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Using Place-Based Decision Making to Address Educator Shortages in Colorado: 2020 Stakeholder Engagement Report

September 2020





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EXECUTIVE SUMMARY

In fall 2019, the Colorado Department of Education (CDE) requested support from the Region 12 Comprehensive Center (R12CC), a technical assistance center funded by the U.S. Department of Education, in addressing an ongoing statewide educator shortage. In response, the R12CC worked with CDE to craft a solution for analyzing educator shortage data that included the development of essential questions about Colorado’s educator shortages, the identification and securing of data related to the essential questions, and the creation of a Geographic Information Systems (GIS) map to visually group and present the data by location across the state of Colorado. The GIS map layers data to enable a sophisticated spatial analysis that considers how multiple, related data point to “place effects” that are the result of unequal access to resources and opportunities (Dreier et al., 2004; Orfield, 2011; Sampson, 2012; Sharkey, 2013). CDE identified eight educator shortage essential questions for which data were secured and curated in the GIS map:

- » Which districts experience the greatest educator turnover rates?
- » Which endorsement areas experience the greatest educator shortages?
- » Are the shortage mechanisms working to fill the positions to be hired?
- » Do stipends to address teacher shortages go to the districts that need them the most?
- » Is the supply of educators concentrated on the places and subjects needed the most?
- » Do districts/schools with lower performance ratings experience greater teacher turnover?
- » Do districts/schools with greater at-risk populations experience greater teacher turnover?
- » Do schools with less favorable working conditions experience greater teacher turnover?

In summer 2020, the R12CC facilitated virtual engagement sessions for two cohorts of stakeholders during which they were guided through an interactive analysis of the GIS map and the identification of data findings, interpretations, and recommendations to address Colorado’s educator shortage problem. Stakeholders identified eight highest priority recommendations as follows:

- » Differentiate educator shortage strategies to reflect specific regional context.
- » Strengthen the Special Service Provider (SSP) pipeline.
- » Facilitate partnerships between Education Preparation Programs (EPPs), community colleges, and districts.
- » Increase access to online EPP courses.
- » Explore licensure pathways for paraprofessionals.
- » Explore strategies to address the cost of living for educators.
- » Develop strategies to improve leadership quality.
- » Examine the impact of existing educator shortage programs.

Details about the highest priority recommendations as well as other recommendations created by stakeholders are provided in this report. As follow up, stakeholders recommended identifying other essential questions and adding specific data elements to the GIS map, such as five-year trend data,

that might help stakeholders develop other insights about Colorado’s educator shortage issue. Also, CDE might consider additional engagement sessions to capture input from stakeholders who were unable to attend the summer 2020 sessions.

BACKGROUND AND PROBLEM STATEMENT

Leading up to the 2019–20 school year, Colorado schools sought to fill 7,242 teaching positions representing 13.25% of all teaching positions in the state (Colorado Department of Education, 2020). Of those positions, 1,132 remained unfilled or were filled through a shortage mechanism (e.g., long-term substitutes, retired educators, alternative/emergency authorizations). Estimates of the cost to replace a teacher range between \$9,000 to more than \$20,000 per teacher depending on the geographic setting of the district (i.e., rural, suburban, or urban) (Learning Policy Institute, 2017). The ability to retain teachers reduces the demand and expense related to recruitment and limits the negative impact turnover has on student achievement. Colorado has sought to help schools address the shortage challenge through a variety of funding opportunities made available through state legislation.

As part of a regional exploration of teacher retention, mobility, and attrition, the Central Regional Educational Laboratory (REL Central), funded by the Institute for Education Sciences, produced two reports that included teacher data from Colorado: *Teacher retention, mobility, and attrition in Colorado, Missouri, Nebraska, and South Dakota* (Meyer et al., 2019); and *Factors related to teacher mobility and attrition in Colorado, Missouri, and South Dakota* (Espel et al., 2019). These reports uncovered the scale of teacher shortages in Colorado but not the specific factors for each regional context. To help the Colorado Department of Education (CDE) better understand the specific factors impacting not only teacher but educator shortages in the state, Commissioner Katy Anthes requested support from the Region 12 Comprehensive Center (R12CC), a technical assistance center funded by a U.S. Department of Education grant, to explore educator shortage data using a geographic lens and develop recommendations to address the contextual place-based needs of Colorado’s districts and regions.

