2014

Math for America (MfA) Evaluation Report

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Table of Contents

List of Figures

List of Tables

Introduction

The Math for America (MfA) Fellows Program was initiated in Utah in 2010 under the leadership of Hugo Rossi and as a partnership between the College of Science and College of Education and between the University of Utah and Utah State University. Funding for the initiative was from the National Science Foundation Robert Noyce Teaching Scholarship Program, the Math for America Foundation, and the State of Utah. Currently under the leadership of Herb Clemens, the Utah MfA program offers a preservice/licensure program for well-qualified graduates who aspire to become secondary school mathematics teachers. The overall goal of the Utah MfA program is to prepare mathematics teachers and improve the quality of mathematics education in Utah. As a national organization, the mission of MfA is "to improve mathematics and science education in U.S. public secondary schools by building a corps of outstanding STEM teachers and leaders" (http://mfa.utah.edu/index.php).

The Utah Education Policy Center (UEPC) was secured to conduct an external evaluation of the MfA program. The current evaluation follows two previous evaluations of the Support and Mentoring in an Alternate Route to Teaching (SMART) program (now also referred to as the MfA program), which focused on the first two years of MfA program implementation (Groth, Shooter, & Raphael, 2011; Shooter & Groth, 2012). This current evaluation focuses on the impact of the MfA program now that the fellows have entered their second through fourth years of teaching. The primary objectives of the present MfA evaluation were to identify the support received by Fellows during their early careers as inservice teachers, identify the school conditions that contributed or hindered their effectiveness, and to evaluate the impact of MfA program on the fellows' preparedness and effectiveness as secondary mathematics teachers.

MfA Program Overview

The MfA program was developed and implemented as a response to reported teacher shortages in Utah. MfA trains qualified candidates whose academic backgrounds were in mathematics or science to become secondary mathematics classroom teachers. Specifically, the goals of the MfA program are to increase the quantity and quality of secondary mathematics teachers in Utah and increase student achievement with the presence of secondary mathematics teachers who have mathematics or science expertise.

Recruitment, Selection, and Financial Support

Candidates for the MfA program are recruited through undergraduate math advisors, College of Science and College of Education faculty members, graduate fairs, and informally by word of mouth. Candidates for the MfA program are selected through a competitive process that is facilitated by MfA administrators and faculty members from the College of Science and the College of Education who review applications and conduct interviews. To be selected into the MfA program, candidates must first meet the following admissions criteria:

- Have a Bachelor of Science degree,
- Acceptance into the university's graduate school,
- Demonstration of mathematics skills such as linear algebra and differential equations, and
- Achieve a score of 165 or higher on the Praxis 5161, which covers math content knowledge.

Once the basic admissions criteria are met, reviewers use an application rubric to rate MfA program candidates. The rubric includes selection criteria such as the quality of the university where candidates earned undergraduate degrees, Grade Point Averages, major subject areas, Praxis scores on Praxis 5161 and Praxis 0063, written personal statements, and letters of recommendation. In addition to the overall assessment performed through scoring on the application rubric, potential MfA Fellows are invited to an interview. The interview process lasts for two days and involves one-on-one interviews, group interviews, and tests of math skills that must be completed individually and as a member of a small group of candidates.

The MfA program requires Fellows to make a five year commitment to the program and to teach mathematics in Utah secondary schools for four of those years. In turn, the MfA program provides a scholarship for full-time tuition and an additional stipend of $1,200 per month for the Fellows' first 15 months of participation in the program ($18,000). For the next four years the Fellows receive a smaller stipend of $6,000 per year that is distributed directly to them in monthly payments of $500. If a Fellow drops out of the MfA program or stops teaching, the monthly payments are no longer distributed. If Fellows do not complete the program, they are expected to repay the money, however, this policy is treated on a case-by-case basis.

Each Fellow is assigned a Mentor and the Mentors are a central feature of the MfA program. Mentors are recruited through their personal relationships with MfA faculty members. Mentors receive a $5,000 stipend for mentoring Fellows through the preservice student teaching experience during the Fellows' first year in the program. Mentors receive a $2,500 stipend during the Fellows' second year in the program when the Fellows are working as inservice teachers. The payments to Mentors are made directly to them in two installments, one in December, and one in April.

Program Year 1: Coursework and Preservice Student Teaching
The first year of the MfA program consists of:

- Coursework,
- A full year of supervised student teaching under the leadership of a Mentor, and
- Participating in MfA program activities.

Fellows begin their coursework during the first program year with the goals of achieving a Level 4 math endorsement, fulfilling the requirements for a teaching license, and completing a master's

degree[1]. While the bulk of the coursework is completed during the first program year, Fellows may take the full 5 years of the program to complete the master's degree. At both the University of Utah and Utah State University, teachers are recommended for licensure by their respective Colleges of Education.

During the first year of the program, Fellows spend a minimum of 12 hours a week in schools, working one-on-one with MfA Mentors, observing classes, and student teaching. Year 1 MfA program activities, such as monthly cohort meetings and professional development opportunities (e.g., attending bi-yearly and summer workshops), provide additional content and pedagogical training while developing a support network within the cohort of Fellows.

Program Year 2: Inservice Teaching with the Support of an MfA Mentor

In the second year of the program, the Fellows begin inservice teaching in Utah schools. In addition, Fellows continue to work with their MfA Mentors, continue their coursework (if not complete), and participate in several MfA program activities. The year 2 program activities include monthly cohort meetings, bi-yearly workshops, and mathematics workshops. The MfA program activities are intended to provide ongoing professional development, as well as opportunities to continue developing and maintaining the cohort support that was established during the Fellows' first year. By the close of the second year, Fellows have experienced teaching within two school contexts, one at the school where they served as a preservice student-teacher (first year) and one at the school where they served as an inservice teacher (second year). An aggregated comparison of the school contexts is provided in the findings section of this report.

Program Years 3-5: Inservice Teaching

The substantial change that occurs between program years 2 and 3 is that starting in program year 3 Fellows no longer have the formal support of the MfA Mentors. Some Fellows and Mentors may choose to continue their relationships and to offer collegial support for one another, but such ongoing relationships are outside of the MfA program requirements or funding structure. For the third through fifth years of the program, Fellows are expected to continue participating in select, ongoing program activities, such as the Teachers' Math Circle Summer Workshop. Fellows may also complete any remaining coursework and their final project for the master's degree by the end of the fifth year.

This evaluation focuses on the support provided to Fellows, the school conditions in which they worked, and the preparedness and effectiveness of the Fellows once they began working as inservice teachers (years 2-5). To provide context for our evaluation, we first provide a brief

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[1] The master's degree awarded has changed over the few years of the program's existence and there is variation between the University of Utah and Utah State University. At certain points in the program students at USU received master's degrees in education, later they received a master's degree in mathematics, and followed the state ARL checklist to complete their licensure requirements. Currently students at the University of Utah receive the Master of Mathematics Teaching degree while the students at Utah State University receive a Master of Mathematics degree, which is designed for teachers.

summary of research related to alternate routes to licensure and recommendations for teacher preparation programs.

Alternate Routes to Licensure

Alternate routes to licensure (ARL) programs emerged in the early 1980s as a response to teacher shortages, particularly in the areas of math and science (Wayman, Foster, Mantly-Bromley, & Wilson, 2003). ARL programs have grown in popularity. To date, 47 states have ARL programs and reportedly up to 1/3 of teachers nationwide now enter the field through an alternative route (Grossman & McDonald, 2008; Kee, 2012). While some practitioners, policymakers, and scholars alike have suggested that ARL programs are a valuable solution to getting teachers into schools, others have decisively criticized them. The lack of pedagogical preparation is among the biggest criticisms of many alternative routes to licensure programs (Wayman et al., 2003). Having adequately prepared teachers is a consistent concern in the field, particularly because first-year teachers who arrive to the classroom underprepared are less effective and less likely to remain in the field (Clotfelter, Ladd, & Vigdor, 2010; Goldrick, Osta, Barlin, & Burn, 2012).

Empirical studies of ARL programs nationwide have reported wide variation in program requirements, implementation, and effectiveness (e.g., Cherer, 2012; Darling-Hammond, Chung, & Frelow, 2002; Goldhaber & Brewer, 1999; Grossman & McDonald, 2008; Kee, 2012; Patterson, 2013; Qu & Becker, 2003), which may also make program design and implementation comparisons difficult (Boyd, Grossman, Lankford, Loeb, & Wyckoff, 2009). Rather than debate the effectiveness or comparative effectiveness of ARL preparation programs to traditional means of preparation, we provide a summary of key components of teacher preparation programs that result in effective teaching (Boyd et al., 2009; Darling-Hammond, 2006).

Recommendations for Teacher Preparation Programs

Teachers play a critical role in student learning and may be one of the most important school-based predictors of student achievement (Rice, 2003; Wayne & Young, 20002). While teacher quality may be among the most important predictors of student outcomes, there remains a lack of agreement about the key attributes of teacher preparation programs that produce the best teachers (Coggshall et al., 2012; Rice, 2003). Our review of research suggested several key attributes of quality teacher preparation programs (Ball & Forzani, 2010; Boyd, Grossman, Lankford, Loeb, & Wyckoff, 2009; Darling-Hammond, 2006, 2010; Harris & Sass, 2011). The list below shows key recommendations for **quality teacher preparation programs** from two widely cited sets of recommendations offered by Darling-Hammond (2006, p. 305; 2010, p. 40):

- A common, clear vision of good teaching that permeates all course work and clinical experiences, creating a coherent set of learning experiences
- Well-defined standards of professional practice and performance that are used to guide and evaluate course work and clinical work
- Opportunities to study the local district curriculum

- A strong core curriculum taught in the context of practice and grounded in knowledge of child and adolescent development and learning, an understanding of social and cultural contexts, curriculum, assessment, and subject matter pedagogy
- Extended clinical experiences—at least 30 weeks of supervised practicum and student teaching opportunities in each program—that are carefully chosen to support the ideas presented in simultaneous, closely interwoven course work
- A match between the context of student teaching and candidates' later teaching assignments, in terms of grade levels, subject matter, and type of students
- Extensive use of case methods, teacher research, performance assessments, and portfolio evaluation that apply learning to real problems of practice
- A capstone project (typically a portfolio of work done in classrooms with students)
- Explicit strategies to help students to confront their own deep-seated beliefs and assumptions about learning and students, and to learn about the experiences of people different from themselves
- Strong relationships, common knowledge, and shared beliefs among school- and university-based faculty jointly engaged in transforming teaching, schooling, and teacher education

Quality teacher preparation programs begin by providing a solid foundation of coursework that focuses on subject content, pedagogy, and the learner. Darling-Hammond's (2006) framework for teacher preparation focused on:

- Knowledge of learners and their development in social contexts,
- Knowledge of subject matter and curriculum goals, and
- Knowledge of teaching that can be integrated into unique classrooms.

As preservice teachers build a foundation of knowledge through engaging in coursework, high quality teacher preparation programs facilitate practice teaching experiences for their preservice teachers that are supervised by an experienced, qualified teacher, well-aligned with the program's coursework, and well-aligned with the context in which the preservice teacher will eventually work.

While preservice preparation is important for teachers, the first few years of teaching can shape a new teacher's career dramatically. The first year of teaching, for example, is a critical time and first-year teachers are considered a vulnerable group (Goldrick et al., 2012; Wang et al., 2008). First-year inservice teachers are often less effective than their experienced peers and they need the support of an experienced peer colleague (Goldrick et al., 2012). Assigning mentors to work with novice teachers is a common practice among programs that provide support for early-career teachers. Other common types of support that are offered to early-career teachers include release time, professional development, peer networking opportunities, support for collaborating with peers, and classroom assistance (Caperton, Moir, & Bushow, 2010; Ingersoll & Strong, 2011).

In the evaluation study that follows, we consider how the Fellows' ongoing engagement with the MfA program provided support during their early-career as inservice teachers and we consider the school conditions that contributed to or hindered the MfA Fellows' effectiveness during their first inservice teaching years. Another goal of this MfA evaluation was to determine if the new teachers who received training through the MfA program were sufficiently prepared to be effective teachers during their first years of teaching. In the methods section that follows, we introduce the evaluation questions and the procedures that were used to answer those questions.

Evaluation Methods

Four evaluation questions were developed in collaboration with the MfA administration team to guide this study. Table 1 presents an overview of the evaluation questions and their associated data sources.

Table 1. Evaluation Questions and Data Sources

Evaluation Question	Data sources
Implementation	
1. In what ways has the ongoing engagement with the MfA program supported MfA Fellows in their first years of teaching?	• Fellow Survey • Mentor Survey • Focus Groups
2. What school conditions contributed to or hindered MfA fellows' effectiveness in their first years of teaching?	• Fellow Survey • Mentor Survey • Principal Survey • Focus Groups
Outcomes	
3. To what extent are MfA fellows prepared to be effective secondary math teachers?	• Fellow Survey • Mentor Survey • Principal Survey • Focus Groups
4. How does secondary student achievement compare between MfA Fellows and other secondary math teachers?	• Student achievement data (2012-13 school year) • Teacher data for MfA Fellows (see Table 2)

Sample

This evaluation was designed to gather information about the MfA Fellows who had previously completed their first MfA program year, which included coursework, supervised student teaching, and MfA program activities. The Fellows in this evaluation had completed one to four years of inservice teaching. We also collected information about the Fellows from their MfA Mentors and the principals who were their current supervisors. There were 34 Fellows who met the criteria to be included in this evaluation, 25 of whom participated in the program at the University of Utah and 9 who participated at Utah State University. Table 2 displays the number of Fellows in each cohort. For the student achievement analyses associated with evaluation question 4, data were limited such that only 10 Fellows could be included. This sample size was too small to analyze the student achievement data. A detailed explanation is available in Appendix C.

Table 2. MfA Fellows by Cohort

Cohort	University of Utah	Utah State University	Total
Spring 2010	3	0	3
Summer 2010	8	3	11
Summer 2011	9	3	12
Summer 2012	5	3	8
Total	25	9	34

MfA program administrators also provided contact information for 27 MfA Mentors and we identified 29 principals who were supervising MfA Fellows.

Data Collection

For this evaluation we collected data using multiple sources to inform our inquiry into the support that Fellows received, the school conditions they experienced, and their preparedness and effectiveness as early-career teachers and participants in the MfA program. Both quantitative and qualitative data were collected to answer the evaluation questions.

The quantitative data included three original surveys that were administered to 1) the MfA teaching Fellows, 2) the Mentors of MfA teaching Fellows, and 3) the principals in schools where the Fellows worked. The surveys asked questions about the involvement of Fellows and Mentors in MfA program activities and asked all three stakeholder groups about the support that was provided to the Fellows, as well as the extent to which the Fellows were prepared and effective early-career classroom teachers. The intent of this design was to gain insights into how prepared the fellows perceived themselves to be and to elicit the observations of other stakeholders who were familiar with the Fellows' teaching practices.

The Fellow Survey had a unique routing feature that guided Fellows to answer questions about their Mentors. MfA Fellows could potentially have two mentors, one provided through the MfA program and one provided through the State's Entry Years Enhancement (EYE) program. All early-career teachers in Utah receive a mentor through the EYE program (Utah State Office of Education, 2013). The EYE program is a support program for Level 1 licensed educators that requires them to have a mentor, receive two annual evaluations, and to pass the Praxis II test in order to earn their Level 2 professional license. Given this combination of two potential mentors, the Survey asked Fellows to indicate the type of mentor(s) that were assigned to them at the time they completed the survey. Table 3 displays the number of fellows who reported having an MfA Mentor, an EYE Mentor, both mentors, or no mentor at all.

Table 3. Mentor Type

Mentors Assigned to MfA Fellows	Number of Responses
MfA Mentor	7
Entry Years Enhancement (EYE) Mentor	7
Both MfA Mentor and EYE Mentor	10
Neither Mentor	8
Total	32

Source: Fellow Survey

Based on the responses given in Table 3, Fellows were routed to identical sets of questions for both mentor types. There were 17 Fellows who reportedly had MfA Mentors.

In addition to the survey data, the UEPC research team analyzed data available from the Utah State Office of Education (USOE), according to an established data sharing agreement[2], to address the question of student achievement outcomes. These data included the earliest cohorts of MfA Fellows who had already completed their preservice training and their first year as inservice mathematics teachers in the 2012-13 academic year or earlier (see Table 2).

The qualitative data consisted of three focus groups and open-ended survey questions. Two of the focus groups were conducted with 16 Fellows and one with 9 of their MFA Mentors. The focus group participants were a convenience sample of Fellows and Mentors who attended a scheduled MfA meeting at which the focus groups were conducted. The focus group protocols followed a similar line of inquiry to that of the surveys and are available in Appendix B. Table 4 presents an overview of the number of respondents for each of the original data sources.

Table 4. Response Rates

Data Source	Number of Possible Respondents	Number of Complete Responses
Fellow Survey	34	30 (88%)
Mentor Survey	27	22 (81%)
Principal Survey	29	4 (14%)
Fellow Focus Groups	-	16
Mentor Focus Groups	-	9

All three of the surveys were administered online by emailing a request to participate directly to the individuals. After sending the initial request to participate, a minimum of two additional reminders were sent. Following the initial request to participate and the reminders, non-

[2] Data are available to the UEPC under a data sharing agreement established between the USOE and the UEPC in February 2010 and according to the partnership agreement of the Utah Data Alliance.

respondents were contacted again, either by an MfA administrator or by the UEPC evaluation team. Despite those efforts, the Principal Survey response rate of 4 (14%) was insufficient to justify including the Principal Survey data in the analysis, results, and conclusions of this study.

Data Analysis

The quantitative survey data were analyzed using descriptive statistics. Tables and figures of these analyses are presented in the findings section.

The qualitative data from the open-ended survey responses was summarized and example quotes are included in the results. The qualitative data from the focus group transcripts were coded first using an open coding process with both descriptive and in vivo codes (Charmaz, 2006; Strauss & Corbin, 1998). A second round of coding was then conducted using a combination of focused and axial coding to determine themes. The findings from the qualitative data are summarized in the results section and quotes are included that are representative of the category.

The purpose of using the achievement data was to compare student achievement between the students of MfA Fellows and other secondary math teachers. At a minimum this would provide a descriptive analysis of Student Growth Percentiles (SGP) for both groups of teachers. However, due to the limitations explained in Appendix C, the results from the analyses of student achievement data were inconclusive. As a result, this evaluation relied on the available evidence from surveys and focus groups to answer the evaluation questions, the results of which are presented in the following section.

Findings

This section presents the findings of the UEPC evaluation. Findings are reported based on the evaluation questions. The findings are organized in three sections: 1) MfA Program Engagement and Support, 2) School Conditions and Context, and 3) MfA Fellows' Preparedness to be Effective Mathematics Teachers. Because this evaluation report is organized by the evaluation questions rather than thematically, readers will notice reoccurring themes that overlap across and within sections throughout this report. For example, discussions of the support provided by Mentors appears in two sections, the first in regards to MfA program support provided through MfA Mentors and the second in regards to the school-level support provided through EYE Mentors. Similarly, differences in the school contexts where Fellows completed their student teaching and where they work as inservice teachers appears in the MfA Program Engagement and Support section as well as the School Context and Support section because these differences in school context are discussed first as they impacted the support provided by MfA Mentors and secondly as the Fellows adapted to the new school contexts of their inservice schools.

MfA Program Engagement and Support

To begin, this section presents Fellows' reports of the extent to which their ongoing engagement with MfA program activities supported their instructional practice in their first years of inservice teaching. We then consider the support networks that were reportedly developed through MfA program participation. The next section focusses in the role of the MfA Mentors and includes the frequency and value of Mentor and Fellow interactions as well as findings related to the support provided by MfA Mentors. Following that is a section that reports the challenges faced by MfA Mentors.

The key findings related to MfA program engagement and support are:

- Most MfA Fellows agreed that the MfA program activities supported their instructional practices.
- A benefit of participating in the MfA program activities was a sense of community and support that they developed through ongoing, supportive relationships with MfA peers, MfA faculty, and MfA Mentors.
- The frequency of mentoring interactions among inservice teaching Fellows and their MfA Mentors was relatively low, but the interactions that occurred were valued by the Fellows and Mentors.
- MfA Mentors faced challenges to providing support that stemmed from working at different schools than their Fellows. Those challenges included:
    - Geographic distance,
    - A lack of familiarity with their Fellows' school contexts,
    - Misalignments between MfA Mentors and on-site school supports, and
    - Misalignments in school philosophies and teaching practices between the Fellows' preservice and inservice teaching experiences.

