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NATIVE AMERICAN COMMUNITY DIGITAL DIVIDE: STUDENT INSIGHTS

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DAKOTA STATE UNIVERSITY

NATIVE AMERICAN COMMUNITY DIGITAL DIVIDE: STUDENT INSIGHTS

A doctoral dissertation submitted to Dakota State University in partial fulfillment of the requirements for the degree of

Doctor of Philosophy

in

Information Systems

March 2023

By
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DISSERTATION APPROVAL FORM

This dissertation is approved as a credible and independent investigation by a candidate for the Doctor of Philosophy degree and is acceptable for meeting the dissertation requirements for this degree. Acceptance of this dissertation does not imply that the conclusions reached by the candidate are necessarily the conclusions of the major department or university.

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ABSTRACT

The digital divide continues to be an issue for many Native American individuals in rural tribal areas. This research used a qualitative grounded theory method from the data collection of semi-structured interviews with Native American university students. The open coding of the transcribed responses was used to analyze the text data from individual Native American experiences. The data analysis codes included cost, location, access, digital literacy, and technology knowledge as continuing issues. The coding also shows limited technical support or training availability in the communities. The absence of technology use increases the need to understand factors that remain digital divide barriers for Native American communities. The digital divide - individual experiences model (DD-IEM) is based on three main categories: community, education, and home environments. Six propositions produced the DD-IEM that encompasses digital environments within the three settings that are unique to each individual.

Declaration

I hereby certify that this dissertation constitutes my own product, where the language of others is set forth, quotation marks so indicate, and that appropriate credit is given where I have used the language, ideas, expressions or writings of another.

I declare that the dissertation describes original work that has not previously been presented for the award of any other degree of any institution.

Signed,

_____

<Student name>

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CHAPTER 1

INTRODUCTION

The introductory chapter begins with a general background of Native American community demographics. The statement of the problem is the next section that identifies the digital divide inequities associated with Native American communities. The chapter concludes with the research question development and presentation.

General Background

The term digital divide was first introduced in the late 1990s as a division between individuals with access to devices and the ability to connect to broadband Internet. This divide is referred to as the first-generation digital divide. The second-generation digital divide includes technical skills and uses (Hargittai, 2002). The expansion of the digital divide began with a lack of access to devices and the Internet. This divide progressed into a second-generation digital divide which is the ability to be productive using devices and the Internet. A third-generation digital divide was later introduced that emphasized the use of the Internet and devices to produce outcomes or tangible benefits (Wei et al., 2011; Van Duersen & Helsper, 2015).

Researchers have made little effort to cross the border and learn from Indigenous peoples, their theories, stories, and knowledge (Myers et al., 2020). Tribal councils require tribal information technology (IT) professionals to fill the role of liaison between technology and tribal communities (Du et al., 2015; Chavez, 2017). Culturally relevant changes to institutional environments require support inclusive of diverse viewpoints and education methods (Kodaseet & Varma, 2012). Current and continuing research is needed to obtain a deeper understanding of individual Native American experiences with the digital divide.

Native peoples continue to be relegated to a mere footnote under an asterisk in reports and scholarship, justifying their exclusion from research studies because of low numbers (American Indian College Fund 2019). Native American communities are unique in relation to other locations and population groups. This study examines digital divide issues in Native

American communities that continue to exist after the expansion of broadband Internet availability in rural areas. Issues with access to technology and knowledge, skills and abilities (KSA) continue to exist in Native American communities. This research will focus on the continuing digital divide issues in Native American communities. Understanding the experiences of Native American students increases the knowledge of digital divide barriers. This study addresses the question, "What digital divide inequities continue to exist for Native American communities?".

Statement of the problem

Research of emerging solutions for rural inequities for improving infrastructure is relevant to Native American and rural communities (Walts, 2011). Additional research is necessary to fill the gaps that examine the experiences of Native American students with technology access across different digital environments. Subramony (2007) recommended that Native American populations transition from users of technology to producers of technology. The divisions and inequities between tribal lands and state or federal land infrastructure development issues are often related to remote geographical environment accessibility. The government's inability and the private sector's unwillingness to assist in closing the gap in these remote environments is a major obstacle (Wynn, 2005). When Native students' needs are not met, the result is the unrealized potential of thousands of people, cascading into potentially tragic personal, familial, social, and economic effects (American Indian College Fund 2019). Increased access to the Internet has not reduced costs associated with rural availability. The House Energy and Commerce Committee shared that there was an urgent need for broadband deployment in tribal lands (United State House Committee on Energy and Commerce, 2020). There continue to be issues with technology availability, access, education, and KSA in some rural Native American communities.

Research Question

Technology affects all levels of education disrupting traditional learning environments including innovations that affect individual student learning methods and skills (Youssef et. Al, 2022). The choice of Native American communities to determine future direction and technology development will affect individual everyday lives (Rekhari, 2008). Innovations in

the past have consistently included issues with equity of distribution and access to technology based on economic abilities (Betts, 2009). The persistence of digital divide inequities gave clarity to the division between those who had access to technology and those who did not during the pandemic (Phillips & Shipps, 2022). The lack of broadband access for individuals living in tribal communities was around 35% according to the Federal Communication Commission (FCC) in comparison to 8% for the rest of the United States (Sanchez, 2020). Understanding the experiences of Native American students increases the understanding of digital divide environments. The divisions and inequities between tribal lands and state or federal land infrastructure development issues are often related to remote geographical environment accessibility. This study analyzes the question, "What digital divide inequities continue to exist for Native American communities?".

Research Significance

The importance of analyzing the digital divide disparities among Native American communities continues to be relevant. Additional research to reveal a deeper understanding of lived experiences that show continuing issues with the digital divide in Native American communities. High-risk populations include rural, Native American, and poverty-level status which are all prevalent in many Native American communities. The student population group has increased technology knowledge experiences through academic and personal use. The students are members of Native American tribes and have experiences in other predominately white or urban communities. The diversity of digital KSA, educational environments, culture, and geographical location create a specific group of individuals that can provide greater insight into Native American digital divide experiences.

The study deepens the understanding of circumstances for the digital divide of Native American communities. Research findings may increase the significance of future policies or interventions. The researcher desires that this study contributes to reducing the digital divide. This research will begin with a literature review section containing background and proceed into research design, research methods, findings, emergent theoretical model, and conclusion.

CHAPTER 2

LITERATURE REVIEW

Summarization of the literature review in this chapter will strengthen the foundation of this research. The initial section reviews the digital divide and how it relates to this research. The following section reviews previous research on disparities between races and digital access. The final section of the review discusses digital divide inequities among Native American individuals and communities. This review will conclude with a description of the research gap.

