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Perceptions of Self-Efficacy & Support Among Secondary Early-Career Teachers and their Principals During the COVID-19 Pandemic

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PERCEPTIONS OF SELF-EFFICACY AND SUPPORT AMONG SECONDARY EARLY-CAREER TEACHERS AND THEIR PRINCIPALS DURING THE COVID-19 PANDEMIC

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Abstract: In response to challenges faced by middle and high school educators during the COVID-19 pandemic, a study was conducted in the Spring of 2021 involving 33 early-career mathematics teachers and eight supervising school principals in the State of California. These participants completed detailed surveys which provided demographic information, as well as perceptions of support, efficacy and job satisfaction. Findings show a variety of associations among teacher perceptions of support and their efficacy and job satisfaction in the face of challenging circumstances. As it related to principal support and recognition, principal participants expressed confidence in their ability to support teachers as a result of the pandemic, including understanding best practices for evaluating teachers for online teaching. Additionally, while agreeing that teachers at their schools needed more professional development in instructional practice, participating school principals felt they supported their teachers as they adapted instruction due to the COVID-19 pandemic. This study aspires to inform practitioners and policymakers alike in their understanding of teachers and their principals as they responded to significant challenges as a result of the COVID-19 pandemic.

Teaching is a challenging profession and early-career teachers must adjust quickly to the demands of the profession. Feiman-Nemser (2003) stated that "the stories of beginning teachers typically revolve around several themes—reality shock, the lonely struggle to survive, and the loss of idealism" (p. 27). The crisis created by the COVID-19 global pandemic quickly impacted the entire educational community, including potentially vulnerable early-career teachers in the mix. Longitudinal studies from the United States report that 45% of teachers leave the profession within their first 5 years (Ingersoll et al., 2018) with overall annual turnover rates of 17% (Carver-Thomas & Darling-Hammond, 2017). Therefore, addressing the complexity of teacher retention amidst a global crisis is a priority.

Experts agree that addressing the issue of teacher retention, particularly for mathematics teachers, will require a more cohesive system of teacher preparation, support, and development (Mehta et al., 2015; Smith et al., 2018). Principal support is one workplace condition proven to be highly predictive of teacher turnover (Carver-Thomas & Darling-Hammond, 2019). However, previous research examining the role of principal support on teacher turnover was not situated in the context of crisis, such as a global pandemic. With annual teacher turnover costs in the United States averaging $7.3 billion annually (National Math + Science Initiative, 2013) and declining enrollment in teacher preparation programs, immediate attention to teacher retention is critical.

To better understand the unique space and time created by the global COVID-19 pandemic, this study aimed to provide a preliminary look at issues related to teacher retention including self-efficacy, overall job satisfaction, and principal support. Additionally, this study investigated principal perceptions of support for their early-career math teachers. This pilot study was conducted on behalf of the Association of Public Land-grant Universities (APLU) Mathematics Teacher Education Partnership (MTEP). Within this entity, a Research Action

Cluster (RAC) focuses its efforts on Secondary Teacher Retention and Induction in Diverse Educational Settings (STRIDES).

The research team was provided contact information for a population of early-career mathematics teachers who had previously earned their teaching credentials by participating in a preparation program administered the California State University (CSU) system. Using this information, over five hundred early-career teachers were invited to join this study by taking a survey, and 33 teacher participants agreed to participate. In addition, participating teachers were asked to nominate their principals to join in the study, and eight of these principals agreed and completed a separate survey. The research questions for this study are:

1. What is the relationship between early-career mathematics teachers' perceptions of teaching self-efficacy, job satisfaction, and principal support?
2. What is the relationship between early-career mathematics teachers' considerations of continued employment in the teaching profession and conditions related to the COVID-19 pandemic?
3. How did principals perceive their ability to support their early-career mathematics teachers during a global pandemic crisis?

Theoretical Framework

This study can be inspected through social cognitive theory (Bandura, 1977) which focuses on self-efficacy, defined as "people's beliefs in their capabilities to perform in ways that give them control over events that affect their lives" (Bandura, 2000, p. 12). Aside from their personal lives, educators (e.g., principals and teachers) focus their professional efforts on performing tasks in school settings (Hoy & Hoy, 2013; Imants & De Brabander, 1996). Sources of self-efficacy attainment can be categorized in four areas, including: (a) mastery experiences, (b) psychological and emotional arousal, (c) vicarious experiences and (d) social persuasion (Bandura, 1993; Hoy & Hoy, 2013; Stajkovic et al., 2018). Mastery experience is the most influential source of efficacy for leaders (Hoy & Hoy, 2013). Specifically, individuals' prior skills to perform and positive perceptions of their ability to find success increase their self-efficacy in that area (Bandura & Wessels, 1997). Along with mastery experience, attending to individuals' affective states (e.g., psychological or emotional state) is especially important when schools are under pressure or facing crisis (Tschannen-Moran & Gareis, 2015). An example of this may include a principal addressing teachers' concerns when facing challenging situations during crises. Vicarious experiences are interactions where individuals learn from observing others' experiences. Finally, social persuasion involves a shared sense of purpose and vision and cohesive efforts to work toward a common goal. For teachers and principal leaders, the interconnected nature of these four sources of self-efficacy relates to the degree attainment is possible. This study focuses primarily on two of the aforementioned sources of self-efficacy attainment – mastery experiences and psychological and emotional arousal - as they relate to early-career teachers' experience level and psychological state during a global pandemic.

Background Literature

Pertinent literature that relates to this study is provided in this section. This includes background information regarding self-efficacy beliefs of teachers and principals, factors of teacher retention, and response to crisis events in schools.

Self-Efficacy Beliefs of Teachers and Principals

Self-efficacy beliefs are "people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events to affect their lives" (Bandura, 1994, p. 71). Individuals with higher feelings of self-efficacy see difficulties as challenges to overcome and are more likely to persist in the face of adversity. Highly efficacious teachers and school leaders believe they can find some sense of control in environments facing external turmoil (Stajkovic et al., 2018). This instills confidence in their ability to lead and make decisions. In educational environments facing immense change or crisis, investigating the self-efficacy beliefs of teachers and principals can help to identify areas where support, or lack thereof, might affect their beliefs in their abilities and emotions. For example, teacher self-efficacy strongly predicts student academic achievement (e.g., Tschannen-Moran & Barr, 2004; Yoon et al., 2012) and highly efficacious math teachers positively influence their students' interest in future STEM careers (Autenrieth et al., 2018; Kelley et al., 2020). Further, achievement

increases when the mood of the individuals (e.g., students, teachers, principals) correlates with their psychological state. Hence, an individual can have both high and low self-efficacy depending on the task or context. When an individual experiences excitement, this can be energizing and motivating (Bandura, 1997). However, traumatic events or failure can ignite negative emotions or moods that can reduce teachers' beliefs in their ability to persist. Further, teachers have higher self-efficacy in teaching when they feel they are working toward a common goal as a part of team (social persuasion) and are able to learn from the experiences of others around them (vicarious experiences) (Bandura, 1993).

An individual's judgement of self-efficacy (e.g., to teach or lead) can greatly influence how they initiate, commit, and persist through change or obstacles (Bandura, 1977, 1986, 1997; Tschannen-Moran & Woolfolk-Hoy, 2007). For teachers, this could translate to continuing their employment in the field. For leaders, their own comfort leading during change could be impacted by their own feelings of self-efficacy. School principals are called to create and support an environment of teacher quality and student achievement (Hallinger & Wang, 2015; Hauserman & Stick, 2014; Leithwood & Day, 2010). Highly efficacious leaders are traditionally understood to be able to strategically plan and enact change initiatives (Bandura, 1986; Gist & Mitchell, 1992; McCormick, 2001), however less is known about how this might translate in crisis situations.

