

Reconnecting New Mexico

Home Internet in
Education

Our Team

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Engineering, 2022

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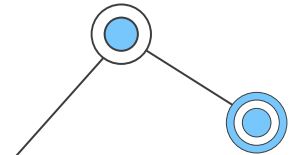
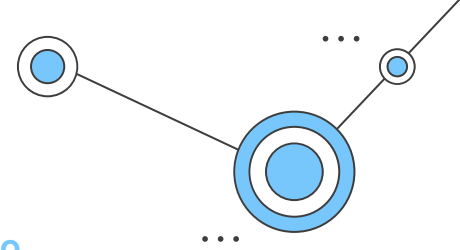
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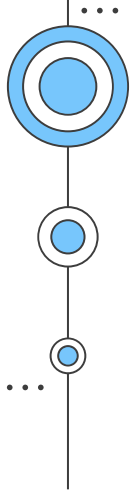
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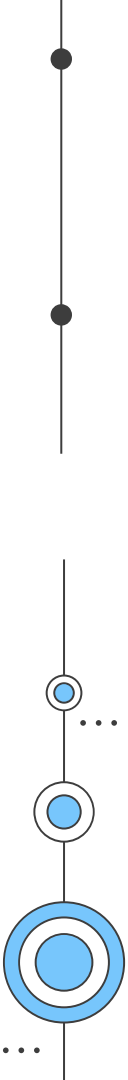
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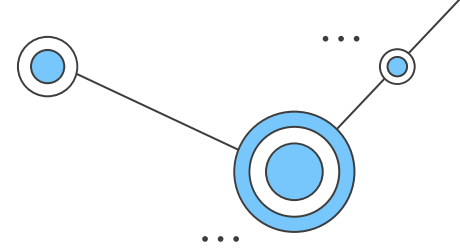




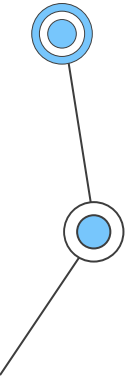
Introduction

What is the purpose of this project?

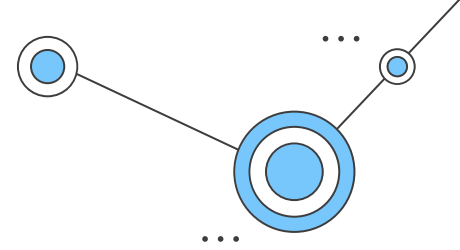




- The Internet is a very important resource
- Many regions in the United States lack adequate broadband access
- During this pandemic many students, teachers, and families are relying on internet access for work and school
- New Mexico is heavily impacted by their lack of internet access

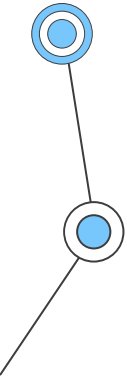


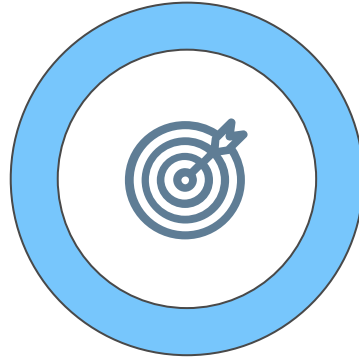
Effects on Education



A lack of broadband access:

1. Contributes to the Homework Gap
2. Disproportionately affects minority students
3. COVID-19 restricts in-person learning





Our Goal

Help community leaders and policy makers improve internet equity and accessibility in northern counties of New Mexico by identifying relationships between connectivity and demographic data that may pose challenges to broadband access and making policy recommendations.

...

Objectives

01
...

Research

Characterize residential internet access and equity in 8 northern New Mexico counties and in Peñasco with existing data.

02
...

Survey

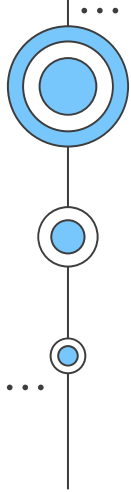
Deploy pilot survey to assess internet access and equity in Peñasco Independent Schools.

03
...

Strategies & Solutions

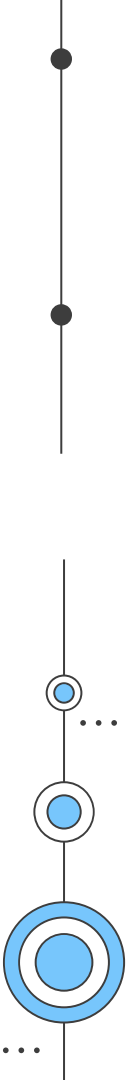
Identify successful strategies used in other programs and outline potential solutions for Peñasco .





Methods

How did we address our objectives?