> o An additional challenge for some Mentors was a lack of preparation to provide support, particularly in the areas of conducting classroom observations and providing feedback.

MfA Program Activities

MfA program activities occur throughout the Fellows' five year commitment. Figure 1 presents the Fellows' responses regarding the extent to which their participation in MfA program activities that occurred during the first program year or at any time since, supported their instructional practices. The majority of Fellows agreed or strongly agreed that the MfA activities supported their instructional practices, with less agreement about summer workshops and other professional development opportunities. Importantly, participation was lowest in the math circles, math triangles, or journal club meetings.

Figure 1. Percent of Fellows who Agreed or Strongly Agreed that MfA Program Activities Supported their Instructional Practices.
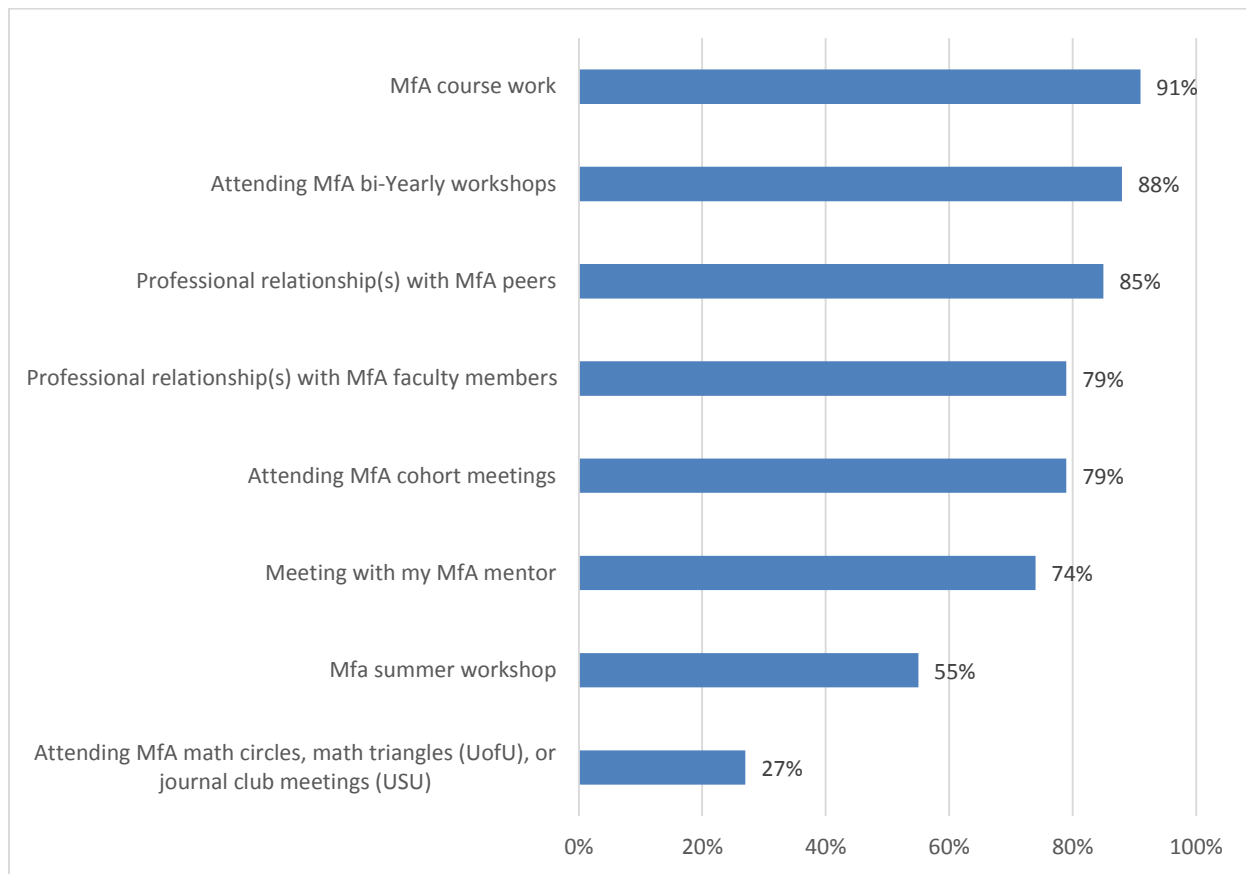
Source: Fellow Survey

Responses to open-ended survey questions and focus group discussions provided additional insight into how participation in the MfA program activities established conditions of support for the early-career teaching Fellows.

Supportive Peer Relationships and a Sense of Community

Participating in the MfA program created conditions through which the MfA Fellows developed supportive relationships with one another. These supportive relationships were built as Fellows moved through the program together. It was more than their participation in one activity over another that facilitated the supportive relationships. Instead the supportive relationships were developed as Fellows collectively engaged in the coursework, attended cohort meetings, solved problems together, overcame challenges, and had a depth and breadth of shared experiences that were centered around a common goal. These shared experience of struggling together toward a common goal resulted in a sense of community that provided emotional, academic, and professional support, as well as practical ideas that Fellows could use in their practice. The following quotes provide examples of how the Fellows relied on one another to succeed in the program.

> *MfA has given me a network of people I can talk with to get ideas and support when I am struggling in my own classroom.* (Fellow Survey)

> *I have people I can commiserate with and I also have people that are able to share their experiences and help me, because all the best teachers are actually thieves, so it helps me steal awesome things from other people to make my practice better.* (Fellow Focus Group)

> *It's nice to know that there are other people in my same position that I can contact just for moral support, not even for a specific document but just like, are you tired, me too.* (Fellow Focus Group)

The Fellows indicated that the support they received and the network they developed with other participants in the program activities served as a strong bond and a way to be sustained in the early years of teaching practice.

> *[Because of the cohort meetings] ... you don't feel alone or frustrated that you're a failure. You see that everybody works through it so it gives you the energy boost in terms of being able to face your problems. . . . I mean, so many people leave teaching in the first couple years I think because they don't have that. They can only look at people who have survived the experience.* (Fellow Focus Group)

> *...there's a big support about us being in all different schools and different organizations but feeling this interconnectedness because we took courses together and because we talked together and know each other...* (Fellow Focus Group)

In addition to moral support and a sense of togetherness, the relationships that Fellows developed within the MfA program also provided practical professional support that Fellows utilized in their classrooms.

The MfA programs support my instructional practices because they give me ideas to use in my classroom of how to teach certain concepts better. I also really appreciate the support given to me by other people in the MfA community [Mentors, Fellows, and faculty members]. (Fellow Survey)

I find the most useful thing that usually comes up in all of them is just the discussions I will have with my [MfA] peers who are teaching the same topics or just ideas you can get. (Fellow Focus Group)

The support that Fellows received from one another as they participated in the MfA program was evident in their comments and discussions about the relationships that they developed through their year-long student teaching experiences, shared coursework, monthly cohort meetings, and workshops. The support offered through the MfA program community and the regular opportunities to meet and discuss shared experiences, struggles, and ideas seems to have fostered a supportive environment in which beginning math teachers were supported and encouraged as they developed as teachers. While peers served as a substantial source of support, there were other sources of support within the MfA program as well.

MfA Sources of Support

Figure 2 presents additional information about the sources of support that Fellows received. In this case, Fellows were asked to indicate the extent to which MfA peers, faculty members, and Mentors had supported them to be effective teachers. The majority of the Fellows agreed or strongly agreed that they felt supported by their peers in the program (88% agreed or strongly agreed), by faculty members (84% agreed or strongly agreed), and by MfA Mentors (65% agreed or strongly agreed).

Figure 2. Percent of Fellows who Agreed or Strongly Agreed that They Have Been Supported to be Effective Teachers By MfA Program Staff or Peers
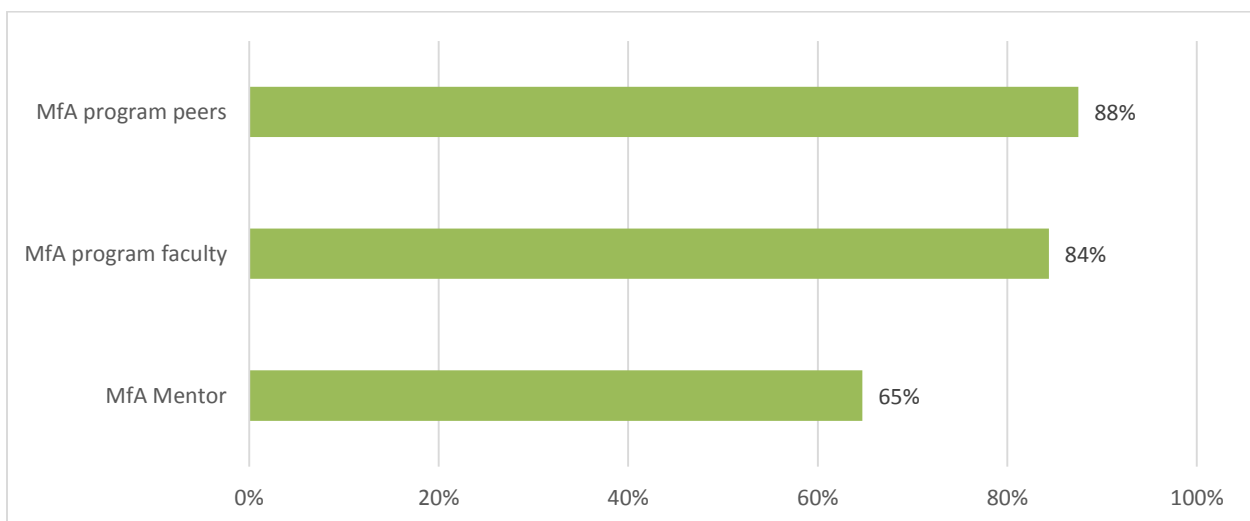
Source: Fellow Survey

Although fewer Fellows agreed that the MfA Mentors supported them, the positive responses in Figure 2 are consistent with the descriptions of supportive relationships that reportedly developed through participation in MfA program activities. The results in Figure 2 add that in addition to MfA peers, MfA program faculty and Mentors were also sources within the network of support for Fellows. The following sections explore the role of the MfA Mentors in terms of the overall support that they provided and the challenges that they faced in providing support.

The Role of MfA Mentors

The MfA Mentor is a central program feature of the MfA program. Formal mentoring is designed into the MfA program for the first two program years, which includes the preservice student-teaching year and the first year of inservice teaching. To the extent possible, MfA Mentors work with the same Fellows during both years. This mentoring arrangement is intended to provide continuity for the relationships that were established during the Fellows' student-teaching year. The findings in this section include the frequency and value of MfA Mentor and Fellow interactions, the value of interactions for Mentors, and findings regarding the support that Mentors provided to the Fellows.

Frequency and Value of MfA Mentor and Fellow Interactions

The MfA program has established written expectations for the role of MfA Mentors during the Fellows' first inservice teaching year. Mentors were expected to meet with their Fellows once a month, conduct two classroom observations, and participate in MfA program activities such as cohort meetings and workshops during the Fellows' first inservice teaching year. Figure 3 shows that there was a relatively low overall frequency of interactions among Fellows and their Mentors. There were no reports of interactions occurring more often than once a month and very few occurrences of monthly interactions. The most common interactions that the Fellows reportedly had with the MfA Mentors were discussing teaching and learning and meeting informally (81% and 75% at least once a year or more, respectively).

Figure 3. Frequency of MfA Fellow and Mentor Interactions
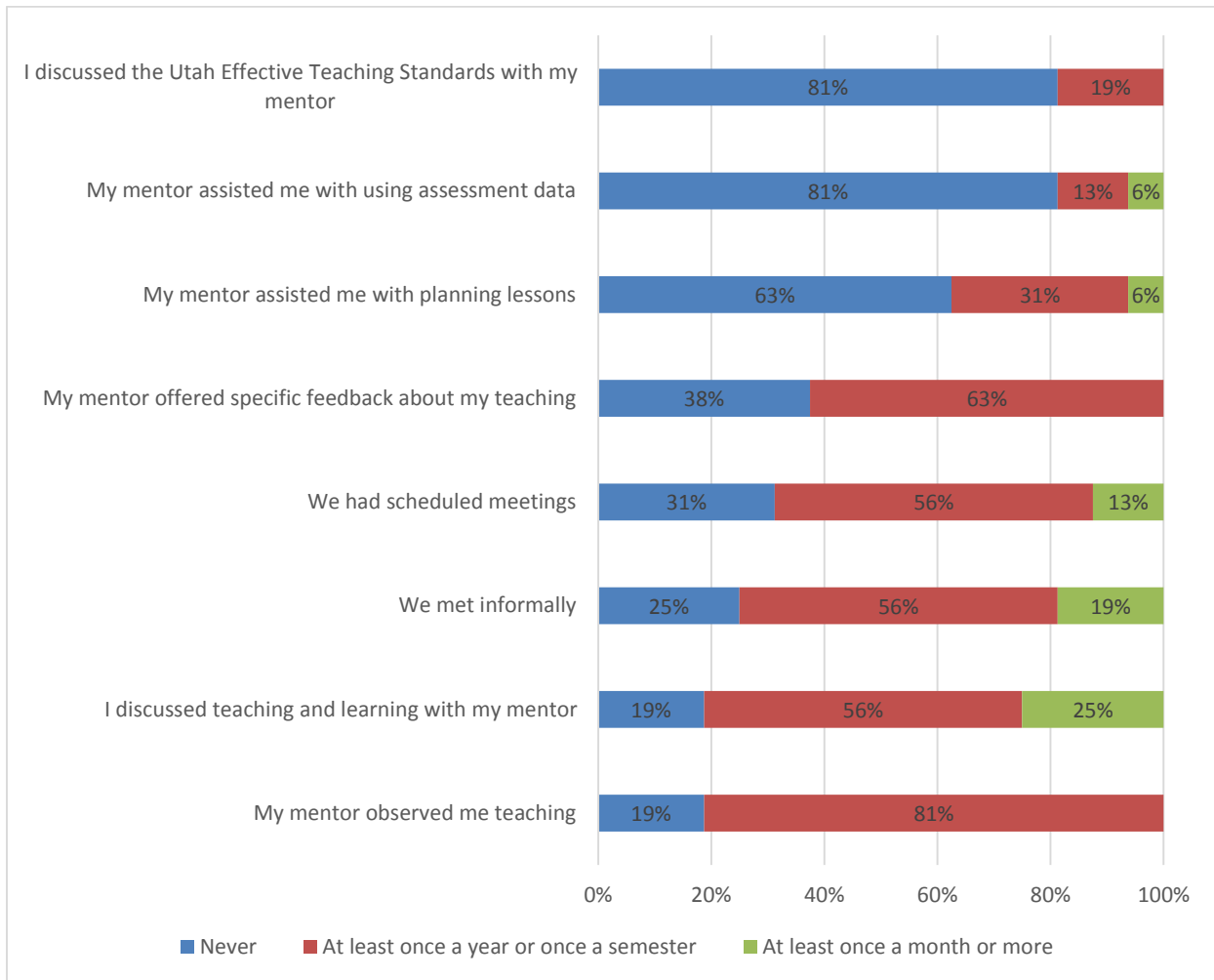
Source: Fellow Survey

Notably, a majority (81%) of Fellows reported *never* having discussed the Utah Effective Teaching Standards and *never* receiving mentors' assistance with using assessment data (81%). A closer look into the frequency of the Mentors' teaching observations revealed that within the 81% of Mentors who conducted teaching observations, at least once a year or once a semester, 50% conducted those observations only once a year and 31% conducted observations at least once a semester. In other words, 31% of the Fellows reported that their MfA Mentor fulfilled the program expectation of conducting 2 classroom observations during the Fellows first inservice teaching year. As for the expectation that MfA Mentors would meet once a month with their Fellows, only 13% of the Fellows reported that they had scheduled monthly meetings with their Mentors.

In addition to the frequency of interactions, Fellows rated the value of those interactions. As shown in Figure 4,[3] despite the relatively infrequent interactions of MfA Mentors and Fellows, the interactions that did occur were valued by the Fellows. For example, 92% of the Fellows agreed or strongly agreed that they valued discussing teaching and learning with their mentors, 83% agreed or strongly agreed that they valued their Mentors' assistance with planning lessons, and 80% agreed or strongly agreed that they valued the MfA Mentors specific feedback about their teaching.

Figure 4. Percent of Fellows who Agreed or Strongly Agreed that Interactions with their MfA Mentors were Valuable
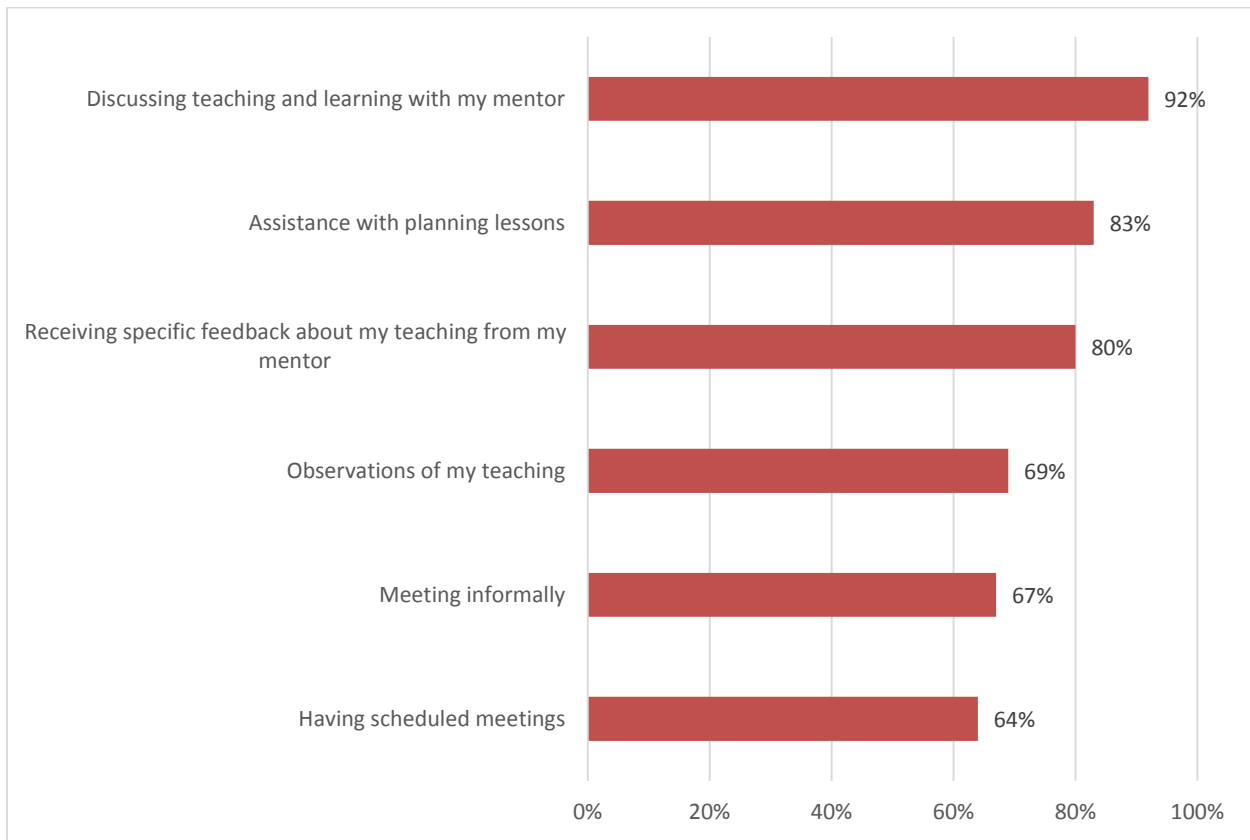
Source: Fellow Survey

Even though the frequency of interactions was relatively low (see Figure 3), most Fellows valued the support they received. In addition to the value of Fellows' interactions with Mentors, the Mentors also discussed that they benefited from interactions with Fellows and with one another through their engagement in the MfA program.