Factors of Teacher Retention

Teachers who feel prepared and equipped to handle the challenges of their early career have been shown to stay in the profession longer (DeAngelis et al., 2013). When teachers do not feel adequately supported by their principals, teacher retention has been shown to decrease (Feiman-Nemser, 2003).

Berry et al. (2021) found that principal leadership and teacher leadership positively influence teacher retention and school performance. Their findings suggest that principal leadership is one of the largest predictors of the development of teacher leadership, more experienced teachers' ability to help novice teachers, and the ability of teachers to work more closely with students and their families. Collectively, these factors interact to improve the overall sense of efficacy within a school. Considering principal support in hard-to-staff schools, the conversation about teacher retention becomes even more critical. Hughes et al. (2015) concluded that every area in which a principal can support a teacher is considered important based on quantitative data, including the frequency of praise positively impacting teacher retention.

Response to Crisis Events in Schools

Oxford Languages (n.d.) describes crisis as "a time of intense difficulty, trouble and danger." Crepeau-Hobson (2018) notes that "crisis events" (p. 18) often have social, psychological, and functional consequences that regularly last longer than the physical consequences. In 2020, educators moved with incredible swiftness to make novel changes as a result of a life-threatening virus that spread across the world. The impact of traumatic events affects those who experience them and impairs the operation of the community (Seyle et al., 2013). Research has been conducted following a crisis event, but little research has been focused on educational leadership during times of crisis (Fletcher & Nicholas, 2016). A large portion of research is related to school preparedness (Mutch, 2014). Specifically, disaster plans focus on physical safety (Crepeau-Hobson, 2018), student and teacher well-being (McKen, 2001; Lazarus et al., 2003), and communication of clear directions for disseminating information (Flanagan, 2007; Crepeau-Hobson, 2018). Schools are encouraged to return to a normal school routine; however, this process should be considered a long-term, rather than short-term, goal (McKen, 2001; Mutch & Gawith, 2014; Crepeau-Hobson, 2018).

Although teachers are generally considered to be first responders in the midst of disaster in a school setting, school administrators (at building principal and district levels) make "top -level" decisions that impact how schools' function in response to crisis situations. Fletcher and Nicholas (2016) note a "dearth of research on educational leadership and management at times of natural disasters" (p. 359). Despite this, Pepper et al. (2010) identified four actions K-12 leaders are tasked with during a crisis: (a) identifying immediate priorities, (b) focusing time and effort on the priorities, (c) communicating frequently with stakeholders, and (d) remaining sufficiently detached. The emphasis placed on teachers by administrators to respond normally in a situation that is not typical can lead to increased uncertainty and stress (McKen, 2001). Furthermore, McKen (2001) discovered that poor communication, paired with a lack of input from teachers, allows misinformation to proliferate to the extent that teachers enter a reactive state. Past research focused on the ways educators respond to disasters contributes in a general way to our understanding of this topic, but it is important to highlight more current research associated with the COVID-19 pandemic.

To date, there is limited preliminary research focusing on how K-12 educators have specifically responded to the COVID-19 pandemic. Initial worldwide research has focused on how K-12 school leaders (e.g., principals), teachers, and students have responded to and been impacted by the pandemic (Ayyildiz & Baltaci, 2020; Martinez & Broemmel, 2020; United Nations, 2020). Carlson (2020) interviewed nine teachers to understand their views about changes in instructional modalities due to the pandemic. Baker (2020) identified pandemic-related "stressors", including deficiencies in access to technology, particularly in rural areas, and difficulties for instructing students remotely. School safety, student readiness to return to school, and the overall well-being of the school community have also been identified as top concerns from school leaders and over 8,000 teachers in a survey of teachers in Alberta, Canada (Hare, 2020). More specifically, respondents in this study mentioned (in no particular order) issues of increased poverty and food insecurity, equity, curricular gaps, the pandemic's impact on vulnerable student populations (e.g., students with special learning needs, English Language learners, refugee students) and the burden of standardized testing during the COVID-19 pandemic.

There is a need for more research on how COVID-19 and other disasters disproportionately impact different populations and demographic groups (United Nations, 2020). In a report published by the RAND Institute (Hamilton et al., 2020), teachers in the United States reported that they lack adequate support to serve students with disabilities and those living in adverse conditions (e.g., homelessness). The researchers postulated that due to these disparities for particular communities and student populations, the COVID-19 pandemic will only increase educational inequities in the future.

School principals anticipate reallocating their priorities in the coming years to focus on recovering from learning gaps and mental health concerns due to the pandemic. Previous studies on self-efficacy and principal support during crisis events show evidence of each positively impacting teacher retention (Martinez & Broemmel, 2020). COVID-19 presented unique challenges for both administrators and teachers. In this pilot study, researchers considered early-career mathematics teachers' perceptions of self-efficacy, job satisfaction and support as related to the COVID-19 pandemic, as well as principals' perceptions of their ability to support these teachers during the crisis.

Method

Research Design

The research team implemented a correlational survey design to gather data on teacher and principal perceptions during the COVID-19 pandemic.

Participants

Teachers Potential teacher participants were selected from a database of 550 secondary mathematics teachers who had earned their preliminary teaching credentials at one of the 22 California State University campuses. The participant pool included teachers within their first three years of teaching mathematics in grades 6-12, after they had formally completed their teacher preparation through a California State University program. A total of 44 early-career mathematics teachers responded to an initial interest email and follow-up reminder emails, and ultimately 33 (6% response rate) of these teachers participated in the study. The low response rate (even with follow-up reminders at multiple stages), was likely due to a variety of factors, including lack of time and prioritization given the ongoing COVID-19 conditions.

All teacher participants were mathematics teachers serving in secondary schools in the State of California distributed as follows: 18% in grades 6-8 (middle only), 12% in grades 6-12 (secondary), and 70% in grades 9-12 (high school only). Of the 33 teacher participants, 55% identified as female, 45% identified as male, and no participant indicated they did not want to disclose their gender when given the option. The majority of teacher participants (69.7%) ranged between 20-29 years old, 15.2% ranged between 30-39 years, 9.1% ranged between 40-50, and the remaining 6% of participants were 50 years-old or older. In terms of ethnicity, teacher participants identified themselves as White (n=17; 52%), Asian (n=9; 27%), Black or African American (n=2; 6%), and Mexican or Hispanic (n=2; 6%), with three teachers (9%) declining to answer. At the time of the study, teacher participants reported an average of 2.1 years of experience. All teacher participants earned at least a bachelor's degree with ten participants also earning one or more master's degrees and one participant earning a doctoral degree. Six of the 33 teachers also earned instructional technology certifications. Additional demographic data are illustrated in Table 1.