Objective 1: Characterize Residential Internet Access and Equity

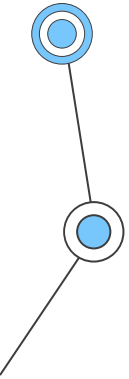
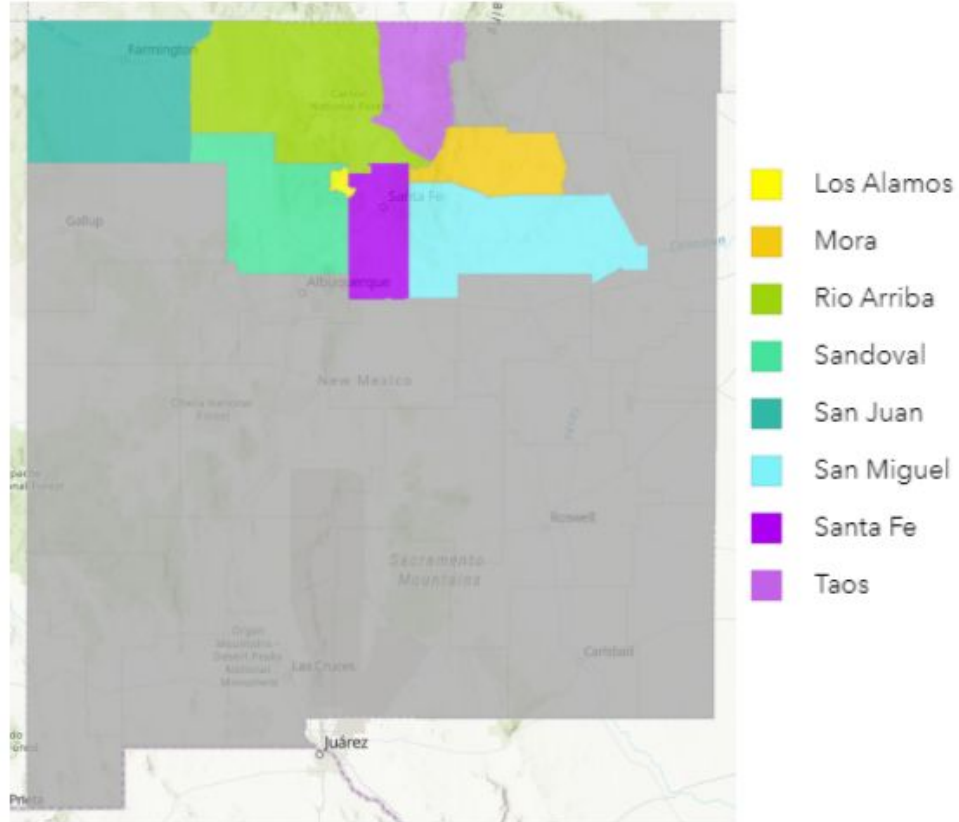
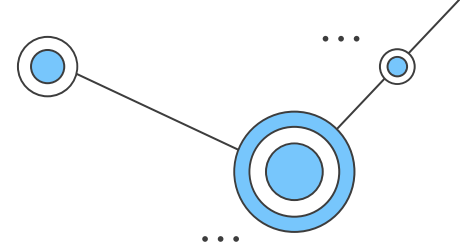


Use existing data to characterize broadband access and equity in...

- New Mexico
- Focus areas (Los Alamos, Mora, Rio Arriba, Sandoval, San Juan, San Miguel, Santa Fe, and Taos)
- Peñasco



Objective 1: County Map



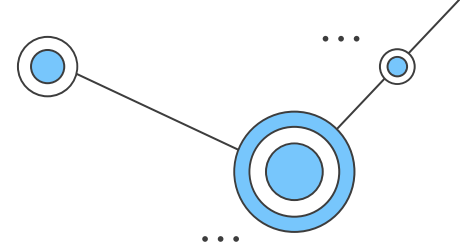
Objective 1: Residential Internet

Main focus on the relationships between broadband access and...

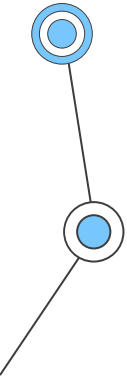
- Median income
- Rurality
- Ethnicity



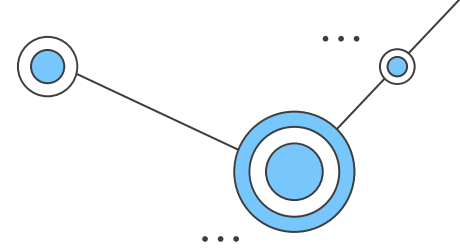
Objective 2: Deployment of the Connectivity Survey



1. Recommended small changes & additions to the New Mexico Connectivity survey.
2. Reached out to Michael Noll, of the Peñasco Independent school district and sent him the link to the survey and an instructional video for completing a submission.
3. He distributed the survey and the video to 22 teachers, who then gave the survey to their students.



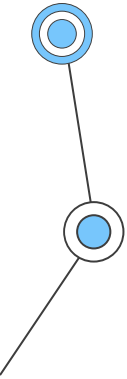
Objective 3: Exploring Potential Solutions & Recommendations

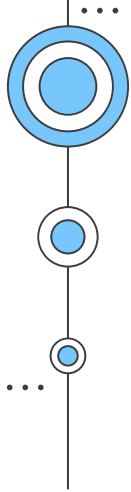


Recommend ways to improve the deployment process of the New Mexico Connectivity Survey.



Suggest broadband strategies for Penasco to consider which have been successful elsewhere.





Findings

What did we learn from our research?



Current Connectivity – New Mexico

72.3% of residents have a broadband subscription (U.S. Census Bureau, 2018).



66.5% of residents have access to wired broadband; satellite is essentially available statewide, but its quality is vulnerable to weather (BroadbandNow, 2020).



Current Connectivity – New Mexico

12.5% have access to wired low cost plans (BroadbandNow, 2020).



New Mexico's poverty rate is 18.2% (U.S. Census Bureau, 2018).



Many providers also put data caps on their residential plans.



There is potential for this to become more of an issue with distance learning.



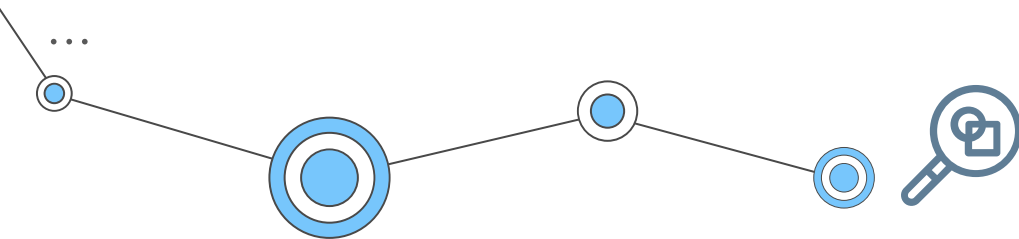
Current Connectivity – Target Areas



These areas vary in widely in categories such as population, rurality, median income, and poverty rate.