Native American Digital Divide

The digital divide is defined as the disparity of access to digital environments which can include devices or Internet access based on race, socio-economic factors, age, gender, geographic location, knowledge, education, technology aptitude, social, political, or cultural factors (Dijk, 2012). Digital divide factors can also consist of a personal choice for technology aversion (Riggins & Dewan, 2005). Research of emerging solutions for rural inequities that improve infrastructure is relevant to Native American and rural communities (Walts, 2011). Additional research is necessary to fill the gaps that examine perceptions of Native American students that have technology access differences associated with usual everyday activities. An individual daily experience can include diverse technical environments, Internet speeds, devices, and digital access. Prior research has addressed different student populations that were identified as institution-specific or discipline-specific groups of Native American research.

Further research is necessary to get a deeper understanding of Native American individual encounters with a variety of disparities related to the digital divide in their communities. Reducing barriers from the digital divide requires addressing operations, economics, or technologies of infrastructure access and consistency (Walts, 2011). Kodaseet and Varma (2012) state that geographical location contributes to issues with access and exposure to technical skills and knowledge. Technology adaptations must address indigenous cultural information and social traditions to improve indigenous communities' technology

practices (Du et al., 2015). The limited availability of Native American technology experts and access to digital knowledge can restrict the tribal leaders' ability to formulate satisfactory decisions (Chavez, 2017). Winter and Boudreau (2018) indicated that the digital divide research focuses on the benefits of technology for indigenous culture instead of discovering the benefits of indigenous cultures' use and influence on technologies. There needs to be consideration that indigenous and western-influenced societies' intellectualization and utilization of technology are diversely different in practice than currently identified in scholarly articles (Myers et al., 2020). Additional research is needed that examines individual insights with technology.

Digital divide research theory continues to benefit through the examination of disparities of access (Pick & Sakar, 2016). Racial disparities continue to be issues for digital divide inequities. There is nearly a 15% gap between Native American students and the next racial group of Black Americans at 64%. The disparity between Native American students and White Americans was double the disparity with a 30% difference (NEA, 2020). The geographical location of many Native American communities can compound the access issue.

Native American individuals pursuing higher education degrees have more familiarity with digital technologies for educational and personal use. The students also have experiences in multiple digital environments within education and community variances for digital access. Attendance in multiple digital environments increases student response validity. Research of student insights will contribute to the knowledge and identification of themes about continuing Native American community digital divide inequities.

The current digital environment continues to demonstrate instances of the digital divide among Native American communities. The researcher desires this study to contribute to the reduction and elimination of digital divide inequities. Infrastructure issues and digital literacy in lower-income households are the largest contributors to disparities in IT knowledge (Krish et al., 2018). Availability of broadband service expansions have increased availability in rural areas but there is still a slow response to subscribe. Only 30% of rural residents have broadband connections (Atske & Perrin, 2021). The question this research explores is, "What digital divide inequities continue to exist for Native American communities?".

Digital Divide Theories

Table 1 identifies the different theories, authors, date of publication, and a short description of the theory. The theories show how past studies have developed theories for the existence of different digital divide environments. The theories demonstrate how different groups have addressed the digital divide. The motivation for the actions can be an individual or a combination of the theories to reduce inequities from the digital divide. The first five theories address larger groups while the last theory, Individual Difference Theory of Gender and IT, explores individual actions toward addressing digital divide inequities.

Table 1. Digital Divide Theories

Theory	Author	Year	Description
Early modernization theory	Luyt	2006	technological deterministic thinking
Social & Economic Representation Model of Modernization Theory	Hwang	2006	The transformation process of underdeveloped societies
Diffusion theory	Straub	2009	innovation is shared throughout a population
Adoption theory	Straub	2009	is not composed of a single change but a chain of events
Individual Differences Theory of Gender and IT	Trauth, Quesenberry & Morgan	2004	endogenous and exogenous factors that influence an individual's personal development

Digital divide research theories expand on the identification of digital inequities based on economic and location access disparities. Van Dijk (2012) discusses the inequities in social and economic distribution as the foundation of digital divide disparities. Increased research

into second-generation digital divide research. Early modernization theory by Luyt (2006) describes digital adaptation in groups where technology is part of a deterministic thought process. Hwang (2006) expanded early modernization theory into the social and economic representation model of modernization theory. Diffusion theory by Straub (2009) states that innovations that are shared by the entire group reduce the digital divide. Straub (2009) also introduced adoption theory that studies the reduction of the digital divide due to a chain of actions, not a singular change. These theories are beneficial for the examination of response coding and data analysis. The findings are influenced by the different theories for the creation of themes and propositions.

Figure 1. Experiences of Digital Divide – Theoretical Lens

Research Gap

The incidence of in-home Internet subscriptions; however, varies across households, and Native American households are less likely to subscribe to Internet services (Stenberg, 2018). In a review of the underserved status in, race/ethnicity, one quarter (24%) of American Indian/Alaskan Native students reported access to only one device at home and further, 20% of American Indian/Alaskan Native students only have access to a smartphone, compared to 4% of White students a gap of 16 percentage points (ACT Research & Center for Equity in Learning, 2018). Moore et al (2018), continued reliance on the Internet and digital device integration into society continue to increase. The digital divide inequities then increase gaps

in community resources such as disaster aid, emergency notifications, healthcare, and remote access to education or employment (Sandoval & Lanthier, 2021).

The literature on the information systems digital divide among Native American groups has been summarized in this section. Economic-related articles spotlight technology's role to interpret the abilities of students but do not discuss digital abilities (Youseff et. al, 2022). This section also described the different digital divide theories and how these theories relate to coding interview response data. Previous digital divide articles have focused on infrastructure issues but the digital divide extends beyond into mindset of the individual family and overall community (Nayak & Alam, 2022). The review shows a research gap of continuing digital divide inequities that exist in some Native American communities.

CHAPTER 3

RESEARCH DESIGN AND METHODOLOGY

This research used a qualitative grounded theory method to examine Native American students' interaction with the digital divide. The guiding research question is: "What digital divide inequities continue to exist for Native American communities?". The Eisenhardt (1989) approach is utilized with interviews as the primary data collection and open coding for data analysis. The approach enables concepts and relationships to be arrived at and assessed using the 'enfolding the literature' as well as the theoretical sensitivity from open coding (Eisenhardt, 1989). Theoretical sensitivity gives the research insight and gives meaning to the events and happenings in the data. It allows being able to sift through the data and discover new insights. The Eisenhardt approach supports the generation of relationships or theories with constant comparison to the literature and emergent theory with valid relationships, models, or theories due to building processes being interconnected with data.

