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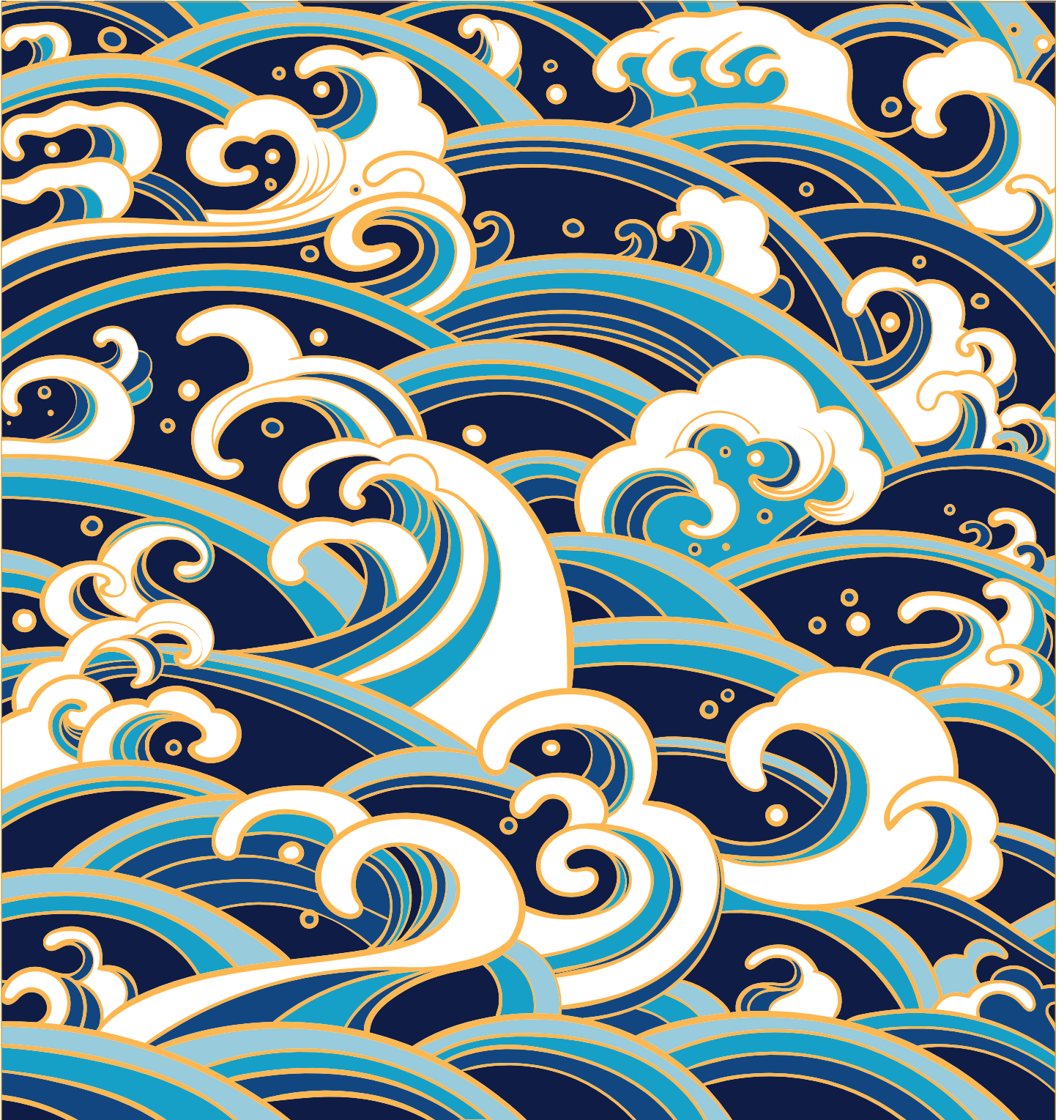


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What Educational Leaders Need to Know About Early-Career Mathematics Teachers

James A. Martinez, *University of Tennessee*

Lisa R. Amick, *University of Kentucky*

Abstract

In response to a national crisis to retain middle and high school teachers in Science, Technology, Engineering and Mathematics (STEM) classrooms, a study was conducted to define factors that affect job satisfaction among early-career mathematics teachers, including perceived support by school administrators. Survey data gathered from 141 early-career mathematics teachers across the United States revealed the degree that administrative and peer support affected teachers' perceptions of their enthusiasm for teaching mathematics. Results from the study are being used to design targeted professional development involving early-career mathematics teachers with their principals with the overarching goal being to increase retention for these teachers in middle and high schools. Connections are made to promote professional development aimed at developing instructional leadership skills among school leaders.