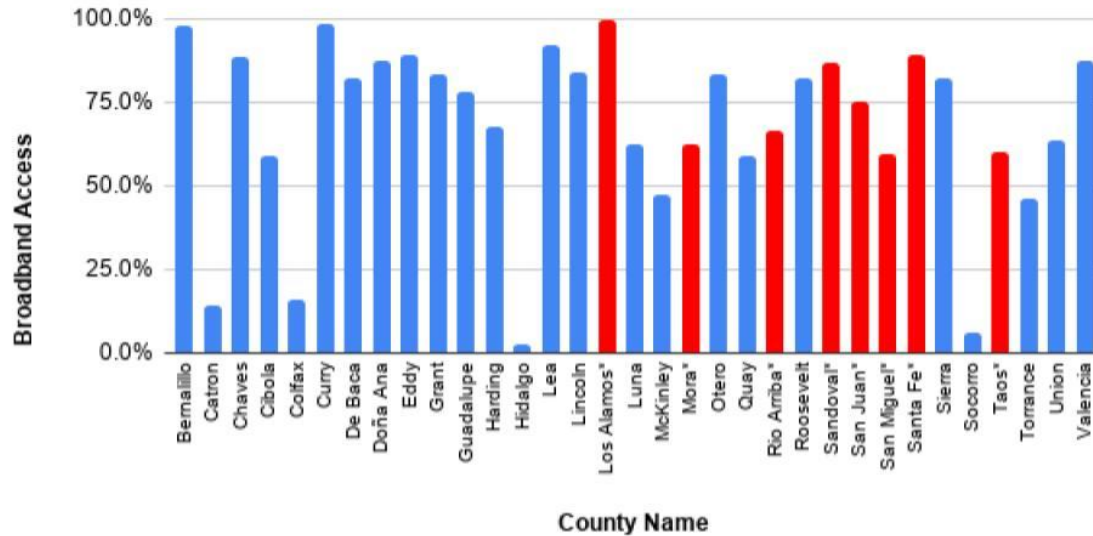
Among them, broadband access ranges from 59.4% to 99.5% (BroadbandNow, 2020).



Current Connectivity – Target Areas

Broadband Access by County (NM)

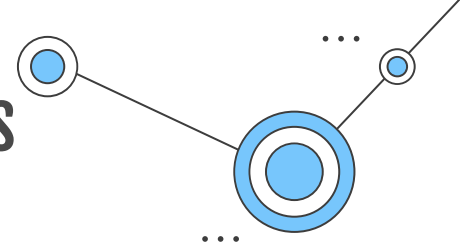
*Focus counties appear in red



Sources:

BroadbandNow. (2020, September 1). *Internet Access in New Mexico: Stats & Figures*. <https://broadbandnow.com/New-Mexico>.

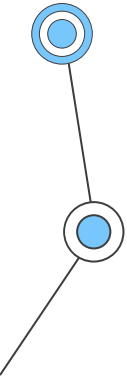
Current Connectivity – Target Areas



Those with the highest median incomes (Los Alamos, Santa Fe, Sandoval, and San Juan) also have the highest coverage.



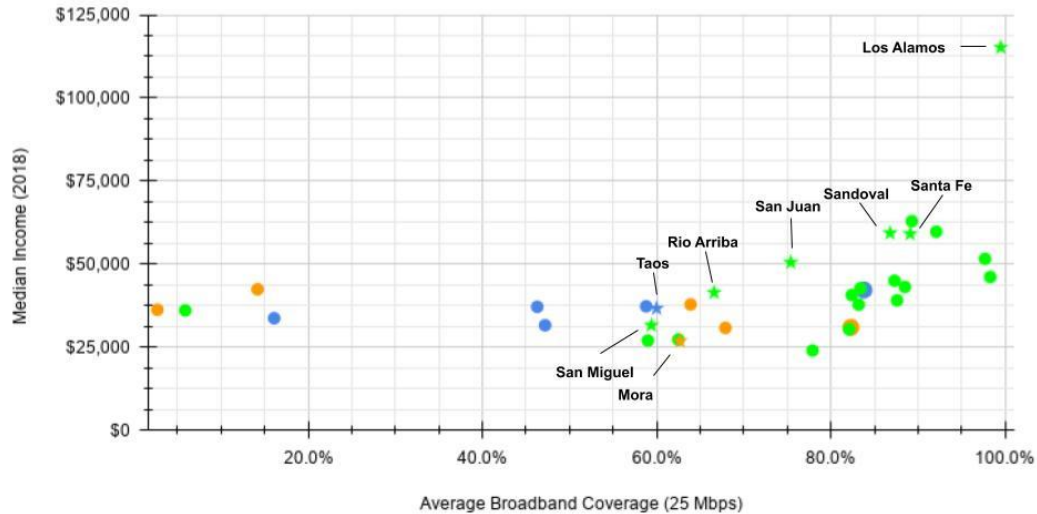
All of the counties with greater than 75% coverage are urban, while 2 of the 3 with less than 75% access are rural.



Current Connectivity – Access and Equity

County Broadband Coverage vs. Median Income

*Stars indicate target counties. Green: mostly urban Blue: mostly rural Orange: completely rural



BroadbandNow. (2020, September 1). *Internet Access in New Mexico: Stats & Figures*. <https://broadbandnow.com/New-Mexico>.

U.S. Census Bureau QuickFacts. (2019). 2019 Population Estimate. U.S. Census Bureau.

