (151)
- [ ] Seesaw Portfolio (152)
- [ ] Socrative (153)
- [ ] Sphero (154)
- [ ] Swift Playgrounds (155)
- [ ] Twitter (156)
- [ ] WhatsApp (157)
- [ ] Wikipedia (158)
- [ ] YouTube (159)
- [ ] Other (160) _____

**Instructional Hardware Used in Teaching** For each of the following examples of instructional technology hardware, please indicate your current level of expertise.

Instructional Hardware Used in Teaching

| | |
|---|---|
| PC Desktops and Laptops (1) | ▼ (0) None (13) ... (5) High Level- I have it mastered (18) |
| Projector Screens (2) | ▼ (0) None (13) ... (5) High Level- I have it mastered (18) |
| Electronic Whiteboards (3) | ▼ (0) None (13) ... (5) High Level- I have it mastered (18) |
| Mobile devices (5) | ▼ (0) None (13) ... (5) High Level- I have it mastered (18) |
| Television (6) | ▼ (0) None (13) ... (5) High Level- I have it mastered (18) |
| 3D Printers (8) | ▼ (0) None (13) ... (5) High Level- I have it mastered (18) |
| Other (9) | ▼ (0) None (13) ... (5) High Level- I have it mastered (18) |

**Learning about Technology.** Individuals tend to have preferred methods for learning more about technology. Please indicate the importance of each of the following methods to you for learning about technology, getting support, and accessing information about innovations.

Regarding media and methods for acquiring **NEW** technology skills and knowledge, how important are the following to you?

| | |
|---|---|
| Online manuals (1) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Hard copy materials (books, etc.) (2) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Hands-on experimenting & troubleshooting (3) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| A mixture of manuals and hands-on experience (4) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Workshops and presentations (5) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Structured courses and guidance (6) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |

Regarding **HELP OR ASSISTANCE** with using technology, how important are each of the following sources of support to you?

| | |
|---|---|
| Experienced students (1) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Colleague(s) in your building (2) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Colleague(s) at another school site (3) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Outside professionals trained in technology use (4) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Media center support staff (5) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Telephone assistance (6) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| One-on-one assistance (7) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |

How important are the following sources of information to you for keeping **up-to-date** of changes/adoptions in the area of technology?

| | |
|---|---|
| An informal network of family and friends (1) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Colleague(s) in your building (2) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Colleague(s) at another school site (3) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| IT staff (4) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Principal (5) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Innovative students (6) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Popular newspapers and television (7) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Popular computer magazines (8) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Refereed computer journals (9) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Conferences, demonstrations, and workshops (10) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Online computer newsgroups & websites (11) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Online computer journals (12) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Publications from major computer vendors (13) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |

| | |
|---|---|
| Hardware and software catalogs and brochures (14) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Hardware and software stores, vendors, supplies (15) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |

**Profile of Instructional Technology use in the classroom**

| | Please select the stage that best describes **teachers using technology** in your school. (1) |
|---|---|
| **Stage 1. Teacher as Learner** In this information-gathering stage, teachers learn the knowledge and skills necessary for performing instructional tasks using technology. (1) | ○ |
| **Stage 2. Teacher as Adopter** In this stage, teachers progress through stages of personal and task management concern as they experiment with the technology, begin to try it out in their classrooms, and share their experiences with their peers. (2) | ○ |
| **Stage 3. Teacher as Co-Learner** In this stage, teachers focus on developing a clear relationship between technology and the curriculum, rather than concentrating on task management aspects. (3) | ○ |
| **Stage 4. Teacher as Reaffirmer/ Rejecter** In this stage, teachers develop a greater awareness of intermediate learning outcomes (i.e., increased time on tasks and greater student engagement) and begin to create new ways to observe and assess the impact on student products and performances and to disseminate exemplary student work to a larger audience. (4) | ○ |
| **Stage 5. Teacher as Leader** In this stage, experienced teachers expand their roles to become action researchers who carefully observe their practice, collect data, share the improvements in practice with peers, and teach new members. Their skills become portable. (5) | ○ |

Please give the reason for the stage you have selected.

_____

What do you believe are characteristics of an innovative school?

_____

How do you define innovative teaching practices?

_____

**End of Block: Administrators**

**Start of Block: Teacher**

How many years have you been a teacher?