Table 1

Attributes of participating teachers (N=33)

	n	%
Gender		
Female	18	55%
Male	15	45%
School Grade Group		
Grades 6-8	6	18%
Grades 6-12	4	12%
Grades 9-12	23	70%
Age Group		
Between 20 and 29 years	23	69.7%
Between 30 and 39 years	5	15.2%
Between 40 and 49 years	3	9.1%
Above 49 years	2	6%
Highest Degree Completed		
Bachelor's	22	66.7%
Master's	10	30.3%
Doctorate	1	3.0%
Ethnicity		
White	17	51.5%
Asian/Asian American	9	27.3%
Black or African American	2	6.1%
Mexican or Hispanic	2	6.1%
Prefer not to answer	3	9.1%

Principals Interested early-career teacher participants were also asked to provide names and contact information (i.e., email addresses) for their principals. In all, a total of eight principals (24% response rate) completed the survey. Of these, five identified as female (63%) and three identified as male (37%). The principals were all between 40 and 60 years-old. Four self-identified their race as White (50%), two as Latino (25%), one as Asian (12.5%) , and one as American Indian/Alaskan Native (12.5%). Three principals (37%) had earned doctoral degrees and five (63%) had earned master's degrees, including one (12.5%) with an instructional technology certificate/degree. Only one principal reported earning a bachelor's degree in a STEM field; the remainder of these principals reported having mathematics coursework and/or a mathematics teaching methods course as part of their

teacher credentialing program. While one of the principals had fourteen years as a teacher of mathematics and another spent two years teaching in this subject area, six of the eight principals had no prior experience teaching mathematics. Table 2 describes the principals' ages, self-identified gender, race, education, and years of service teaching mathematics.

Table 2

Attributes of participating principals (N=8)

	n	%
Gender		
Female	5	62.5%
Male	3	37.5%
Ethnicity		
White	4	50.0%
Latino	2	25.0%
American Indian/Alaskan Native	1	12.5%
Asian	1	12.5%
Age Group		
Between 55 and 59 years	2	25.0%
Between 50 and 54 years	2	25.0%
Between 45 and 49 years	2	25.0%
Between 40 and 44 years	1	12.5%
Between 0 and 39 years	0	0%
Highest Degree Completed		
Bachelor's	0	0%
Master's	5	62.5%
Doctorate	3	37.5%
Years of teaching mathematics		
0	6	75.0%
1-5	1	12.5%
11-15	1	12.5%

Setting

In their surveys, participating teachers and principals were able to designate the size of communities in which they served. Options ranged from communities with populations of "less than 15,000 people" (6.1% of sample) to "more than 500,000 people" (18.2% of sample). Additionally, 15.2% of teacher participants represented communities with 15,000-50,000, 24.2% were from communities with 50,000-100,000, and lastly, 36.4% were from communities between 100,000-500,000 people.

In the context of COVID-19, the setting of teaching and learning for many schools was impacted drastically in both delivery format and location. Teaching conditions of COVID-19 have increased the number of instructional models needed to meet the social distancing and remote learning requirements. Synchronous hybrid learning required classes to meet at regularly scheduled days and times with some students in person and others online. Asynchronous hybrid learning required students to view pre-recorded lessons and complete coursework independently and meet with their teacher and classmates in a face-to-face setting at least once a week. Fully synchronous online instruction, representing 70% of the instructional formats for the educators participating in this study, required that students meet with their teachers online at a regularly scheduled class time one or more times per week. The last model, hybrid of face-to-face synchronous and asynchronous, required students to meet in person and online with both scheduled synchronous and individual remote learning occurring intermittently. Figure 1 shows the frequency distribution of the teacher participants' instructional delivery format due to COVID-19 conditions in the spring of 2021.

Figure 1
Instructional Delivery Format during COVID-19 for Participant Teachers
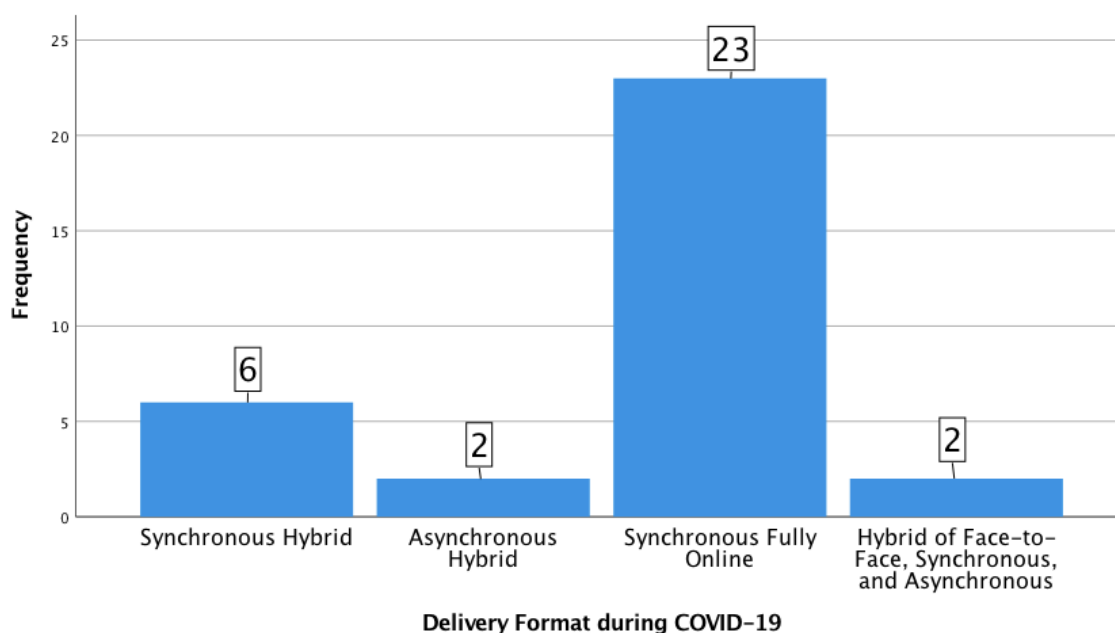
The majority of the 33 teacher participants surveyed continued to teach synchronously online into 2021. Further, most teacher participants taught mathematics from their homes. Only 21% of surveyed teachers were required to teach in their school building, while 64% taught solely from their home. Figure 2 shows the primary location for instructional delivery for participant teachers.

Figure 2
Primary Location for Instructional Delivery for Participant Teachers
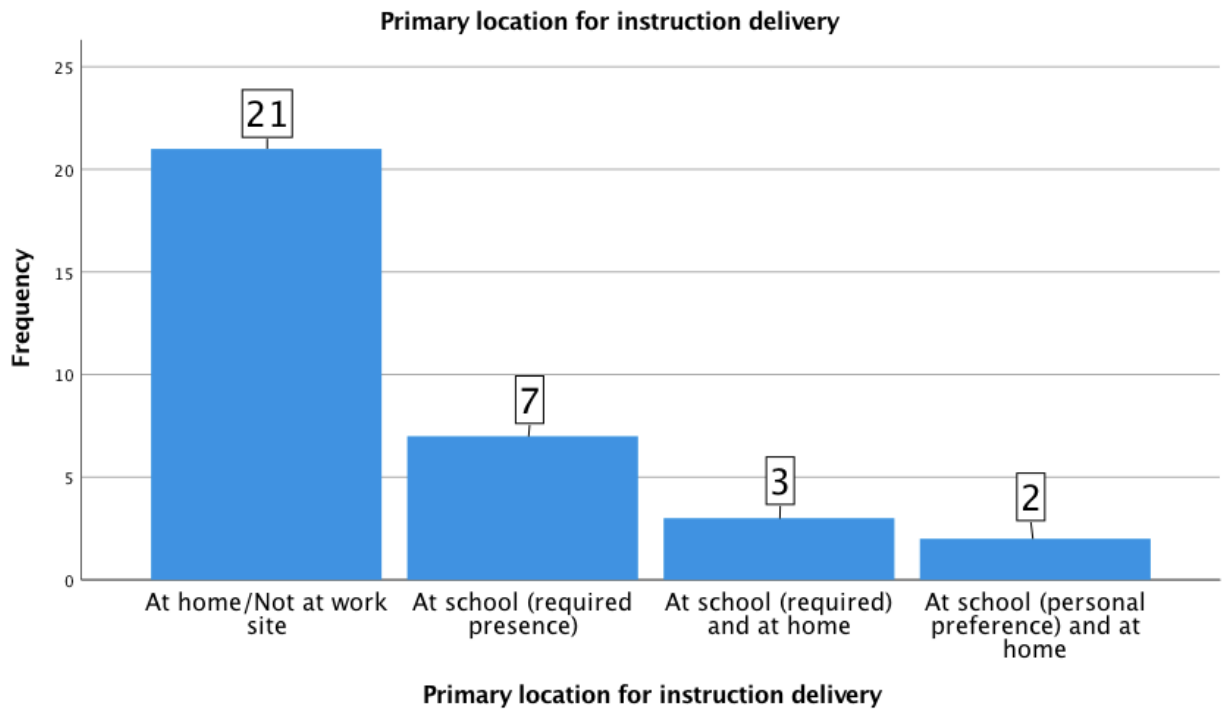
Instrument