Keywords

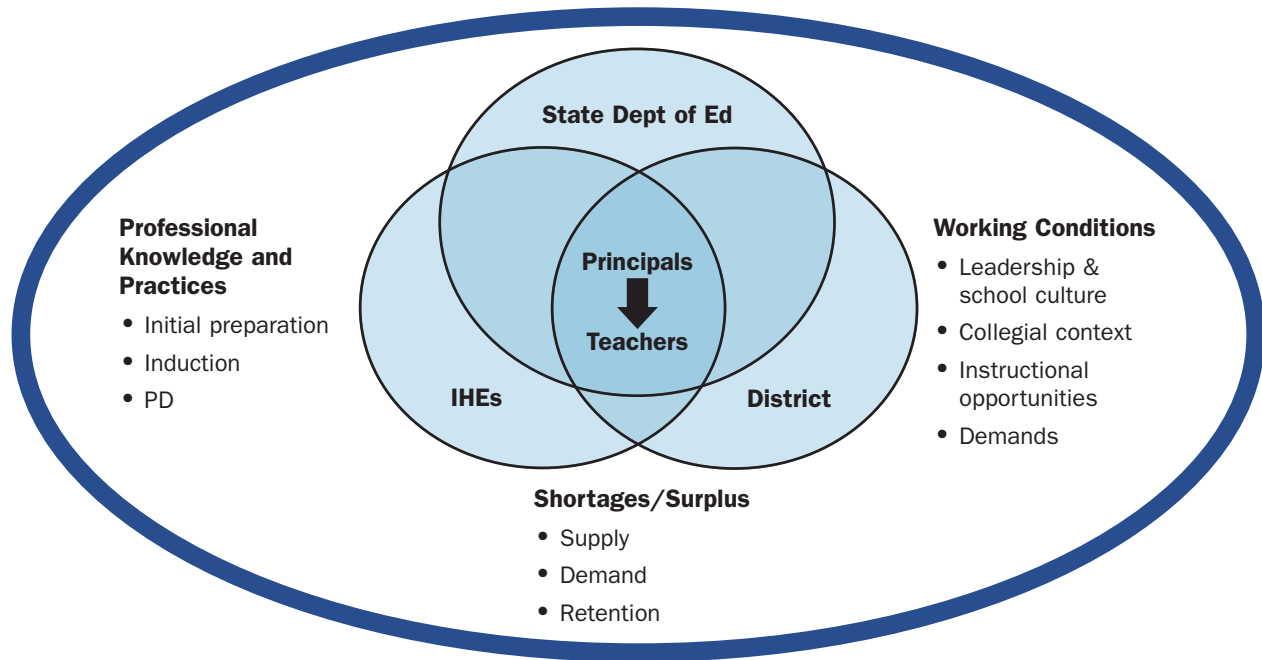
early-career, mathematics teacher, secondary, administrator support, principal

Introduction

Half of all teachers leave the profession within the first five years (Foster, 2010). This rate is even higher in high poverty schools and in subjects such as mathematics and science (Carver-Thomas & Darling-Hammond, 2017; Fantilli & McDougall, 2009; Goldring et al., 2014). Enrollment in teacher preparation programs is declining, and teacher turnover is costing America \$7.3 billion annually (National Math + Science Initiative, 2013). Increasing percentages of less experienced mathematics teachers has a profound effect on how well-prepared students are in mathematics to be successful in high school, college and beyond. Researchers agree that addressing the mathematics teaching crisis meaningfully will require building a more cohesive system of teacher preparation, support, and development (Mehta, Theisen-Homer, Braslow, & Lopatin, 2015).

Providing additional support to early-career teachers by their site administrators is one strategy to address this need. For instance, the California Mathematics Project (CMP) emphasizes the importance of school leader support for mathematics teachers, stating in its guiding principles that “(mathematics) teachers need a variety of forms of support from exemplary...administrators...to facilitate their growth and development” (2012, p. 4). The CMP guiding principles inform teacher preparation in the California State University program, which “prepares more of California’s P-12 teachers than all other institutions combined” (California State

FIGURE 1. *Conceptual Framework Describing Outside Influences on Early-Career Teachers*
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University, 2018). The purpose of this study is to investigate early-career, mathematics teacher perceptions of support in their schools and their general feelings of job satisfaction. This study contributes to a growing body of research by analyzing secondary mathematics teacher attitudes about administrative support using a quantitative research design with qualitative connections.

Conceptual Framework

To fully characterize the many outside influences that affect early-career teachers in their professional roles in their schools, we rely on a conceptual framework by Billingsley and Bettini (2017), represented in Figure 1. The figure was originally created to describe the factors and relationships of special education teachers, but it can be used more generally to characterize influences on early-career mathematics teachers.

At the center of these factors is the principal and the teacher, re-emphasizing the direct influence that the administrator has with early-career teachers. Both principals and teachers are affected by policies and directives put forward by the local school district as well as the State Department of Education. In addition, there are connections for early-career teachers to the institution of higher education (IHE) where they are currently matriculated in or have completed

their preparation program. These “outside” organizations also interact with each other as well, in separate pairs or all as one, as shown in the diagram. For example, the State Department of Education may change teacher evaluation protocols which would need to be communicated (and ultimately adopted) by the school districts. IHE’s and other professional development providers, like district offices, then would change their course requirements related to assessment of teachers to ensure they are prepared for the most current procedural expectations for evaluation at their sites.