In response to Commissioner Anthes’ request for support, the R12CC convened a team to consult on the design of a solution for exploring educator shortage data using a Geographic Information Systems (GIS) map that allows users to view Colorado educator shortage data statewide, regionally, and locally. The team included staff and consultants from the R12CC, staff from CDE, and staff from the REL Central. From January through May 2020, the team provided input and guidance on the following action items:

- » Development of essential questions about educator shortages in Colorado;
- » Identification and securing of data related to the essential questions; and
- » Creation of a GIS map to visually group and present the data by location across the state of Colorado.

SOLUTION AND APPROACH

Where a person lives, learns, and works can have a dramatic impact on their life outcomes. These “place effects” are the result of unequal access to resources and opportunities (Dreier et al., 2004; Orfield, 2011; Sampson, 2012; Sharkey, 2013). To better understand these inequities, the R12CC leveraged GIS mapping to produce customized interactive maps designed to contextualize factors that may be affecting educator shortage challenges across the state. GIS maps allow users to visualize how data overlap within the same space. The GIS process of layering data on top of each other enables more sophisticated spatial analysis by considering multiple, related data factors simultaneously. To determine which data would be included in the Colorado educator shortage GIS map, and how that data would be overlaid on top of each other, a first step was to determine priority questions related to educator shortages that CDE wanted to better understand. The process of defining the essential questions for analysis for educator shortages in Colorado took place over several months. Ultimately, CDE identified eight educator shortage essential questions:

- » Which districts experience the greatest educator turnover rates?
- » Which endorsement areas experience the greatest educator shortages?
- » Are the shortage mechanisms working to fill the positions to be hired?
- » Do stipends to address teacher shortages go to the districts that need them the most?
- » Is the supply of educators concentrated on the places and subjects needed the most?
- » Do districts/schools with lower performance ratings experience greater teacher turnover?
- » Do districts/schools with greater at-risk populations experience greater teacher turnover?
- » Do schools with less favorable working conditions experience greater teacher turnover?

To best answer the essential questions, CDE, R12CC, and REL Central discussed the data available, including data related to location, educators (teachers and school leaders), schools, districts and social factors that could support CDE in understanding Colorado’s educator shortage and retention challenges. Table 1. GIS Map Data Sources highlights the data sources included in the GIS map. In addition, Appendix A. Essential Questions and Related Data Sources provides an overview of how data sets were organized within the GIS map to inform each of the essential questions developed by CDE.

TABLE 1. GIS MAP DATA SOURCES

Location Data	Educator Data	School and District Data	Social Data
<ul style="list-style-type: none"> » District locations » School locations » Education Preparation Programs (EPP) locations » District regional status (small rural, rural, non-rural) » Location of roadways » Topographical information 	<ul style="list-style-type: none"> » % of teacher turnover by school and district » % of school leader turnover by school and district » % of SSP turnover by school and district » % of leader turnover averaged over three years in a district » % of teacher turnover averaged over three years in a district » % of positions unfilled by district and each endorsement area » % of positions filled by shortage mechanisms » % of EPP completers by endorsement » Number of new teachers hired by district and EPP » Number of Teacher of Record Licenses received by teachers in a district » Number of Teacher of Record Program teachers employed in a district » Number of Colorado Rural Teaching stipends received by teachers in a district » Number of Concurrent Enrollment Educator Qualification stipends received by teachers in a district » Number of Rural Alternative Licensure stipends by teachers in a district 	<ul style="list-style-type: none"> » % of African American students by district and school » % of Latinx students by district and school » % of all students of color by district and school » % of students receiving free and reduce priced lunch by school and district » % of special education students by school and district » % of English language learner students by school and district » School overall composite score on the Teaching and Learning Conditions in Colorado (TLCC) survey » School leadership composite score on the TLCC survey » Low-performing school or district designation (school performance rating, district performance rating) 	<ul style="list-style-type: none"> » Unemployment by district » Median income by district

While a GIS map allows users to visualize various factors influencing educator shortages, a significant benefit of the tool is that stakeholders are able to collaboratively explore and interpret the data using their knowledge and expertise. Through these collaborative conversations, stakeholders can explore common trends as well as unique, contextual factors of specific regions or districts to inform state and local policy, programs, and resource allocation decisions.