Questions in the teacher and principal surveys used in this study provided data that revealed their perceptions of self-efficacy, job satisfaction and support. With permission of the survey author, many of the questions were taken from the Teacher Self-efficacy Scale (TSES) (Tschannen-Moran et al., 1998) and Principal Self-efficacy Scale (PSES) (Tschannen-Moran & Gareis, 2004). Both TSES and PSES scales have been established in terms of validity and reliability to measure educator self-efficacy. Construct validity of the TSES was assessed using a measure of work alienation (Forsyth and Hoy, 1978). Construct validity of the PSES was established using the initial instrument with other known constructs (Tschannen-Moran & Gareis, 2004). Measuring self-efficacy (i.e., perceived ability to perform) was key to answering the first and third research questions. Specific questions were selected from these scales based on how well they connected with educators working under adverse conditions.

Other questions on the surveys were created by the researchers to specifically investigate early career mathematics teachers' and principals' experiences during the COVID-19 pandemic, which connect to research questions two and three. Validity and reliability measures have not yet been formally established for the researcher-created questions related to COVID-19, as these were newly created questions to measure specific pandemic effects on teachers and principal participants. Aside from demographic questions, these Likert scale questions focused on teacher beliefs, job satisfaction and principal support in general, and perspectives of work life in the context of COVID-19. One question focused on defining the general instructional delivery format for the school. For principals, six questions of this survey related to perceptions of accountability for academic achievement, and 23 questions, based on a 5-point Likert scale, 1 *(strongly disagree)* to 5 *(strongly agree)* including 3 *(neutral)*, related to principal perceptions of support for teaching mathematics.

Data Analysis

Researchers used the Statistical Package for the Social Sciences (SPSS) version 27 and Microsoft Excel for data analysis. For all teacher and principal participant survey responses, researchers initially evaluated the frequencies, percentages, and distributions of data to familiarize ourselves with the dataset by question and categorical topic (e.g., self-efficacy, COVID-19 related, demographic data). Furthermore, the researchers performed bivariate correlation analyses with the items on the teacher survey. We reported only descriptive statistics gleaned

from the principal participant data, so as to not imply the generalizability of the findings to a larger population. Due to our inability to link particular principal participants with their respective building teacher(s), we elected to keep the two participant data types' and analyses separate. During the interpretation phase, we integrated our findings in combination to address our research questions.

Results

This study examined the perceptions of early-career mathematics teachers and a subset of principals from their respective schools during the spring of 2021 when schools were impacted by the global COVID-19 pandemic. The results are presented separately for teachers and principals in this section to address the following research questions in the context of the COVID-19 pandemic:

1. What are the relationships among early-career mathematics teachers' perceptions of teaching self-efficacy, job satisfaction, and principal support?
2. What is the relationship between early-career mathematics teachers' considerations of continued employment in the teaching profession and conditions related to the COVID-19 pandemic?
3. How did principals perceive their ability to support their early-career mathematics teachers during a global pandemic crisis?

Teacher survey respondents were asked about their beliefs in their abilities to teach mathematics effectively, their perception of the level of support they received from principals, and their satisfaction with teaching and staying in the profession during the COVID-19 pandemic. Descriptive statistics (mean and standard deviation) along with bivariate correlation analysis are presented in Table 3. Due to the small sample size, we elected to highlight statistically significant correlations where $p < .01$ in the narrative below along with additional attention to areas where our findings are contradictory to previous, evidence-based research.

Table 3

Descriptive Statistics and Correlations for Teacher Participant Responses (N=33)

	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. My principal cares about me.	3.30	.585	--																
2. Number of person-person interactions with principal in the last year	2.79	1.083	.450**	--															
3. I think of myself as an effective teacher.	3.36	.489	.149	-.086	--														
4. At my school, I feel like a part of a team.	3.18	.808	.540**	.510**	-.014	--													
5. My professional strengths are utilized at work.	3.18	.683	.405*	.350*	-.017	.675**	--												
6. I feel connected to my teaching colleagues at school.	3.09	.765	.495**	.439*	.160	.680**	.506**	--											
7. My work gives me a feeling of professional accomplishment.	3.24	.792	.376*	.171	.331	.173	-.026	.272	--										
8. I am satisfied with my job.	3.15	.755	.246	.117	.354*	.209	-.116	.192	.878**	--									
9. I would recommend my school as a good place to work.	3.09	.765	.355*	.250	-.008	.478**	.506**	.199	.272	.192	--								
10. I feel overwhelmed at work.	2.79	.740	-.496**	-.097	-.385*	-.195	-.169	-.075	-.390*	-.276	-.296	--							
11. I think about quitting teaching.	1.70	.810	-.130	.210	-.424*	-.056	.046	.046	-.662**	-.638**	-.257	.463**	--						
12. I am confident in the alternative teaching methods necessary due to COVID-19	2.79	.696	.009	-.020	-.042	.071	-.048	.037	.266	.301	.037	-.151	-.173	--					
13. My principal is familiar with the instructional changes I have made due to COVID-19.	3.24	.792	.443**	.353*	.250	.173	-.026	.169	.352*	.407*	-.141	-.336	-.077	.380*	--				
14. I regularly connect with my teaching colleagues about best teaching strategies as a result of COVID-19	3.06	.827	.477**	.329	.098	.544**	.534**	.633**	.120	.085	.139	-.234	-.112	.294	.359*	--			
15. I regularly connect with my principal about best teaching strategies as a result of COVID-19.	2.24	.792	.713**	.390*	.088	.613**	.436*	.530**	.352*	.303	.375*	-.443**	-.126	.153	.452**	.502**	--		
16. I am more likely to seek another profession as a result of the changes in teaching during COVID-19.	1.79	.893	.127	.243	-.247	.012	.065	.029	-.411*	-.461**	.029	.214	.643**	-.175	-.013	.060	-.190	--	
17. I considered quitting as a result of COVID-19	1.82	.950	.046	.295	-.392*	.004	.149	.066	-.521**	-.570**	-.105	.299	.820**	-.202	.019	.094	-.189	.874**	--
18. I have the resources necessary to do my job well.	3.21	.600	.434*	.168	.155	.369*	.361*	.297	.283	.272	.229	-.318	.008	.485**	.349*	.351*	.415*	.145	.070

** Correlation is significant at the $p < .01$ level (2-tailed).
* Correlation is significant at the $p < .05$ level (2-tailed).