As the framework illustrates, these dynamic interactions affect, and at times are affected by, the professional knowledge and practices, working conditions, and shortages/surplus aspects that are connected to staffing. For example, the increased demand for secondary mathematics teachers may allow for them to be hired as interns at their sites, which may alter the district’s induction requirements for them, which in turn may provide alternative instructional opportunities for the newly hired teacher. It is important to note that “leadership” under the heading of “working conditions” refers to professional opportunities for teachers such as serving as a subject-area department chair (for larger schools) or leading a committee for accreditation. The elements described herein are enclosed within a large oval to emphasize the particular interactions which are

contained within the professional role and do not include outside influences (e.g. family, location) and individual teacher dispositions. Although significant, these outside forces were not addressed in this study except as they related to the early-career mathematics teachers' perceptions of overall job satisfaction.

Definition of Terms

Early-career teachers — those who are serving as the teacher of record while in their teacher preparation program (i.e. internship or residence model placements) as well as those who are serving as a contracted professional in their first, second, or third years in the classroom.

Review of the Literature

Administrative Involvement

The practicality and availability of school principals to support teachers has been a topic of focused research over the past half-decade. Carver-Thomas and Darling-Hammond stated that “given the enormous scope of their duties, it’s simply unfeasible for principals to give the level of attention needed to supporting...teachers” (2013, p. 1). Particularly for hard-to-staff schools, research has shown that systemic structures (e.g. scheduling of professional development time, teacher compensation) served as barriers that kept principals from supporting teachers at their sites. Additionally, leadership skills (e.g. communication, self-care) were listed as traits that principals needed to develop to ensure that “principal-teacher relationships” were nurtured, forming a basis for collaboration (Hughes, Matt, & O’Reilly, 2015). Specifically addressing the role of principals in STEM schools, Sparapani & Calahan (2015) found that, of the factors that determined whether teachers regularly used technology in their science and mathematics classrooms, “the most important factor...is the involvement of the school principals” (p. 250-251). Faughn, Felter and Pence (2015) specified that support models for math teachers includes “professional development... (and) district and/or school administrative support among others” (p. 1614).

In a quantitative study specifically focused on secondary teachers, You and Conley (2014) analyzed National Center for Educational Statistics (NCES) School and Staffing Survey (SASS) responses from over seventeen thousand U.S. teachers. The data from this investigation revealed a

statistically significant correlation between administrative support and teacher work commitment for novice (five years or less), mid-career (six to ten years) and veteran (more than 11 years) teachers. Furthermore, the effect administrators have had on teacher job satisfaction has been documented with teachers who served in STEM classrooms in the mid-1990s and early 2000s. For example, Walker, Garton and Kitchel (2004) surveyed 149 secondary science (i.e. agriculture) teachers in Missouri who left the teaching profession during this period. In qualitative (open response) measures, “lack of administrative support” (or statements to that affect) were the most frequently cited reasons for their departure from the profession. In another analysis of quantitative measures, the Learning Policy Institute ranked lack of administrative support among the most frequently cited reasons for teacher departure in 2012-2013 (Carver-Thomas & Darling-Hammond, 2017).

Classroom Management Support

The relationship between classroom management issues and teacher attrition has been well-documented. Wentzell & Cohn (2017) presented their understandings about early-career teacher attrition stating that the “most common reasons teachers cite for leaving the profession include lack of support from administration/ineffective school leaders, feelings of isolation, a sense of powerlessness in the decision-making process, lack of effective classroom management skills, working in subpar conditions, and lack of peer support” (p.47).

In their review of related literature, Guarino, Santibanez, & Daley (2006) collected research articles which focused on teacher recruitment and retention, specifically those which examined the characteristics of those teachers who left the teaching profession. Generally characterizing the collected studies, the authors stated that “the most frequently reported causes of job dissatisfaction both for migrating teachers and teachers who left the profession were low salaries, lack of support from the school administration, and student discipline problems” (p. 51). Ingersoll (1999) examined characteristics of schools which affected staffing, including reasons for dissatisfaction among teachers that led to increased migration. In agreement with the above studies, “low salaries, lack of support from the school administration, student discipline problems, and lack of teacher influence over decision-making” were listed as significant factors affecting job satisfaction for teachers (p. 22).

Instructional Support

With the increased emphasis on judging school effectiveness based on standardized testing results, site principals are encouraged to practice instructional leadership (IL) as part of their duties. Prior to the 1980s, the role of a school administrator was focused on managerial tasks with less of an emphasis on curriculum and instruction. Improvement of instructional practices by teachers was addressed by other professional educators who were separated from the line authority of the principal (Alfonso, Firth, & Neville, 1975; Hoy & Forsyth, 1985). The concept of a principal as an instructional leader was introduced in the 1980s and redefined their role as facilitators of professional development and of good teaching in the classroom (Beck & Murphy, 1993). Brazer and Bauer (2013) state that instructional leadership is “the effort to improve teaching and learning for PK-12 students by managing effectively, addressing the challenges of diversity, guiding teacher learning, and fostering organizational learning” (p. 650).