The R12CC worked with CDE to identify a diverse group of stakeholders including representatives from educator preparation programs, other CDE departments like Legislative Relations and Policy and Gifted Education, and partner organizations that support teacher shortage efforts such as the Colorado Center for Rural Education. Stakeholders were invited to participate in one of two cohorts for the virtual stakeholder engagement sessions. Each cohort participated in two sessions that were held in the summer of 2020. Organizations invited to send representatives to the stakeholder engagement sessions are identified in Appendix B. Organizations Invited to Participate in Stakeholder Engagement Sessions. The next section describes the stakeholder engagement process including pre-work and homework, objectives for each of the virtual sessions, and engagement activities.

STAKEHOLDER ENGAGEMENT PROCESS

Two cohorts of stakeholders each participated in two 90-minute virtual sessions via Zoom—the first in July and the second in August 2020 (four sessions total across the two cohorts). The objectives of Session 1 were for participants to understand the purpose and goals of the work, reflect on the issue of educator shortages in Colorado, and analyze the GIS map to identify key findings. The objectives of Session 2 were for participants to reflect on their findings, develop data interpretations from the findings, and identify potential strategies and recommendations to address educator shortages. During the sessions, participants engaged in a mixture of large group discussions and small-group breakout activities.

To prepare stakeholders to engage in focused discussion, the R12CC designed a pre-work assignment prior to Session 1 that included two parts: 1) reading the aforementioned REL Central reports that highlight the current educator shortage challenge in Colorado; and 2) viewing a 10-minute recorded video providing an orientation to the GIS map, including its purpose, structure, key components, and common terminology.

The stakeholder engagement sessions followed a standard data interpretation process. In Session 1, participants received additional orientation to the GIS map, explored two essential questions within the map, and identified specific data findings for their essential questions. A data finding was defined as an objective statement of information or data. Findings are statements that reflect the data and do not attempt to interpret or make meaning of the data. An example of a finding could be “De Beque School district has the highest teacher turnover rate at 74%.” A statement such as “teachers tend to leave rural districts” would not be a finding as it does not specifically refer to data. Stakeholders were also asked to explore additional essential questions within the map as homework. In preparation for Session 2, the R12CC organized stakeholder findings thematically.

For Session 2, stakeholders were divided into breakout groups and asked to make meaning of the data findings. This activity involved a two-step process, where stakeholders first made an interpretation of a data finding or group of similar data findings. Stakeholders were instructed that an interpretation of a data finding included a hypothesis as to why a finding or set of findings may be occurring. For example, if a finding is “districts with the highest teacher turnover rates do not have TLCC survey data,” then a data interpretation could be that “the working conditions in these schools may be so challenging that they are unable to get high enough response rates to access their TLCC results.”

After breakout groups completed their data interpretations, they were then guided to look across the interpretations and to make recommendations. Stakeholders were encouraged to consider recommendations without being constrained by whether it was within CDE’s purview. Recommendations could apply to other education stakeholders, e.g., research organizations, other Colorado state agencies, district leaders, institutions of higher education, partner organizations, or the R12CC.

Appendix C. Stakeholder Engagement Session Agendas provides a detailed overview of the stakeholder engagement process.

EDUCATOR SHORTAGE RECOMMENDATIONS

To support the stakeholders in developing recommendations, the R12CC organized the findings into common themes after Session 1. Data findings focused on geography, student population, cost and stipends, educator roles, educator supply, and working conditions. Session 2 stakeholders were assigned to review one or two of the data themes and develop interpretations and recommendations based on the data. Stakeholders then ranked the recommendations as a higher, medium, or lower priority. Across the two cohorts, stakeholders identified eight higher priority, four medium priority, and four lower priority recommendations as detailed below.