Colleague support and general job satisfaction We found a variety of associations between teacher connectedness and support in their schools. For example, there were three statistically significant relationships between teachers who feel like they are a part of a team and other aspects of their work life, not considering COVID-19 conditions. The findings show that the more teachers feel a part of a team, the more they feel that their professional strengths are utilized (at their schools) ($r(33) = .68$, $p < .01$), the more connected they feel to their colleagues ($r(33) = .68$, $p < .01$), and the more they would recommend their school as a good place to work ($r(33) = .48$, $p < .01$). When considering the context of COVID-19, teachers who feel like they are more a part of a team also reported more regularly connecting with teaching colleagues ($r(33) = .54$, $p < .01$) about best practice strategies.

Our findings also showed a statistically significant correlation between teachers who feel their professional strengths are utilized and three other survey items. Teachers who feel their professional strengths are utilized are more likely to recommend that their school is a good place to work ($r(33) = .51$, $p < .01$), to feel connected to their teaching colleagues ($r(33) = .51$, $p < .01$), and to regularly connect with their teaching colleagues about best practice strategies as a result of COVID-19 ($r(33) = .53$, $p < .01$). There was also a significant correlation between feeling connected to their teaching colleagues and regularly connecting with their colleagues about best practices as a result of COVID-19 ($r(33) = .63$, $p < .01$).

Teacher self-efficacy and support of principal Contrary to research on teacher self-efficacy related to social persuasion and vicarious learning (e.g., Bandura, 1993; Tschannen-Moran et al., 1998; Tschannen-Moran & Woolfolk-Hoy; 2007), we did not find a statistically significant relationship between participants who thought of themselves as effective (self-efficacy for teaching) and other survey items related to social interactions with colleagues or their principal. Therefore, while teacher participants overall thought of themselves as effective (M=3.36, SD= .489), there was no associated pattern with their personal beliefs about their ability to be effective and their perceptions of satisfaction or support on any other survey item. Except for one survey item, there was minimal to no relationship (R-values ranging from -.173 to .26.) between feeling confident in the alternative teaching methods necessary during COVID-19 and any other teacher respondent data (e.g., principal support, colleague support). There was a statistically significant correlation between feeling they have the resources necessary to do their job well and feeling confident in the alternative teaching methods needed during COVID-19 ($r(33) = .49$, $p < .01$).

Our findings also showed a negative correlation between teachers who stated, "I feel overwhelmed at work" and those who "regularly connect with my principal about best practice teaching strategies as a result of COVID-19" ($r(33) = -.44$, $p < .01$). This relational pattern shows that teachers who report feeling more overwhelmed at work are less likely to report regularly connecting with the principal about best practices during COVID-19, and vice versa. Of note, there is not a statistically significant correlation between teachers' feelings of being overwhelmed and regular connections with their teaching colleagues as a result of COVID-19 ($r(33) = -.23$, $p > .05$).

When considering the context of COVID-19, teachers who regularly connect with their principal about best practice strategies also report feeling like they are more a part of a team ($r(33) = .61$, $p < .01$). Similarly, teachers who regularly connect with their principal about teaching strategies as a result of COVID-19 feel their principal is more familiar with the instructional changes they have made due to COVID-19 ($r(33) = .45$, $p < .01$) and are more likely to regularly connect with their teaching colleagues about best teaching strategies as a result of COVID-19 ($r(33) = .50$, $p < .01$).

Teacher self-efficacy, job satisfaction and retention When it comes to teacher job satisfaction and factors related to retention, there is a statistically significant correlation between teachers' reporting that their work gives them feelings of professional accomplishment and also reporting they are satisfied with their job ($r(33) = .88$, $p < .01$). Furthermore, there is a statistically significant negative correlation between teachers reporting that their work gives them feelings of professional accomplishment and reporting that they "think about quitting teaching" ($r(33) = -.66$, $p < .01$). In other words, the more teachers' work gives them feelings of accomplishment, the less likely they are to think about quitting teaching. Similarly, the more their work gives them feelings of professional accomplishment, the less likely teacher participants report considering "quitting as a result of COVID-19" ($r(33) = -.52$, $p < .01$). However, data show that the more teachers have considered quitting as a result of COVID-19, the more likely they are to seek another profession as a result of the changes in teaching as a result of COVID-19 ($r(33) = .87$, $p < .01$).

Descriptive statistics show that the smallest mean values occurred on survey items related to retention in the profession. Survey questions such as "I think about quitting" (M = 1.70, SD = .810), "I am more likely to seek another profession as a result of the changes in teaching as a result of COVID-19" (M= 1.79, SD= .893), and "I have considered quitting as a result of COVID-19" (M= 1.82, SD= .950) are the only survey items with a mean less than 2.00 and they are all related to retention. These survey items also denote the greatest standard deviation values

relative to the mean. On average most teacher respondents had not considered quitting the profession in the past nor did they expect to quit in the future, even in the face of COVID-19. That said, outlier data points do exist for these questions, which explain a range of opinions about job satisfaction. Additionally, on average respondents report that they think of themselves as effective teachers (M=3.36, SD= .489). These statistics show the highest mean and agreement, with the smallest variation, for this subset of questions, but as previously stated, showed no statistically significant relationships between any other survey items related to their self-efficacy beliefs for teaching, support, or job satisfaction.

With regards to workload perceptions, there is a statistically significant correlation between teachers who feel overwhelmed and who think about quitting teaching ($r(33) = .46$, $p < .01$). The more teachers feel overwhelmed, the more likely they think about quitting teaching. Similarly, there is a statistically significant correlation between teachers who think about quitting teaching and those "more likely to seek another profession as a result of the changes in teaching as a result of COVID-19" ($r(33) = .64$, $p < .01$) and considered quitting as a result of COVID-19 ($r(33) = .82$, $p < .01$).

In terms of principal support, there is a statistically significant relationship between teachers who feel their principal cares about them and five other items on the survey. First, teachers who feel most cared for are more likely to have had a greater number of person-person interactions with their principal in the last year ($r(33) = .45$, $p < .01$). Also, they are more likely to feel like a part of a team ($r(33) = .54$, $p < .01$), feel connected to their teaching colleagues at school ($r(33) = .50$, $p < .01$), feel less overwhelmed at work ($r(33) = -.50$, $p < .01$), and feel that their principal is familiar with the instructional changes they have made due to COVID-19.

Principal Surveys

Although limited to descriptive statistical analyses due to a small number of participants (n=8), information gathered revealed general feelings by principals with regard to: (a) their relationships with their teachers, (b) teacher expertise and evaluation, (c) teacher understanding of mathematics learning, and (d) their ability to support teachers at their schools during the COVID-19 pandemic. Based on a 5-point Likert scale, administrative participants either *agreed or strongly agreed* on twelve of the sixteen statements posed in their survey. All *strongly agreed* that they value their relationships with the teachers at their schools. All *agreed or strongly agreed* that they value teacher input and that they solicit teacher input in decision making.

Additionally, all *agreed or strongly agreed* that they make an effort to get to know the teachers at their schools, that they take an interest in the personal lives of teachers at their schools and that they consider themselves effective instructional leaders. All a*greed or strongly agreed* that they provide teachers the support that their teachers need, that they take time to recognize the work teachers do, and that they provide meaningful feedback to teachers in their schools. All principal participants *agreed or strongly agreed* that they communicate regularly with teachers in their schools. While one principal did disagree, seven of the principal participants *agreed or strongly agreed* that they are familiar with the National Council of Teachers of Mathematics (NCTM) Teaching Practices. Finally, seven of the eight principal participants *agreed* that mathematics teachers at their schools need more professional development in instructional practice.