<https://www.census.gov/quickfacts/fact/table/NM/PST045219> (Accessed on November 30, 2020)



Current Connectivity – Peñasco

- Small rural town in Taos county
- Only 50.9% of households in Peñasco have a broadband subscription
- Main connection types are DSL (tends to be slower) and satellite (vulnerable to weather)
- Median income is \$32,685 and 39.6% fall below the poverty line (2017)
 - Statewide \$48,059 and 18.2% (2018)



Current Connectivity – Access and Equity



Low income areas have poorer broadband coverage than high income areas

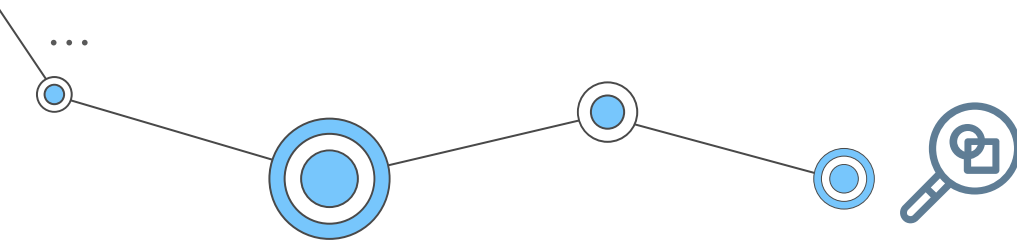
Rural areas have poorer broadband coverage than urban areas



Communities with > 50% Hispanic population have a median of 59.8% households with broadband

Communities with $\geq 10\%$ Indigenous population have a median of 53.2% households with broadband

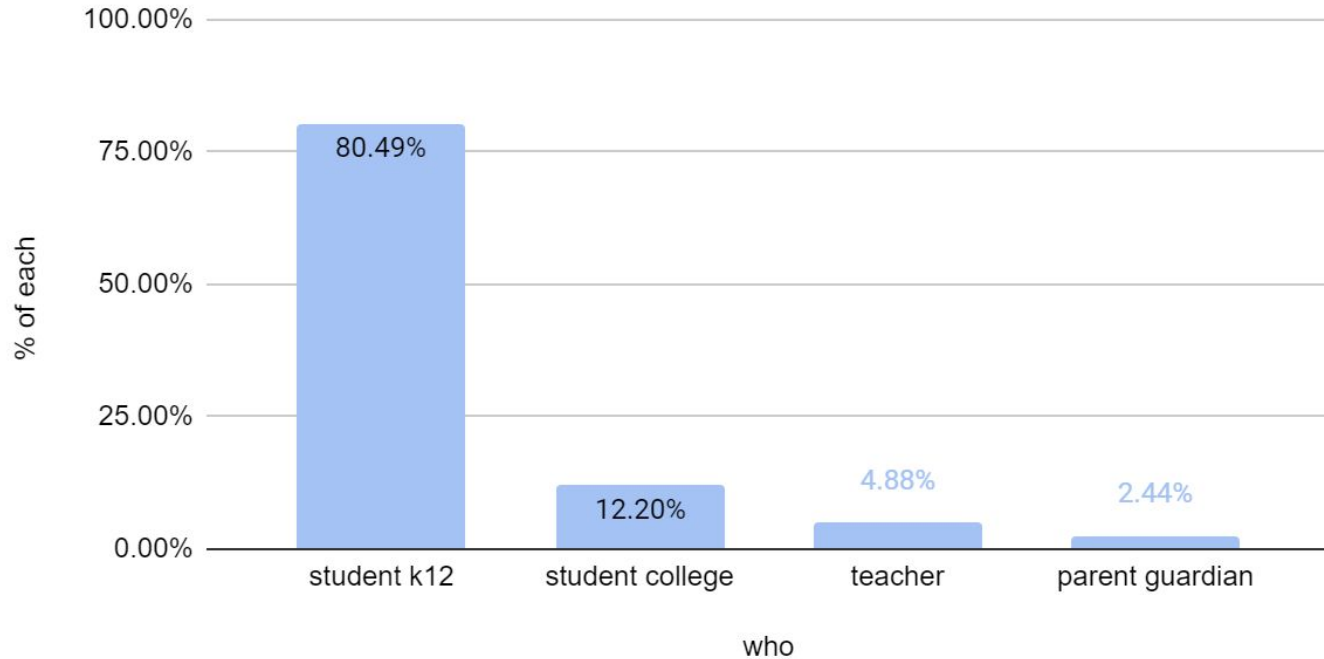
Communities with > 50% white populations have a median of 68.3% households with broadband