Higher Priority Recommendations

1. Differentiate educator shortage strategies to reflect specific regional context.

Stakeholders analyzed the GIS map and identified that, across the state, shortage challenges vary by community and district. For example, in urban areas educator shortage challenges are short-term, remote rural areas struggle with access to a pipeline of educators, and remote rural districts have trouble recruiting educators due to issues such as cost of living. The stakeholders emphasized the importance of differentiating educator shortage strategies to reflect the unique challenges and contexts of each geographic region.

2. Strengthen the Special Service Provider (SSP) pipeline.

Stakeholders noticed that SSPs have higher turnover rates compared to teachers and leaders in the state, and posited that certain pipeline challenges are contributing to the SSP shortage. Examples include SSP programs limiting enrollment, programs lacking sufficient faculty to train SSP candidates, and SSP candidates being required to have advanced

training such as doctoral degrees. Some of these challenges place additional cost and time burdens on SSP candidates. To address these pipeline challenges, stakeholders recommended providing funding directly to SSP program candidates to offset costs related to training. Another idea from the stakeholders was for EPPs to develop an apprenticeship model to support the preparation of SSPs. This would allow SSP candidates to work in schools, develop needed skills and practices, and provide needed services to students in schools that may be missing an SSP.

3. Facilitate partnerships between Educator Preparation Programs (EPPs), community colleges, and districts.

When looking at trends related to unfilled positions, stakeholders noted that districts along the I-70 highway corridor and the eastern region of the state posted a higher percentage of unfilled positions compared to other districts. Many of these districts do not have an EPP nearby which may limit their access to educator candidates early in the pipeline. As a result of this finding, stakeholders recommended creating cohesive partnerships between EPPs, community colleges, and district leaders to develop an educator pipeline, particularly in rural areas. When possible, stakeholders suggested creating partnerships between EPPs and districts with common geographies and cultures. One example of an existing partnership in the state is Otero Junior College (OJC) and the University of Colorado Denver (CU Denver) which partnered together to provide a four-year pathway to a teaching license for candidates in Otero, Crowley, and Bent counties in the Rocky Ford area. Prospective teachers can take courses at OJC to receive their associate degree and then continue their studies towards a bachelor's degree on-site at OJC through a combination of online and in-person courses provided by CU Denver. Like this partnership between an EPP and community college, there may be opportunities to encourage partnerships between traditional and alternative programs particularly to serve rural communities.

4. Increase access to online EPP courses.

Related to the finding above regarding a lack of educator candidates in rural communities, the stakeholders also recommended encouraging EPPs to offer more online programs to reach those candidates. Stakeholders discussed how the current COVID-19 climate may offer a unique opportunity to implement this recommendation since many EPPs may be making investments to develop online versions of their programs and coursework due to the pandemic. Leveraging these recent investments could allow for these online programs to continue beyond the pandemic and provide opportunities for students from anywhere in the state to obtain a teaching degree.

5. Explore licensure pathways for paraprofessionals.

The stakeholders found that districts in the eastern plains region of Colorado tend to use retired teachers and alternative licensed teachers to fill vacancies. Based on this, stakeholders recommended that CDE explore pathways for helping paraprofessionals become fully licensed teachers, rather than relying on retired or alternative licensed teachers. Developing a Grow Your Own program that prepares potential educators from the

communities experiencing shortages could be one strategy worth exploring for paraprofessionals. This strategy could create a potential pipeline of educators with experience in these classrooms and schools who are currently in the workforce. Relatedly, stakeholders suggested that CDE also gather data to determine if its existing Grow Your Own programs are having an impact addressing educator shortages in their communities.

6. Explore strategies to address the cost of living for educators.

When reviewing regional educator shortages data with social data simultaneously, stakeholders observed that schools in the rural resort communities, such as the Roaring Fork School District and Eagle County School District, experience greater teacher shortages compared to other rural neighboring districts and the schools with the highest educator turnover report lower performance ratings. To address these challenges, the stakeholders recommended focusing on strategies to reduce educator turnover, such as addressing the cost of living in these communities. These strategies include expanding programs that offer housing subsidies for teachers, student loan forgiveness programs, and developing partnerships to provide day care for the children of educators. Stakeholders also recommended providing financial incentives for highly effective teachers to work in the most challenging contexts, such as schools with the lowest performance ratings. Another suggestion from stakeholders was to explore opportunities for shortening the work week from five days to four as a possible recruitment strategy and method to improve quality of life.