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[3] Please note that two categories, discussing the Utah Effective Teaching Standards and receiving Mentors' assistance with using assessment data, were not included in this figure because of the high number of reports from Fellows (81%) having *never* engaged in these activities. Also, the items in Figure 4 were displayed in a two part question in the survey. We made minor edits to the wording of these items for the purpose of clarity in figure 4.

The value of interactions for the MfA Mentors was realized in terms of working with both the Fellows and in working with other Mentors. Through providing mentoring support for Fellows, the MfA Mentors had the opportunity to reflect on their own teaching practices. With Fellows observing their classes, the Mentors found themselves with a new audience member, which motivated them to place greater emphasis on their own teaching performances. With the Fellows watching them closely and asking them questions about why they did what they did in the classrooms, the Mentors felt the need to look more deeply into their own teaching practices and be prepared to offer explanations and guidance. Through their conversations with Fellows, the Mentors could explore their own practices and target areas in their own practices that could be improved. The following quotes exemplify ways in which the Mentors benefited from working with Fellows.

> *Any time I am observing and helping other teachers I find that I reflect on my own practices and often implement new ideas or procedures that benefit my own professional development.* (Mentor Survey)

> *It helped me focus on best practices. Being a good example forces you to do good things. It also allows for opportunities to talk about my own weaknesses/bad examples and try to fix them.* (Mentor Survey)

For the MfA Mentors, having Fellows in their classrooms during the Fellows' student teaching year prompted them to become more self-critical in a way that they believed helped them further develop their own teaching practices. In addition to working with the Fellows, the Mentors were inspired and encouraged by participating in a community of Mentors who were working together to train preservice teachers.

Through participating in MfA program activities such as cohort meetings and workshops, the Mentors developed a supportive community of their own. Within this community, the Mentors found themselves in a setting that promoted the open sharing of ideas and provided ample opportunities to learn from experienced peers. Not only were they discussing how to help their Fellows, but they were also sharing experiences from their own teaching practices from within a variety of different schools. Considering that Mentors were hand-picked by MfA program staff, this was a group of engaged math teachers who were excited to learn from one another. In doing so they had the opportunity to connect with other math teachers who also appreciated the unique opportunity to share comradery and support. The quotes below provide first-hand accounts of the process through which Mentors experienced benefits of participating in a community of math educators.

> *We get to talk and we get to see each other and I think that's one thing that the program has definitely created is that we are totally willing to collaborate and we're totally open minded with each other in that we are all friends . . . . You know, if somebody moves to a*

different high school, boom, you have a friend, you have a connection, you have a network, and this is definitely creating a network. (Mentor Focus Group)

I always feel that way when I get together with the other mentors. I feel like what comes out is somebody shares and everybody else kind-of automatically kind-of just empathizes and volunteers ideas and we do really well like that. (Mentor Focus Group)

I'm learning so much about what goes on in other districts and I'm learning about how to make our practice public. No longer – we don't want the teachers who go into their room, [close] their doors and say don't bother me. It is all about let me share what I'm doing in my classroom, let me share what I saw in somebody else's classroom, because it was so awesome. (Mentor Focus Group)

Through their participation in MfA program activities, the MfA Mentors appreciated the opportunities that they had to meet with and learn from other math teachers. The following section considers the support that the Mentors provided to the Fellows.

MfA Mentor Support

A key role of the MfA Mentor is to provide ongoing support for the Fellows. The Mentor Survey asked the MfA Mentors to document the extent to which they provided mentoring support to their Fellows. Figure 5 shows that most Mentors felt that they provided substantial support to the Fellows. For example, 93% of the Mentors agreed or strongly agreed that they demonstrated effective teaching and 78% agreed or strongly agreed that they helped their Fellows integrate into the teaching profession.

Figure 5 also includes four closely related parallel items from the Fellow Survey, in which the Fellows indicated the extent to which their Mentors provided support. Overall, the Fellows rated the support that was provided by the MfA Mentors slightly below the Mentors' own ratings of the support they provided. The greatest disparity in responses between Fellows and Mentors was the extent to which Mentors served as good role models. In this case 89% of the Mentors agreed or strongly agreed that they served as good role models compared to the Fellows, of which 75% agreed or strongly agreed that the Mentors served as good role models, a 14% difference. In contrast, the Mentor and Fellow responses were most closely aligned regarding the Mentors' availability. Ninety six percent of Mentors agreed or strongly agreed that they encouraged their Fellows to reach out to them if they needed help and 88% of the Fellows agreed or strongly agreed that they could reach out to their Mentors if they needed help, an 8% difference.

Figure 5. Percent of MfA Mentors and Fellows who Agreed or Strongly Agreed to Statements about the Support that Mentors Provided for Fellows

Legend: ■ Mentors ■ Fellows

Statement	Percent
I encouraged my fellow to reach out to me if he/she needed help with anything	96%
Fellows: I knew I could reach out to my mentor if I needed help	88%
I demonstrated effective teaching	93%
Fellows: My mentor demonstrated effective teaching	81%
I served as a good role model	89%
Fellows: My mentor served as a good role model	75%
I helped my fellow adjust to working at her/his school	69%
Fellows: My mentor helped me adjust to working at this school	56%
My fellow and I worked well together	82%
I helped my fellow integrate into the teaching profession	78%
I helped my fellow develop a professional network of colleagues	67%
I had release time to meet with my fellow	52%

Source: Mentor Survey; Fellow Survey

The close alignment of Mentor and Fellow perspectives regarding the Mentors' availability is curious given relatively low reports of Mentor and Fellow interactions reported in Figure 3. Despite the reports of infrequent interactions, Fellows felt that the Mentors were available if they needed help.

It was through the shared work of teaching and learning during the preservice year that Fellows developed supportive relationships with their Mentors and in turn felt comfortable calling on their MfA Mentors when they needed them during their first inservice teaching year. The Mentor-Fellow relationships that were established during the student teaching year provided an important foundation that was highly valued during the Fellow's first inservice year. Most Fellows expressed confidence in their MfA Mentors' ability to respond to their questions and concerns as they navigated their first year of teaching. The following quotes further highlight the variance of Mentor-Fellow interactions, but also clarify how the quality and value of supportive relationships that were developed during the preservice teaching year continued to provide support during the inservice teaching years.

> *My mentor and I have a great personal relationship, and I know that I can call him/her any time for advice or ideas. We've talked about trying to meet more frequently, but it's so hard to make the time. When we do meet, it's incredibly valuable, though.* (Fellow Survey)

> *So I think that is the nice thing about it is that there is a personal relationship that you established when you co-teach or student teach or whatever, so it is more the relationship you have established . . . you can call five times a week, but if you don't need them, it's not like they are bugging you.* (Fellow Focus Group)

> *My mentor, I asked right . . . during Christmas break, right before we went back, I just felt like I was looking down the barrel of an impossible year she was really like, okay, what do you need and we went out for dinner and . . . she was like this is the stuff I recommend, and so that was really helpful. She was willing to take time during her vacation to sit down and talk about teaching, so that was appreciated.* (Fellow Focus Group)

These quotes add insight into the ability of the MfA program activities to foster opportunities for supportive relationships to develop between Fellows and Mentors, especially through the preservice year student teaching experience. The confidence in the relationships that formed between Fellows and Mentors, along with confidence in the Mentors' availability, served as valued forms of support.

While there were numerous accounts of supportive relationships that developed through MfA program participation, there was also evidence, in addition to that presented in Figure 3, that the MfA Mentors' support was inconsistent with MfA program expectations. Follows accounts of the actual support of their Mentors was mixed. Some Fellows indicated that they had little or no interaction with their Mentors while others recalled the practical support that was offered

through meetings, classroom observations, and feedback. For example, when asked in the Fellow Survey what they wished their Mentors had done differently, some Fellows simply stated that they were pleased with the support they received from their mentors; others noted that they would have liked more frequent meetings and classroom visits. In general, it seems that when the MfA Mentor support was provided it was appreciated and effective in supporting the MfA Fellows, however, as the following quotes portray, the support was inconsistent across the program.

> *I had an exceptional Mentor. I wouldn't change my experience.* (Fellow Survey)

> *I would have liked it if he/she came and watched me teach and given me feedback.* (Fellow Survey)

> *During my first year teaching, it was like we were just barely trying to survive and stay afloat, and my Mentor came in and observed me twice during that year and those two times that she/he came and gave me feedback, it was like a breath of air from being drowning in the water, because she/he was like, do this, and this, and this, and she/he gave me three things that I could actually do the next day and it helps.* (Fellow Focus Group)

> *I was mentorless for my second year.* (Fellow Focus Group)

Similar reports were given by the Mentors and the responses of infrequent interactions presented in Figure 3 are corroborated with their focus group discussions and open-ended survey responses, in which the Mentors explained that they could have engaged more with lesson preparation and delivery, observed more frequently, and provided better feedback.

> *I wish that there had been more time available once the Fellow entered his/her own classroom.* (Mentor Survey)

> *[I wish we] Had a schedule of meetings, talked more amount lesson development* (Mentor Survey)

> *I wish I had more regular, frequent contact with him and visited him at the start of the year.* (Mentor Survey)

Taken together, the Fellow and Mentor quotes above communicate the range of actual support that Fellows received from their Mentors during their first inservice teaching year. The findings presented in the following section will further explore some of the reasons behind the inconsistent support Fellows received once they transitioned into having their own classrooms.

Challenges for MfA Mentoring

There were a number of circumstances that created challenges for the support offered by MfA Mentors. For example, once the Fellows began their first year of inservice teaching, they worked at different schools than their MfA Mentors and this played a substantial role in the lack of

interactions between Fellows and Mentors. The Mentors lamented the difficulty of getting away from their own classes to visit those of their Fellows. In some cases, Mentors had relatively long distances to travel to visit their Fellows, which would cost them additional time away from their own classes. While MfA provides a substitute teacher for Mentors when they visit Fellows, the Mentors expressed a reluctance to leave their own classes, fearing that it would be giving up day of learning for their students. As these quotes suggest, there was agreement among the Mentors that having to turn their classes over to a substitute teacher was undesirable and that was a barrier to visiting the MfA Fellows.

> *Everyone supports us, they're like take a sub, don't worry, but it is hard to take a sub.* (Mentor Focus Group)

> *I don't know if you guys are the same way, but having a substitute is . . ., the worst. So even though the program is offering to pay for a substitute, it is still a big deal. I hate leaving my kids because I know it is a lost day even if I get a great sub.* (Mentor Focus Group)

The infrequent visits by Mentors impacted the quality of support that they provided. Fellows and Mentors expressed that infrequent visits caused problems because the MfA Mentors were out of touch with the unique circumstances of the Fellows' classrooms and schools.

> *And when someone comes to [watch] for the day, it's like it's hard for them to know what is going [on] all the time.* (Fellow Focus Group)

> *My Mentor came on a very bad day, very, very bad day. The worst day I've had this entire year, he/she just happens to observe. . . . It just wasn't at all representative of what a day looks like because I was just barely making it through.* (Fellow Focus Group)

> *I don't know, that is something I've struggled with maybe you guys have had the same thing where the interactions that we had when we were in the same classroom felt a lot different than when I would go and it was their own classroom, I hadn't seen them for a month or two, hadn't talked to them a whole lot, and I just go in kind of cold turkey and observe the random class and then have to talk about it with them.* (Mentor Focus Group)

Once they began their first inservice year, the Fellows found themselves immersed in a new school context that was different than that of their Mentors'. The quotes above introduced how problems occurred as the MfA Mentors were unfamiliar with the Fellows' new school contexts. The notion of being out of touch with the Fellows' unique situations and contexts within their new schools also surfaced in relation to misalignments between the support provided by the MfA Mentors and the support provided from within the Fellows' schools.

Misalignments of Support

In addition the MfA Mentor, Fellows had an EYE Mentor who was on-site in the Fellows' schools. In addition to the EYE Mentor, some Fellows also had access to coaches. MfA Mentors

discussed in the focus groups the problems that sometimes existed between the support that they provided and the on-site support at the Fellows' schools. Due to their lack of proximity to the Fellows, Mentors felt that they had limited influence during the fellows first inservice teaching year. MfA Mentors reportedly believed that in some cases the on-site school resources were a more effective means of support because the EYE Mentors, support coaches, and peer teachers were in a better position to provide on-going support that was relevant within the contexts of the Fellows' school. In the two quotes below, the MfA Mentors recount how they felt disconnected from their Fellows during their first inservice teaching year, even to the extent that they suggested the on-site school support might have provided better support than they could.

> *What seems to be coming to the surface here is that we as the [MfA] Mentors are not in the building and we often feel that coming in and observing cold is a little abrupt, it doesn't necessarily seem as valid, and also, that [at] times I guess there are kind of maybe even some structural issues with doing that. So I think a good question to be answered is what really should we be doing, because maybe what we are getting at here is that this class – a classic classroom observation is better done by their in-house Mentor.* (Mentor Focus Group)

> *When I went to visit him/her [Fellow], this guy came in, and I guess it is the teacher next door and he had taken him and under his wing and he was basically taking my spot as his Mentor in the school, so I think that was a big help…* (Mentor Focus Group)

The next quote provides the most dramatic example of the misalignment of support between MfA Mentors and support from within the Fellow's school. In this example, an MfA Mentor was asked by school administrators to stop observing his or her fellow.

> *They just said . . . you can still talk to her and stuff, but we don't want you coming in and observing and sitting down and doing that, because we're telling them one thing and then you might be giving them different ideas and then they get overloaded . . . and they said we'll keep you in the loop. . . . I haven't heard not one word, like not one word.* (Mentor Focus group)

In addition to this circumstance of direct conflict, there were other accounts by MfA Mentors that the EYE Mentors were surprised by their visits and MfA Mentors sensed the potential for conflict between themselves and the EYE Mentors. Accounts such as these highlight misalignments in the sources of support that were available to the Fellows. The quotes above also introduces how additional misalignments between the MfA Mentors' approaches to teaching differed from those of the Fellows' schools and that created challenges for the MfA Mentors regarding the support they offered.

Misalignments of Teaching Philosophies and Practices
The MfA Mentors held teaching philosophies and engaged in teaching practices that were, at times, at odds with those of the schools in which the Fellows worked. Some Mentors and Fellows reported that differences in school philosophies and teaching practices between MfA

Mentors and the Fellows' schools complicated the mentoring relationships. These misalignments created situations in which the value and utility of feedback from MfA Mentors was limited when MfA Mentors provided feedback that was inconsistent with a school's practices or the Fellows' teaching experiences. In the first quote that follows, a Mentor from a school that espoused an inquiry-based approach to math instruction was working with a Fellow who was teaching in a school that had adopted a more traditional approach. The Mentor struggled to find the best way to support the Fellow. In a second example, the misalignment was that the Mentor and Fellow found themselves teaching different grades and therefore they were teaching different content and serving students with different needs.

> *I did not know what to do to support them [the fellow] because they are asking me questions about inquiry, they are asking me questions about all of these things that happened in my school, which is the context, and I think it happens in more schools, I'm not saying it only happens in my school, but they went to a new context that I didn't understand, that they didn't understand, and it was hard for me to help them navigate that in the context.* (MfA Mentor Focus Group)

> *I don't know, because my Mentor teacher teaches at high school and I teach at middle school it's really so different.* (Fellow Focus Group)

Misalignments between school context of the Mentors and Fellows presented additional challenges for them because they found themselves working in different situations that required different teaching practices. In these cases, the support of Mentors was limited due to the misalignment of Mentor and Fellow experiences once the Fellows began their inservice teaching year.

Mentor Training

There were instances in which a lack of Mentor training hindered the support that Fellows received. The MfA Mentor responses regarding the adequacy of their training were mixed. Some Mentors reportedly felt they received sufficient training, while others expressed a need for more extensive and specific training. Mentors who were interested in additional training identified opportunities that they believed would have helped them fulfill their roles in the MfA program. Examples of those opportunities included receiving more detailed information about the Fellows' expectations and experiences in the MfA program, specifically in the areas of knowing about their coursework, conducting observations, and providing feedback. This request to know more about the Fellows' experiences is particularly important considering with recommendations from the literature suggesting that coursework and preservice student teaching experiences should be well-coordinated (e.g., Ball & Forzani, 2010; Darling-Hammond, 2006).

> *One of the major things that happened in that this year for me was that when [we learned about] some of the texts that they [the Fellows] use in their methods classes. That was a big piece of missing information for me... I didn't know the book existed, let alone that*

every fellow I had had, and I've had like four or five [Fellows] too, who had been taught through this book. (Mentor Focus Group)

I wish I had known what experiences and frameworks for teaching that my fellows had experienced before their student teaching year. (Mentor Survey)

Knowing about the experiences that Fellows were having in their coursework would allow Mentors to more intentionally craft learning opportunities in the student teaching setting and would allow the Mentors to more directly integrate coursework in the student teaching experiences.

Many of the MfA Mentors felt that they were not well-prepared to conduct the classroom observations and give feedback to their Fellows. Mentors reportedly used a variety of strategies for conducting observations and giving feedback, but felt that there was no clear purpose to their observations. A clear goal or protocol for observations and feedback during the first inservice teaching year was lacking and Mentors mentioned a need for a more structured way to conduct the observations and provide feedback. These quotes exemplify the lack of purpose, structure, and protocol in the observations and feedback that was recognized by Mentors and Fellows.

Having a form [which we don't have] in front of me, if I am looking for student engagement, I can tally and just say look, this is what happened, now let's have the discussion. So it's not an opinion on my part, it is just here you go, what do you think about this, even videoing. (Mentor Focus Group)

That [unstructured feedback] also impacts the way they hear, because if it is just coming out as your opinion, it does feel personal, but if it is coming out as feedback with data, these are observations, it might feel less personal. (Mentor Focus Group)

When I've been observed, I kind of got this laundry list of what [are] you doing about this, what are you doing about this, what are you doing about this, and it wasn't helpful feedback to me. It's like I know those are issues, but that's not what I can focus on right now. (Fellow Focus Group)

The Mentors and Fellows expressed how additional resources and increased structure in the classroom observations and feedback process might aid Mentors in providing support. They expressed how reliance on specific resources and protocols would allow them to deliver direct, objective feedback that pointed clearly to the Fellows' current abilities and specific teaching practice that could be improved.

School Context and Support

In addition to presenting findings related to MfA program engagement and support discussed in the previous section, this section addresses the question, what school conditions contributed to or hindered MfA Fellows' effectiveness in their first years of inservice teaching? To understand the various ways that school conditions and contexts supported Fellows as they entered their first years of teaching, we first examine the school profiles and contexts where they completed their

student teaching and where they work as inservice teachers. We then report findings related to various aspects of school-level support received by the Fellows, including the support offered by school (EYE) Mentors.

The key findings related to school context and support were:

- The student demographic profiles were relatively similar at the schools where Fellows completed their student teaching and the schools where they now work as inservice teachers.
- Fellows and MfA Mentors reported differences in school contexts with regard to the professional culture and teaching philosophies between the Fellows' preservice training and the school contexts where they now work as inservice teachers.
- As early-career teachers, Fellows indicated that they experienced a continuum of school support, ranging from limited support in some areas, and more robust support in others.
- The school-level support that Fellows received, especially from peer teachers, was important and valued.

School Context

In light of the recommendations that school contexts of preservice training and inservice teaching should be well-matched (Darling-Hammond, 2010), we used publicly available data from the Utah State Office of Education website to create school profiles. Figure 6 reports a comparison of student characteristics at the Fellows' preservice and inservice schools and Figure 7 presents a comparison of student performance between the schools.

The schools where Fellows completed their student teaching had higher student mobility rates (23%) than the schools where they now serve (11%) as teachers. The preservice student teaching schools and inservice teaching placement schools had closely aligned average daily attendance rates, percentages of minority students, English language learners, low income students, and students with disabilities (SWD). None of the schools used for student teaching placement were Title 1 schools and two of the inservice teaching placement schools were Title 1 schools.