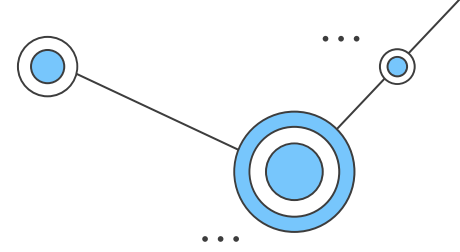
Peñasco Survey Results

who answered the survey

n=82

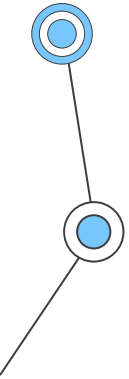
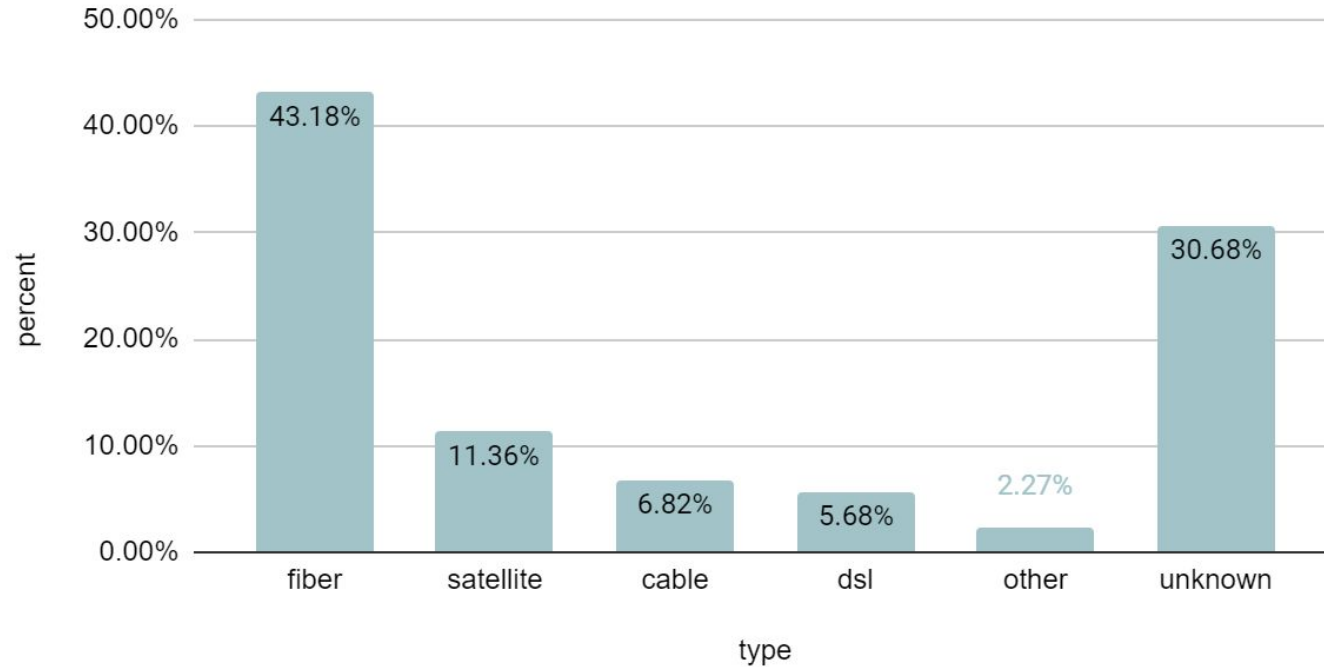