7. Develop strategies to improve leadership quality.

As mentioned in the first recommendation above, stakeholders identified that the shortage challenges vary by community and stakeholders acknowledged that leadership quality may be at the core of turnover variation. Assessing working conditions and leadership quality is key to understanding if the turnover is “good” or if the school or district needs support related to retention strategies. Some strategies the stakeholders suggested related to leadership quality included examining if there is a correlation between leader preparation programs and leader turnover, requiring robust teaching experience for all leaders, and supporting schools to have shared leadership models.

8. Examine the impact of existing educator shortage programs.

Throughout the GIS map review, stakeholders acknowledged that different strategies are successful in different communities. To capitalize on strategies that work and scale them to other districts, stakeholders recommended researching the impact of educator shortage programs and further investments in effective programs. Stakeholders suggested identifying communities with effective recruitment and retention strategies, conducting research to better understand what makes them successful, and figuring out how to replicate those strategies in other areas of the state. The stakeholders also recommended additional broad-scale research on educator shortages in Colorado. Relatedly, the GIS map currently visualizes data on various recruitment supports such as the Colorado Rural Teacher Stipend; however, there may be additional programs at the state and local level to address educator shortages that should be included in the GIS map.

Medium Priority Recommendations

1. Explore strategies to support the retention of SSPs.

As mentioned in the second higher priority recommendation, SSPs experience a higher turnover rate as compared to teachers. To further address this finding, stakeholders suggested examining districts with high SSP retention rates and developing a deeper understanding of what makes them successful. Stakeholders expressed interest in exploring itinerant models for SSPs which would allow SSPs to visit students on their caseload in a variety of settings including homes, early childhood centers, community-based programs, and hospitals in addition to schools. The stakeholders were interested in exploring whether SSPs prefer an itinerant model versus staying in one location, what supports are in place for itinerant providers, and whether those supports improve retention rates.

2. Examine educator shortages and benefits of neighboring states.

Recognizing that educator mobility can include moving across state lines, stakeholders discussed the benefits of accessing similar educator shortage data for neighboring states and border districts. Access to this information would allow CDE to explore Colorado's educator shortage issues compared to bordering states/districts to better understand if they are state or regional challenges. Stakeholders recommended examining the percentage of educators trained in Colorado who secure positions in other states and the percentage of educators who stay in the state. Further, stakeholders noted a desire to learn more about effective educator recruitment and retention strategies working in nearby states. This information could help ensure that Colorado matches or offers more attractive benefits for educators compared to its neighboring states.

3. Explore the impact of the Rural Colorado Grow Your Own Educator Act.

As noted in the third and fourth recommendations in the higher priority section, rural districts along the I-70 highway corridor and eastern plains lack access to nearby EPPs and educator candidates. The Rural Colorado Grow Your Own Educator Act (House Bill 18-1002) created a rural teaching fellowship via partnerships between EPPs and rural Colorado schools/districts/BOCES or charter schools (i.e., rural local education provider). The EPP provides a stipend for the candidate to complete their preparation and the fellow must commit to teaching in the rural local education provider following the completion of the fellowship. Stakeholders recommended exploring the possible impact of this bill, such as: the sufficiency of a two-year commitment; eligibility requirements and their influence on candidate applications; and how the selection priorities serve districts with crucial hiring needs.

4. Incorporate additional data and updates to the GIS map.

Throughout the GIS map review, stakeholders suggested potential data that could be added to the GIS map and additional analysis (see Figure 1 for data suggestions for the GIS map). For example, stakeholders suggested further analyses on the geographic differences contributing to turnover rates such as cost of living, income, and working conditions. Currently, data on these variables are available in the GIS map, but stakeholders suggested combining these data within the same dashboard to examine simultaneously.

FIGURE 1. DATA SUGGESTIONS FOR GIS MAP

- » Add data on other programs and resources such as the Quality Teacher Recruitment Grant.
- » View data in five-year trends.
- » View unfilled positions by percentage of teaching positions and per 100 students.
- » Differentiate in the symbology between traditional and alternative preparation programs and traditional, charter, and online schools.