- ○ Less than 1 year (1)
- ○ 1 to 3 years (2)
- ○ 4 to 6 years (3)
- ○ 7 years or more (4)

Which Oklahoma public school district are you primarily affiliated with?

Please select from the drop-down list below.

▼ Other (7) ... Zion Public School (533)

Which Oklahoma public school district are you primarily affiliated with?

_____

For each of the following examples of instructional technology platforms, please indicate your current level of expertise.

Operating Systems

| | |
|---|---|
| Android 9.0 Pie (17) | ▼ (0) None (13) ... (5) High Level- I have it mastered (18) |
| Apple iOS 12 (18) | ▼ (0) None (13) ... (5) High Level- I have it mastered (18) |
| Apple macOS Mojave (19) | ▼ (0) None (13) ... (5) High Level- I have it mastered (18) |
| Chrome OS (20) | ▼ (0) None (13) ... (5) High Level- I have it mastered (18) |
| Windows 10 (21) | ▼ (0) None (13) ... (5) High Level- I have it mastered (18) |
| Windows 7 (22) | ▼ (0) None (13) ... (5) High Level- I have it mastered (18) |
| Windows 8 (23) | ▼ (0) None (13) ... (5) High Level- I have it mastered (18) |
| Other (24) | ▼ (0) None (13) ... (5) High Level- I have it mastered (18) |

**Instructional Technology Used in Teaching** For each of the following examples of instructional technologies, please indicate which you use in your lessons:

- ☐ Blackboard (100)
- ☐ BrainPOP (101)
- ☐ ClassCraft (102)

- [ ] Code.org (103)
- [ ] Dash & Dot (104)
- [ ] Edmodo (105)
- [ ] English Central (106)
- [ ] Facebook (107)
- [ ] Google Classroom (108)
- [ ] Google Earth (109)
- [ ] Google Expeditions (110)
- [ ] Instagram (111)
- [ ] Kahoot! (112)
- [ ] KerbalEDU (113)
- [ ] Khan Academy (114)
- [ ] Lego Mindstorms (115)
- [ ] MinecraftEDU (116)
- [ ] Mystery Skype (117)
- [ ] NearPod VR (118)

- [ ] Plickers (119)
- [ ] Prezi (120)
- [ ] Quipper School (121)
- [ ] Quizlet (122)
- [ ] Schoology (123)
- [ ] Scratch, Scratch Jr. (124)
- [ ] Seesaw Portfolio (125)
- [ ] Socrative (126)
- [ ] Sphero (127)
- [ ] Swift Playgrounds (128)
- [ ] Twitter (129)
- [ ] WhatsApp (130)
- [ ] Wikipedia (131)
- [ ] YouTube (132)
- [ ] Other (133) _____

**Instructional Hardware Used in Teaching**

For each of the following examples of instructional technology hardware, please indicate your current level of

expertise.

Instructional Hardware Used in Teaching

| | |
|---|---|
| PC Desktops and Laptops (1) | ▼ (0) No expertise (1) ... (5) High Level- I have it mastered (6) |
| Projector Screens (2) | ▼ (0) No expertise (1) ... (5) High Level- I have it mastered (6) |
| Electronic Whiteboards (3) | ▼ (0) No expertise (1) ... (5) High Level- I have it mastered (6) |
| Mobile devices (4) | ▼ (0) No expertise (1) ... (5) High Level- I have it mastered (6) |
| Television (6) | ▼ (0) No expertise (1) ... (5) High Level- I have it mastered (6) |
| 3D Printers (8) | ▼ (0) No expertise (1) ... (5) High Level- I have it mastered (6) |
| Other (9) | ▼ (0) No expertise (1) ... (5) High Level- I have it mastered (6) |

**Learning about Technology.** Individuals tend to have preferred methods for learning more about technology. In the following questions, please indicate the importance of each of the following methods to you for learning about technology, getting support, and accessing information about innovations.