Figure 6. Student Characteristics

Source: http://www.schools.utah.gov/data/Educational-Data/Accountability-Reports.aspx
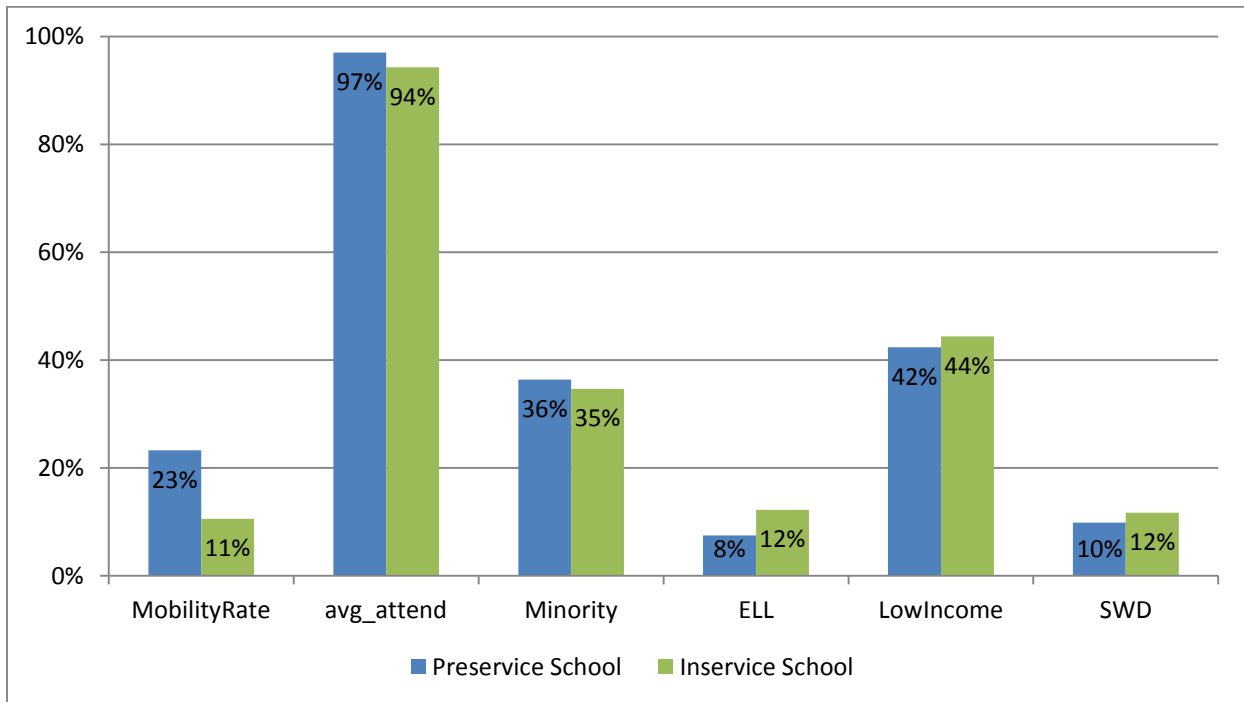
Figure 7 shows that students in the schools where Fellows did their student teaching performed lower by an average of 37 Utah Comprehensive Accountability System (UCAS) performance points, 28 UCAS growth points, and 6 UCAS proficiency points than students in the schools where Fellows now serve as inservice teachers.

Figure 7. Mean School Performance by Teaching Placement

Source: http://www.schools.utah.gov/data/Educational-Data/Accountability-Reports.aspx
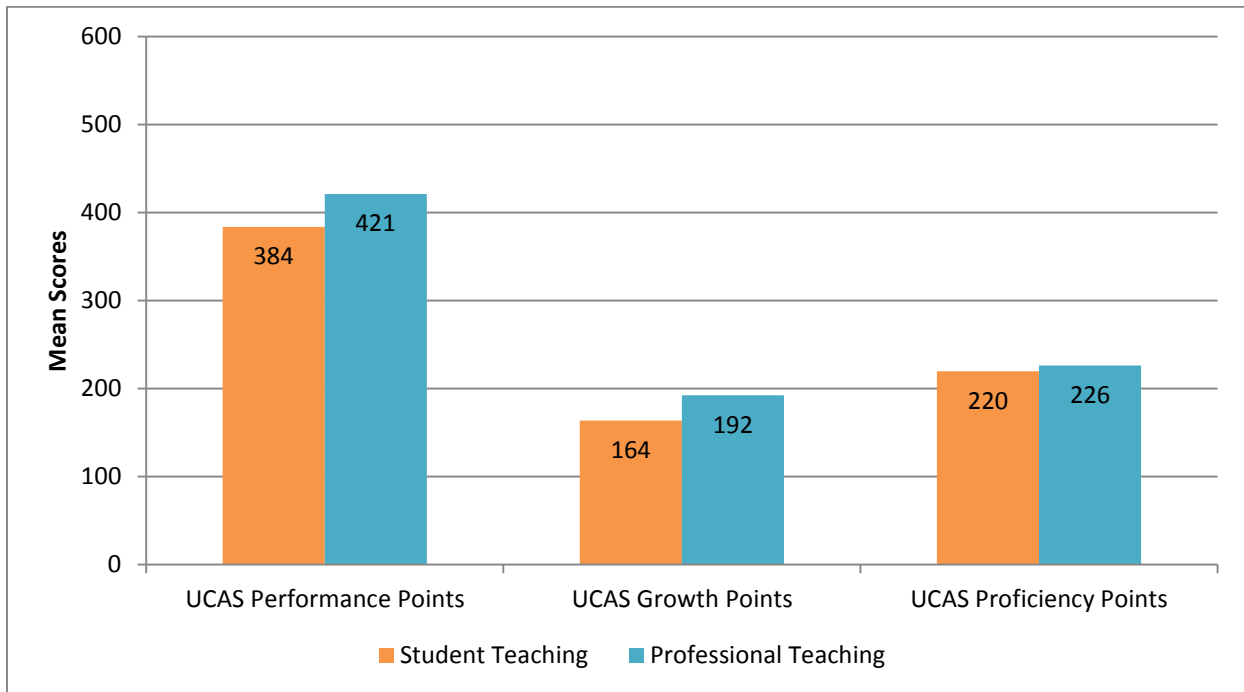
Taken together the school profiles in Figure 6 and Figure 7 show relatively minor differences in the preservice and inservice teaching contexts. However, findings from the previous section (See *Challenges for MfA Mentoring*) revealed that differences in school contexts between preservice and inservice teaching experiences lead to misalignments that created challenges for MfA mentoring and affected the support they provided. Misalignments across preservice and inservice school contexts resurface here, but in relation to how such misalignments hindered the Fellows' teaching effectiveness.

The preservice training that many Fellows received did not match their experiences once they started working as inservice teachers. During their preservice year, Fellows learned to teach for the context of the schools where they completed their student teaching. The teaching practices that they developed were not always compatible for the schools in which they worked as inservice teachers. In the following quotes, the Mentors explain that they helped prepare the Fellows to teach based on their own school contexts, but the Mentors observed that Fellows did not always transition smoothly into teaching practices that suited the Fellows' new schools.

> *They [school districts] are still stuck in teaching 1980s where we are teaching [using research-based methods]. . . . I think that the problem is when they [Fellows] go out there and get infiltrated into the math workforce, that they are overcome by all this quote unquote bad teaching, not that it's necessarily bad, but it's just like everyone is just so old-school [it] overwhelms them and then they are forced to conform. It's like trying to put a circle peg into a square hole.* (Mentor Focus Group)

> *So what I have found with my current Fellow who is at the same school and the Fellow I had before left my school and went to another school for her/his second year that they both wanted to teach like me, but that wasn't appropriate in a different school.* (Mentor Focus Group)

The Mentors quotes above reference the misalignments of preservice training and inservice teaching contexts. Fellows also noted misalignments in the two school contexts. They reported feeling more prepared than their new colleagues to implement the new Utah Core Standards. Since the Fellows were new teachers and did not have the prior experience of teaching a previous math curriculum, they did not have the same challenges as other teachers who were learning the new Core Standards while transitioning from their previous curriculums. In this way, the Fellows felt that they were ahead of the teachers in their new schools. However, the quotes below exemplify how this emerged as another misalignment of school context when other teachers were unprepared and when the schools had not embraced the Utah Core Standards.

> *I feel like a resource at my school for people who are like, what is this [is it] a secondary one or secondary two standard [from the Utah Core] and . . . I'll know. Somehow I became the expert.* (Fellow Focus Group)

> *I mean, the other thing that doesn't come out that makes our experiences harder to judge is we all are teaching [the Utah Core Standards], so in some ways, we're ahead of our peers within the school because we're trained on the new core and our peers are still one foot in the old door and . . . the peers I work with are having a hard time pulling out their feet from the old core to the new core.* (Fellow Focus Group)

> *There is a lot of resistance in the teaching profession to the common core [Utah Core Standards], and so MFA has really said like, we are doing the core, you are all going to learn it, like none of you are learning algebra two, none of you are learning algebra one, none of you are learning geometry, we are all learning the core.* (Fellow Focus Group)

Where the MfA program has prepared Fellows to teach using the new Utah Core Standards, some individual schools, departments, and teachers have been more resistant to these efforts than others or have been less prepared to implement the standards. Further, while Fellows may have preferred to practice innovative teaching practices and felt well-versed in the Utah Core Standards, the potential mismatch in school contexts between their experience with MfA and their experience as early-career teachers may have caused them some difficulty making the transition to inservice teaching.

School Support

This section reports findings of school support experienced by the Fellows. It includes findings related to the frequency and value of school experiences, the frequency and value of the feedback that was given to the Fellows, the frequency and value of school supports, and the support offered from school (EYE) Mentors. We begin this section by presenting responses regarding the extent to which Fellows received support from key individuals at their schools.

Figure 8 shows the extent to which Fellows felt that individuals in theirs schools supported them to be effective teachers. From the survey choices that were presented, peer teachers were the highest rated source of school support (90% agreed or strongly agreed). School administrators and EYE Mentors were the second highest rated source of support (60% and 59% agreed or strongly agreed, respectively). Less than half of the Fellows (43%) agreed or strongly agreed that instructional coaches provided support.

Figure 8. Percent of Fellows who Agreed or Strongly Agreed that they Received the Following Sources of School Support
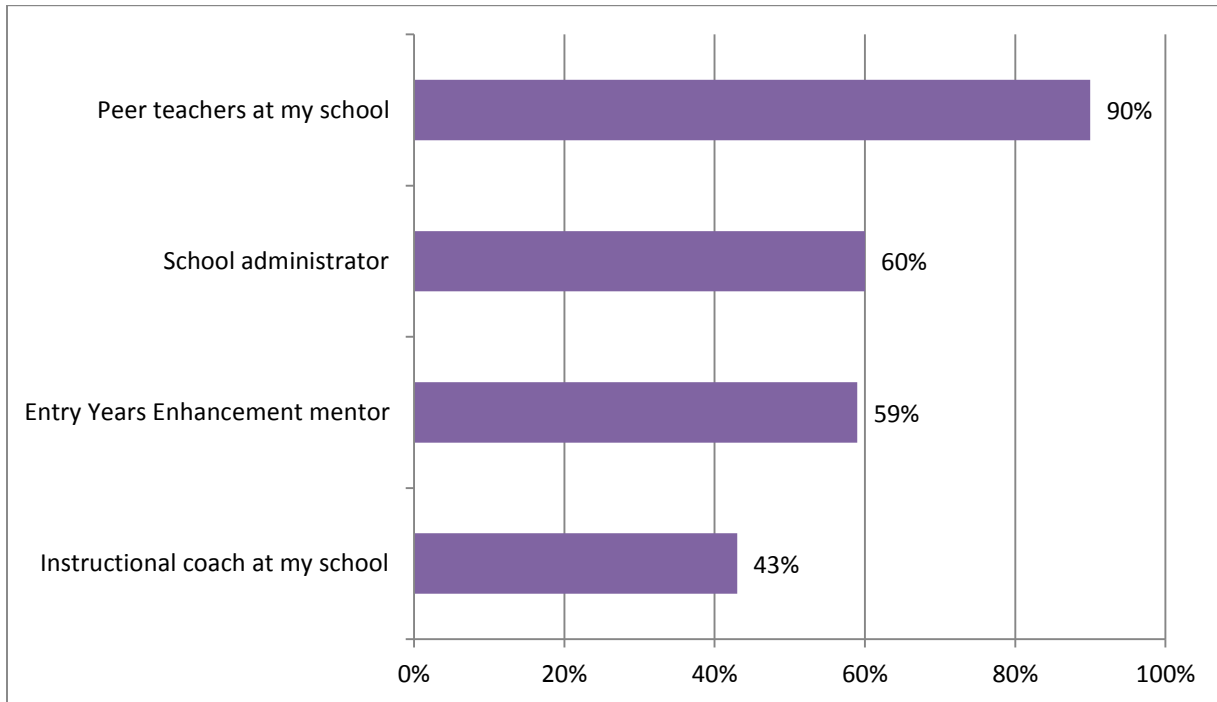
Source: Fellow Survey

The finding that peer teachers were an important source of support is consistent with findings presented in the previous section that MfA peers were an important and highly valued form of support. The finding that just over half of the fellows reported that EYE Mentors were supportive is similarly aligned with results presented in Figure 2, regarding MfA Mentors.

Frequency and Value of School Experiences
Fellows reported a range of experiences within their school contexts. Figure 9 and Figure 10 display the Fellows' reports of the frequency and value of four school experiences. Most Fellows (85%) were observed by a school administrator at least once during the year or once a semester, however, those observations were the least valued (52% agreed or strongly agreed) of these school experiences. Collaborating with peer teachers to plan math lessons (58% at least once a month or more) and collaborating with peers to assess student learning (48% at least once a month or more) were the most frequently occurring school experiences and most Fellows

reported that those collaborations were highly valued (91% and 81% agreed or strongly agreed, respectively). About half (48%) of Fellows reported that a peer teacher observed them teaching, but 75% of the Fellows agreed or strongly agreed that those peer observations were valuable.

Figure 9. Fellow Reports of the Frequency of School Experiences
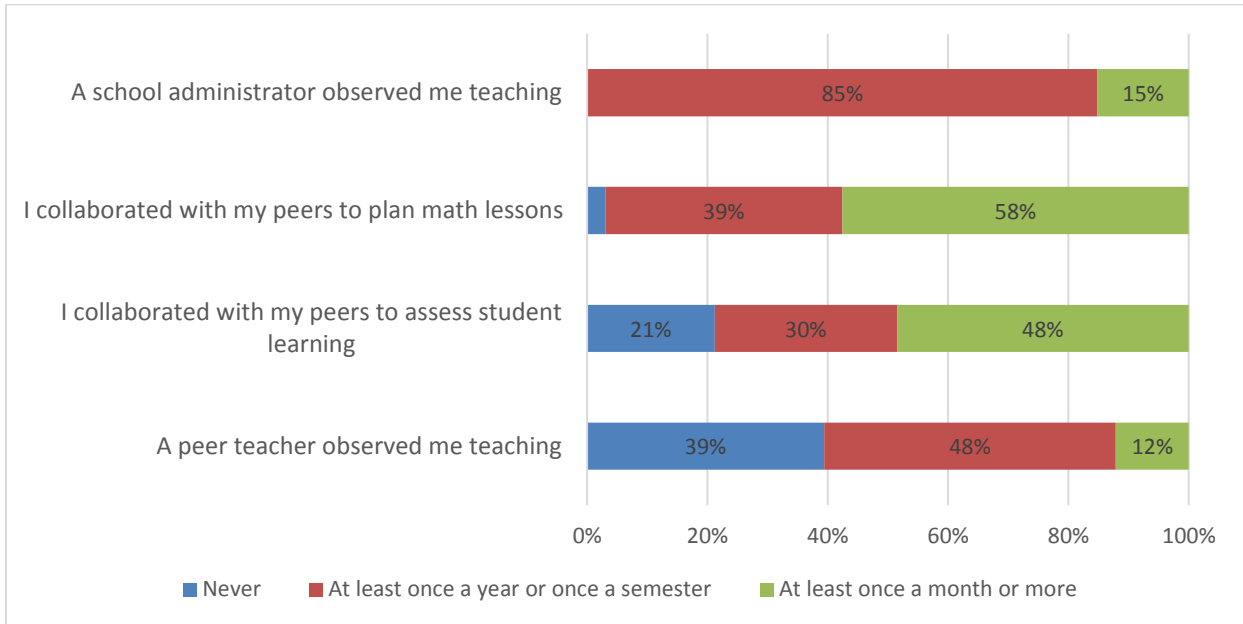
Source: Fellow Survey

Figure 10. Percent of Fellows who Agreed or Strongly Agreed that they Valued School Experiences
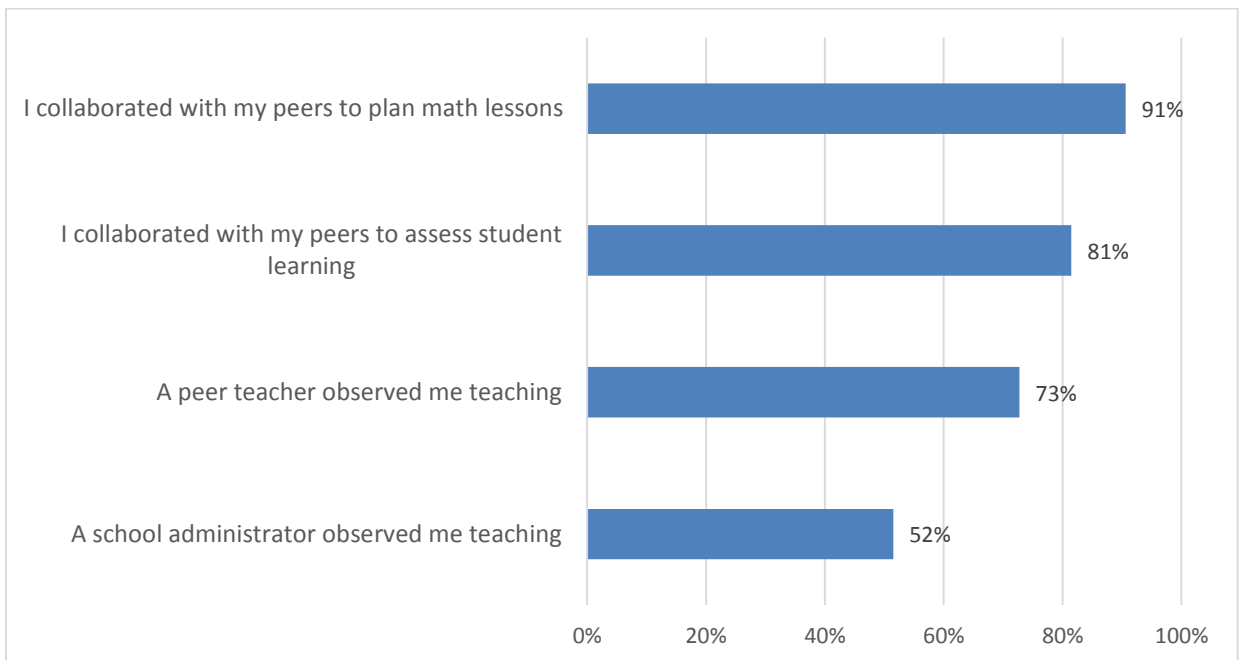
Source: Fellow Survey

The findings in Figure 10 point again to the perceived importance and value of peer teachers in the Fellows' early career experiences within their schools. This is not surprising considering the focus of the MfA program on collaboration and the findings that were presented in the previous section regarding the high frequency and value of collaborating with MfA peers and the importance of MfA peer support.

Despite the value of collaborations with peer teachers in their schools, the findings in Figure 9 show that about half of the Fellows had at least monthly collaborations with peer teachers in their schools. This finding was consistent with focus group discussions. Fellows pointed out that building collaborative relationships takes time and they described collaborative experiences with their school peers that ranged from not collaborating at all to having close daily collaborations. They explained that the extent to which they had collaborative experiences within their schools depended on the conditions in each unique school context. Fellows discussed the influence of school leadership on their school-level collaborations and suggested that some school cultures embraced and promoted peer collaborations among teachers while others did not. The following quotes communicate the range of collaborative experiences encountered by Fellows and how various school conditions affected peer collaborations.