The data analysis evaluated the response transcript data from the interviews with Native American students to discover individual experiences towards the digital divide. The interviews were recorded and then transcribed to ensure the accuracy of the individual responses. Transcribed data was saved into text files that were used for open coding and data analysis. The files were put into Atlas.ti 22™ to provide storage for coding, analysis, visual diagrams, and network findings.

Methods

The area of the digital divide inequities that continue to exist in Native American communities is complex, vague, and context-specific. The qualitative methods used in the research can yield data from which process relationships, models, and explanations about how and why processes and outcomes occur can be developed (Markus & Robey, 1988, Klein & Myers, 1999). The study uses a grounded theory methodology. Theory discovery of systematically obtained data for social research (Glaser & Strauss, 1967). The collection of data for analysis through breakdown, sorting, and synthesis is a major component of grounded theory (Charmaz, 2006). The substantive theory is limited to a particular area and formal

theory is fundamental and possibly encompasses multiple areas of study (Glaser & Strauss, 1967). The formation of theory from the continuing digital divide issues among Native American communities is the focus of this study.

Klein and Myers (1999) stated information system interpretive research should be conducted and evaluated using anthropology, phenomenology, and hermeneutics. Clear and conscious selections concerning the casual building of theory creation (Markus & Robey, 1998). Emerging categories are given context and relationship through the utilization of a structured design provided by Corbin and Straus (1990). The open codes were reviewed to create axial codes that were later combined into broader categories. The categories were analyzed to create themes. Propositions were created from the categories and themes.

Furthermore, grounded theory is utilized using the Unlu-Qureshi four-step coding instrument for data handling, coding, and results (Qureshi & Unlu, 2020). The research data analysis is driven by the experiences of Native American students. This research design identifies a structure through the collection, analysis, and interpretation of the findings based on a logical model that identifies potential relationships between factors (Nachmias & Nachmias, 1992). The responses were open-coded for content meaning and connotation.

Data Collection

The questions were constructed to allow open-ended questions to gather the greatest amount of participant feedback. The questions were created to address the experiences of individuals in different digital environments. The environments for the study of individual digital technology use settings included community, education, and home. Participants also responses were expanded to include knowledge of extended family, education, and community environments. The interviews were open to all majors and created a unique perspective to speak with students from all majors instead of only information technology (IT) students. The why and why-not perspective of perception analysis developed an understanding at a deeper level of complexity and comprehension. The interview discussions were conducted using physical or virtual interviews. The choice of method was at the discretion of the individual being interviewed. The digitally recorded interviews were approximately 30 minutes in length and were transcribed using MS Teams™ to capture audio with no video. The audio transcription was reviewed for validation of transcription accuracy.

Table 2 shares the research method that was used for the interview response stages of analysis (Creswell, 2003).

Table 2. Interview Method

Modeling construct	Description
a	identify interviewees
b	determine the interview type
c	include audio recordings of the questions and answers
d	make brief notes
e	select an appropriate interview locale
f	develop a flexible plan
g	probe participants to maximize information output
h	maintain professionalism and courtesy

"No additional data are being found whereby the [researcher] can develop properties of the category", is defined as the grounded theoretical saturation point (Glaser & Strauss, 1967). Interviews had increased data replication responses at interview eight. Response collection and analysis begin to create a replication of the data which is a sign of saturation (Morse, 1995).

Researcher Point of View

The researcher does not come into this study without prior knowledge of the population or cultural stereotypes. The researcher has lived near and has been involved in different environments with Native American communities. This factor will be considered as the data are collected, coded, and analyzed for this research to maintain accurate data analysis without personal influence. Careful consideration will be given to the collection and interpretation of the findings. Every attempt will be made to disseminate the data without influencing the interpretation of the data in the final analysis.

Research Tools

The research will consist of one-to-one interviews conducted either in person at the Native American Cultural Center on the state university campus or through virtual interviews using MS Teams™ to record only audio and, in some instances, transcribe the sessions. These transcriptions will be compared to the recorded audio to ensure response accuracy. The qualitative analysis application Atlas.ti 22™ will be used for storage, coding, analysis, and graphical representations.

Data Analysis

The open codes were categorized from the response data of the individual interview transcripts. Initial reads were done with the assistance of the interview audio recordings to ensure accuracy. This action was repeated to create codes that captured the greatest meaning from the data analysis. The researcher's inductive interpretation of information was unbiased and evolved as the research was designed, developed, conducted, recorded, and analyzed. According to Patton (2002), there are two sections to qualitative research, instruction, and application. Instruction deals with the explanation of concepts, analysis, and interpretation of findings, ongoing synthesis process, and final synthesis presentation. Application is the presentation of the completed analysis and interpretation. Data analysis goals are to increase the meaning of the responses by assigning the blocks of raw data into significant code assignments and this creates qualitative research that is driven by questions with a learning directive (Patton, 2007).

The initial analysis step used a semantic open coding of the data from the individual responses. The identification of significant portions of information from the transcripts was analyzed and marked using descriptive verbal open code tags. The codes are repeatably reanalyzed to ensure the final codes are used to categorize meaning from the responses or portions of the responses. The Atlas.ti 22™ application was utilized as a repository for all audio and text files. The application establishes a chain of evidence and versioning of the files for increased construct validity (Yin, 2008).

The Unlu-Qureshi four-step coding instrument was applied to the data analysis of the interview responses. The instrument begins with initial open coding of the data from interview transcripts. The second element concept contrasts and compares the codes to create

greater generalizations. Categories are part of the third stage which examines the concept of relationships. The final element is the review of all codes, concepts, and categories to create an encompassing theme shown in figure 2.

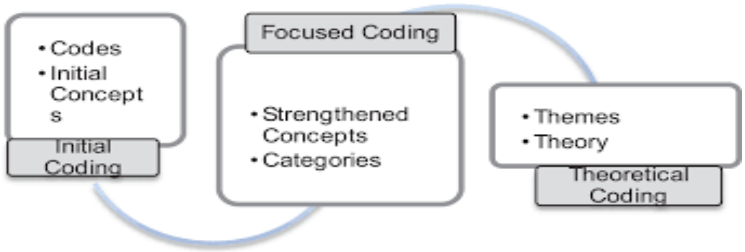

Figure 2. Unlu-Qureshi (2020) – Four-Step Coding Instrument Stages

Open Coding

The initial phase of the data analysis is open coding. The text from the transcripts was reviewed for relevant items that were quoted for initial tags and then reexamined to identify the first set of open codes identified in Appendix A. The codes come from the meaning of the dialogue text for the creation of "in vivo" codes that are created from the vivid word in the text (Charmaz, 2006). The guidelines provided by Charmaz, (2006), are shown below in Table 3. The association of codes, visual graphic creation, and the ability to chain codes together from open to focused categories and themes were assisted by the use of the Atlas.ti 22™ application.