Regarding media and methods for acquiring **NEW** technology skills and knowledge, how important are the following to you?

| | |
|---|---|
| Online manuals (1) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |

| | |
|---|---|
| Hard copy materials (books, etc.) (2) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Hands-on experimenting & troubleshooting (3) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| A mixture of manuals and hands-on experience (4) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Workshops and presentations (5) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Structured courses and guidance (6) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |

Regarding **HELP OR ASSISTANCE** with using technology, how important are each of the following sources of support to you?

| | |
|---|---|
| Experienced students (1) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Colleague(s) in your building (2) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Colleague(s) at another school site (3) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Outside professionals trained in technology use (4) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Media center support staff (5) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Telephone assistance (6) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| One-on-one assistance (7) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |

How important are the following sources of information to you for keeping **up-to-date** of changes/adoptions in the area of technology?

| | |
|---|---|
| An informal network of family and friends (1) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Colleague(s) in your building (2) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Colleague(s) at another school site (3) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| IT staff (4) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Principal (5) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Innovative students (6) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Popular newspapers and television (7) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Popular computer magazines (8) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Refereed computer journals (9) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Conferences, demonstrations, and workshops (10) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Online computer newsgroups & websites (11) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Online computer journals (12) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Publications from major computer vendors (13) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |

| | |
|---|---|
| Hardware and software catalogs and brochures (14) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |
| Hardware and software stores, vendors, supplies (15) | ▼ (0) Not Important (1) ... (5) Highly Important - very, very important (6) |

**Profile of Instructional Technology use in the classroom**

| | Please select the stage that best describes **you as a teacher** using technology. (1) |
|---|---|
| **Stage 1. Teacher as Learner** In this information-gathering stage, teachers learn the knowledge and skills necessary for performing instructional tasks using technology. (1) | ○ |
| **Stage 2. Teacher as Adopter** In this stage, teachers progress through stages of personal and task management concern as they experiment with the technology, begin to try it out in their classrooms, and share their experiences with their peers. (2) | ○ |
| **Stage 3. Teacher as Co-Learner** In this stage, teachers focus on developing a clear relationship between technology and the curriculum, rather than concentrating on task management aspects. (3) | ○ |
| **Stage 4. Teacher as Reaffirmer/ Rejecter** In this stage, teachers develop a greater awareness of intermediate learning outcomes (i.e., increased time on tasks and greater student engagement) and begin to create new ways to observe and assess the impact on student products and performances and to disseminate exemplary student work to a larger audience. (4) | ○ |
| **Stage 5. Teacher as Leader** In this stage, experienced teachers expand their roles to become action researchers who carefully observe their practice, collect data, share the improvements in practice with peers, and teach new members. Their skills become portable. (5) | ○ |

Please give the reason for the stage you have selected.

_____

What do you believe are characteristics of an innovative school?

_____

How do you define innovative teaching practices?

_____

**End of Block: Teacher**

# Appendix C

## Survey Instrument Revisions

| Original | Revision | | | | | |
|---|---|---|---|---|---|---|
| **Operating Systems** | | | | | | |
| Apple iOS 11 | Apple iOS 12 | | | | | |
| Android 7.0 Nougat | Android 9.0 Pie | | | | | |
| | | | | | | |
| **Sources of support** | | | | | | |
| For the Parents and Other roles | | | | | | |
| Experienced students | My child / children | | | | | |
| Colleague(s) in your building | Parent(s) at your school | | | | | |
| Colleague(s) at another school site | Parent(s) in your community | | | | | |
| | | | | | | |
| **Instructional Hardware Used in Teaching** | | | | | | |
| PC Desktops and Laptops | PC Desktops and Laptops | | | | | |
| Projector Screens | Projector Screens | | | | | |
| Electronic Whiteboards | Electronic Whiteboards | | | | | |
| Flipped Learning | Mobile devices | | | | | |
| Mobile Learning | Television | | | | | |
| Television | 3D Printers | | | | | |
| Virtual Field Trips | Other | | | | | |
| 3D Printing | | | | | | |
| Other | | | | | | |
| | | | | | | |
| **Sources of Information** | | | | | | |
| For the Parents and Other roles | | | | | | |
| Colleague(s) in your building | Parent(s) at your school | | | | | |
| Colleague(s) at another school site | Parent(s) in your community | | | | | |
| IT staff | Customer service | | | | | |
| Principal | School staff | | | | | |
| Innovative students | My child / children | | | | | |
| | | | | | | |
| **Added/Updated the following questions** | | | | | | |
| How do you define innovation in schools? | What is your definition of a school that is innovative? | | | | | |
| (No previous question) | How do you define innovative teaching practices? | | | | | |
| | | | | | | |
| **Instructional Technology Used in Teaching** | | | | | | |
| Blackboard | Blackboard | English Central | Kahoot! | NearPod VR | Scratch, Scratch Jr. | WhatsApp |
| Kahoot! | BrainPOP | Facebook | KerbalEDU | Plickers | Seesaw Portfolio | Wikipedia |
| Google Classroom | ClassCraft | Google Classroom | Khan Academy | Prezi | Socrative | YouTube |
| | Code.org | Google Earth | Lego Mindstorms | Quipper School | Sphero | Other |
| | Dash & Dot | Google Expeditions | MinecraftEDU | Quizlet | Swift Playgrounds | |
| | Edmodo | Instagram | Mystery Skype | Schoology | Twitter | |