Peñasco Survey Results—internet type



Internet Type

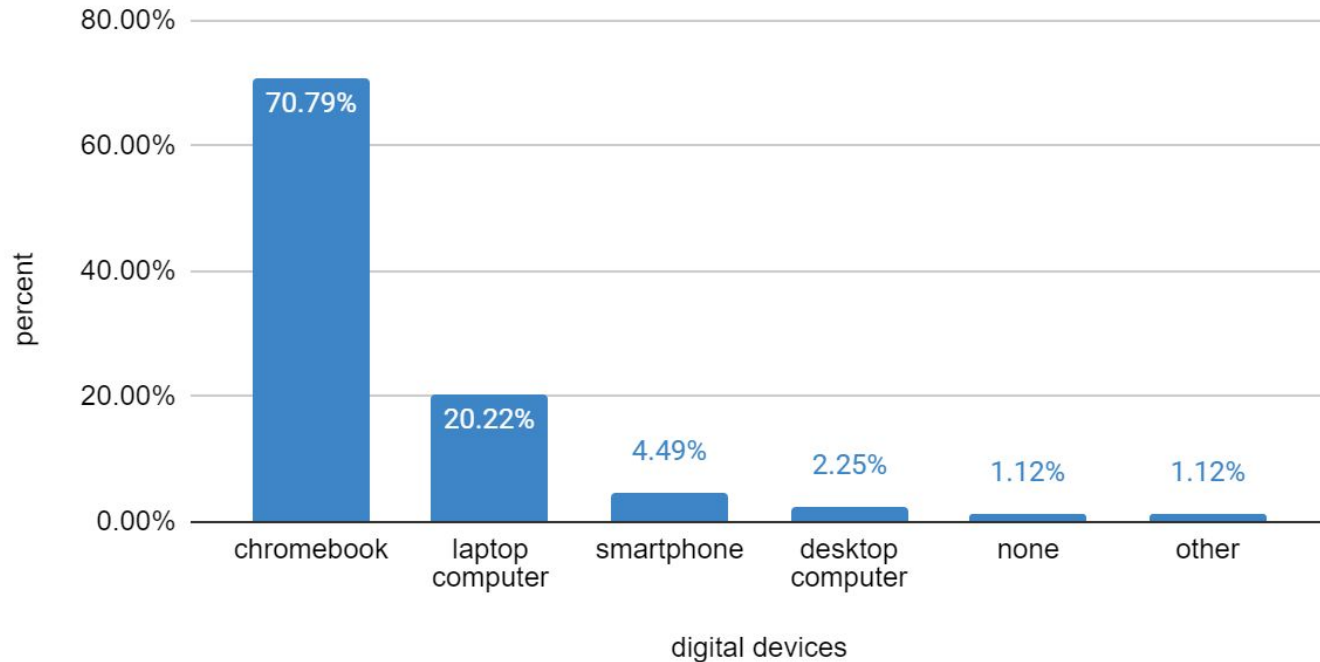
n=88



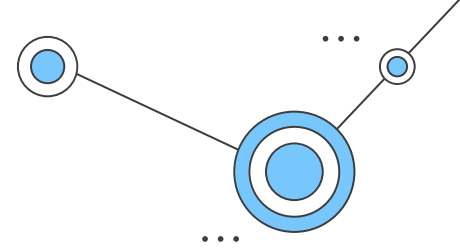
Peñasco Survey Results—digital device

Digital device

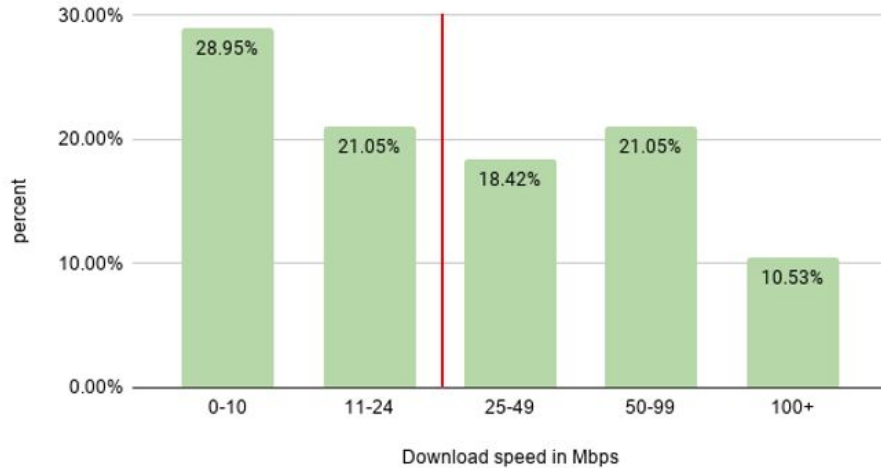
n=89



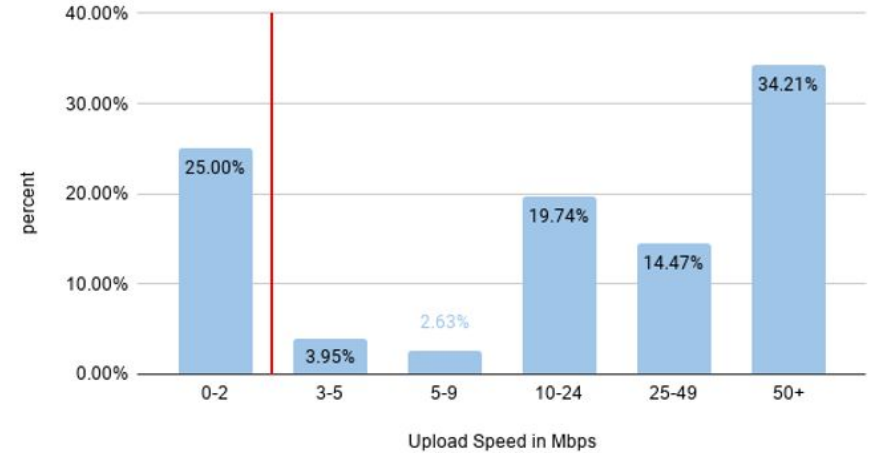
Fcc standard



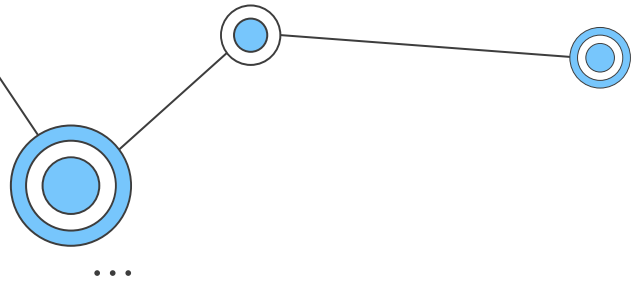
Download Speed Range



Upload Speed Range



Red line represents FCC standard (25Mbps download, 3Mbps upload)

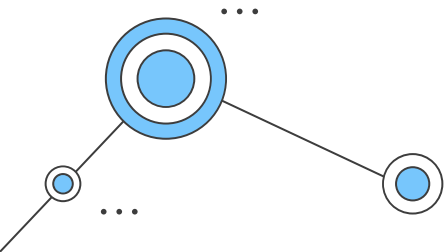


Success Stories

28 Collected

What we looked for in each story:

- Is the location of the project rural or urban? (Rural, urban, etc.)
- What demographic is being affected? (ethnicity, income, etc.)
- What was the solution? How much was funding increased?



14

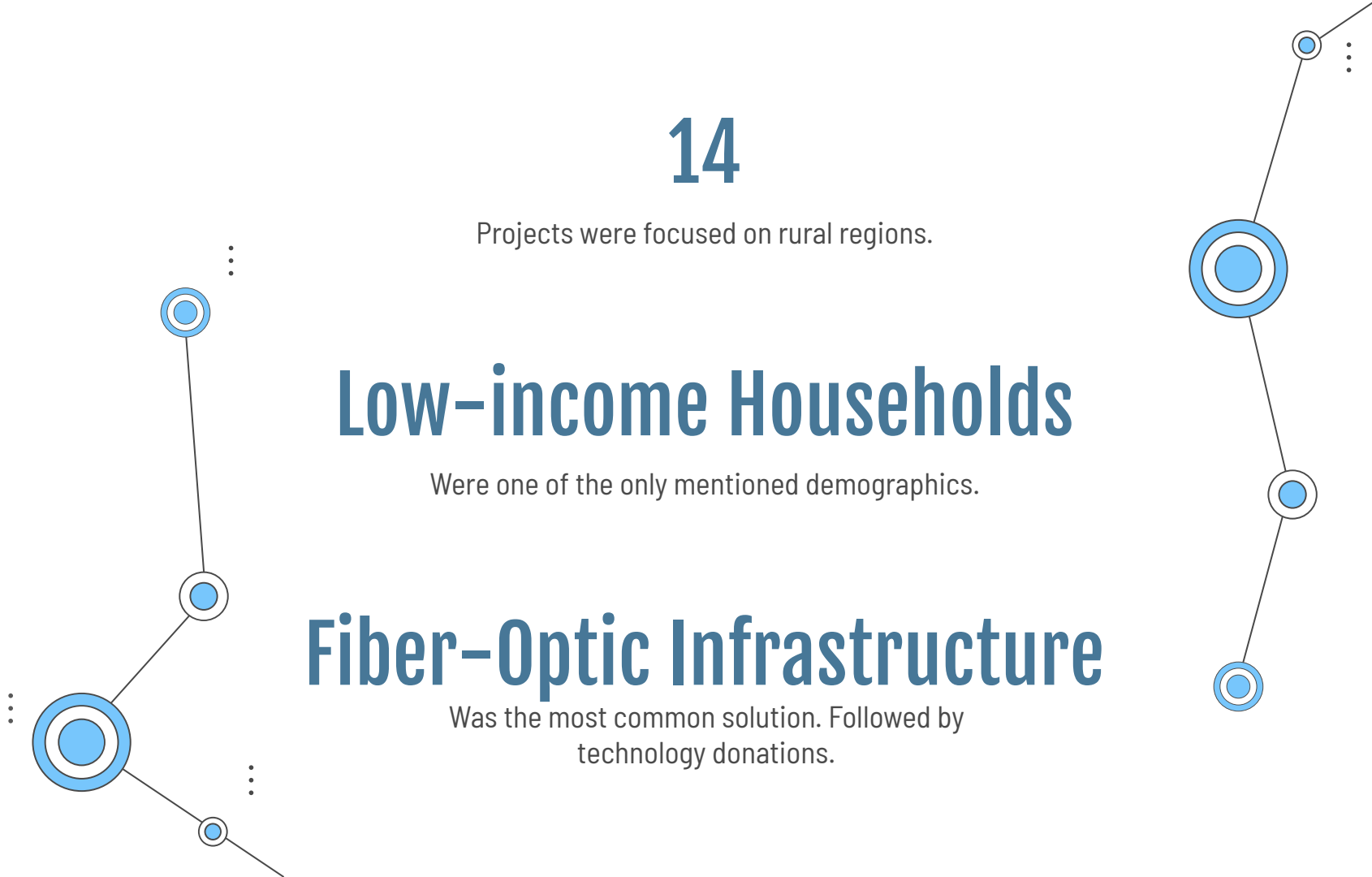
Projects were focused on rural regions.