Principals take the lead in building strong teams of teachers who are directly charged with improving student outcomes (Zepeda, 2014). In support of the importance of IL, Elmore (2004) posits, “the skills and knowledge that matter in leadership . . . are those that can be connected to, or lead directly to, the improvement of instruction and student performance. Under this definition, principals’ core work is instructional improvement, and everything else is instrumental to it” (p. 58). In a meta-narrative review of 109 quantitative studies published between 1985 and 2013, Boyce and Bowers (2018) found that “principal leadership and influence” was one of four emergent themes of instructional leadership and that “teacher retention” was one of three factors most researched in connection to instructional leadership. By practicing IL, principals build the capacity of teachers to ensure instructional improvements are sustained (Honig, Copland, Lorton, Rainey, & Newton, 2010).

Grissom, Loeb and Master (2012) endorse effective instructional leadership by stating “time spent coaching teachers about their instructional practice and evaluating teachers or curriculum predict greater school effectiveness and increases in school effectiveness (than overall instructional time)” (p. 4). Particularly with regard to supporting school administrators as instructional leaders in mathematics, Boston, Henrick, Gibbons, Berebitsky, & Colby (2017) argue that “an essential component of knowledge and skill required by principals is the ability to differentiate

between high- and low-quality instruction within a specific content area” (p. 184). This would require that some administrators acknowledge a departure from previously accepted forms of mathematics instruction (e.g. direct instruction with student note-taking and individually solving problems by applying algorithms) to more current instructional practices endorsed by the National Council of Teachers of Mathematics (NCTM). For example, principals practicing IL would advocate that their mathematics teachers employ whole-class, active student discussions where students use reasoning skills to justify alternative methods to solve problems (Boston et al., 2017).

Methods

Under the auspices of the Association of Public Land-grant University (APLU) Mathematics Teacher Education Partnership (MTEP), two online surveys were used to better understand the degree to which early-career mathematics teachers felt they were being supported in their schools. The following sections will focus on the procedures, participants, methods and data analysis related to this survey research.

Procedure

An online pilot survey containing 23 quantitative and qualitative questions was developed in the fall of 2015 by an MTEP working group of secondary mathematics teachers and school administrators, as well as higher education faculty who specialize in mathematics, mathematics education and educational leadership. An electronic mail was sent to all MTEP institutions across the United States which included secondary mathematics teacher preparation programs with an appeal to forward the survey to early-career teachers who were matriculated or had earned their teaching licensure through their programs. In all, 47 early-career teachers responded to the pilot survey in the spring of 2016. The researchers reduced the data from the pilot survey creating graphical representations that were presented to the entire MTEP working group at the MTEP annual conference in the summer of 2016.

A representative group of seven MTEP educators met in October of 2016 to analyze the results from the pilot survey to create a final survey. This final survey, comprised of 25 questions, was sent out in November of 2016 to all MTEP institutions in the same manner as the pilot survey, ultimately resulting in 141 early-career teacher responses. The following sections detail the participants, measures,

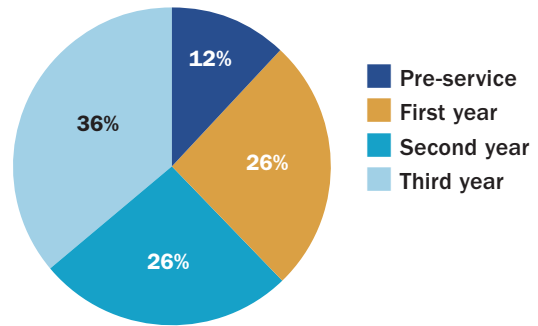
data analysis, results, and conclusions drawn from the final survey.

Participants

A third of the participants who responded to the final survey were located in the state of Utah, USA. However, data were gathered from participants from a number of other states as well as shown in Table 1.

The pre-service and early-career teacher participants were solicited via electronic means by MTEP university faculty. As shown in Figure 2, twelve percent of the respondents designated themselves as pre-service teachers, 26% in their first year, 26% in their second year and 36% in their third year of teaching. An overwhelming number (94%) of these teachers were serving in public secondary schools. Of all participants, sixty-eight percent of survey respondents

FIGURE 2. *Participants by Experience Level*



described their communities. They described them as rural (13%), suburban (32%), and urban (23%), teaching in a full range of classes from 6th grade general math through calculus. Although the majority of the teachers participating in the study were serving students in middle income neighborhoods, many also taught in low-SES (26%) and high-SES (9%) schools. Almost three-quarters (72%) of the pre-service and early-career teachers surveyed stated that between five and twenty percent of the students they were teaching had Individual Educational Plans (IEPs). Fifty-nine percent stated that between five and twenty percent of their students were designated as English Language Learners (ELLs), and fifty-five percent of them reported that between forty to one hundred percent of their students qualified for free and/or reduced lunch.