> *I had both sides of it. First two years at [school name] almost no collaboration in the level that came about was as I developed relationships with a couple of the teachers, especially one, her and I collaborated a lot . . . but as far as a department, it . . . kind of comes down from the department head, I mean what kind of culture are they trying to foster? And so there wasn't a lot, and then I went to [school name], and I'm having much more of this experience and I like it so much more. It is so much better.* (Fellow Focus Group).

> *We collaborate like crazy. We are never not collaborating, we're shooting e-mails back and forth, I go into one of their classrooms every single day and talk, we figure out how we're going to plan things, like just today, we are teaching a lesson tomorrow, which is another thing. We collaborate so much to the point at which we teach the exact same thing every single day.* (Fellow Focus Group).

> *In [my] school, we only have two math teachers for grade, so I don't really collaborate.* (Fellow Focus Group).

Non-collaborative school cultures might be difficult to overcome, but as the next quote suggests, the Fellows could take leadership roles in their schools where peer collaboration was limited. The Fellows may influence school cultures such that peer collaborations among teachers can become a norm within their schools.

> *I feel like if we had some way, some information . . . that said, hey, this is how we collaborate. . . . We should be – right when we get there, we should be trying, at least pushing and shoving our way through, trying to force collaboration and whatever that means, and I realize that that's hard in some schools it's impossible, but I feel like that's a*

mentality that we need to be pushing, not just collaborating with us, because we can only get so far with just us. (Fellow Focus Group).

The Fellows learned to appreciate, rely upon, and value peer collaboration through their experience in the MfA program (see *MfA Sources of Support section*). They recognized the need for their peer support network to extend beyond that of their MfA peers into the school contexts that made up their daily teaching practices. Overall, while some Fellows felt their schools lacked the support of a collaborative climate and specifically requested support in establishing a more collaborative atmosphere within their schools and their departments, other Fellows celebrated their ongoing school-level peer collaborations.

Frequency and Value of Feedback

Receiving feedback is way for early-career teachers to learn from others about what they are doing well and in what areas they might improve their teaching effectiveness. Figure 11 reports the frequency of feedback that Fellows received from four sources. Figure 12 shows the extent to which Fellows valued feedback from those sources. Consistent with reports of frequent observations by school administrators in Figure 9, Figure 11 shows that Fellows received feedback most frequently (94% at least once a year or more) from school administrators, however, that was also the least valued form of feedback. The least frequent source of feedback was from instructional coaches (54% at least once a year or more), but 74% of Fellows agreed or strongly agreed that the coaches feedback was valued. Most Fellows received feedback about their teaching from mentor teachers or peer teachers at least once a year or more (79% and 67%, respectively).

Figure 11. Fellow Reports of School-level Frequency of Feedback
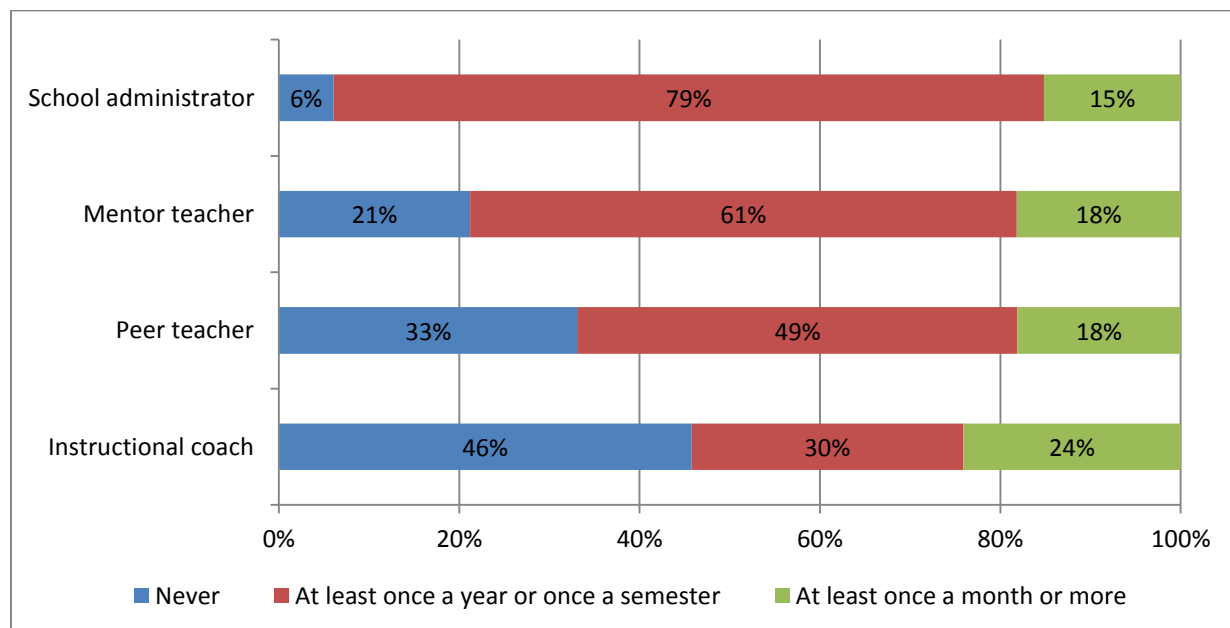
Source: Fellow Survey

Figure 12. Percent of Fellows who Agreed or Strongly Agreed that they Valued of Feedback from Various Sources
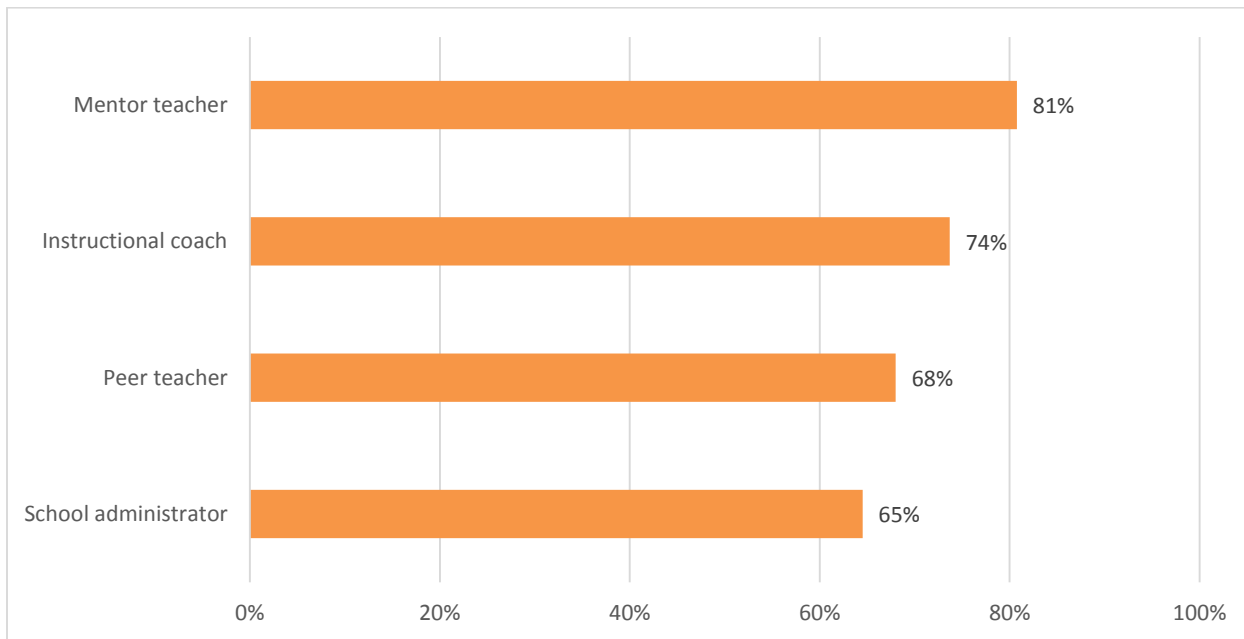
Source: Fellow Survey

While school administrators were portrayed as part of the Fellows support network by providing classroom observations and feedback, relatively few Fellows found observations or feedback of school administrators particularly valuable. Instead, Follows consistently indicated that working with peers was important to them. Those who worked in collaborative settings found that rewarding and supportive. In addition to the school experiences and feedback described above, the Fellows received a range of school-level support at the schools in which they worked.

Frequency and Value of School Supports
School planning and organization structures can establish conditions that offer support to varying extents. Figure 13 and Figure 14 display the frequency and value of five school-level supports. The most frequently available types of support were supportive communication with principals, administrators, or department chairs, and common planning time with other math teachers (87% and 77% at least once a year or more, respectively). Common planning time was also the most valued type of support from this set of questions. This finding is consistent with the emphasis on peer collaboration discussed throughout this report. Importantly, almost none (6%) of the fellows had a reduced teaching schedule and more than half (58%) never had extra assistance in the classroom. There were relatively limited reports of Fellows having release time to work with Mentors (22% monthly and 38% never), but those who had release time to work with their mentors reported it as valuable (84% Agreed or Strongly Agreed).

Figure 13. Fellow Reports of the Frequency of School Supports
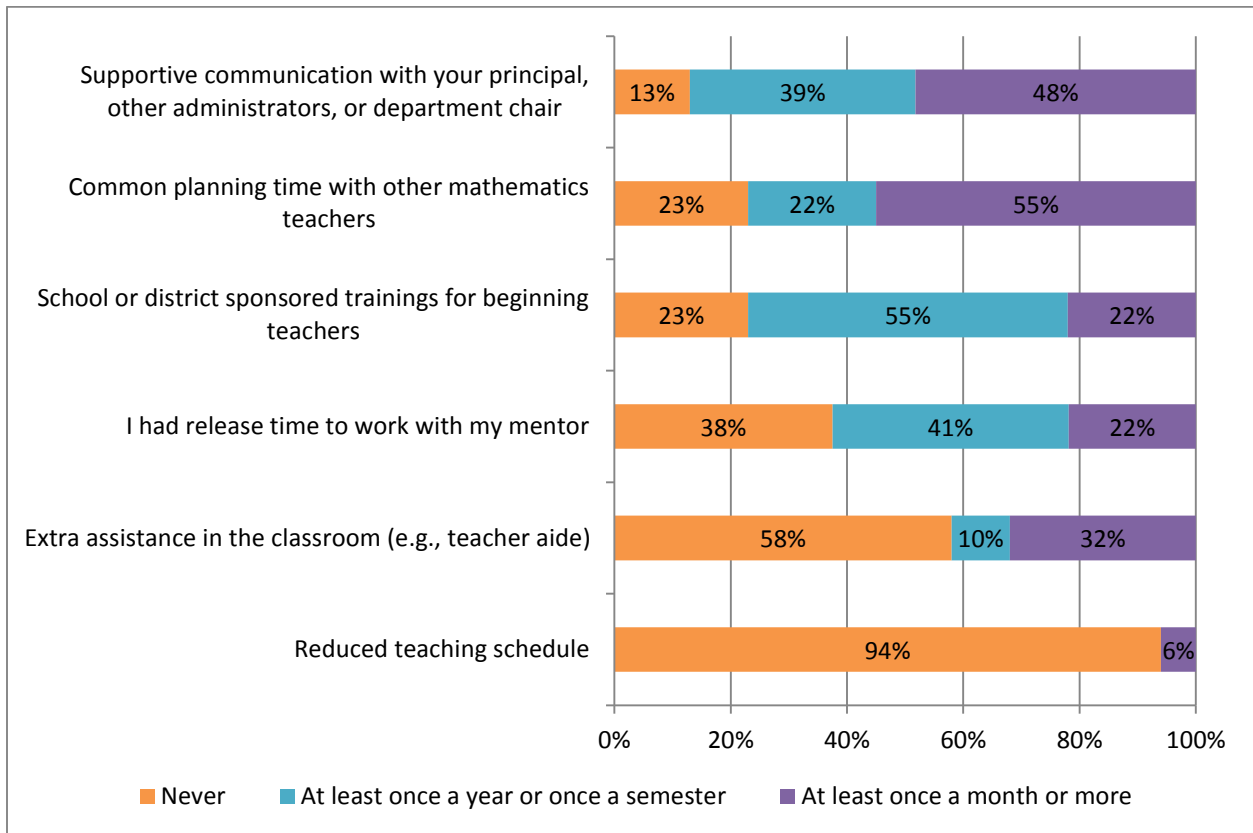
Source: Fellow Survey

Figure 14. Percent of Fellows who Agreed or Strongly Agreed that they Valued School Supports
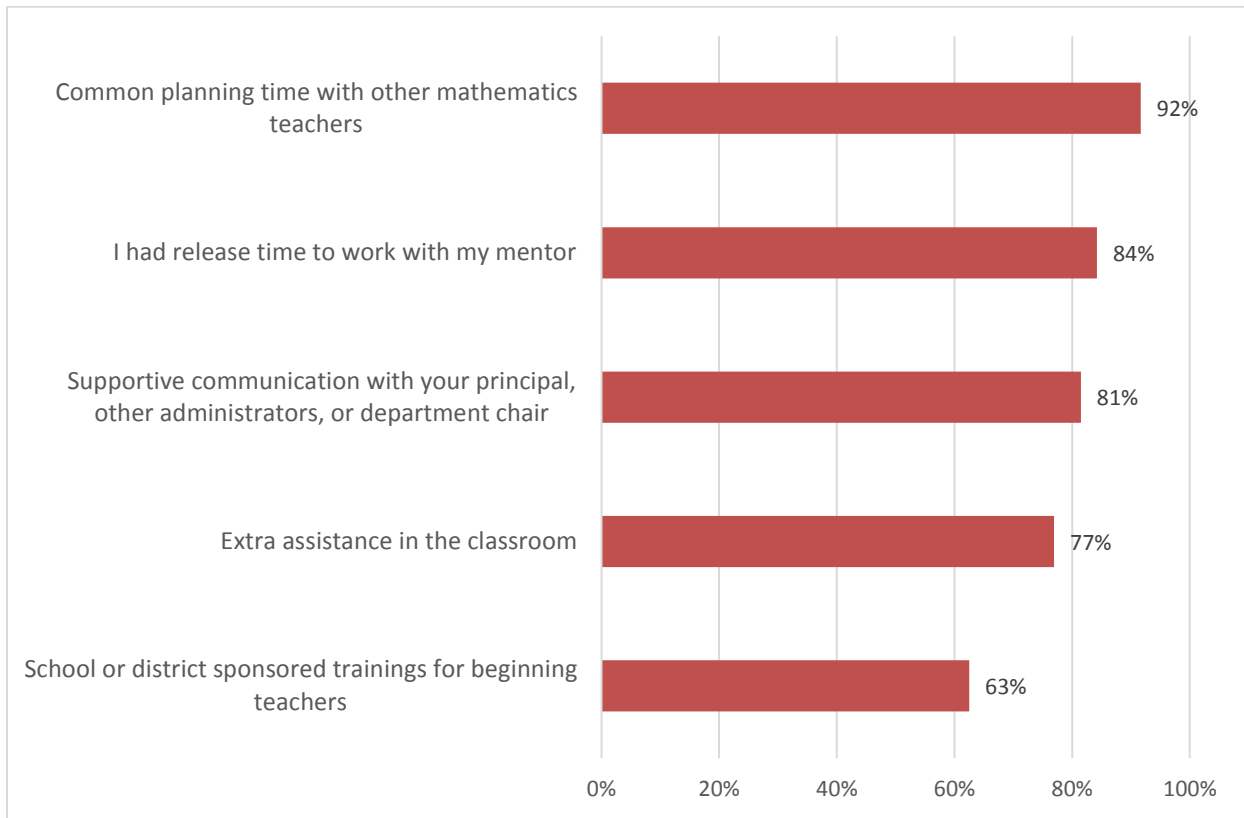
Source: Fellow Survey

Overall, the variation in the responses shown in Figure 13 and Figure 14 highlight the different early career teaching experiences and supports that Fellows had, depending on the schools in which they worked. From the frequency of the school experiences reported in Figure 13 we learned that few of the Fellows had monthly release time to work with mentors. This finding is of particular interest given the low frequency of monthly meetings that were reported by MfA Mentors in the previous section (see Figure 3). Again we see the Fellows placing a high value on opportunities to interact with their peers, as almost all of the Fellows placed a high value on having common planning time with other math teachers.

School Mentor Support
An important school-level support is the presence of a quality mentor. In addition to the MfA Mentors with whom Fellows are assigned to work for their first two years in the MfA program, early-career teachers in Utah are also assigned a mentor as part of the EYE program. Whereas the MfA Mentors work at different schools than their Fellows, the EYE Mentors are on site at the schools where the Fellows teach. We report here responses to the same survey items that we did for the MfA Mentors in the *MfA Program Engagement and Support* section above, but for the EYE Mentors.

The findings regarding the frequency and value of the Fellows' interactions with the EYE Mentors are presented in Figure 15 and Figure 16[4]. The most frequent interactions with the EYE Mentors was discussing teaching and learning and meeting informally (50% and 44% at least once a month or more, respectively). The least frequently occurring interactions were getting assistance from the EYE Mentor with using assessment data (69% never), receiving assistance with planning lessons (63% never), and discussing Utah Effective Teaching Standards (56% never). These were also the least frequently occurring interactions with the MfA Mentors.

Figure 15. Fellow Reports of the Frequency of EYE Mentor Interactions
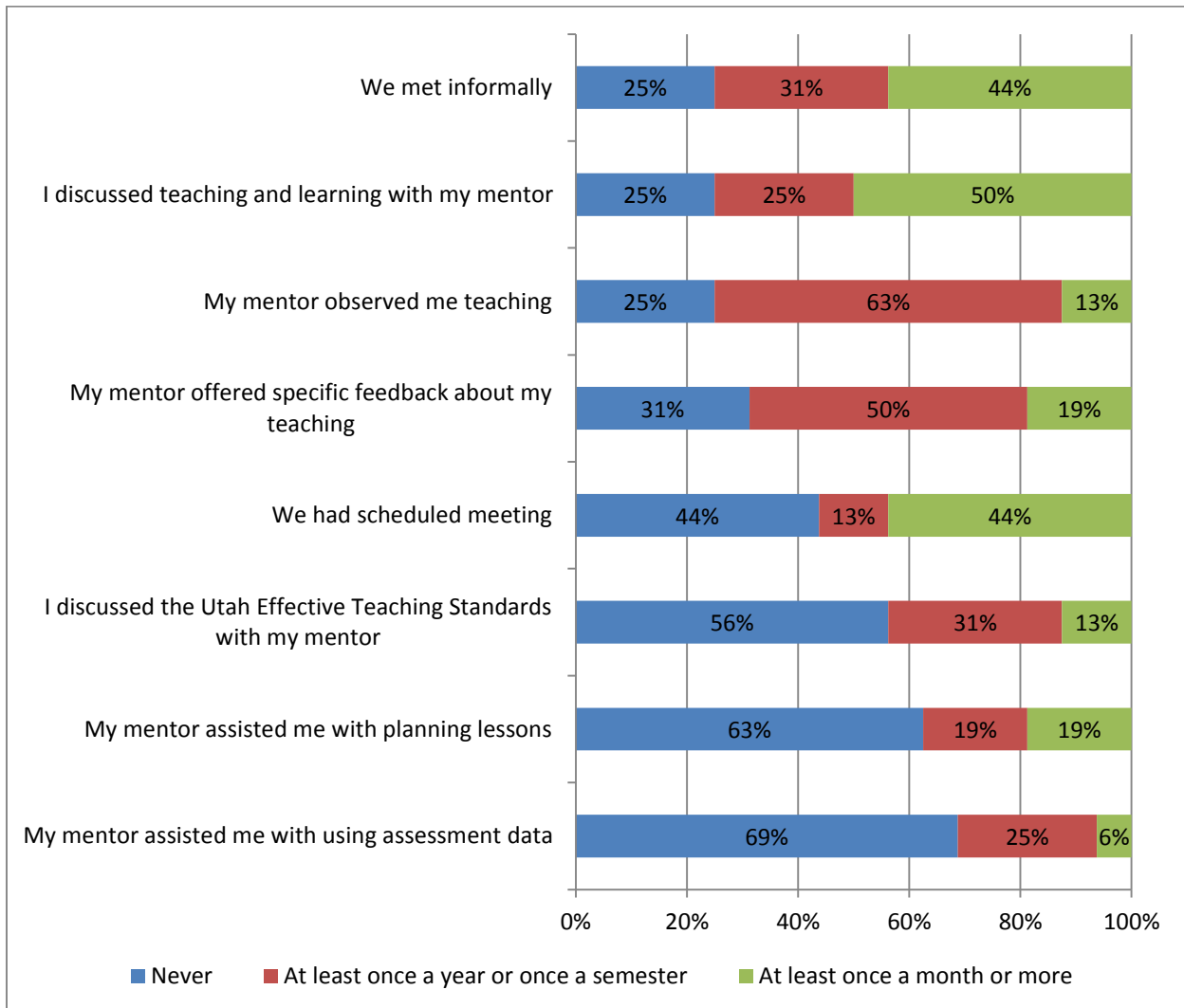
Source: Fellow Survey

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[4] The high number of reports from fellows having *never* received assistance with using assessment data and never received assistance planning lessons, resulted in numbers that were too low to warrant a presentation of percentages in the value ratings presented in Figure 16. Also, the items in Figure 15 were displayed in a two part question on the survey. We made minor edits to the wording of these items for the purpose of clarity in figure 16.