In terms of teacher expertise and evaluation, seven of the principal participants *agreed* that mathematics teachers at their school utilize effective strategies for teaching mathematics. In addition, all principals surveyed *disagrede or strongly disagreed* that they sometimes doubt their ability to evaluate mathematics teachers for face-to-face classroom teaching and all of the principal participants *agreed* that they are confident in their ability to evaluate mathematics teachers for online teaching. In terms of interactions during the COVID-19 pandemic, all principals surveyed *agreed* that they support the teachers at their schools while they adapted instruction due to the COVID-19 pandemic. Six of the principal participants *agreed or strongly agreed* that their teachers are proficient in teaching using alternative methods as a result of the COVID-19 pandemic.

Discussion

This study provided evidence that investigations of teachers and principals during crisis events are of value. The COVID-19 pandemic offered a unique research opportunity to inspect participant beliefs of self-efficacy, job satisfaction and perspectives on support during a crisis event. Teacher attrition and retention continue to be key issues in education, especially in STEM content areas (Smith et al., 2018), with working conditions and teacher burnout being most impactful on teacher attrition and retention (Doherty, 2020). The working conditions during

COVID-19 were unlike others (Baker, 2020; Hare, 2020). Thus, understanding factors that affect teacher retention, including perceptions of school principal support and teacher self-efficacy, contributes to this key area of study.

The theory of self-efficacy posits that both teachers' and principals' beliefs in their ability to effectively manage job-related responsibilities are influenced by the level of support they receive (e.g., social persuasion, vicarious learning) and their feelings of place in their school environment (e.g., psychological state). While this study found many statistically significant correlations between job satisfaction and teachers feeling supported by their principal and connected to their colleagues, there were no direct associations of those supports to their beliefs about their ability to be effective teachers. One reason for this might be that most teacher respondents in this study taught from their homes. Our findings show that while support and job satisfaction are associated, there was no association between their self-efficacy for teaching and professional support. This finding, in contrast to the literature on self-efficacy (e.g., Tschannen-Moran et al., 1998; Tschannen-Moran & Woolfolk-Hoy; 2007), warrants further investigations into how factors of teacher self-efficacy, such as increased isolation, may have been impacted due to COVID-19.

Overall, early-career teachers and principals agreed that both parties connected regularly and that principals were familiar with teachers' instructional changes and strategies impacted by COVID-19. Principals in the study shared favorable perspectives on their ability to support their teachers during the pandemic and their teachers' ability to demonstrate effective mathematical teaching practices. Also, regular connections with their principals had a stronger association to reducing teachers' feelings of being overwhelmed than even their regular connections with their teaching colleagues. Previous research highlights that principal support impacts teacher retention (Berry et al., 2021; Feiman-Nemser, 2003; Hughes et al., 2015) and our data shows that early-career teachers overall feel supported and cared for by their principals and on average, do not think about quitting the profession.

When the state of crisis is ongoing, such as with the COVID-19 pandemic, gathering insights from this time and space is important to help understand future implications and impacts on organizations, such as schools. As researchers, we were able to disaggregate data related to teacher self-efficacy, job satisfaction and perceptions of principal support. Principals, however, may not have the opportunity to fully understand the effects of crisis events like the pandemic on their teachers, individually and collectively as group. For example, factors such as teachers feeling cared for by their principal and feeling that their professional strengths are utilized at work were more aligned with higher job satisfaction factors and intention to remain in the field. Schools are complex organizations and therefore take careful and thoughtful consideration especially in response to crisis and change. As our world continues to examine the "new normal" in response to the COVID-19 pandemic, refocusing and reassessing efforts around teacher retention, especially for early-career teachers in high-turnover areas, will be critical.

Our data show that early-career mathematics teachers who have seriously considered quitting as a result of the COVID-19 pandemic are also likely to seek a new profession altogether (and not return to teaching). A promising note from our data is that, overall, these early-career teachers felt that they were "part of a team," although most taught in isolation from home during part, or all, of the pandemic. Although this study focused on early-career teachers, increased efforts will likely be needed, to identify support measures for school administrators during crisis events (Gyang, 2020; Hamilton et al., 2020). Our study showed a moderately strong, positive relationship between teachers who regularly communicated with their principals and those who felt supported and cared for during the COVID-19 pandemic. While principals have many roles and responsibilities around instructional leadership (Hallinger & Wang, 2015), regularly connecting with their teachers is positively related to teachers' perception that their principal "cares about them" (as individuals). In response to crisis events it is recommended that principals reprioritize their future goals and tasks to best support teachers at their sites, and the students they serve (Ayyildiz & Baltaci, 2020).

Delimitations/Limitations

With the study controlling for only early-career, secondary mathematics teachers, questions remain about how different variables may or may not show effects in different communities (e.g., career-stage, geographical location, type of community, school size, subject area) or circumstances (e.g., crisis vs. non-crisis timeframes, personal vs. professional responsibilities). Due to the small sample size, results cannot be extrapolated to larger populations. Furthermore, due to the lack of validity and reliability of specific researcher-created survey questions that focus on the COVID-19 pandemic, results are preliminary in nature until construct validity is established and future research is completed using these questions. Also, the data is limited by the fact that only teachers who had earned their teaching credentials in the California State University system were included in the study. It would be ideal to have various states participate in the study. Further, participating teachers invited their principals to join the study, which may have incurred an inherent bias for both parties, as opposed to administrators being contacted directly by the researchers. Finally, the chosen methodological design (i.e., survey) is limited by its nature. Other

methods to investigate the study's phenomena (e.g., interviews, observations) would provide alternative findings and/or results.

Future Directions and Recommendations

In the future, we hope to gather qualitative data (e.g., interviews) with this study's participants to substantiate the results of this investigation. Also, we hope to broaden the current study to include more participants from a greater geographical area in the United States. In addition, we hope to interrogate our findings qualitatively with case study analysis following early-career teachers who stay in the profession and also those who leave teaching.

We call for further research on the implications of this pandemic to inform both educator preparation programs and ongoing professional development for teachers. Due to its unpredictable nature, the COVID-19 pandemic challenged K-12 educators in many ways as never before. Educator preparation programs and in-service professional learning programs will need to re-evaluate their curricula to ensure that teachers and principals will be trained to respond effectively during future crisis events that require significant understanding, flexibility, and adaptability. Finally, further investigations will be needed to measure the impact of COVID-19 on teacher preparation and professional development.

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Appendix A – Teacher Survey

This is a survey of early-career mathematics teachers (within the first three years of teaching), sponsored by the Mathematics Teacher Education Partnership (MTEP), specifically the Secondary Teacher Retention and Induction in Diverse Education Settings (STRIDES) research action cluster (RAC). This survey will help us understand how early-career mathematics teachers are being supported and how support can be strengthened.

The survey will take 10-15 minutes to complete. Please try to answer the questions honestly.

Participation is voluntary and anonymous. Your identity will be unknown to researchers, and responses will be kept anonymous. If there are significant findings from this study, the results may be published in a research journal, but all references to place will be anonymized; that is, there will be no references to names of persons, schools, or districts. YOUR ADMINISTRATOR/PRINCIPAL WILL NOT SEE YOUR SURVEY RESPONSES.

You will receive no direct benefits from participating in this research study. However, your responses may help us learn more about what novice math teachers need in order to feel supported. The possible risks or discomforts are minimal. You may feel slight discomfort in answering questions related to your work life.