One survey question that related to overall job satisfaction prompted the early-career mathematics teachers to respond to the query, “To what extent do you agree with the following statement: I am generally satisfied with being a teacher, student teacher, or observer at this school?”. Likert-type responses from this question were: (a) strongly agree, (b) somewhat agree, (c) somewhat disagree, and (d) strongly disagree. Ninety-three percent (n=131) either strongly agreed or somewhat agreed to this question, which vastly contradicts the fact that about half of all teachers leave the field in their first few years. Researchers believe this may have occurred because those teachers who are enjoying their jobs are possibly the same ones who are willing to take the time to fill out a survey to inform the field of education as a whole. Since, generally speaking, the teachers responding to the survey were content with their professional role, results from other survey questions need to be grounded with this understanding. That is, responses to their feelings about administrative support and how this support relates to their enthusiasm for teaching were taken from early-career teachers who, for the most part, had an

Table 1: *Final Survey Participants by State*

State	Participants	Percent of All Participants
Utah	47	33
Texas	27	19
Tennessee	17	12
California	9	6
South Dakota	9	6
Nebraska	6	4
Georgia	5	4
Hawaii	5	4
Kentucky	4	3
North Dakota	4	3
Minnesota	2	1
Idaho	1	1
Illinois	1	1
New Jersey	1	1
Washington	1	1
Wisconsin	1	1
Wyoming	1	1

optimistic attitude about their professional roles. While this population is not necessarily representative of early-career teachers as a whole, researchers believe that this unique group of highly satisfied teachers can provide much insight on what needs to be present for early-career teachers to have high levels of job satisfaction.

Measures

Surveys used for this study were created in the Qualtrics® survey software which ultimately gathered both quantitative (e.g. Likert scale) and qualitative (e.g. open-response) data. For the quantitative portion, Likert scale questions did not include a neutral selection option as it was important to have the respondents either agree or disagree, to some degree, to these queries (Fink, 2003; Fowler, Jr., 2014). Data collected in the surveys revealed teachers' feelings about: (a) professional development activities, (b) professional learning communities (PLCs), and (c) perceived level of support by on- and off-site administrators. Demographic information was collected also. Detailed contextual information about the respondents' schools (e.g. public, private, middle school, high school) was collected as well as the degree that these teachers served students from special populations (i.e. special education, English Language Learner, gifted). More specifically, the degree that the participants generally felt that their administrators supported them professionally was measured, as well as how this support was confined to specific areas (e.g. assessment, instruction, curriculum, classroom management, collegial collaboration and course assignments/loads).

Delimitations and Limitations

This study is limited primarily due to the relatively small number of participants in 17 U.S. states, so results cannot be generalized to larger, broader populations. In addition, the convenience selection of these participants biased the results as participating teachers were serving in MTEP sites, and therefore, the sample is not representative of all secondary, early-career mathematics teachers. Inherently, survey responses and self-reported data are limited by individual perceptions of reality. In addition, survey research does not manipulate the conditions in an experimental manner (e.g. treatments and controls) and therefore cannot infer cause and effect. The analysis of the quantitative data in this study was descriptive in nature and as such does not infer statistical inference or significance.

Data Analysis

The descriptions of data reduction that follow were used for both the pilot and final surveys. As an initial step, electronic survey data collected from the Qualtrics® survey software was imported into the Microsoft® Excel software program. Once the transfer of data was complete, representations of the data (e.g. pie/bar/column charts) were produced so the researchers could view the data graphically. Numerical quantities for each measure were included in the graphical representations. Geographic data were exported to the online site, EasyMapMaker.com, to create visual representations of this data. Qualitative data acquired from the Qualtrics® survey's open-response questions were exported into the Microsoft® Word software program, where a preliminary exploratory analysis was performed by the researchers. Qualitative statements from the participants that supported quantitative measures were separated for use in reporting.

Results

So what do educational leaders need to know about early-career mathematics teachers? One of the most important findings is that this unique group of satisfied teachers feel a strong sense of connection and support. Researchers on this project believe that if we can better understand these supports, strengthen them even further, and replicate them for teachers with presumably lower levels of support and job satisfaction, then we can truly impact the teacher retention crisis that is happening in our country. The first step in that process is to better understand how the teachers in this study are being supported. Analysis of data revealed the extent that the early-career teachers perceived themselves as receiving administrative support including the types of assistance that were most meaningful to them.

Degree of Support by Different Administrators

One survey item prompted the early-career teachers to respond to the question, "How much support do you receive from the following (administrative persons)?" and were provided the following options: (a) substantial support, (b) moderate support, (c) minimal support, (d) no support, or (e) does not apply. The survey collected these responses from the teachers as they regarded support from: (a) the superintendent, (b) other district office administrators, (c) the principal, (d) other building administrators, including associate or assistant principals, deans, and the like, and (e) university professors. Table 2 displays these results.