Table 3. Charmaz - Guidelines for Initial Coding

Guidelines for Initial Coding
Remain open
Stay close to the data
Keep your codes simple and precise
Construct short codes
Preserve actions
Compare data with data
Move quickly through the data

Focused Coding

Focused codes sort and group the data into concepts and categories. The formation of these groups is the desired outcome of axial coding. The codes applied during the open phase are segmented and separated from one another. The comparison of the codes looks for significant connections between the codes to create conceptual groupings for continued research. The different conceptual groupings are then used to create emerging themes.

Theoretical Coding

Theoretical codes were used to build on the two previous coding stages. The purpose of the theoretical codes is to combine the conceptual groupings into larger categories to produce emerging themes from the data. Themes are developed to clarify relationships that were initially produced at the axial levels. Emerging categories are given context and relationship through the utilization of a structured design (Figure 2.) provided by Qureshi & Unlu (2020).

Ethical Considerations

Ethical considerations were addressed in different ways. The research has been submitted to the Dakota State University and Minot State University Institutional Review Board (IRB) for review and approval. The research was administered following individual and university requirements for using Collaborative Institutional Training Initiative (CITI) program training standards and practices. There was also a review by an independent expert in Native American culture to ensure proper practices are being used in the research and the dissemination of findings.

Validation

Qualitative validity confirms the researcher has checked the accuracy of findings by incorporating procedures versus quantitative reliability by research approach consistency among a variety of researchers and studies (Gibbs et al., 2007). Creswell and Creswell (2017) outline different procedures to ensure research validity such as the definition of qualitative validity, triangulated validation approach and resources, validation of findings, descriptive findings, opposing responses or views, time in the field, peer debriefing, and an external

auditor to review the project. The research will incorporate multiple reviewers along with an independent outside expert in Native American culture for proper cultural expression and use of grammar assessment.

In this chapter, the research objectives and analysis method have been described. There is a description of the participants who participated in this study and the tools that were used to record, transcribe, code, and analyze the data. This chapter has defined the qualitative grounded theory method of research that was used for this study. The section finishes by addressing ethical considerations and validation of the findings from the interviews.

CHAPTER 4

RESULTS

This research addresses the question, “What digital divide inequities continue to exist for Native American communities?”. The findings from this research are presented in a discussion of how responses connect to individual interview questions or sets of questions. Some of the questions are identical except for reference to home, community, education, or state university environments. A subset of five questions regarding demographic information was asked within question one of the interviews. The interview guide is available to view in (Appendix A).

Interview Demographics

Eleven (11) Native American student participants ranged in age from 18 to 54 and included current, new, and transfer students. The interviews resulted in 203 pages of transcribed text that was based on 237 total minutes of audio interview recordings. A demographic summarization table (Table 3) is included below.

Table 3. Interview Summary

Demographic Information	
Number of students	11
Age range	18 to 54
Degree	3 Associate; 8 Bachelor
Gender	2 Male; 8 Female; 1 Two Spirits

Table 4. Data Collection Summary

Data Collection Information	
Recorded minutes	237
Pages of transcript	203

Findings

The 203 transcript pages identified 1,492 quotation open codes which were reduced to 132 initial codes (see Appendix B). Response data analysis showed a slowly increasing use of technology in education for research and knowledge. There was additional use of technology for entertainment or social communications. Some students stated social activities were on their smartphones and education, research, entertainment, and other functions were done on personal devices. Broadband Internet access is available in rural areas but requires the added cost of installation from the access point and high costs associated with monthly subscription fees. This was seen as an issue for access to technology and educational responsibilities outside of the education settings. Increased educational access could be a possible advantage for elders to also access technical knowledge, services, and support. Device and Internet experiences were heavily represented throughout the interview data. The codes for availability and speed for Internet access were at high levels and were seen as beneficial only if it was fast, reliable, and affordable.

This coding review was repeated at different times during the analysis stages to improve relevancy. The merging of codes was done to reduce similar codes into larger generalizations. The codes identified from the open coding process were compared for relevancy within the interview data. The focused codes (Appendix C) with the greatest instances are identified in Figure 3. The data shows 500 positive and 493 negative code connotations associated with digital divide response insight analysis. The first column of the table is the negative column which lists the codes followed by the second column which identifies the number of code instances. Two additional codes were only associated with the negative instances in the table listed below the other codes. The positive code labels are the same as the negative code labels with the number of positive code instances in the next column. The final column shows the total number of times the codes were used in the analysis.

NEGATIVE		POSITIVE		Totals
• 1G Digital Divide	47	• 1G Digital Divide	43	90
• 2G Digital Divide	11	• 2G Digital Divide	9	20
• community	34	• community	21	55
• device access	40	• device access	55	95
• device use	19	• device use	45	64
• education	44	• education	87	131
• home access	54	• home access	53	107
• home use	12	• home use	12	24
• influence	9	• influence	10	19
• Internet speed	19	• Internet speed	19	38
• technology availability	82	• technology availability	98	180
• technology knowledge	34	• technology knowledge	48	82
• cost	50			
• location	38			
	493		500	993

Figure 3. Digital Divide Connotation Code Instances

The codes are generalizations of open codes that were related to the digital divide. The first-generation code includes device and Internet access and the second-generation code label relates to issues such as use and KSA. Community code references community access, availability, and community KSA. Cost was associated with Internet access fees and device expenses. Device access relates to access to a digital device for personal or educational use. The code for device use relates to having a device and using it for productivity. Education code was the use of technology in educational settings. Home code instances show data that was related to home device access and home device use. The influence code included data about the influence of developing technology KSA. Internet speed identifies codes about reliability and speed. The location code relates to geographical location items. The last two codes of technology availability reference devices, access, and Internet, and the final code technology knowledge encompassed KSA. The codes identified as cost for Internet or devices and rural location were only mentioned as negative connotations.

The open codes of text were separated into three categories. The categories included community (191), education (197), and home (209) open codes from each digital environment group of questions. Each environment has some similarities and differences. Each theme has different experiences and influences for individuals in Native American communities. The different codes were separated into two different connotations after further review for generalized code creation. It was noticed during the examination of the initial codes and later reemphasized during the focus and theme coding stages.