Low-income Households

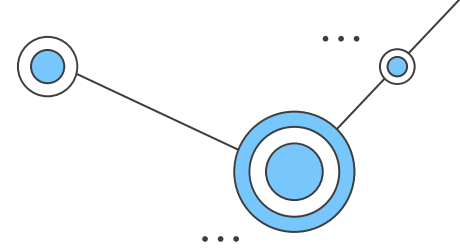
Were one of the only mentioned demographics.

Fiber-Optic Infrastructure

Was the most common solution. Followed by technology donations.



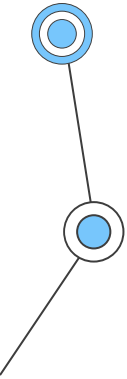
The 'Ammon Model'

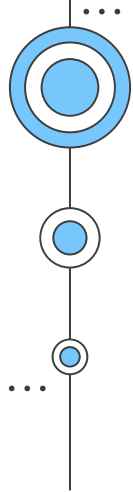


Ammon, Idaho installed and maintains its own fiber network as a utility service.



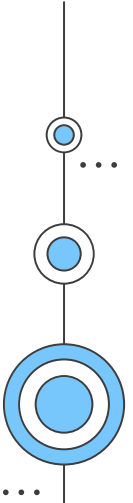
Everyone has access to cheap, high speed internet.





Website

How have we constructed the Reconnecting New Mexico website and why?



Website Construction

We split the Reconnecting New Mexico website into three main sections. We modeled this method of organization from the Michigan Moonshot website.


SECTION	DESCRIPTION
Data & Maps	Contains a description of the Digital Divide and its history, New Mexico county and school district data, survey results, and interactive maps.
Policy & Funding	Contains policy from New Mexico and the United States regarding broadband access. Relevant New Mexico funding can also be found here.
Resources	Contains access to the connectivity survey, a compilation of success stories, several infographics, and a term dictionary.



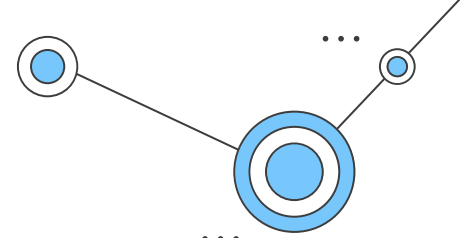


Recommendations

What else can be done and what can
be done better?



Connectivity Survey as a Pilot



Our sponsors have plans of deploying the connectivity survey to all 89 school districts of New Mexico. Our recommended next steps are as follows:

1.	Create a second pilot test. Central Consolidated school district would be great for a second pilot due to its increased student count and similar lack of broadband access. A second pilot would allow for the implementation of new deployment changes before pushing the survey to the entire state.
2.	Create a guide for respondents to determine their connection type. From our survey results, it's apparent that many respondents were unsure of what their connection type was. This led to skewed results.
3.	Set a window for survey completion. By setting a time in which the survey needs to be completed by, results will be more timely and results can be analyzed sooner.



Improving Digital Literacy

Ensure the efficacy of improved access



Many respondents indicated a need for support with technical skills

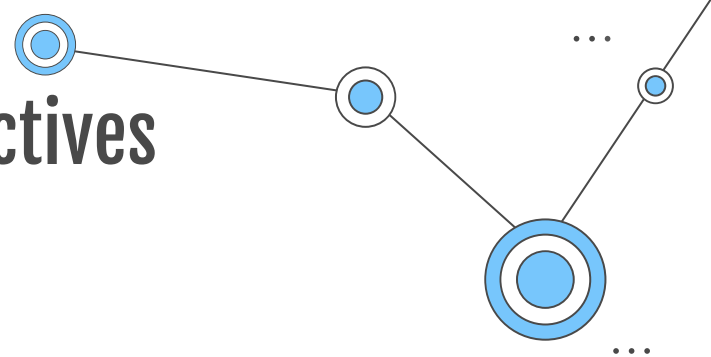


Program for guardians and students on basic computer skills, such as:

- Common terminology
- System storage
- Word processing programs
- Effective use of search engines