Table 2: Participant Responses to “How much support do you receive from the following (administrative persons)?” (n=141)

Administrator	No Support	Minimal Support	Moderate Support	Substantial Support	Does Not Apply
Superintendent	45	40	12	5	38
Other District Office Administrators	27	37	37	8	32
Principal	5	28	44	51	13
Other Building Administrator (Associate Principal, Assistant Principal, Dean, etc.)	4	25	42	57	13
University Professor	32	20	25	20	44

In terms of a combined measure of moderate and substantial support, principals (n=95; 67%) and “other building administrators” (n=99; 70%) far outpaced other persons under consideration. Moderate and substantial support from other district office administrators (e.g. instructional coordinators or teachers on special assignment) and university professors was considerable (n=45; 32%). For this measure, the least amount of combined responses for moderate or substantial support (n=17; 12%) were associated with the superintendent.

Specific Areas of Support

Study participants were also asked to rate the support by the aforementioned persons in particular areas including: (a) curriculum, (b) classroom management, (c) course alignment/load, (d) assessment, (e) instruction/instructional materials, (f) collegial collaboration, and (g) affirmation. Table 3 displays these results.

Although all the persons listed gained votes in each of the categories by the participating teachers, site principals

Table 3: Participant Responses to “In what areas do you receive support from these administrators/ university partners? (Select all that apply.)” (n=141)

Administrator	Curriculum	Classroom Mgmt.	Course Assignment/Load	Assessment	Instruction/ Materials	Collegial Collaboration	Affirmation	N/A
Superintendent	6	5	4	3	2	2	30	91
District Office Administrators	54	16	6	28	37	15	24	58
Principal	24	52	39	25	27	33	85	23
Assistant Principal	20	68	25	31	30	34	67	36
Dean	2	5	2	3	1	1	4	123
University Professor	30	26	14	24	29	27	25	88
Other	20	15	8	17	18	11	13	70

were chosen most often overall, including garnering the highest number in affirmation and course assignment/load. The assistant principal ranked second overall, leading the collegial collaboration, assessment, and classroom management categories. District office administrators and university professors ranked third and fourth, respectively, with district office administrators leading the curriculum and instruction/instructional materials categories.

Associate principals ranked fifth overall, then “other”, and finally the superintendent, ranked seventh, and dean ranked eighth, overall. In terms of support from administrators in a variety of areas (curriculum, classroom management, course assignments, assessment, instruction, collaboration and affirmation), the respondents relied to a much larger degree on those who were on-site (principals and assistant principals) rather than university professors and district office personnel.

Meaningful Support

In a related open-response question, “Please describe the most meaningful, mathematics teaching-related support that you received from an administrator and why it was meaningful for you,” study participants provided qualitative responses that revealed the degree that study participants felt administrators supported them with content. In terms of support from off-site administrators, one early-career stated, “I have received very little support from (on-site) administration. The only teaching-related contact I have had with an administrator has come from the director of curriculum who evaluated me for PDAS (Professional Development and Appraisal System).” In terms of administrators at their school sites, a number of teachers responded to this question with a connection to their administrators’ supervisory practices (e.g. evaluation, observation). One teacher commented, “I received positive feedback on my observations and they appreciated my effort to engage students and come up with activities to help students meet objectives.” Another noted, “The principal is my evaluator this year and we have honest conversations on how I am as a teacher. I am still learning new things each year and he lets me know areas I can focus so that it is not overwhelming.” One other participant responded by saying, “The principal had a walkthrough and coached me on questioning techniques. It was very helpful in teaching effectively.” And finally, one other early-career teacher shared that “Administrators have been happy to observe my class and offer feedback whenever I have requested it.” Overall, these positive statements could be summed up by one teacher’s comments:

My principal was my evaluator for my first year. He was very supportive and encouraged me to try new things. He praised the way I ran my classroom and used assessments and gave me lots of encouragement that I needed as a first year teacher. Since then, I have felt very comfortable going to him with questions, concerns, and struggles that I need advice for.

That said, a number of teachers were critical of the support, or lack of, provided by their administrators as it relates to mathematics teaching. One participant stated, “Administrators do not really support me in a mathematics teaching-related context. The administrators that I work with are concerned with scores on district Proficiency assessments and EOC (end of course) scores.” Another remarked, “I cannot recall any mathematics teaching-related support that I have recently received from [sic] an administrator.” One other study participant responded, “My mentor teacher and I had a quick meeting with the Principal about how things were going...not necessarily mathematics teaching-related but teaching related.” Another noted, “I have not yet received any support from my administration that was specifically mathematics teaching-related.”

Content Related Support

However, a few teachers answered the survey question about “mathematics teaching-related support” by their administrators by alluding to their principal’s comfort level with the subject. One study participant felt that content-related support was not essential to her success, stating:

I would say my assistant principal. While they weren’t [sic] a math person, they were able to give me some direct instruction on how to deliver the material better. Simply listening to my instruction, he was able to let me know what was unclear for him, from a student’s perspective, and how I could have done it differently that might have allowed him to understand.

That said, a few teachers responded positively regarding their administrators’ background knowledge and support with regard to content. For example, one noted, “My admin was a previous math teacher so I can seek advice on anything,” and another stated, “One of the assistant principals used to be a math teacher and has been very supportive. She is knowledgeable in the material and was a great teacher. She has observed me multiple times with helpful feedback.” Finally, one teacher spoke of assistance with a

particular mathematical/pedagogical skill, stating that, “the associate principal gave us ideas of different ways to teach slope and engage the students.”