The focused codes were created and identified in both connotation areas negative and positive. The instances of codes were totaled and put in total columns for each sentiment and the total instances within the data analysis. The totals give weight to the focus codes from open codes. The greater the number the more imp important giving to the topic overall or based on negative or positive sentiment. The largest code instances related to technology availability. It was the largest total of all the focused codes in total and each connotation. The analysis shows large numbers for positive instances but also negative instances. The codes reemphasize the data analysis and show the codes that were most identified in the response analysis. It could also be further examined to give a greater understanding of the data for themes that were both negative and positive about technology availability. The codes and connotation analysis were used to create the final themes and propositions based on the number of occurrences.

The final data analysis reveals that there has been improvement in the technology available for broadband Internet access. There were also insights into the increase in technology devices and Internet access for students during the pandemic. Post-pandemic codes show that technology is still available in educational settings but continues to be an issue for students in homes that are rural or lower-income households. Many communities have limited access for individuals to use, learn, or get support to use technology. There is a growing effort to increase the availability of technology but there are few opportunities to use technologies for developing individual or community use. Cost and KSA continue to be major barriers for individuals in Native American communities.

Community Digital Environment

Community environments vary within each geographical location. Individuals living in the community centers had superior Internet connections but were costly and had a limited selection of Internet providers. The communities had technology resources at schools but not readily available in the community. There were benefits to being able to utilize technology in school but it was usually on a limited basis. The data also revealed issues with KSA about how to understand and be productive with technology. Respondents expressed experiences with digital divide inequities in Native American community settings. The initial responses discussed the lack of certain technology availability and difficulty in accessing devices within

the community. The codes show positive changes in technology availability in educational environments and more homes. There are still negative codes for second-generation digital divide issues with community access, use, and knowledge.

> *Oh, in my community back home, there's really nowhere unless you're in the school system. So, in the school system, we don't really have a place where you can go to just do…you know… if you don't have a household computer or you don't have a job, or you're not in a school where computers are released, there's really no place you know…you just kind of have to hope that you can…kind of hope you know somebody that owns the…you know…the things that you need to get done. We don't have…you know like a local library or, you know, just a local place where you can go to use computers. You just kind of have to hope you know somebody that has one or you have to work in one of the school systems. – Interviewee #05*

Education Digital Environment

The educational digital environment experiences included access to technology at a young age through high school but lacked proper knowledge on how to use applications, device repair, and research activities. In the last two years due to the pandemic influence on technological solutions, greater access to devices was developed for students but many families still struggled with Internet cost, availability, and reliability. Native American individuals in an educational setting have reduced issues of access for first-generation digital divide inequities with access to devices and the Internet. Second-generation digital divide inequities are prevalent in all digital environments except within the state university digital environment. Native American individuals need additional opportunities to obtain knowledge and skills with technology before beginning in higher learning settings. The increased digital knowledge for Native American individuals creates opportunities to grow digital abilities instead of just using technology to perform tasks.

> *I'm not totally sure it might…it might be able to do something with like just teaching about the technology because a lot of the problems like I*

even have problems with the technology sometimes where it's just because I don't completely understand how something is working and reload moving some of that frustration from it would probably help a lot because I do know also that some people just don't use technology because they, they get so frustrated with trying to make it work…umm…that if you don't get support, that makes it even more frustrating. – Interviewee #09

Home Digital Environment

Home environment responses described many digital divide inequities and issues that exist due to financial and geographical issues. Some responses revealed issues with digital knowledge for the support of individuals at home and use by some members of the community. Internet speed and reliability were discussed positively by all Native American students in multiple responses about the digital divide environments and some educational discussions. Access to the Internet was seen as adequate for most environments but remained expensive and unreliable in rural areas of the communities. The geographical location in rural areas increases monthly access costs. The speed and reliability of the access do not always justify the cost. Some rural homes are still unreachable for broadband Internet access. The home environment was mostly an issue due to the cost of access fees. The analysis showed this was influenced by geographical distance or a limited selection of providers. There were also issues with home devices and knowledge of how to use technology. Many of the community's younger members have greater access to devices in educational settings but lack adequate access to the Internet at the home. Home access showed a high number of codes due to the necessity for educational access during the pandemic.

Start talking to our community leaders and our politicians. Whoever can help our community get access to free Wi-Fi up. I mean, right now I know this was kind of apples and oranges, but we were able to get free lunches now for our kids because of COVID. Well, why can't we start the ball rolling to get free Wi-Fi? I think everybody has the right to that. – Interviewee #02

CHAPTER 5

EMERGENT THEORETICAL MODEL

The research addresses the question of what digital divides still exist for Native American communities and is the basis for the theoretical model. The data analysis generated codes, concepts, and finally themes. Positive themes included increased access to broadband Internet in populated areas of Native American communities, increased device accessibility for education during the pandemic, and increased community awareness for device and Internet access in the home. The negative themes include increased access but the barrier to access due to cost and rural location, lack of community access to technology, and the final negative availability of knowledge and skills development in the community, education, and home. The propositions will be discussed in greater detail and the emergent theoretical model (Digital Divide – Individual Experience Model - DD-IEM) will be presented in association with the data analysis results.

Propositions

Proposition 1: Community availability to broadband Internet has increased for those near population centers and in educational facilities.

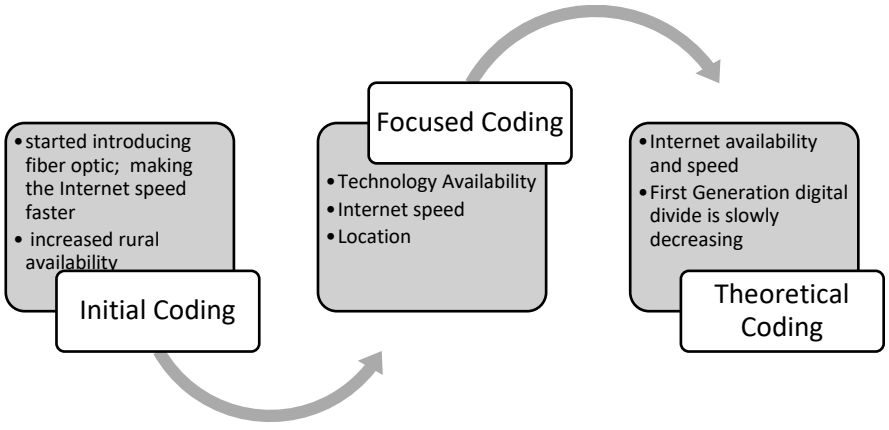

Figure 4. Community Digital Divide Positive

Interview response data showed that the majority of Internet and connectivity access was within the educational system of their communities. One of the larger coded instances of

the participant responses was the greater availability of broadband Internet in the population centers with limited availability in the rural areas of the communities. Any individual able to access educational facilities had access to devices and the Internet. Some responses mentioned access at some libraries depending on the community and with limited restricted public devices.