Lower Priority Recommendations

1. Explore participation and lessons learned from Teaching and Learning Conditions in Colorado (TLCC) Survey Data.

When reviewing the TLCC working conditions data in the GIS map, stakeholders found that schools with the highest teacher turnover rates were missing TLCC data. Because schools and districts must have a 50% response rate to publicly share this data, stakeholders wanted to explore factors that may be contributing to low participation rates. The stakeholders also found that small districts did not have TLCC scores and posited that it was because staff might have been afraid of repercussions or the culture did not promote it. Stakeholders suggested exploring schools with high TLCC scores to better understand what is working specifically for each regional setting and sharing those strategies with similar districts. For example, looking at other small schools to see if there are strategies to learn.

2. Examine strategies to diversify the workforce and increase cultural competency.

Stakeholders noticed that students of color attended schools with higher rates of educator turnover compared to schools with mostly white student populations. Stakeholders acknowledged the importance of having an educator workforce that represents the student population it is serving. While they did not identify specific strategies to diversify the workforce, stakeholders did express a need to develop long-term and comprehensive strategies to address this issue. In the short-term, while Colorado continues to work on diversifying its workforce, the stakeholders suggested measuring the effectiveness of existing cultural competency efforts in schools to determine their impact on improving cultural competencies in educators' practice and improving student outcomes.

3. Investigate issues around alternative licenses and long-term substitutes.

As mentioned in the fifth higher priority recommendation, districts in the eastern plains use alternative licensed teachers to fill vacancies and districts in the southeast tend to use long-term substitutes at higher rates than other regions. The stakeholders recommended exploring why districts use these strategies in lieu of regularly licensed teachers, understanding the access to alternatively licensed staff in these areas, and investigating which pathways may be contributing to greater access to alternatively licensed educators. Relatedly, stakeholders suggested researching the barriers that exist for long-term substitutes in becoming fully certified teachers (e.g., cost of PRAXIS) and what certification pathways are available to long-term substitutes.

4. Share GIS data with supporting organizations or institutions.

When reviewing the data on stipends and programs, stakeholders discussed how the GIS map would be helpful in determining where to target stipend efforts. For example, the Colorado Center for Rural Education provides teachers stipends to promote teacher recruitment in rural areas. The data from the GIS map could help the Center identify which rural areas are experiencing shortages and target the promotion of opportunities in these communities, support the development of relationships with nearby EPPs and BOCES, and conduct targeted outreach to potential candidates for these stipends.

LIMITATIONS AND CONSIDERATIONS

Using the GIS map to better understand Colorado's educator shortage problem and the process of guiding stakeholders through an analysis of the GIS map to identify findings, interpretations, and recommendations has some limitations that CDE should consider as the Department reviews the recommendations. Fewer stakeholders participated in the engagement sessions than originally planned and some were only able to join one of the sessions, which may have limited the diversity of voices and expertise of individuals who examined the data and provided input into the data interpretations and recommendations. Additionally:

- » Some key invited stakeholder groups were unable to attend, such as representatives from the Colorado Department of Higher Education or any BOCES. CDE may want to *consider replicating this stakeholder engagement process in order to ensure that diverse stakeholders are able to analyze the GIS map data and develop recommendations* informed by their context and expertise from their role in support educator talent in the state.
- » CDE may want to *consider including more practitioners in the stakeholder engagement process* such as teachers, administrators, and district-level staff, e.g., the individuals involved in hiring educators and providing professional development. These roles may have unique perspectives that may offer new insights into the issues surrounding educator shortages and possible solutions. For example, it may be assumed that educator pipeline barriers are occurring during preparation, but perhaps there are some district hiring practices or policies creating recruitment challenges that can be shared by teachers and the staff responsible for hiring at the district-level.
- » Stakeholders identified additional data sources that may be helpful to include in the GIS map in order to analyze the essential questions. The stakeholders also identified additional questions or issues that they recommended be explored further. This may mean that with additional data, the stakeholders may have uncovered new additional gaps or opportunities to address educator shortages. CDE may want to *consider the suggestions for additional data and questions to examine* and work with the R12CC to update the GIS map prior to any additional stakeholder engagement sessions.