A few early-career teachers responded to this question about the “most meaningful, mathematics teaching-related support” by relating to their principals use of general encouragement. For example, one noted, “My administrative support doesn’t relate to teaching or pedagogy. Most of the support I receive is encouragement.” Another stated, “I received general support from the principal and assistant principals, which I would characterize as general positive encouragement of the sort directed to all teachers at the school.” One other responded by stating, “Our assistant principal has been extremely helpful...He is always checking in to see how things are going...I feel very comfortable asking for help from him and our other administrators whenever I need it.” In a tribute to non-content related support, one other early-career teacher responded:

I haven’t really received direct support with mathematics instruction from administration as far as content goes. I have, however, received major support regarding parents that call in with issues. I found this meaningful because it reassured me that I was doing my job correctly and fairly. It reassured me that I had support from the “higher-ups” that could reassure parents that I am performing to a standard that the school and district expected and approved of.

Classroom Management Support

This comment was echoed by a few other participants who voiced their praise for their administrators with regard to classroom management and parent issues. One teacher related, “My assistant principal is the most meaningful supporter because she helps me through...behavioral issues.” A related story from another early-career teacher further illustrates this point:

My assistant principal recently helped me with a parent/student/grade issue. The student was not performing well in my class. The student had a B in my class for the first quarter I taught them and then their grade dropped dramatically when their grandparent passed away, understandably. However, with only three weeks remaining in the course the parents started to constantly email and call me asking if there was any way their child could get a B in the course. My assistant principal helped me handle the constant calls and e-mails as well as reinforced what I was saying.

Professional Learning Activities that Increased Enthusiasm

With regard to professional learning activities that had occurred within five months of taking the survey which marked an “increase (in the study participant) enthusiasm for teaching mathematics,” a number of possibilities were included in the survey for consideration, including: (a) professional conference, (b) professional development workshop, (c) work/communication with a mentor/coach, (d) work/communication with an online professional community, (e) professional course (e.g. online/university), (f) coordination/planning with site/district colleagues, (g) school/department meetings, and (g) online activities. The teachers ranked each category as “very influential,” “moderately influential,” “not influential,” or “I did not participate in this activity.” Table 4 displays the results of this survey question.

In terms of a combined measure of “very” or “moderately” influential, “work/communication with a mentor or coach” rated the highest among all choices with 84% (n=119) of the respondents. Although the “mentor/coach” in this question was not specified, the result exemplifies the level of support that these early-career mathematics teachers have with this form of collaboration.

Professional Decisions

As the results of survey research cannot be used to infer cause and effect, it was not the intent of this study to determine how support from administrators, other professionals or professional organizations, and professional development affected these teachers’ feelings about whether teaching was the best personal choice for them, in terms of career. That said, the survey included a question that asked these teachers “if (they) could go back and start college again,” would they: (a) “certainly...not become a teacher,” (b) “probably...not become a teacher,” (c) “certainly...become a teacher,” or (d) “probably...become a teacher.” One additional option allowed these teachers to state that they were “unsure (they) would become a teacher.” Table 5 displays the results of this survey question.

Overwhelmingly, the early-career mathematics teachers responded they would either “certainly would become a teacher” or “probably would become a teacher” (81%, n=114). Eleven percent (n=14) stated they were “unsure (they) would become a teacher,” 5% (n=7) responded that they “probably would not become a teacher,” and 3% (n=4) responded that they “certainly would not become a

Table 4: Participant Responses to “To what degree did each set of professional learning activities you participated in during the last five months increase your enthusiasm for teaching mathematics?” (n=141)

Professional Learning Activity	Did Not Participate	Not Influential	Moderately Influential	Very Influential
Professional conference	83	7	29	24
Professional development workshop	21	30	71	22
Work/Communication with a mentor/coach	10	15	68	51
Work/Communication with online professional community	93	17	26	7
Professional course	81	12	25	23
Collaboration/planning with site/district colleagues	33	21	60	28
School/Department meetings	12	44	65	19
Online	92	18	23	10

teacher.” In terms of longevity in the profession, nearly half (46%, n=65) of the surveyed early-career teachers would remain in teaching “as long as (they) were able.”

Qualitative responses to the question, “If I could change one thing about my job, it would be...” yielded a variety of responses. Support with classroom management was mentioned most frequently. For example, one teacher commented that they would appreciate having, “more support from administration and better classroom management strategies.” Another stated, “administration [sic] support with trouble students” and another responded to this question with “more support, especially in the discipline area.”

Collaboration and curricular modifications were also mentioned in response to this question. One early-career teacher stated she wanted additional, “support and collaboration within our high school community...more time to meet with other teachers and our administration” and another requested a “more student accessible curriculum.”

Summary of Results

What are the biggest takeaways from these results? What do educational leaders need to pull from this study in order to better support their early-career mathematics teachers in hopes of retaining them in the field?