Despite the relatively infrequent interactions of EYE Mentors and Fellows, the interactions that did occur were valued by the Fellows. For example, 91% of the Fellows agreed or strongly agreed that they valued the EYE Mentors specific feedback about their teaching. Similarly, among the Fellows who had these interactions with the EYE Mentors, 86% valued discussing Utah Effective Teaching Standards and 83% agreed or strongly agreed that they valued discussing teaching and learning with their EYE mentors.

Figure 16. Percent of Fellows who Agreed or Strongly Agreed to Statements About the Value of EYE Mentor Interactions
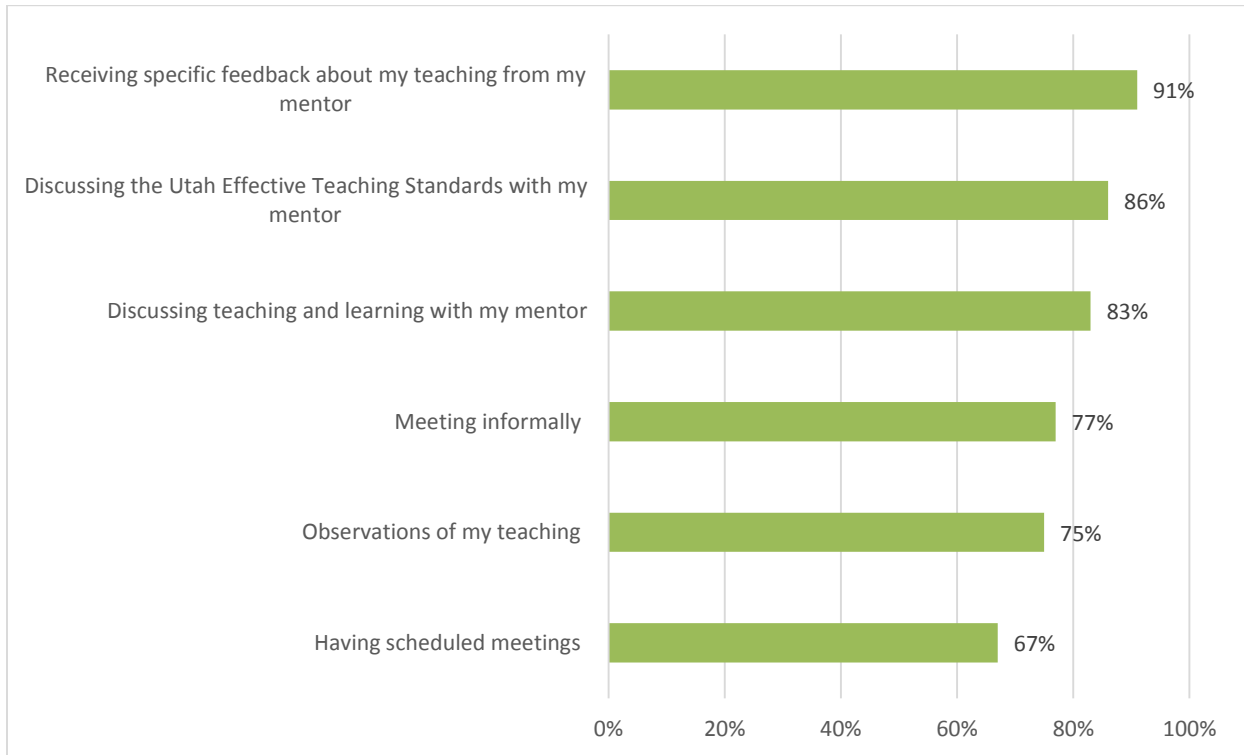
Source: Fellow Survey

Much like the findings related to MfA Mentors (see Figure 3 and Figure 4), although the interactions with EYE Mentors were relatively infrequent, those interactions were valued. Fellows especially valued opportunities to receive feedback about their teaching from EYE Mentors, which suggests a desire and openness to continue improving their teaching practices.

MfA Fellows' Preparedness to be Effective Mathematics Teachers

The previous two sections have focused on MfA program engagement and support and the school contexts and support experienced by Fellows during their first years as inservice teachers. In this section we address the question, to what extent are MfA Fellows prepared to be effective secondary math teachers? We begin with an overview of the preparation context that compares the licensure coursework for the MfA program with that of the licensure coursework for a BA in

Math Teaching. Following that are findings related to the Fellows' preparedness in mathematics topics, general topics, and classroom practices, and perceptions of their preparedness to teach.

Below are the key findings related to the MfA Fellows' preparedness to be effective mathematics teachers.

- Fellows reported feeling prepared to teach secondary math, but Fellows and MfA Mentors gave mixed reports regarding Fellows' teaching preparedness for classroom management and working with diverse groups of students.
- Fellows reported that the MfA program prepared them well to be effective teachers, MfA Mentors indicated that Fellows were effective in many classroom practices, and Fellows reportedly had a strong foundation of mathematical content knowledge; however, findings suggested that the Fellows might have benefited from increased clarity of the final project and a greater focus on math pedagogy.

Coursework Preparation Context

Coursework is a central aspect of the Fellows' preparation. As noted in the introduction to this report, MfA Fellows complete the coursework requirements for a Master's of Mathematics Teaching (University of Utah) or a Master's of Mathematics (Utah State University) through the MfA program. In both cases the degrees are specifically designed for mathematics teachers. The mathematics course requirements for the degrees at both universities are comparable to the requirements for a Level 4 math endorsement[5] and the courses cover similar topics but at a more advanced level than the endorsement requires. The MfA coursework appears to cover the Utah secondary math core curriculum, but the sequencing of courses varies by cohort because not all courses are offered every semester.

While the math course requirements are fairly similar between the MfA program requirements and the traditional route requirements, there are differences in the courses required for teacher licensure, especially at the University of Utah where the traditional route licensing requirements are more extensive than at Utah State University. Table 5 shows the differences in licensing requirements for the MfA program and for a traditional route at the University of Utah. The course numbers and names are presented in Table 5 in comparison to one another to show approximate equivalences. If no equivalent course was available, then the corresponding cell in the table was left blank.

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[5] This is the highest level math endorsement offered by the state of Utah and allows a teacher to teach any math class offered at the high school level. For a specific listing of MfA courses compared to the traditional courses see Appendix A. Coursework

Table 5. University of Utah Licensure Coursework Comparison

Licensure Coursework for MfA Program (University of Utah)	Licensure Coursework for BA in Math Teaching (University of Utah: Traditional Route)
	EDU 1010 Introduction to Teaching, Field: 20 hrs
ECS 3150 Multicultural Education	ECS 3150 Multicultural Education, DV Field: 18 hrs
	EDPS 3030 Research & Inquiry in Education
	ELP 3410 Education, Law, & Policy for Classroom Teachers
FCS 5230 or EDPS 6050 Adolescent Psychology	Choose One: PSY 1230, PSY 3220, FCS 5230, or EDPS 5050 Adolescent Psychology
	EDU 5200 Teacher Language Aware, Field: 16 hrs
	EDPS 5151 Educational Applications of Technology: Grades 6-12
SPED 6012 Inclusive Classrooms or SPED 6141 Math Instruction for Students with Mild/Moderate Disabilities	SPED 5012 Inclusive Classrooms in Secondary Ed
SPED 6021 Assess & Data-based Decision Making	SPED 5021 Principles of Assessment & Data Based Decision Making
SPED 6022 Instruction & Behavior Support	SPED 5022 Principles of Instruction & Behavior Support
	ECS 5645 Assessment of Linguistically Diverse Populations
	ECS 5709 Building Family-School Partnerships for Youth Success Field: 32 hours
	LING 5812 Content-Based Language Teaching Field: 16 hours
	EDU 5490[6] Field Practicum: Secondary Field: 9 hours a week
	EDU 5201 Seminar in Language Awareness
	ECS 5715 Urban Education (3)
EDU 6491 Action Research- Professional Development and Teacher Research	EDU 5491 Professional Development & Teacher Research (3)
EDU 6495 Student Teaching Full School Year half-time+	EDU 5495 Student Teaching: Secondary (9) Field: 12 weeks full-time

Source: MfA program administrator; http://uite.utah.edu/future-students/secondary-licensure/Secondary%20Ugrad%204-14.pdf

The comparison in Table 5 suggests a number of potential gaps in the coursework including the use of technology, knowledge of applicable laws, working with diverse students, and making connections with the community. The largest of these appears to be in the area of working with a

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[6] An argument could be made that for MfA students the practicum hours are rolled into the student-teaching since MfA students complete significantly more hours of student-teaching than traditional route students.

diverse student body. In the traditional route, students are required to take six more classes on teaching a diverse student body (mostly on working with speakers of other languages), than in the MfA program.

The MfA licensure coursework is more closely aligned with the traditional route coursework at Utah State University than the coursework at the University of Utah (See Appendix A. Coursework). This closer alignment appears to be an artifact of the smaller number of courses required for licensure at USU. In either case, at both sites MfA Fellows were taking fewer licensure courses than a traditional route student at the University of Utah.

Having established the preparation context in terms of required MfA coursework and coursework comparisons, the following section explores how completing the coursework and participating in the comprehensive MfA program prepared the Fellows to be effective secondary mathematics teachers. Fellows and MfA Mentors answered similar survey questions about the Fellows' preparedness in a number of mathematics topics and general topics. The following section begins with results related to mathematics topics preparedness.

Mathematics Topics Preparedness

MfA Mentors rated the Fellows as notably more prepared in the mathematics topics than the Fellows rated themselves (see Figure 17). This may be, at least in part, an artifact of the high number of *I don't know* responses to these items from the Mentors. Mentors were given an additional option to select *I don't know* if they were not confident about providing a rating of the Fellows' preparedness, which drastically limited the number of Mentors who are represented in these items. The *I don't know* responses were excluded from the calculations of the Mentors' responses. However, most of the Mentors who provided ratings of the Fellows' preparedness indicated that the Fellows were very or extremely prepared. In fact, all (100%) of the Mentors who provided responses indicated that the Fellows were very or extremely prepared in the topics of contemporary math and linear algebra.

In contrast to the Mentor ratings, few of the Fellows indicated that they were very or extremely prepared in any of the math topics[7]. They reported feeling most prepared in methods of teaching (55% very or extremely prepared), foundations of geometry (48% very or extremely prepared), and foundations of algebra (48% very or extremely prepared). For all of the other math preparedness items, less than half of the Fellows reported feeling very or extremely prepared.

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[7] One possible explanation for the Fellows' reported lack of preparedness could be found within the survey question itself. This question asked Fellows: "Given your current teaching experience, to what extent has the MfA program prepared you to be an effective mathematics teacher in the following mathematics topic areas?" Some of these math topics such as *probability and statistics above the introductory level* or the *history of mathematics* are not typically included in secondary school math curriculums.

Figure 17. Mentor and Fellow Reports of the Extent to Which Fellows were Very and Extremely Prepared to Teach Math Topics

Topic	MfA Mentors	Fellows
Advanced topics in history of mathematics	88%	23%
Topics in contemporary mathematics	100%	23%
History of mathematics	69%	39%
Number theory	88%	32%
Foundations of analysis	90%	32%
Methods of teaching secondary mathematics	65%	55%
Probability and statistics (above introductory level)	71%	13%
Foundations of geometry	85%	48%
Foundations of algebra	95%	48%
Differential equations	88%	19%
Linear algebra	100%	29%
Multivariate calculus	86%	32%

*Mentors' I don't know responses were excluded from the calculations of the percentages.
Scale: Not at all prepared, somewhat prepared, moderately prepared, very prepared, and extremely prepared
Source: Mentor Survey; Fellow Survey

The Fellows' reports of low preparedness to teach math topics are perplexing because they conflict with other data sources. In open-ended survey items and focus group discussions, Fellows emphasized the MfA program's focus on math competency. The thoroughness of the Fellows' preparation in math content knowledge is a theme that runs throughout this section and readers will notice additional quotes that support this conclusion.

Fellows portrayed themselves as having a mastery of mathematics content that, for some Fellows, served as an important foundation for their teaching. Fellows expressed confidence in their mathematical abilities to teaching the math content of the Utah Core Standards. In recounting their experiences as inservice teachers, Fellows found themselves to have a greater command of math content than many of their peer teachers. In the quotes that follow, Fellows link their mastery of math content to their participation MfA program and celebrate their success of gaining a strong foundation of math content knowledge.

> *I think MfA gave us a strong mathematical background. Because of our depth of knowledge we can better teach concepts to students.* (Fellow Survey)
>
> *I would argue that the strongest level is in the [math] content, that has always been MfA's strong point; I think is that they ground us really in a content and try to [focus on] math knowledge.* (Fellow Focus Group)
>
> *I thought that class [capstone class] helped me to understand about the college algebra that I'm teaching in math three. We are teaching how to analyze cubics and quadratics, fifth order polynomials that stuff I didn't really realize until [my math professor] drove me through that this fall, and I'm like wow, and I feel so confident in that type of content now.* (Fellow Focus Group)
>
> *I am one of – there's probably one other teacher at my school and we are probably the top as far as understanding mathematics. We might not be the best – I'm not the best at teaching obviously, but as far as understanding mathematics, I understand it really well, better than most other high school teachers because I [have] taken those classes.* (Fellow Focus Group)

Fellows believed that mathematics content was a strength of the MfA program. The program's focus on math content is evident in the coursework and in the additional opportunities that Fellows have to further their understanding of mathematics in cohort meetings and workshops that often involve solving math problems in groups. The emphasis on knowing and understanding math content is a salient aspect of the MfA program and Fellows communicated that in their comments.

General Topics and Preparedness to Teach

Similar to the math topics, both Fellows and MfA Mentors responded to a set of general topics items, we offer Figure 18 to provide comparisons of their responses. For the general topics, the Mentor reports of Fellows preparedness were fairly well aligned. The greatest disparity in

Mentor and Fellow responses regarding preparedness in general topics was knowledge of law and policy (21% difference) and teaching English language learners (16% difference). For both of those items, the Mentors rated the Fellows as more prepared than they rated themselves.

Fellows' reports of their preparedness to teach general topics were all low; the highest was general instructional methodology (58% very or extremely prepared), followed by assessment of student learning (52% very or extremely prepared). Fellows rated themselves least prepared to teach English language learners (13% very or extremely prepared) and in the topical area of family-school partnerships (23% very or extremely prepared). Mentors rated Fellows as least prepared to understand students with disabilities (17% very or extremely prepared), teaching English language learners (29% very or extremely prepared), and family-school partnerships (30% very or extremely prepared).

Figure 18. Mentor and Fellow Reports of the Extent to Which Fellows were Very and Extremely Prepared to Teach General Topics
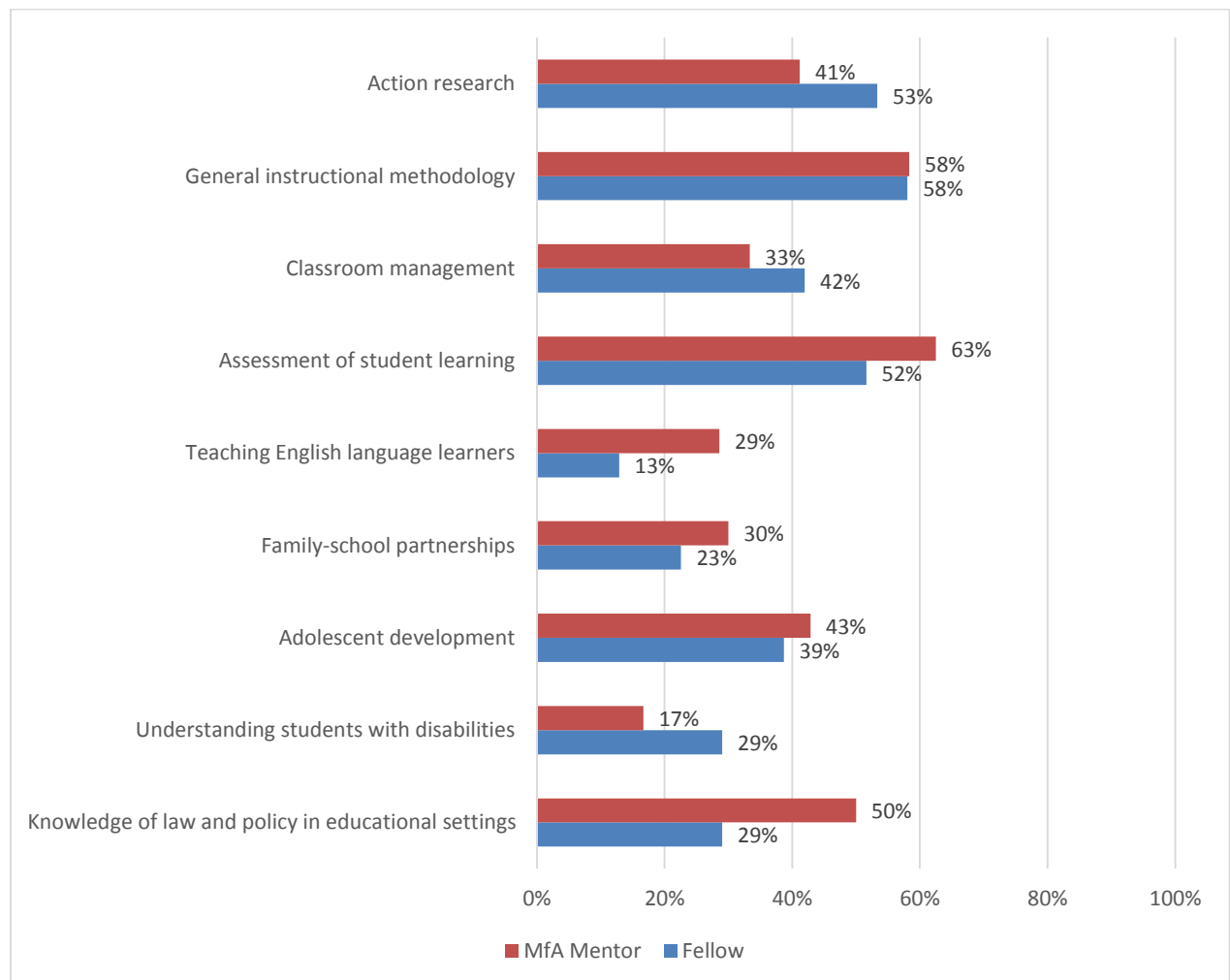
*Mentors' I don't know responses were excluded from the calculations of percentages.
Scale: Not at all prepared, somewhat prepared, moderately prepared, very prepared, and extremely prepared
Source: Mentor Survey; Fellow Survey

The overall low ratings of Fellow preparedness in the general topics reported in Figure 18 set the stage for the remainder of this section. The theme of under-preparedness in topics such as classroom management and working with various student groups appeared across data sources and later in this report are sections devoted to these topics that will provide additional detail about the Fellows' preparation to be effective math teachers.