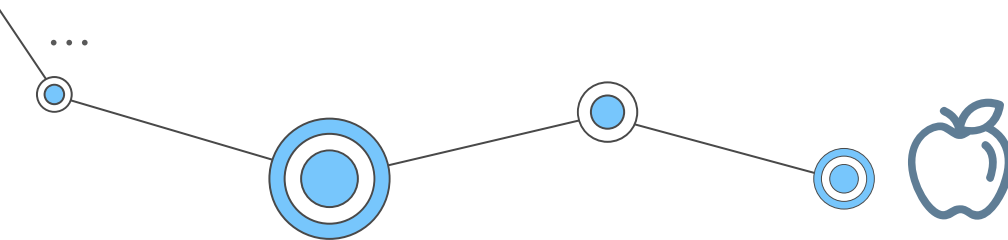
Gain Teachers' Perspectives



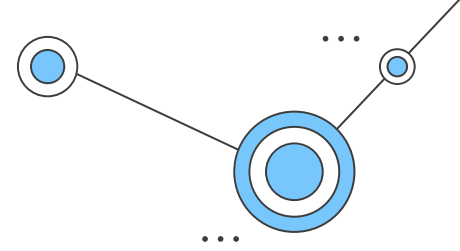
Have teachers characterize experience with their own and students' technological issue



Can also serve as a "double check" of the data collected using the connectivity survey

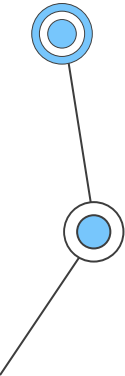


Internet Technology Recommendations

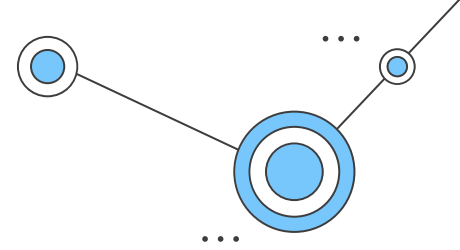


Mesh Network: a network or “mesh” of access points communicating with each other

Pros	Cons
Scalability	Increase workload and power consumption
Low cost	Can have higher latency
Resistant to problems	Initial setup can be complicated

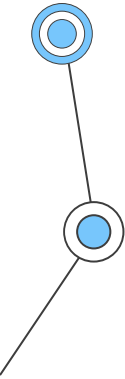


Policy Recommendations



Municipal Broadband Network: open access network owned by public entity

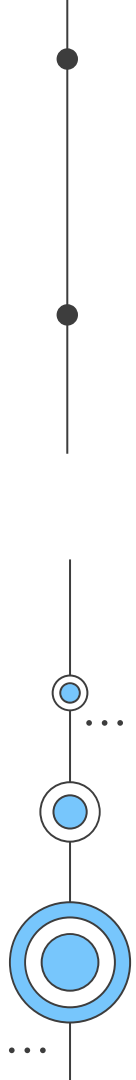
Pros	Cons
Low-cost high speed internet	ISPs may hesitate to use open access networks
Community-wide economic development	Up front costs
Innovation and fair pricing from providers	



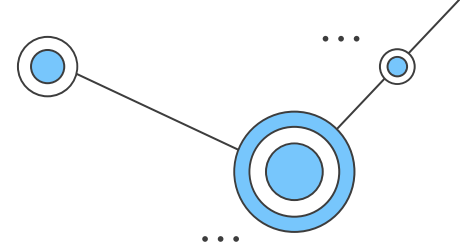


Conclusions

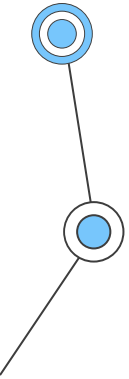
What can be learned from this project?



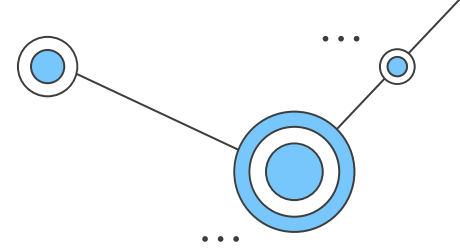
Conclusion 1: Demographic Patterns



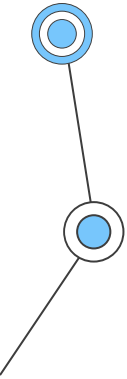
1. low income areas are more likely to have poor broadband access, while high income areas rarely do.
2. More rural areas are lacking access while more urban areas have widespread access.
3. Areas with higher Hispanic and Indigenous populations have lower median access than majority white communities, by 8.5% and 15.1% respectively.



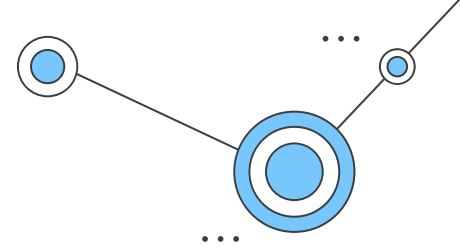
Conclusion 2: The New Mexico Connectivity Survey



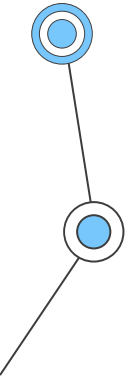
1. We received 82 total responses from the New Mexico connectivity as of 12/4/2020.
2. These responses are from 76 students, 2 parents and 4 teachers from the school district of Peñasco.



Conclusion 3: Digital Literacy



1. New Mexico Connectivity survey results indicate many participants need help with basic computer skills or online learning.
2. Several respondents said that they are unsure of what type of internet service they are using.
3. An increased knowledge of digital resources would provide more reliable survey results and help the community to make the best choices in communication technologies.





Acknowledgements

We'd like to thank:

Michael Noll for deploying the New Mexico Connectivity survey to the Peñasco school district.

-

The **teachers and students** of the Peñasco school district for participating in the pilot test of the New Mexico Connectivity survey.

-


Jennifer Case Nevarez and **John DiRuggiero** for providing guidance to us on this project.

-

Gar Clarke for meeting with us and answering any of our questions.

-

And **Seth Tuler** for advising our project



Thank you!

Do you have any questions?

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