Proposition 2: Device access in the classroom for student education has increased with pandemic funding.

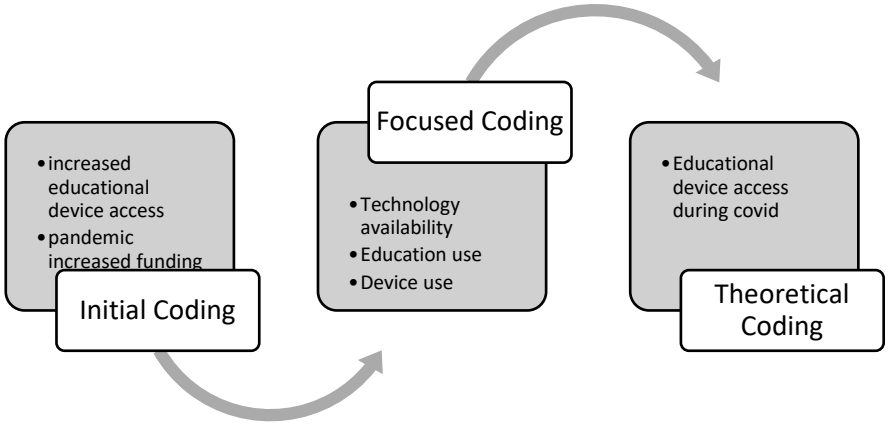

Figure 5. Education Digital Divide Positive

Device access in educational facilities is available to attending students, faculty, and family. Individual student access increased for personal laptops or tables during the pandemic for distance education using the device and availability to broadband Internet for individuals with the ability to access at home. Location was a large factor in availability for students. After the pandemic students have digital devices for education but many are limited to use in educational facilities.

Proposition 3: Broadband Internet is available in more homes.

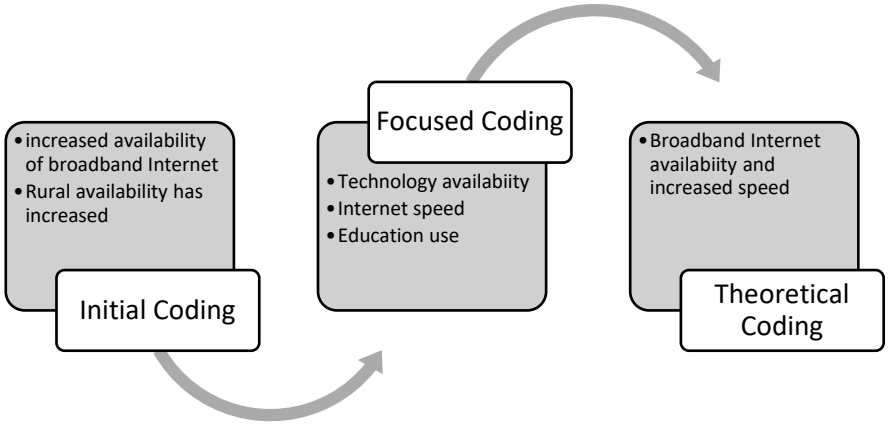

Figure 6. Home Digital Divide Positive

The availability of broadband Internet has increased for most Native American homes in the more populated locations. The rural home availability has increased for most locations depending on the distance from population centers or mainline locations. Access to devices and the Internet has seen the greatest growth in educational facilities. Smartphone access was shown to be the main device used for Internet access in many homes.

Proposition 4: Reduced community open access to technology devices, the Internet, and knowledge increases digital divide disparities.

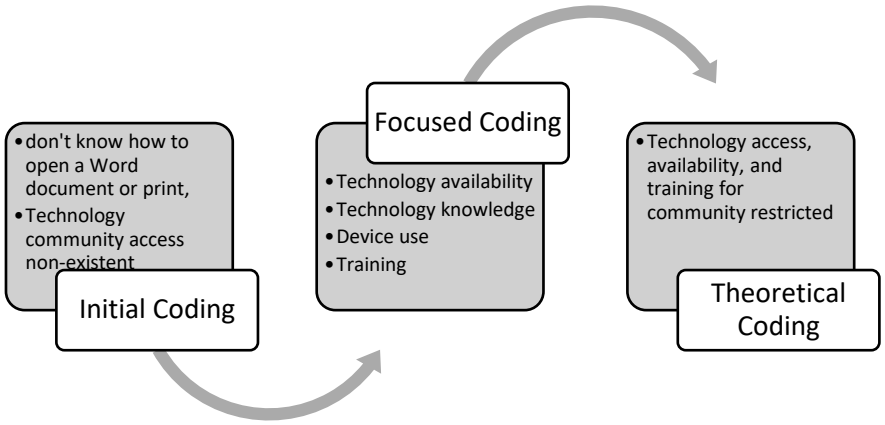

Figure 7. Community Digital Divide Negative

Open access to technology within communities is non-existent. Community access reduces exposure to individuals to use or obtain KSA about using technology. The first-generation digital divide is reduced if you are a student or work in the educational system. Community members' access to learning, utilizing, or technology is limited. Community environments vary within each geographical location. Individuals living in the community centers had superior Internet connections but they were costly and had limited providers. The communities had technology resources at schools but not readily available in the community. There were benefits to being able to utilize technology in school but it was on a limited basis. The data also revealed issues with KSA about how to understand and be productive with technology.

Proposition 5: Technology education is necessary at a community level to assist individuals with knowledge about Internet and device skills to help reduce second and third-generation divides.

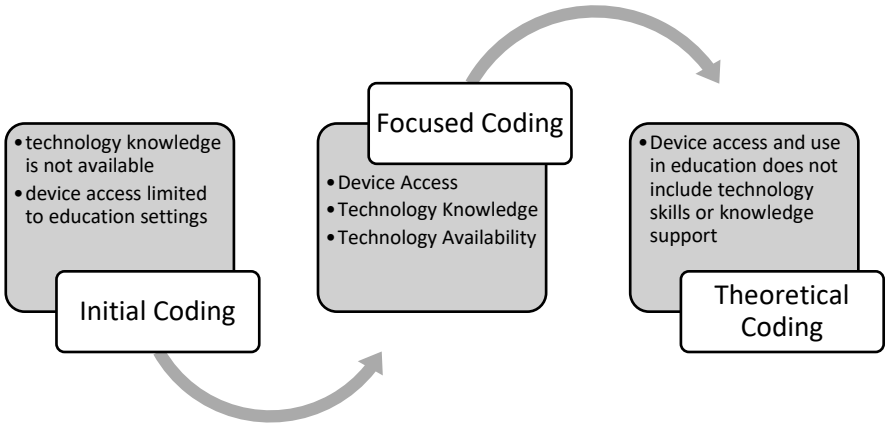

Figure 8. Education Digital Divide Negative

There is a need for technological support according to the data analysis. The ability to troubleshoot and secure devices are something that would require individual knowledge or options for education. Community access codes showed reduced opportunities for individuals to use or obtain KSA about using technology. Access for community members to learn, utilize, or access technology was indicated as limited by the response data. The inability to access technology was seen as being a large factor in digital divide codes. Knowledge codes related to the home were identified as a digital divide emphasized during the pandemic. Families were able to get a device and access to the Internet but children usually stayed with elders who have limited or no KSA about how to use or troubleshoot issues for students attending distance learning programs were coded in the data analysis.