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APPENDIX A. ESSENTIAL QUESTIONS AND RELATED DATA SOURCES

Essential Question	Sub-Questions	Data Sources
Which districts experience the greatest educator turnover rates?	<ul style="list-style-type: none"> » Which school districts have the greatest concentration of teachers leaving or moving? Leaders leaving or moving? Special support service providers leaving or moving? » What is the district average teacher turnover rate over the last five years? » What is the district average school leader turnover rate in the last five years? 	<ul style="list-style-type: none"> » District locations » School locations » % of teacher turnover by school » % of teacher turnover by district » % of school leader turnover by school » % of school leader turnover by district » % of SSP turnover by school » % of African American students by district » % of African American students by school » % of Latinx students by district » % of Latinx students by school » % of all students of color by district » % of all students of color by school » % of students receiving free and reduce priced lunch by district » % of students receiving free and reduce priced lunch by school » % of leader turnover averaged over three years in a district » % of teacher turnover averaged over three years in a district » % of SSP turnover averaged over three years in a district
Which endorsement areas experience the greatest educator shortages?	<ul style="list-style-type: none"> » Which grade-levels or subject areas are experiencing the greatest teacher shortages by district? 	<ul style="list-style-type: none"> » District locations » Unemployment by district » Median income by district » % of positions unfilled by district and each endorsement
Are the shortage mechanisms working to fill the positions to be hired?	<ul style="list-style-type: none"> » Which districts have the greatest concentration of emergency licenses by endorsement area? 	<ul style="list-style-type: none"> » District locations » % of positions unfilled by district and each endorsement » % of African American students by district » % of Latinx students by district » % of students receiving free and reduce priced lunch by district » District regional status (small rural, rural, and non-rural) » % of positions filled by shortage mechanisms

Essential Question	Sub-Questions	Data Sources
Do stipends to address teacher shortages go to the districts that need them the most?	<ul style="list-style-type: none"> » Which districts receive grants or stipends focused on addressing shortages? » Do the districts that receive stipends/grants experience greater teacher shortages? 	<ul style="list-style-type: none"> » District locations » % of positions unfilled by district and each endorsement » % of teacher turnover by district » Number of Record License received by teachers in a district » Number of Record Program received by teachers in a district » Number of Colorado Rural Teaching stipends received by teachers in a district » Number of Concurrent Enrollment Educator Qualification stipends received by teachers in a district » Number of Rural Alternative Licensure stipends received by teachers in a district
Is the supply of educators concentrated on the places and subjects needed the most?	<ul style="list-style-type: none"> » Are there nearby EPPs in areas experiencing teacher shortages? » Are the nearby EPPs preparing educator candidates with the endorsements needed to fill needed positions in schools? » Which EPPs are districts hiring new teachers from? » Which EPPs are districts with teacher shortages hiring from? 	<ul style="list-style-type: none"> » School locations » EPP locations » % of EPP completers by endorsement » Number of new teachers hired by district and EPP
Do districts/schools with lower performance ratings experience greater teacher turnover?	<ul style="list-style-type: none"> » Do low-performing schools experience greater educator shortages? 	<ul style="list-style-type: none"> » % of Latinx students by district » % of students receiving free and reduce priced lunch by district » % of teacher turnover by school » % of African American students by school » % of Latinx students by school » % of all students of color by district » % of all students of color by school » % of students receiving free and reduce priced lunch by school » School Performance Rating » District Performance Rating

Essential Question	Sub-Questions	Data Sources
Do districts/schools with greater at-risk populations experience greater teacher turnover?	<ul style="list-style-type: none"> » Do districts/schools with higher percentages of students of color experience greater teacher shortages? » Do districts/schools with higher percentages of low-income students experience greater teacher shortages? » Do districts/schools with higher percentages of special education students experience greater teacher shortages? » Do districts/schools with higher percentages of English language learners experience greater teacher shortages? 	<ul style="list-style-type: none"> » % of Latinx students by district » % of students receiving free and reduce priced lunch by district » % of teacher turnover by school » % of African American students by school » % of Latinx students by school » % of students receiving free and reduce priced lunch by school » % of special education students by district » % of special education students by school » % of English language learner students by district » % of English language learner students by school
Do schools with less favorable working conditions experience greater teacher turnover?	<ul style="list-style-type: none"> » Do schools with poorer working conditions experience greater educator shortages? 	<ul style="list-style-type: none"> » School locations » % of teacher turnover by school » School overall composite score on the TLCC survey » School leadership composite score on the TLCC survey