By beginning the survey, I am agreeing to the conditions set forth in the statements above.

1. For each of the following statements, PRINCIPAL refers to the administrator most responsible for evaluating your work. Please click the column which indicates your level of agreement. *

Mark only one oval per row.

	Strongly Disagree	Disagree	Agree	Strongly Agree
My principal supports the work I do.	○	○	○	○
My principal communicates with me regularly.	○	○	○	○
My principal values my input.	○	○	○	○
My principal appreciates my efforts.	○	○	○	○
I have the resources necessary to do my job well.	○	○	○	○
My principal is familiar with the instructional changes I have made as a result of the COVID-19 pandemic.	○	○	○	○

2. For each of the following statements, click the column which indicates your level of agreement. *

Mark only one oval per row.

	Strongly Disagree	Disagree	Agree	Strongly Agree
My principal knows me as a person.	○	○	○	○
My principal cares about me.	○	○	○	○
My principal is aware of my outside interests.	○	○	○	○
My principal supported me personally during the COVID-19 pandemic.	○	○	○	○

3. What delivery format of teaching are your using? *

Mark only one oval.

◯ Face-to-face only

◯ Synchronous Hybrid (some face-to-face and some synchronous online)

◯ Asynchronous Hybrid (some face-to-face and some asynchronous online)

◯ Synchronous Fully Online

◯ Asynchronous Fully Online

◯ A hybrid combination of face-to-face, synchronous, and asynchronous formats

4. Where do you perform your instruction? *

Mark only one oval.

◯ At home/location not at work site

◯ At school (required presence)

◯ At school (required presence) and at home/location not at work site

◯ At school (personal preference) and at home/location not at work site

5. Approximately how many person-to-person interactions have you had with your principal (face-to-face or electronic) regarding instructional practices during this school year? *

Mark only one oval.

◯ 0 (none)

◯ 1 to 2

◯ 3 to 5

◯ 6 to 10

◯ more than 10

6. For each of the following statements, click the column which indicates your level of agreement. *

Mark only one oval per row.

	Strongly Disagree	Disagree	Agree	Strongly Agree
I think of myself as an effective mathematics teacher.	◯	◯	◯	◯
I communicate mathematics concepts to students successfully.	◯	◯	◯	◯
I sometimes doubt my ability to teach mathematics.	◯	◯	◯	◯
I have a strong background in mathematics.	◯	◯	◯	◯
I sometimes struggle to find the right teaching strategy.	◯	◯	◯	◯
I am confident in the alternative teaching methods necessary as a result of the COVID-19 pandemic.	◯	◯	◯	◯

7. For each of the following statements, click the column which indicates your level of agreement. *

Mark only one oval per row.

	Strongly Diasgree	Disagree	Agree	Strongly Agree
At the school where I teach, I feel like part of a team.	◯	◯	◯	◯
My professional strengths are utilized at work.	◯	◯	◯	◯
I feel connected to my teaching colleagues at school.	◯	◯	◯	◯
My work gives me a feeling of professional accomplishment.	◯	◯	◯	◯
I am satisfied with my job.	◯	◯	◯	◯
I would recommend my school as a good place to work.	◯	◯	◯	◯
I regularly connect with my teaching colleagues about best teaching strategies as a result of the COVID-19 pandemic.	◯	◯	◯	◯
I regularly connect with my principal about best teaching strategies as a result of the COVID-19 pandemic.	◯	◯	◯	◯

8. For each of the following statements, click the column which indicates your level of agreement. *

Mark only one oval per row.

	Always	Often	Seldom	Never
I feel overwhelmed at work.	◯	◯	◯	◯
Teaching is stressful.	◯	◯	◯	◯
There isn't enough time in the day to do what I need to do.	◯	◯	◯	◯
I think about quitting teaching.	◯	◯	◯	◯
I am much more likely to seek another profession as a result of the changes in teaching as a result of the COVID-19 pandemic.	◯	◯	◯	◯
I feel more like quitting teaching since the COVID-19 pandemic.	◯	◯	◯	◯

9. When you think about whether you will remain in the teaching profession, how important is each of the following to your decision? Rank them from most important (#1) to least important (#12). *

Mark only one oval per row.

	1	2	3	4	5	6	7	8
Salary	○	○	○	○	○	○	○	○
Connection to colleagues	○	○	○	○	○	○	○	○
Support from administration	○	○	○	○	○	○	○	○
Love of subject matter	○	○	○	○	○	○	○	○
Desire to work with young people (students)	○	○	○	○	○	○	○	○
Advancement opportunities	○	○	○	○	○	○	○	○
Lack of other career options	○	○	○	○	○	○	○	○
Status of teaching as a profession	○	○	○	○	○	○	○	○
Workload	○	○	○	○	○	○	○	○
Risk to Physical Health	○	○	○	○	○	○	○	○
Risk to Emotional Health	○	○	○	○	○	○	○	○
Teacher Work Hours/Schedule	○	○	○	○	○	○	○	○

10. With which gender identity do you most identify? *

Mark only one oval.

◯ Female

◯ Male

◯ Transgender Female

◯ Transgender Male

◯ Gender variant/non-conforming

◯ Prefer not to answer

◯ Other: _____

11. What is your age in years? *

Mark only one oval.

◯ Between 20 and 24 years

◯ Between 25 and 29 years

◯ Between 30 and 34 years

◯ Between 35 and 39 years

◯ Between 40 and 44 years

◯ Between 45 and 49 years

◯ Between 50 and 54 years

◯ Between 55 and 59 years

◯ Between 60 and 64 years

◯ Between 65 and 69 years

◯ Between 70 and 74 years

◯ Between 75 and 79 years

◯ Between 80 and 84 years

◯ Between 85 and 89 years

12. Are you of Hispanic, Latino, or Spanish origin? *

Mark only one oval.

◯ Yes

◯ No

◯ Prefer not to answer

13. What is your ethnicity? Check all that apply. *

Check all that apply.

☐ American Indian or Alaskan Native

☐ Asian American/Asian

☐ Black or African American

☐ Native Hawaiian or other Pacific Islander

☐ White

☐ Prefer not to answer

Other: ☐ _____

14. What is your highest level of education so far? *

Check all that apply.

☐ Bachelors

☐ Masters

☐ Specialist

☐ Doctorate

15. Do you have a degree in mathematics (that is, a full major in mathematics)? If you choose Other, please specify then your undergraduate major field. *

Mark only one oval.

◯ Yes

◯ Other: _____

16. How many completed years of grades 6-12 mathematics teaching experience do you have? *

_____

17. Please complete the following: I teach in a city/town whose population is... *

Mark only one oval.

◯ Greater than 500,000.

◯ Greater than 100,000 but less than 500,000.

◯ Greater than 50,000 but less than 100,000.

◯ Greater than 15,000 but less than 50,000.

◯ Less than 15,000.

18. At what grade level do you teach mathematics? (Check all that apply.) *

Check all that apply.

☐ 6th

☐ 7th

☐ 8th

☐ 9th

☐ 10th

☐ 11th

☐ 12th

19. In what type of school do you teach? *

Mark only one oval.

◯ Public

◯ Private, non-parochial

◯ Parochial

◯ Charter

◯ Other: _____

20. Have you completed a certificate program or have a degree in instructional technology? *

Mark only one oval.

◯ Yes

◯ No

Appendix B – Principal Survey

This is a survey of early-career mathematics teachers (within the first three years of teaching), sponsored by the Mathematics Teacher Education Partnership (MTEP), specifically the Secondary Teacher Retention and Induction in Diverse Education Settings (STRIDES) research action cluster (RAC). This survey will help us understand how early-career mathematics teachers are being supported and how support can be strengthened.