Learning Math and Learning to Teach Math

Taken together, the coursework preparation findings presented thus far have laid the groundwork for a tension that existed between learning math content and learning to be an effective, well-rounded math teacher. Where Fellows expressed confidence in their mastery of math content, they were less prepared to teach math and to teach math to all types of learners. MfA coursework related to operating an effective classroom did not always translate well for Fellows once they had their own classrooms. They felt that the program's focus on learning higher math sometimes came at the expense of learning how to teach math well. Fellows suggested that an increased focus on the daily experiences of teaching and on the variety of skills that they needed to be effective teachers would have helped them during their early careers as math teachers. Included in the quotes below are specific examples of the topical areas in which Fellows requested additional training.

> *I know it is important to learn and grow as mathematicians, but I also need to see what this should look like in the classroom and how I should handle it as a teacher, not just a mathematician.* (Fellow Survey)

> *Classroom procedures and management skills taught within the university setting was very idealistic. This created some areas of deficiency when the Fellow entered a real classroom setting* (Mentor Survey)

> *Social justice, teaching students who are English Language Learners, co-teaching, and actual instructional strategy (versus mathematical theory). / We spent a lot of time and energy on pure math, which relates a lot less to classroom instruction than the mathematics department seems to think.* (Fellow Survey)

> *I would have liked much more in depth teaching about methods of instruction, time management in the classroom, remediation strategies for kids who just don't get it and differentiation methods in the classroom.* (Fellow Survey)

> *I really enjoy the math but it has not helped me teach at all, and I feel like there were many other areas of teaching that I would like more information on that were covered a lot more, like classroom management, general daily lesson planning.* (Fellow Focus Group).

One source of the perceived tension between learning math content and learning to be a well-prepared, effective math teacher may have been the focus of the education courses taken by the Fellows. Similar to previous evaluations, Fellows complained that the education classes were not

specific enough to teaching math. Some Fellows felt left out of discussions and potential learning opportunities in the education classes because the topics were reportedly not applicable to teaching math. Fellows expressed that the opportunity to take classes that were focused specifically on teaching in math classrooms was more beneficial than general education classes.

> *Well, for one thing, when you take the mathematics teaching for math teachers, you can talk specific topics, whereas when you take general education, you – all your education classes are more geared towards just whether you're social studies or history or English or whatever and there's a pretty wide difference, so if we talk about having to incorporate writing in a general class, most of what we talk about I can't do in a math class, but when we talk about incorporating writing within the context of a group of math teachers, everything we talk about is applicable and I can incorporate it, so I have more tools, less time that I'm spending thinking well, that won't work in a math class, well, that won't work in a math class.* (Fellow Focus Group)

> *My math class is my favorite and I hated my education classes. I could've done without the education classes period.* (Fellow Focus Group)

> *...as far as the math goes, I would have rather learned like, how to teach what I will be teaching, not the existence of higher math.* (Fellow Focus Group).

As suggested in the quotes above, there were reports that Fellows wanted more from the education classes. While some fellows would have preferred to focus primarily on math, others expressed a need for education classes that focused on their specific needs as math teachers and proposed that Fellows could be offered a choice between a Masters degree in Mathematics or Education. They felt that the advanced math content knowledge was not always as valuable to them as the need to have a strong, practical, working knowledge of math pedagogy and a greater focus on daily teaching practices.

Final Project

In addition to the standard coursework, Fellows are required to complete a final project. Issues related to the final project surfaced as Fellows expressed frustration with a lack of clarity regarding that project. The following quotes suggest that there were numerous reports of confusion regarding the expectations related to the final project. Particular points of confusion were the lack of a clear contact person, discrepancies of what the project topics should encompass, and what the standards were for completing the project.

> *So I've had my classes done for over a year now and there is this project I'm supposed to do to like, get my ticket out and I can't. I have not – I haven't even started. I have no – I don't have a topic, I've taken four credits on _____ and I've come up with nothing, so it's probably my fault, but I feel like if there were an option to like, take 10 more classes and not do the project, I would've done that. (Fellow Focus Group)*

> *There are some super mathematically rigorous, and some people get to do an education type thing, and there is no outline of what I am supposed to do. (Fellow Focus Group)*

It depends who you ask, see you can be like, can I do this? And someone will say yeah, that sounds great, and then you ask someone else, and they're like, oh, that's not rigorous enough. (Fellow Focus Group)

The difficulties that Fellows faced concerning the final project stemmed from the lack of clear understanding of what the expectations were and if the project should focus on demonstrating a command of math content knowledge or math pedagogy. While not the case for all Fellows, there was an overall need for resources that would assist Fellows to complete the final project in a timely manner and based on clear guidelines.

Classroom Management

Of the topics related to coursework and preparation to be an effective math teacher, a need for increased focus on classroom management emerged as a theme in the findings. When asked to indicate agreement that they learned how to manage their classrooms, 62% of the Fellows agreed or strongly agreed. Mentors provided similar responses as 67% agreed or strongly agreed that their Fellows demonstrated effective classroom management (See Figure 19).

Figure 19. Percent of Fellows and Mentors who Agreed and Strongly Agreed to Statements about Classroom Management
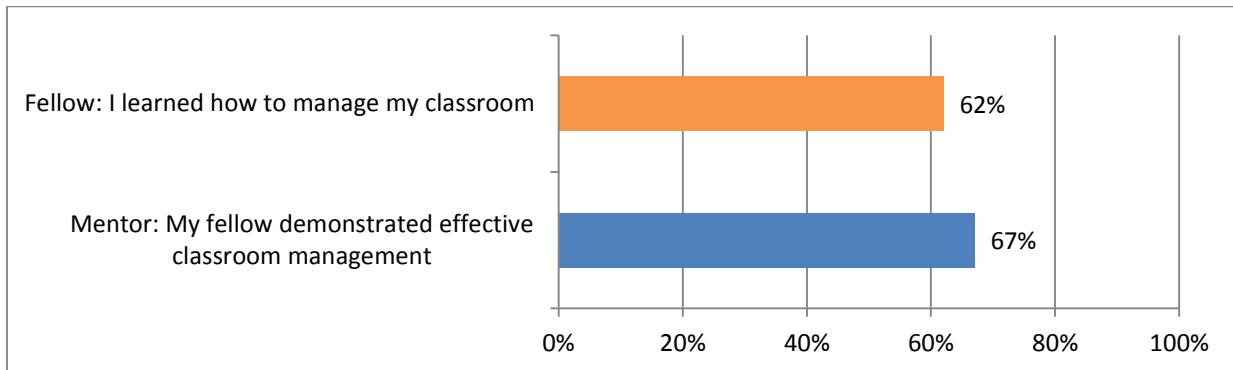
Source: Mentor Survey; Fellow Survey

Additional evidence regarding preparation for classroom management is available in Figure 18, Figure 21, and Figure 23. In Figure 18, only 42% of Fellows and 33% of Mentors reported that Fellows were very or extremely prepared in the topical area of classroom management. Similarly, Figure 21 and Figure 23, present a list of 12 classroom practices, of which *handling a range of classroom management situations* was the classroom practice that received the lowest ratings of preparedness and effectiveness from Fellows and Mentors. Together, these four survey results (Figure 18, Figure 19, Figure 21, and Figure 23) provide a clear statement that classroom management was among the areas in which Fellows were reportedly least prepared.

Fellows recognized their need for additional preparation to manage their classrooms and Mentors observed their Fellows struggle with classroom management issues. Fellows and Mentors made clear the need for additional preparation in classroom management by describing Fellows' lack

of ability and sense of feeling overwhelmed. There were accounts that the MfA courses could have done more to prepare the Fellows to manage their classrooms effectively. The following quotes communicate the feelings of inability to manage classrooms and positively address student behaviors that caused frustrations and disappointments for the Fellows.

> *If there is some way they can figure out how to teach new teachers behavior management skills. Because that is one of the things that I feel is really lacking in my first year is I have no idea how to deal with some of these kids. . . . I felt prepared math wise and I could explain this concept in these ways and this and I could tie all these things in together and the content was great but managing my dear little knuckleheads that was the part that kills me, made me want to quit, because I didn't know what to do with these – some of these kids.* (Fellow Focus Group)

> *None of my Fellows have had questions about content or how should we teach. It [has] always been about these are the challenges I'm having with students, not the content, not the math, but the behavior type of things.* (Mentor Focus Group)

> *So I thought that as far as classroom management, when we – when I went through it was kind-of weak, the classroom management courses they gave us were not very useful.* (Fellow Focus Group)

> *You can learn how to deal with each student specifically, but some general overall management skills [would be helpful], I mean, it took me halfway through my first year before I realized [how to] make the kids ask to get up out of their seats. That seems like a really obvious thing now, I mean, but my first year, I'm like, why are you all running around in my classroom?* (Fellow Focus Group)

Although there was a collection of evidence documenting a lack of preparation in classroom management, the Fellows quoted above make clear that while they struggled initially, they learned more how to manage their classrooms as they gained experience. They acknowledged even with a foundation of knowledge that some skills take direct experience and time to develop. Fellows had opportunities to hone their classroom management skills as they got to know their own students and as they settled in their own classroom settings. Further, not all Fellows struggled with classroom management. There were also Fellows who reported that they were well-prepared to manage their classrooms and that classroom management was among their greatest teaching skills.

> *I am very good at classroom management, teaching content, and running a classroom that my students want to be in.* (Fellow Survey)

> *My strengths are classroom management and organization.* (Fellow Survey)

Along with classroom management, the ability to work with various student groups emerged as an area in which Fellows lacked preparedness. The following section presents results related to the Fellows' preparedness to work with various student groups.

Preparedness to Work with Student Groups

Fellows and Mentors reported the extent to which participation in the MfA program contributed to Fellows' preparedness to work with particular student groups (see Figure 20). The MfA Mentors were more confident about the Fellows' preparedness than were the Fellows themselves and gave higher ratings on every item. Over half of the Mentors agreed or strongly agreed that the Fellows were prepared to work with all of the student groups, but considered them the least prepared to work with students with disabilities (54% agreed or strongly agreed) and to deal with disruptive students (58% agreed or strongly agreed).

Overall, slightly more than half of the Fellows (58%) agreed or strongly agreed that they learned how to teach math to all types of learners[8] and just over half (58%) of Fellows agreed or strongly agreed that they were prepared to work with racial/ethnic minorities and English language learners. Fellows reported that they were least prepared to work with refugee students and students with disabilities (29% agreed or strongly agreed). These findings can also be contrasted with those in Figure 18, in which Fellows indicated a lack of preparedness to understand students with disabilities and to teach English language learners.

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[8] Only Fellow responses are shown because this item was not included on the Mentor Survey.

Figure 20. Percent of Fellows and Mentors who Agreed and Strongly Agreed to Statements About Fellows' Preparedness to Work with Student Groups
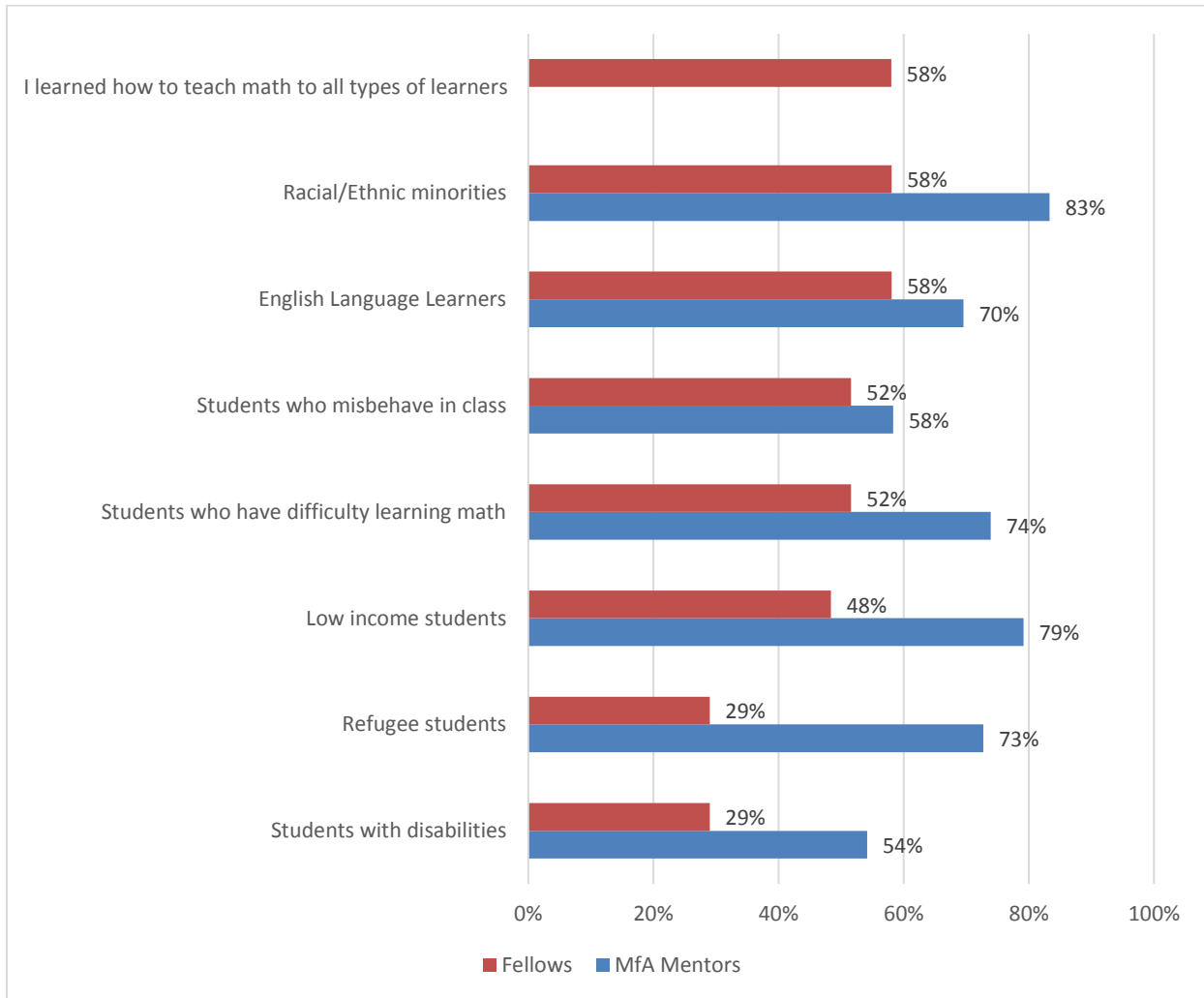
*Mentors' I don't know responses were excluded from the calculations of percentages
Source: Mentor Survey; Fellow Survey

There was an overall theme within the findings that Fellows could have been better prepared to work with diverse students. For example, once they started teaching in their own classrooms they found themselves underprepared to serve English language learners. They explained that there was a lack of access to classes that taught them how to work with diverse learners and that learning to work with diverse students was not emphasized in the MfA program. This may have impacted the Fellows not only in their ability to work with one student group or another, but also in their ability to differentiate instruction within classrooms that included a range of learners.

> *I did not feel prepared to teach ELLs [English Language Learners] at all my first year. I was lucky because I didn't have any my first year. This year I have quite a few, and it's been a struggle for sure. So I think that the courses are definitely available but I was not pushed to take a SIOP [(a particular teaching model)] class, I don't think even [one] was*

offered . . . in my cohort year, so I felt a little bit weaker on teaching ELLs. (Fellow Focus Group)

So for example, I took the ESL . . . the courses are abysmal. I took some – I took half of it at the U before I graduated . . . none of them were particularly effective, they're way too general and not specific enough for me. (Fellow Focus Group)

I struggle with challenging all my students. I'd like to get better at differentiating tasks and implementing group work -- choosing the groups, choosing the tasks, choosing the end product -- so that everyone learns and everyone is challenged at their level. (Fellow Survey)

Fellows made clear that they would have welcomed an increased focus on learning how to work with particular student groups of diverse students. The evidence in these findings suggests that most Fellows did not feel confident adapting their teaching skills as student needs changed or as they encountered groups of students with whom they had little familiarity.

Perceptions of Preparedness

This section focuses on Fellows' perceptions of their preparedness to be effective in specific classroom practices and the importance of the student teaching experience in preparing them to be effective math teachers. To begin, Figure 21 shows Fellows' reports of the extent to which the MfA program prepared them to be effective in 12 classroom practices. Almost all Fellows (94%) agreed or strongly agreed that the MfA program prepared them to deliver effective math lessons. Fellows were least confident regarding their preparation to effectively interpret textbook explanations for students (65% agreed or strongly agreed) and handle a range of classroom management situations (64% agreed or strongly agreed). Overall, however, Fellows felt that the MfA program prepared them to be effective teachers in the classroom practices.

Figure 21. Percent Fellows who Agreed or Strongly Agreed that the MfA program prepared them to be Effective in Classroom Practices
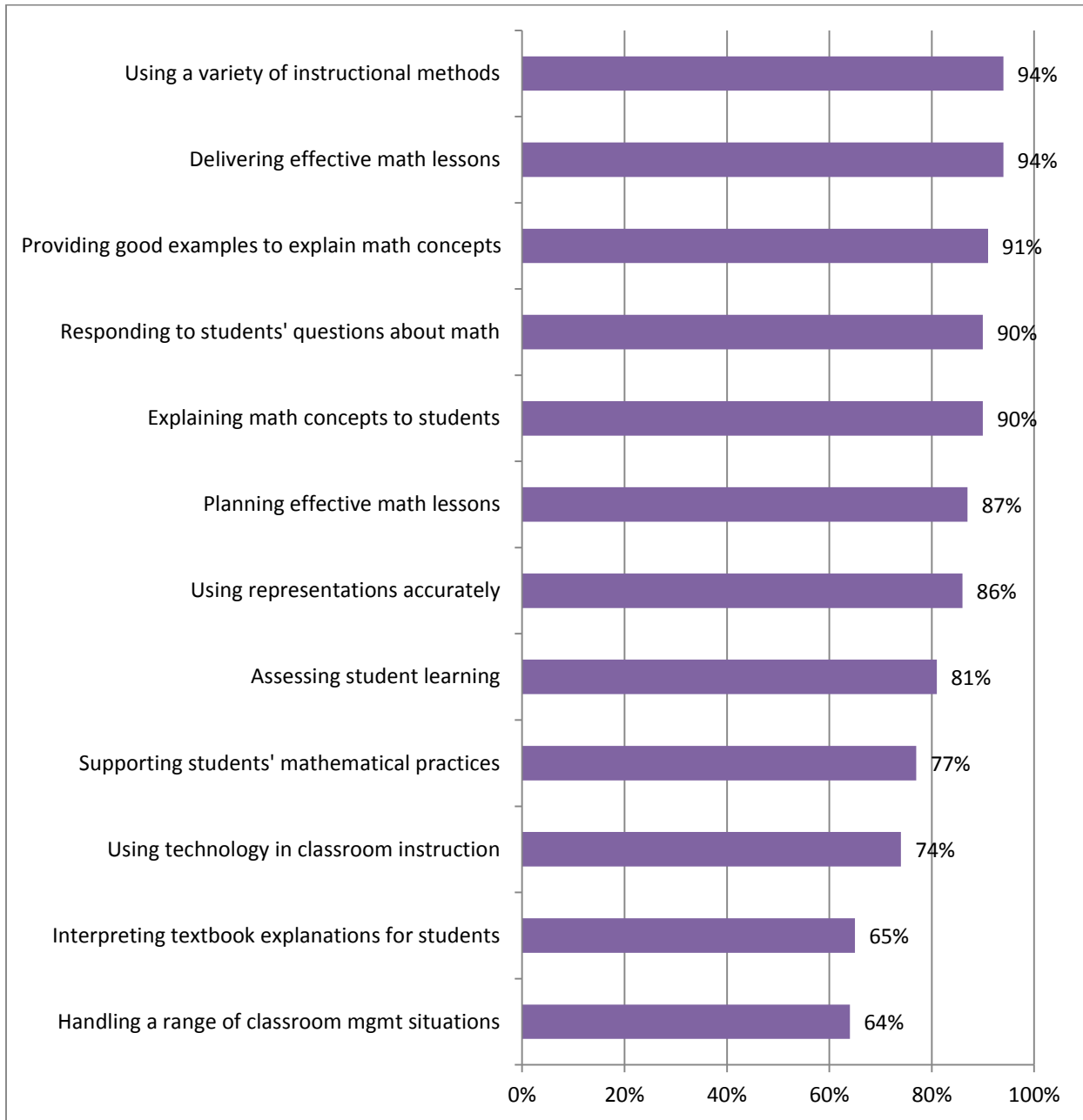
Source: Fellow Survey

In addition to the positive reports of Fellows' preparedness to be effective in specific classroom practices, there were also reports of that Fellows were prepared in other ways. Examples included having access to multiple teaching strategies, advanced content knowledge, and familiarity with the Utah Core Standards. However, the Fellows' student teaching experience was reportedly central to their preparation.