Table 5: Participant Responses to “If you could go back and start college over again, would you still choose to become a teacher?” (N = 141)

Survey Response Choice	n	Percentage
Certainly would become a teacher	53	41
Probably would become a teacher	61	47
Unsure I would become a teacher	15	12
Probably would not become a teacher	7	5
Certainly would not become a teacher	5	4

1. Simply put, teachers in the study wanted backing and praise from their administrators. Teaching requires commitment and perseverance – words of encouragement from an administrator are substantive and reaffirming. A great deal of current research focuses on the importance of administrators serving as instructional leaders, but the teachers in this study value different types of support in their school settings, including support for their professional judgement and being “backed up” in their decision making with students and parents.
2. Early-career teachers crave one-on-one, personal professional development experiences at their school sites that are meaningful and impactful. Even in a technology driven society, teachers participating in this study were not finding substantial support through online resources or virtual relationships. Administrators should create and support on-site, personal, authentic mentor/mentee relationships that are vital to the success of early-career teachers.
3. This study shows that early-career teachers are not using administrators as substantive sources of support for instruction, curriculum, and assessment. Because principals are often responsible for teacher evaluations, and because the more support early-career teachers have, the higher their job satisfaction, principals should have adequate mathematical content knowledge to understand and appreciate best practice teaching strategies in mathematics.

Discussion/Implications

While this specific study focuses on the current support systems of early-career secondary mathematics teachers and the role of educational leaders in those support systems, the overarching goal of the work is to impact teacher retention by better understanding successful support systems and replicating them. The role of administrators is often said to be that of an “instructional leader” in the school, but this study argues that other forms of support may be of equal, if not more, importance to early-career teachers.

Aside from general mentoring and coaching, the perceptions of effective modes of administrator support varied widely by early-career teachers participating in this study. With regard to individual support, principals and “other (on-site) building administrators” far outpaced off-site

administrators under consideration. Additionally, quantitative measures showed that support by principals and assistant principals was perceived as more substantive by the study participants in certain areas – affirmation, course assignment/load, collaboration, assessment and classroom management. Qualitative analysis revealed that the early-career teachers in the study appreciated administrative support with general encouragement and challenging parent interactions.

The degree that a variety of professional learning activities increased participant enthusiasm for teaching revealed that “work/communication with a mentor or coach” was most highly valued, followed by “school/department meetings” and “collaboration/planning with site/district colleagues.” This result relates to the need by these early-career teachers to connect in authentic ways with other professionals as opposed to more traditional professional development opportunities (e.g. professional conferences/workshops/courses) and, surprisingly, computer-based activities (e.g. online professional communities). The results also imply that school districts which have limited collaborative professional development opportunities would benefit from instituting formalized modes of collaboration for early-career teachers, whether that includes the hiring of dedicated instructional professionals (e.g. subject coaches) or increasing subject-specific, collaborative time.

When the early-career teachers in the study were asked to gauge the degree to which they felt they had made the right choice in choosing teaching as a career, over four-fifths of responded that they would probably or certainly become a teacher and nearly half responded that they would remain in teaching “as long as they were able.”

Responses from this study’s early-career teachers suggest that increased attention by administrators, especially those with limited mathematical backgrounds/experiences, on effective ways that mathematical content is delivered, would improve these teachers’ perceptions of administrative support at their schools. In response, due to more recent changes in research-based, best practices for teaching mathematics, targeted professional development for these administrators is warranted that effectively outlines these updated practices. In addition, to ensure that early-career mathematics teachers are effectively evaluated, administrators need to readily recognize effective pedagogical practices in mathematics (Boston et al., 2017).

We feel that advanced preparation for administrators better prepares them to recognize and appreciate currently-endorsed teaching practices (e.g. discourse, modeling, collaboration) over more rudimentary practices (e.g. reduced noise level in the classroom, number of times a student/group is called upon to answer a question). Furthermore, we feel that advance preparations adopted by supervising administrators to assist them in more fully understanding mathematical concepts (e.g. watching a brief overview video on the topic developed) prior to entering classrooms for informal and formal evaluations, would substantively increase the value of these evaluations for both the administrator and the teachers. Measures such as these would also support administrator instructional leadership qualities as administrators make connections between theory and practice (Freedberg & Rice, 2014). Not only would strengthening the mathematics content and pedagogy knowledge of local administrators help mathematics

teachers get more accurate evaluations, it would also provide early-career teachers with another layer of support (instructional) that they currently are not receiving as evidenced by the teachers in our study.

Recommendations for further study include additional analyses of survey data collected in this study, including aggregating data by teacher years of experience, teaching level (i.e. middle school, high school), geographic area (i.e. urban, suburban, rural), primary subject(s) taught (e.g. Geometry), and school demographics (e.g. socioeconomic income, percent of special education students). Additionally, since the qualitative data in this study was only used to support the quantitative results, a separate coding of open-ended survey responses to produce meaningful themes is warranted. Finally, investigating the degree that content-specific professional development for administrators affects teacher perceptions of support is recommended. ✪

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