# Appendix D

## Characteristics of Innovative Schools

| Responses | Codes |
|---|---|
| A pioneer in education and finding different ways to teach/reach/meet different student needs. | Differentiated teaching for students |
| A school that is willing to create and adopt different ideas with technology. The school's priority should be to jump-start the way students thinking critically and using technology to do so is innovative | A willingness to create and adopt ideas |
| Always changing and learning new concepts to help children learn | Fostering a culture of learning and sharing between students and teachers |
| An innovative school respects tradition but tweak them with futuristic needs. | Bridging traditional and innovative teaching practices to connect with students |
| Constantly learning and adapting to new technologies | Having a student-focused culture |
| Having a staff that is opened to new ideas and ready to implement technology in the classroom. | 1. Openness of staff to learn about technology<br>2. Willingness to implement technology in teaching practices |
| Having current technology to benefit instruction. | Having current instructional technologies |
| Integrating technology beyond computers | Integrating technology beyond computers |
| On the cutting edge of what's new | On the cutting edge of what's new |
| One on the cutting edge of technology, constantly staying in the know to effectively impact the classroom. | Continual learning about new technology and practices |
| One that takes the best practices and continually puts them into their school culture | Having a student-focused culture |
| Student-centered | Having a student-focused culture |
| Tries new things | A willingness to break from convention |
| Working together to create | Merging of various opinions to create new ideas |
| Adopting and learning how to use technology to create meaningful change | Using technology to create change |

# Appendix E

## Definitions of Innovative Teaching Practices

| Responses | Codes |
|---|---|
| Having current technology to benefit instruction. | Having current instructional technologies |
| Always willing to learn and adapt | A willingness to learn and adapt |
| Being in the know, understanding what is going on in and out of the classroom. | Environmental awareness inside and out of the classroom |
| Continuously growing and learning new technology and practices. | Continual learning about new technology and practices |
| Having a meaningful relationship with students in order to better understand how to make huge impacts on their lives. | Having a student-focused culture |
| Innovative teaching mixes traditional with new but makes sure it incorporates the student's needs and level. | Bridging traditional and innovative teaching practices to connect with students |
| Meeting children where they are. Creating many ways of learning and sharing it with other teachers | 1. Differentiated teaching for students.<br>2. Fostering a culture of learning and sharing between students and teachers |
| Using cutting edge ideas and materials | Using cutting edge ideas and materials |

# VITA

Wilmon Brown III

Candidate for the Degree of

Doctor of Philosophy

Thesis: THE DIFFUSION OF INNOVATIONS IN URBAN AND SUBURBAN OKLAHOMA SCHOOL DISTRICTS

Major Field: Education

Biographical:

Education:

Completed the requirements for the Doctor of Philosophy in Education at Oklahoma State University, Stillwater, Oklahoma in July 2019.

Completed the requirements for the Master of Science in Educational Psychology at Oklahoma State University, Stillwater, Oklahoma in 2015.

Completed the requirements for the Bachelor of Science in Psychology at Oklahoma State University, Stillwater, Oklahoma in 2013.

Experience:

Educational Researcher, Tulsa Community College, Tulsa, OK
Director of Research and Analytics, Growing Together, Inc., Tulsa, OK
Strategic Data Integrity Associate, Airgas, Inc., Tulsa, OK
Associate Director of Research, Oklahoma State University, Stillwater, OK
Instructor, Oklahoma State University, Stillwater, OK
Instructor, Northeastern State University, Broken Arrow, OK
Instructor, Tulsa Community College, Tulsa, OK