Proposition 6: The socioeconomic factors in rural Native American communities compound the digital divide through delayed home access due to cost.

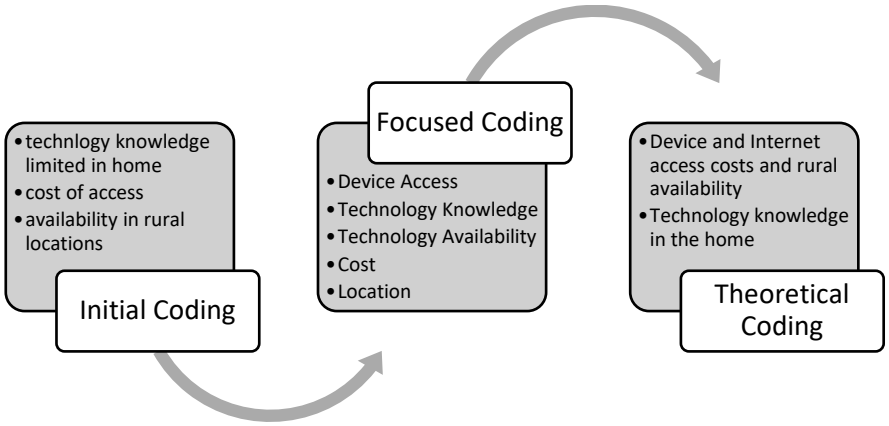

Figure 9. Home Digital Divide Negative

The socioeconomic factor is considered the most significant issue with Native American communities and digital divide inequities. Location is a contributing cost factor to access and availability. Individuals who are fortunate enough to have had access are more knowledgeable than other community members. Economic differences codes in the response data are the most recognizable barrier for not just Native American communities but all minority communities. The student data also shows there is a belief in greater technology availability and access in urban areas for other minorities than in urban locations. The response data show cost issues related to limited providers. The data repeatedly referenced the cost of Internet access and the ability to afford the cost of a device for their home.

Digital Divide – Individual Experience Model (DD-IEM)

Digital divide inequities can be related to a digital environment and the individual experiences with technology in those environments. The experiences can be negative or positive which has an additional influence on what experiences an individual may share with immediate or community family members. There is also the perception influence a family member may share with the individual. All the factors are affected by the first- and second-generation inequities that may exist in one or all environments. The environments are further influenced by varying economic and sometimes racial factors.

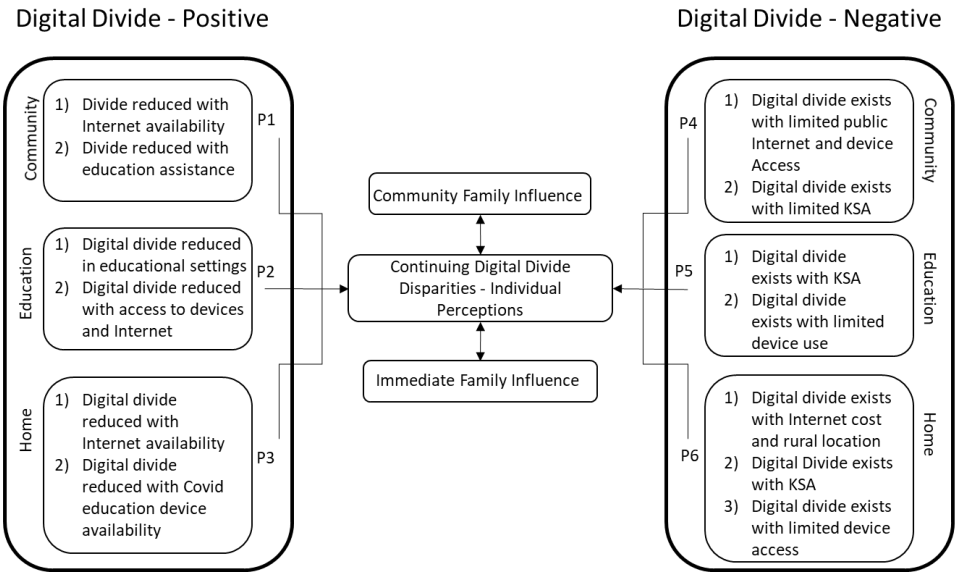

Figure 10. Digital Divide - Individual Experience Model (DD-IEM)

The DD-IEM shows the positive or negative data analysis insights based on individual interviewee response coding. The model begins with placing the individual perception insights in the middle section of the model. The middle section shows how perceptions can influence the individual or how the individual can influence other members of the community. The outer connotation areas are separated into positive and negative environments of an individual's daily opportunities to interact with technology. The insights from the analysis reveal possible areas of positive improvements in Native American communities, education settings, or households. Each category then identifies the overall themes that were discovered from the data analysis within each digital environment. The findings are then used to create the same analysis but with negative insights to show the type of themes that exist with negative perceptions or environments. The model creates a greater understanding of the data analysis and how it can be assembled to create a graphical representation of the greatest insights according to the participants in different digital environments.

The Digital Divide – Individual Experience Model DD-IEM (Figure 10) shows how access to different technologies in different environments can be inconsistent having a positive or negative influence on the individual, the family, the community, education, and culture. As little as one component of the model can have either a significant influence on the whole environment or no effect at all. The sections are all conditional upon one another to

produce a negative or positive impact on the digital divide inequities for an individual or community.

CHAPTER 6

CONCLUSIONS

This qualitative grounded theory study aimed to explore continuing digital divide issues within Native American communities based on student interview data analysis. The research discovered emerging themes from the interview response transcript coding. The analyses of the transcripts produced numerous codes which have been grouped into different connotative response themes. The interviews revealed contrasting themes between home, community, and educational environments. The analysis revealed that there is an opportunity for digital availability in Native American communities, but availability does not address the income disparity that exists in communities that limit individual access to technology. Geographical location and governing issues between tribal reservations, states, and federal agencies complicate the ability for rapid solutions that could reduce the digital divide.