The survey will take 10-15 minutes to complete. Please try to answer the questions honestly.

Participation is voluntary and anonymous. Your identity will be unknown to researchers, and responses will be kept anonymous. If there are significant findings from this study, the results may be published in a research journal, but all references to place will be anonymized; that is, there will be no references to names of persons, schools, or districts. YOUR TEACHERS WILL NOT SEE OR HAVE ACCESS TO YOUR SURVEY RESPONSES.

You will receive no direct benefits from participating in this research study. However, your responses may help us learn more about what novice mathematics teachers need in order to feel supported. The possible risks or discomforts are minimal. You may feel slight discomfort in answering questions related to your work life.

By beginning the survey, I am agreeing to the conditions set forth in the statements above.

1. Please click the column which indicates your CURRENT level of agreement. *

Mark only one oval per row.

	Strongly Disagree	Disagree	Agree	Strongly Agree
I consider myself an effective instructional leader.	○	○	○	○
I provide teachers the support they need.	○	○	○	○
I communicate regularly with teachers in my school.	○	○	○	○
I solicit teacher input in decision making.	○	○	○	○
I value teacher input.	○	○	○	○
I take time to recognize the work teachers do.	○	○	○	○
I provide meaningful feedback to teachers in my school.	○	○	○	○
I have supported the teachers at my school while they adapted instruction due to the COVID-19 pandemic.	○	○	○	○

2. Please click the column which indicates your CURRENT level of agreement. *

Mark only one oval per row.

	Strongly Diasgree	Disagree	Agree	Strongly Agree
I make an effort to get to know the teachers at my school.	◯	◯	◯	◯
I value my relationships with the teachers at my school.	◯	◯	◯	◯
I take an interest in the personal lives of teachers at my school.	◯	◯	◯	◯

3. Please click the column which indicates your CURRENT level of agreement. *

Mark only one oval per row.

	Strongly Diasgree	Disagree	Agree	Strongly Agree	Unable to judge
Mathematics teachers at my school utilize effective strategies for teaching mathematics.	◯	◯	◯	◯	◯
Mathematics teachers at my school need more professional development in instructional practice.	◯	◯	◯	◯	◯
I am confident that my teachers are proficient in teaching using alternative methods as a result of the COVID-19 pandemic.	◯	◯	◯	◯	◯

4. Please click the column which indicates your CURRENT level of agreement. *

Mark only one oval per row.

	Strongly Diasgree	Disagree	Agree	Strongly Agree
I know what effective mathematics instruction looks like for face-to-face classroom teaching.	⬭	⬭	⬭	⬭
I am familiar with current best practices for teaching mathematics for face-to-face classroom teaching.	⬭	⬭	⬭	⬭
I am familiar with the National Council of Teachers of Mathematics (NCTM)'s Mathematical Teaching Practices.	⬭	⬭	⬭	⬭
I sometimes doubt my ability to evaluate mathematics teachers for face-to-face classroom teaching.	⬭	⬭	⬭	⬭
I am confident in my ability to evaluate mathematics teachers for online teaching.	⬭	⬭	⬭	⬭

5. What delivery format(s) of teaching is/are being used for mathematics instruction at your school? (please select all that apply)

Check all that apply.

☐ Face-to-face only
☐ Synchronous Hybrid (some face-to-face and some synchronous online)
☐ Asynchronous Hybrid (some face-to-face and some asynchronous online)
☐ Synchronous Fully Online
☐ Asynchronous Fully Online
☐ A hybrid combination of face-to-face, synchronous, and asynchronous formats
Other: ☐ _____

6. Based on your opinion, please select the percent (rounded to the nearest ten percent) that represents the relative degree to which this person is responsible for the academic achievement of students at your school (will total to 100%). *

Mark only one oval per row.

	0%	10%	20%	30%	40%	50%	60%	70%	8
Teacher	○	○	○	○	○	○	○	○	○
Principal or other administrator	○	○	○	○	○	○	○	○	○
Parent(s) or guardian(s)	○	○	○	○	○	○	○	○	○
Student	○	○	○	○	○	○	○	○	○
Academic Counselor	○	○	○	○	○	○	○	○	○
Instructional Technology Staff	○	○	○	○	○	○	○	○	○
Others (e.g. peers, tutors, etc.)	○	○	○	○	○	○	○	○	○

7. Please click the column which indicates your CURRENT level of agreement. *

Mark only one oval per row.

	Strongly Diasgree	Disagree	Agree	Strongly Agree
In general, I understand best practices for teaching online.	○	○	○	○
I consider myself "tech savvy".	○	○	○	○
I have a good working relationship with the instructional technology support staff that supports my school.	○	○	○	○
I am confident in my ability to support my teachers as a result of the COVID-19 pandemic.	○	○	○	○

8. With which gender identity do you most identify? *

Mark only one oval.

◯ Female

◯ Male

◯ Transgender Female

◯ Transgender Male

◯ Gender variant/non-conforming

◯ Prefer not to answer

◯ Other: _____

9. What is your age in years? *

Mark only one oval.

◯ Between 25 and 29 years

◯ Between 30 and 34 years

◯ Between 35 and 39 years

◯ Between 40 and 44 years

◯ Between 45 and 49 years

◯ Between 50 and 54 years

◯ Between 55 and 59 years

◯ Between 60 and 64 years

◯ Between 65 and 69 years

◯ Between 70 and 74 years

10. Are you of Hispanic, Latino, or Spanish origin? *

Mark only one oval.

◯ Yes

◯ No

◯ Prefer Not to Answer

11. What is your ethnicity? Check all that apply. *

Check all that apply.

- [ ] American Indian or Alaskan Native
- [ ] Asian American/Asian
- [ ] Black or African American
- [ ] Native Hawaiian or other Pacific Islander
- [ ] White
- [ ] Prefer Not to Answer

Other: [ ] _____

12. What is your highest level of education so far? *

Check all that apply.

- [ ] Bachelors
- [ ] Masters
- [ ] Specialist
- [ ] Doctorate

13. Have you completed a certificate program or have a degree in INSTRUCTIONAL TECHNOLOGY? *

Mark only one oval.

- ( ) Yes
- ( ) No

14. Please indicate which level of MATHEMATICS EDUCATION you currently have? (please check all that apply) *

Check all that apply.

☐ No more than high school or college requirement (non-degree)
☐ Completed a mathematics methods course as part of teacher credentialing
☐ Bachelor's Degree Major
☐ Bachelor's Degree Minor
☐ Supplementary or Subject Matter Authorization
☐ Master's or Doctoral Degree
Other: ☐ _____

15. How many completed years of grades 6–12 mathematics teaching experience do you have? *

_____

16. Please complete the following: I am a principal of a school located in a city/town with a population of... *

Mark only one oval.

◯ Greater than 500,000.
◯ Greater than 100,000 but less than 500,000.
◯ Greater than 50,000 but less than 100,000.
◯ Greater than 15,000 but less than 50,000.
◯ Less than 15,000.

17. In what type of school are you a principal? *

Mark only one oval.

◯ Middle school
◯ Junior high
◯ High school
◯ K-8 school
◯ K-12 school
◯ 6-12 school
◯ Other: _____

18. In what type of school are you a principal? *

Mark only one oval.

◯ Public

◯ Private, non-parochial

◯ Parochial

◯ Charter

◯ Other (please specify)

◯ Other: _____