APPENDIX B. ORGANIZATIONS INVITED TO PARTICIPATE IN STAKEHOLDER ENGAGEMENT SESSIONS

Invited Organizations	
» Adams State University*	» Colorado Mountain College
» ASPIRE to TEACH	» Colorado Rural Schools Alliance
» Colorado Association of School Boards*	» Colorado State University*
» Colorado Association of School Personnel Administrators	» Colorado State University Pueblo
» Colorado Association of School Executives	» Ft. Lewis College*
» Colorado Center for Rural Education*	» Public Education & Business Coalition*
» Colorado Children's Campaign*	» South Central BOCES
» Colorado Christian University	» University of Colorado, Colorado Springs*
» Colorado College	» University of Colorado, Denver
» Colorado Department of Education*	» University of Denver*
» Colorado Department of Higher Education	» University of Northern Colorado*
» Colorado Education Association*	» Western Colorado University*
» Colorado Mesa University	» Western State University

* Representatives from these organizations participated in one of the stakeholder engagement cohorts.

APPENDIX C. STAKEHOLDER ENGAGEMENT SESSION AGENDAS

SESSION 1

Cohort 1 – July 22 | Cohort 2 – July 23

Pre-work: Stakeholders were asked to read the REL reports on retention, mobility, and attrition and watch a short video explaining what GIS is, how it can help participants better understand educator shortages in Colorado, and how to read the symbols and navigate through the map.

Session 1 Objectives:

- » Understand the purpose and goals of the work.
- » Reflect on the issue of educator shortages in Colorado.
- » Analyze GIS map to identify key findings.

Engagement Activities:

- » CDE and R12CC provided an explanation of the problem statement, the importance of stakeholder input, and how stakeholder input will be used.
- » Facilitators reviewed highlights from the REL retention, mobility, and attrition reports and asked stakeholders to share key takeaways from the reports.
- » Facilitators provided an overview of a “finding” and reviewed how to identify findings within the GIS map.
- » In breakout rooms, facilitators worked with small groups of stakeholders to identify findings across assigned tabs of the GIS map. Findings were recorded using Padlet—a virtual bulletin board designed for collaboration and note sharing. Small groups analyzed data in the GIS map as follows:
 - Group 1: Educator turnover and working conditions
 - Group 2: Shortage by subject and shortage mechanism
 - Group 3: Stipends, education preparation programs, and teacher supply
 - Group 4: Performance ratings and student populations
- » Back in the main room, stakeholders shared key findings in the whole group and shared what it was like to work with the GIS map.
- » Facilitators asked stakeholders to explore the GIS map for homework and deepen their understanding of educator shortage data by reviewing new tabs as assigned.

Following Session 1, facilitators reviewed and organized the Padlet findings according to themes.

SESSION 2

Cohort 1 – August 5 | Cohort 2 – August 6

Session 2 Objectives:

- » Reflect on the findings identified from the homework.
- » Develop data interpretations from the findings.
- » Identify potential strategies and recommendations to address educator shortages.

Engagement Activities:

- » Stakeholders shared interesting takeaways from the homework assignment to continue exploring the GIS map.
- » Facilitators provided an overview of a “data interpretation,” reviewed how to make data interpretations from the findings and reviewed how to develop recommendations from the data interpretations.
- » In breakout rooms, facilitators worked with small groups to review findings from Session 1, make data interpretations, and develop recommendations. Data interpretations and recommendations were recorded in Padlet.
- » Back in the main room, stakeholders shared key recommendations in the whole group and the data interpretations that informed the recommendations.
- » Facilitators thanked stakeholders for their participation and reviewed how their recommendations will be used.