This research makes contributions to literature, theory, and practice. Native American studies about student digital divide experiences were reviewed to find previous study populations, methods, and theories from the research. The contribution of knowledge within the discovered propositions and the creation of the DD-IEM contributes to the body of research on Native American digital divide issues that continue to exist in some communities. Deep and rich experience analysis of Native American students reveals continuing digital divide research areas for additional populations or research topics. The study enriches the Native American digital divide literature through the use of a qualitative research approach supplementing previous research studies. A deep and rich perspective analysis of Native American digital environments reveals how digital divide inequities continue to exist for many individuals. Geographical location and economic disparities continue to be issues that are unique to Native American individuals versus other races. Native American communities continue to be family and community focused at a level that is difficult to compare to other cultures and populations.

Implications for Communities

The perceptions from the Native American student response data and the development of themes from the response data are limited but confirm digital divide inequities at different levels and different environments. The issue of access to devices and support at the community level is another area for additional research into successful strategies to increase availability and access to technology and support. Centers with assistance for using and utilizing technology can reduce costs for healthcare, applying for services, and virtual interactions that may otherwise include the cost of travel. Remote or virtual employment, job searches, online applications, and the need for a device and technology are barriers to employment opportunities.

Limitations and Future Research

This research has provided insight into the experiences of the digital divide by Native American students. The study has a limitation due to the qualitative nature of the study with a limited sample size of participants. The Native American student sample is comprised of individuals pursuing undergraduate degrees. The results of the research may not be generalizable to other populations. The study results may not represent the changing adaptions and implementations introduced during and after this research in the tribal communities.

Additional qualitative studies would be beneficial in different geographical locations and with different groups. Research could expand on qualitative research within different Native American communities. The investigation of the opportunities for access and knowledge of Native American elders within tribal communities would also add to this body of knowledge. Different factors and influences are associated with Native American communities and other indigenous populations. Some individuals are aware of technology but choose not to use digital environments. Future research could examine community concerns about technology could influence community cultures and traditions. Interviewee #08 summarized, “I think that in situations where that information is not given or that knowledge isn't shared and then all of a sudden, it's a requirement for the student to be able to do it. I think we're…we're creating multiple opportunities for failure”. The research data indicate that there are still opportunities for research within Native American communities to gain unique perspectives on the digital divide.

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APPENDICES

APPENDIX A: INTERVIEW GUIDE

{Phrase “computers and the Internet” is substituted to increase understanding of the topic for discussion. “digital divide” caused confusion about the topic of the question.}

Demographic survey form (optional)

Please identify your gender

Please identify your age group (18-24, 25-34, 35-44, 45-54, 55-64, 65+)

Please identify your level of education (Associate, Bachelor, Master, Doctoral)

Please identify your county and state of residence

Please identify your tribal affiliation

Interview Questions

1. How have you used computers and the Internet during your lifetime?
    a) Did you have computers and the Internet at your k-12 school?
    b) Did you have computers and the Internet at your home?
    c) Do you own a computer (desktop or laptop)?
    d) Do you own a smartphone?
    e) What device do you use most to complete your schoolwork? Reason?
2. How has Internet speed affected your experience with online websites and content?
3. How would you describe the availability and quality of the computers including Internet access at the university?
4. How does the university incorporate computers and the Internet into your educational experience at the school?
5. How has the university influenced your perceptions of computers and the Internet?
6. What could be done to improve access and usage of computers and the Internet at the university?
7. How would you describe the availability and quality of the computers including Internet access in your community?

8. How does your community incorporate computers and the Internet into your educational experience at the k-12 school?
9. How has your community influenced your perceptions with computers and the Internet?
10. What could be done to improve access and usage of computers and the Internet in your community?
11. What could be done to improve access and usage of computers and the Internet in your community k-12 school?
12. What could be done to improve access and usage of computers and the Internet in home?
13. How would your life be different if you did not have access to computers and the Internet?
14. How do you think your experience with computers and the Internet differs from other racial groups in the United States?

APPENDIX B: INITIAL CODES

- acceptance
- access
- age
- art
- availability
- barrier
- communication
- community
- convenience
- cost
- education
- elders
- employment
- entertainment
- experience
- experience: access
- experience: age
- experience: application
- experience: choice
- experience: collaboration
- experience: communication
- experience: community
- experience: covid
- experience: device
- experience: education
- experience: home
- experience: hot spot
- experience: Internet

- experience: location
- experience: Native American Center
- experience: negative
- experience: non-TCU
- experience: production
- experience: race
- experience: reliability
- experience: research
- experience: social
- experience: speed
- experience: technology
- experience: work
- family
- flexibility
- home
- hot spot
- income
- installation
- issue
- knowledge
- Native American Center
- negative
- negative: 1G Digital Divide
- negative: 2G Digital Divide
- negative: community access
- negative: cost
- negative: device access
- negative: device age
- negative: device use
- negative: education

- negative: employment
- negative: home access
- negative: home knowledge
- negative: home use
- negative: influence
- negative: installation
- negative: Internet availability
- negative: knowledge
- negative: location
- negative: race
- negative: reliability
- negative: speed
- neutral
- patience
- perception
- perception: application
- perception: community
- perception: convenience
- perception: device access
- perception: device use
- perception: education use
- perception: home access
- perception: home use
- perception: Internet access
- perception: Internet content
- perception: Internet reliability
- perception: Internet speed
- perception: knowledge
- perception: non-TCU
- perception: production

- perception: race
- perception: technology access
- perception: virtual
- perception: work use
- positive
- positive: 1G Digital Divide
- positive: 2G Digital Divide
- positive: communication
- positive: community
- positive: convenience
- positive: device access
- positive: education access
- positive: education use
- positive: family
- positive: home access
- positive: home use
- positive: influence
- positive: Internet speed
- positive: Native American Center
- positive: non-TCU
- positive: production
- positive: technology availability
- positive: technology knowledge
- production
- race
- research
- services
- smartphone
- social
- speed

- technology
- travel
- university
- urban
- virtual
- work

APPENDIX C: FOCUSED CODES

negative: 1G Digital Divide

negative: 2G Digital Divide

negative: community

negative: device access

negative: device use

negative: education

negative: home access

negative: home use

negative: influence

negative: Internet speed

negative: technology availability

negative: technology knowledge

negative: cost

negative: location

positive: 1G Digital Divide

positive: 2G Digital Divide

positive: community

positive: device access

positive: device use

positive: education

positive: home access

positive: home use

positive: influence

positive: Internet speed

positive: technology availability

positive: technology knowledge