Mentors and Fellows reported that the preservice student teaching experience improved the Fellows' preparedness to teach. Mentors contrasted the Fellows' student teaching experiences with those of student teachers from outside of the MfA program by emphasizing the value and importance of being in the classroom for a full year as opposed to only for a short period of time. Experiencing the continuity of spending a full year in a classroom with an experienced teacher and learning firsthand what it takes to be prepared for each class, day after day, was also valued by Fellows. Fellows reported that spending a full year working their Mentors gave them a chance to refine their early-career teaching practices through student teaching under the guidance of their Mentors. That experience made it easier for them to make the transition into inservice teaching because they knew what to expect and they had learned about their own potential strengths and weaknesses as math teachers. It also allowed them to begin their first year teaching with enough experience to feel comfortable relating to their new colleagues at their new schools. Mentors and Fellows were in agreement that Fellows benefited from experiencing the highs and lows and the rhythm of a full teaching year.

> *I felt like my Fellow was more prepared for the first year experience than any of my student teachers in the past. I felt this way because my Fellow started the school year with me, went through the entire year, the ups and downs, all the adjustments, and then finally ended the year with me.* (Mentor Survey)

> *They have seen a struggle for a year to come up with material and they realize – and they see what that looks like, so when they do it next year, they don't think – they don't get down on themselves their because man, this is so difficult. Well, they saw us go through the exact same thing all year last year and a normal student teacher may not see that.* (Mentor Focus Group)

> *They see big pictures in the scope of the whole year, we are laying out this big idea, this big idea instead of a normal student teaching experience which is I think I might get through a chapter and a half and then I am out of here.* (Mentor Focus Group)

> *You see this cycle, you see how it all works, you see the end of the tunnel, you see the whole thing, and I think that helped give us more confidence and everything that and it also gives the opportunity to have a little bit more confidence when we talk with other teachers.* (Fellow Focus Group)

> *But I had a whole year more . . . as a student whereas I think in this program, at least, my Mentor, we co-taught, so we were actually both in the room the whole time, so I got to observe them teaching a lot and they got to observe me teaching a lot and then we talked about our experiences a lot, so it's completely different than it would've been somewhere else*. (Fellow Focus Group)

The quotes above illustrate the profound contribution that the full year of student teaching was to the Fellows' preparedness. Having taught classes alongside of their Mentors raised the Fellows'

awareness of what to expect once they started teaching, bolstered their confidence, and made them more informed teachers once they started teaching in their own classrooms.

The survey results presented in Figure 22 are well-aligned with comments regarding the importance and value of the Fellows preservice student teaching experience. Most of the Fellows (74%) and Mentors (84%) agreed or strongly agreed that the Fellows' student teaching experience were sufficient to prepare them for inservice teaching. Fellows reported that they learned how to teach math to secondary students (91% agreed or strongly agreed), but the Mentors responded with less confidence (55% agreed or strongly agreed) by indicating that only about half of the Fellows were more prepared to teach than most first-year teachers with whom they had previously worked.

Figure 22. Percent of Fellows and Mentors who Agreed and Strongly Agreed to Statements About Student Teaching Experience and Preparation to Teach
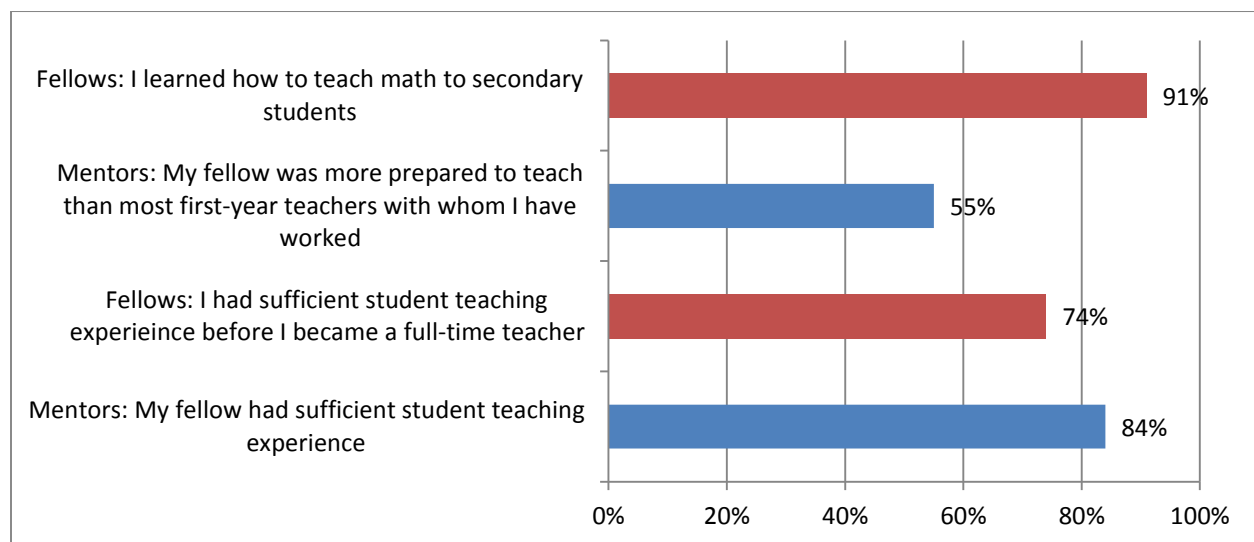
Source: Mentor Survey; Fellow Survey

Overall, Fellow and Mentor reports of the Fellows' preparedness to teach were positive. After having completed at least one or more years as inservice teachers, Fellows largely agreed that their participation in the MfA program contributed to their effectiveness in many classroom practices. Fellows gave a great deal of credit to their student teaching experiences and having worked closely with their Mentors for a full year before they took responsibility for their own classrooms.

Teaching Effectiveness

This section begins with Mentors' reports of the Fellows' effectiveness in the same 12 classroom practices presented in Figure 21 above. Following that we briefly revisit the challenges associated with reaching definitive conclusions about the Fellows' teaching effectiveness, which includes findings related to the Fellow's conceptions of teaching effectiveness.

Figure 23 shows MfA Mentor ratings of the Fellows' effectiveness in 12 classroom practices. Where we asked the Fellows about the extent to which the MfA program contributed to their effectiveness in these same 12 practices (see Figure 21), we asked the Mentors to indicate how effective the Fellows' actually were in these practices. Their responses were similar, which suggests a good alignment between the Fellows' perceptions of their preparedness and the Mentors' reports of how effective they actually were in their classrooms.

Mentors indicated that Fellows were most effective in using representations accurately (92% agreed or strongly agreed), using technology in classroom instruction (91% agreed or strongly agreed), and explaining math concepts to students (91% agreed or strongly agreed). Mentors rated Fellows least effective in handling a range of classroom management situations 58% agreed or strongly agreed). Overall, Mentors' ratings of Fellow effectiveness were positive and 78% of the mentors agreed or strongly agreed that their Fellows effectively delivered math lessons.

Figure 23. Mentor Ratings of Fellows' Effectiveness in Classroom Practices

Practice	Percentage
Using representations accurately	92%
Using technology in classroom instruction	91%
Explaining math concepts to students	91%
Using a variety of instructional methods	88%
Responding to students' questions about math	87%
Providing good examples to explain math concepts	87%
Interpreting textbook explanations for students	84%
Assessing student learning	79%
Delivering effective math lessons	78%
Supporting students' mathematical practices	78%
Planning effective math lessons	74%
Handling a range of classroom mgmt situations	58%

*I don't know responses were excluded from the calculations of the Mentors' percentages
Source: Mentor Survey

The positive findings presented in Figure 23 provide encouraging reports of the Fellow's teaching effectiveness. However, there were a number of challenges to reaching definitive conclusions about the Fellows' overall teaching effectiveness. The design of this evaluation study called for the use of student achievement data and multiple perspectives from Fellows, MfA Mentors, and school principals to reach conclusions about the Fellows' teaching effectiveness. However, as noted in the methods sections, the student achievement data were incomplete and too few principals were willing to participate in the study.

An additional challenge to reaching conclusions about the effectiveness of the Fellows was that few Fellows discussed direct measures of their effectiveness and there appeared to be no clear agreement regarding what constituted an effective teacher. Fellows expressed a range of perspectives regarding their effectiveness in terms of student outcomes. Among Fellows who discussed yearly standardized tests as measures of effectiveness, one explained that standardized test scores were not an accurate measure of student success for her students and another indicated that she/he used the test results as a way to gauge her/his teaching performance against those of her/his colleagues. Some Fellows chose rather than to focus on standardized test scores to focus on more immediate student outcomes such as being present, being invested in learning, and overcoming daily challenges that emerged through the natural process of learning, as ways to determine their effectiveness as teachers.

> *I have attendance issues, so I have had to find SAGE testing [a state mandated test] is not going to be the way to gauge student success. It's more their ability to show up, engage with the problem, try some things, embrace failure a couple of times, embrace getting it wrong, that's how I gauge my success. . . . I can't do it by SAGE. I'm going to have 100 percent fail rate.* (Fellow Focus Group)

> *The testing results I'm always coming in like right in the middle, but I feel okay about that because there're teachers that have been teaching 20 years and my classes are outperforming theirs, but I mean, right in the middle at the same time isn't something to like go home and feel all good about yourself.* (Fellow Focus Group)

> *I think my students do awesome, you [know] it's like teaching them to care about school more than learn math and some of them, they don't care, they are not going to do their homework, but overall I think that my students are doing well.* (Fellow Focus Group)

There appeared to be no agreed upon definition among the Fellows of how their effectiveness should be measured. In the focus groups, when Fellows were asked specifically about their effectiveness as teachers, two Fellows specifically referenced student test scores.

While we have limited evidence from which to reach specific conclusions regarding the Fellows' concepts of teaching effectiveness, the few and varied responses (even when prompted by interviewers) in focus group discussions suggest that Fellows may not have a clear understanding of what it means to be an effective teacher. The lack of a clear, agreed upon understanding of teacher effectiveness creates a situation in which Fellows, Mentors, and program faculty may hold different perspective regarding teacher effectiveness.

### MfA Program Effectiveness
Finally, as a gauge of MfA program effectiveness, we asked Fellows to indicate the likelihood that they would remain in the teaching profession after their fifth year. This is an important consideration given the goal of increasing the number of secondary mathematics teachers in Utah. Fellows indicated the likelihood that they would remain in the teaching profession after

their fifth year. Figure 24 shows that most of the Fellows (80% definitely or probably will remain) intended to remain in the teaching profession.

Figure 24. Likelihood to Remain in the Teaching Profession after a Fifth Year
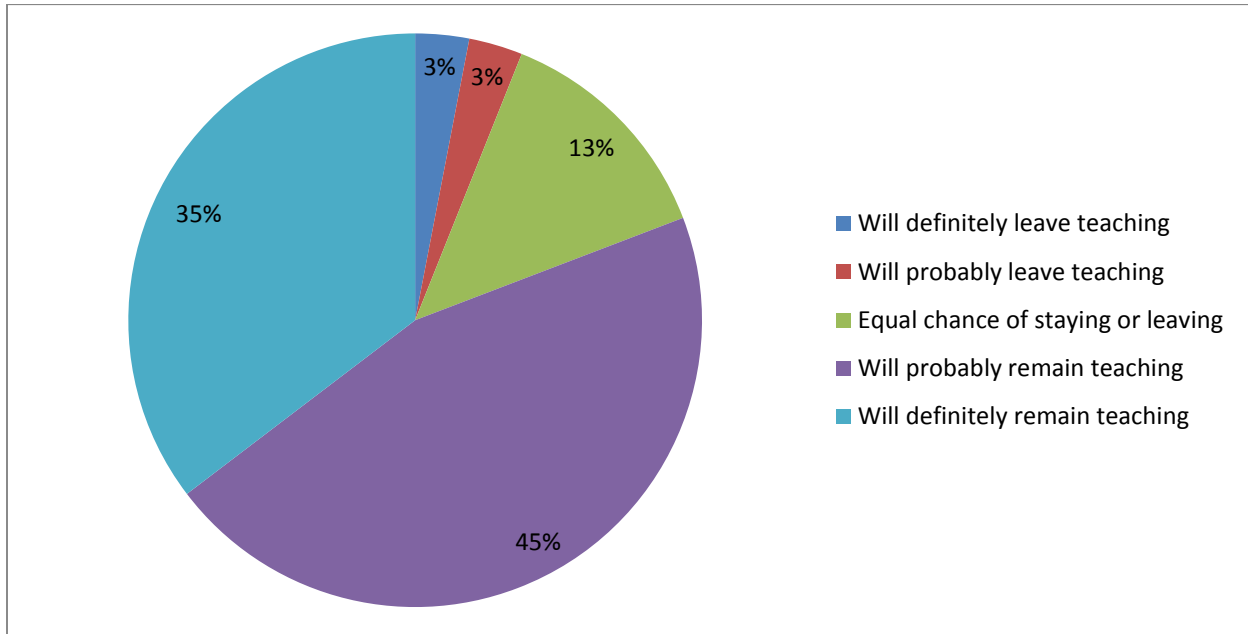
Source: Fellow Survey

With less than 5% (1 of 31 respondents) of Fellows expressing that they would definitively leave teaching, the results presented in Figure 24 are far better than reported retention rates for new teachers. Authors have reported that between 40% and 50% of new teachers leave the field within the first five years (Corbell, Booth, & Reiman, 2010; Ingersoll, & Strong, 2011; Fisher, 2011).

In addition to Figure 24, this section included many findings from with to reach conclusions about the overall effectiveness of the MfA program. The positive responses regarding Fellows' math content knowledge, the reports of their preparedness to be effective in many in classroom practices, and the contributions of the preservice student teaching suggested that the MfA program was effective in many areas.

Conclusion

Taken together, the evidence presented in this evaluation report suggests a promising model of secondary mathematics teacher preparation. The MfA program activities and support were viewed positively and the Fellows were generally perceived as well-prepared to be effective math teachers. The report also pointed out areas in which the MfA program might benefit from continued growth and improvement, including efforts to more intentionally develop the

mentoring component to align with Fellows' first-year teaching needs. A summary of findings and considerations are provided in Table 6.

Table 6. Summary of Findings and Considerations for Program Improvement

Evaluation Questions	Findings	Program Considerations
In what ways has the ongoing engagement with the MfA program supported MfA Fellows in their first years of teaching?	• Most Fellows indicated that the MfA program activities supported their instructional practices. • A benefit of participating in the MfA program activities was the sense of community and support that developed through ongoing, supportive relationships with MfA peers, MfA faculty, and MfA Mentors. • The frequency of mentoring interactions among inservice teaching Fellows and their MfA Mentors were relatively low, but the interactions that occurred were valued by Fellows and Mentors. • MfA Mentors faced challenges to providing support that stemmed from working at different schools than their Fellows. Those challenges included geographic distance, a lack of familiarity with their Fellows' school contexts, misalignments between MfA Mentors and on-site school supports, and misalignments in school philosophies and teaching practices between the Fellows' preservice and inservice teaching experiences. • An additional challenge for some Mentors was a lack of preparation to provide support, particularly in the areas of conducting classroom observations and providing feedback.	• Continue to refine and adjust MfA program activities to build community and supportive relationships. • Ensure that Mentors fulfill their commitments to the MfA program by completing the minimum of two observations per year, meeting regularly, and providing adequate support for Fellows. Provide additional resources for Mentors that will help them structure meetings and conduct observations. • Establish clear expectations regarding how the Mentors can best support the Fellows during the Fellows' first inservice teaching year. • Coordinate alignments between Mentors and Fellows to account for content, expertise, Fellows' needs, and geographic proximity to one another. • Coordinate the efforts of MfA Mentors and the support provided within the Follows' schools to ensure aligned and effective mentoring experiences for Fellows. • Ensure that all MfA Mentors are well trained to conduct structured classroom observations, and to provide objective feedback.

What school conditions contributed to or hindered MfA fellows' effectiveness in their first years of teaching?	• The student demographic profiles were relatively similar at the schools where Fellows completed their student teaching and the schools where they are now working as inservice teachers. • Fellows and MfA Mentors reported differences in school contexts with regard to the professional culture and teaching philosophies between the Fellows' preservice training and the school contexts where they now work as inservice teachers. • As early-career teachers, Fellows indicated that they experienced a continuum of school support, ranging from limited support in some areas, and more robust support in others. • The school-level support that Fellows received, especially from peer teachers, was important and was valued.	• Prepare Fellows for the possibility of encountering inservice school contexts that are different than those of their preservice student teaching experience. • Coordinate with school administrators to establish standards of support for the Fellows.
To what extent are MfA fellows prepared to be effective secondary math teachers?	• Fellows reported feeling prepared to teach secondary math, but Fellows and MfA Mentors gave mixed reports regarding Fellows' teaching preparedness for classroom management and working with diverse groups of students. • Fellows reported that the MfA program prepared them well to be effective teachers, MfA Mentors indicated that Fellows were effective in many classroom practices, and Fellows reportedly had a strong foundation of mathematical content knowledge; however, findings suggested that the Fellows might have benefited from increased clarity of the final project and a greater focus on math pedagogy.	• Consider areas of the coursework in which Fellows may benefit from additional preparation; specifically math pedagogy, working with diverse students, and classroom management. • Continue to refine MfA activities to ensure ample opportunities are provided to Fellows to deepen their math pedagogical knowledge and practice. • Ensure that the MfA Mentors are aware of the Fellows' coursework content and sequencing so that the Mentors can use that information to provide high quality supervised student-teaching experiences for the Fellows.

The MfA program distinguishes itself from other ARL programs in part because it includes strong subject content coverage, a heavy emphasis on student- teaching under supervision of a high-quality mentor, ongoing professional development, the opportunity to earn a master's degree, and support for preservice and inservice teaching Fellows. Similar features of quality teacher preparation programs are well supported in the research literature (e.g., Boyd et al., 2009; Darling-Hammond 2006; Darling-Hammond, 2010; Harris & Sass, 2011). The literatures also suggests that providing student teaching opportunities in the specific context in which pre-service teachers will eventually work, a focus on teaching one's subject that can be applied in context, and a focus on learners (especially diverse learners) are important components of teacher preparation. In this evaluation we found less evidence that these latter program features were as clearly defined or developed in the current MfA program. Updates or refinements in the coursework and adjustments to the MfA Mentor model may strengthen overall program effectiveness.

Quality student teaching experience is an essential component of teacher preparation programs (Coggshall, Bivona, & Reschly, 2012; Darling-Hammond, 2010; Zeichner, 2010) and the MfA model of year-long student-teaching placements with expert teacher mentors provides preservice experiences that are in many ways consistent with the recommendations found in the literature. However, increased training for MfA Mentors, increased coordination with the Mentors concerning the Fellows' needs, an increased focus on the relationship of coursework and clinical experience, and the intentional coordination among MfA Mentors and school mentors may improve the MfA mentoring model, which is already a central feature and strength of the MfA program.

Finally, we conclude with several caveats about the current evaluation study. This study provides extensive information about the ways in which the MfA program has been implemented to prepare secondary mathematics teachers. However, there are additional aspects of the program's effectiveness that were not addressed or considered in this study.

First, we did not have adequate data to explore the influence of MfA Fellows on student achievement levels. The degree to which the MfA Fellows are successful in supporting high levels of student achievement is a critical question to answer for determining the viability of this program.

Second, we did not examine the costs associated with this program, such as tuition or the stipends provided to Fellows and Mentors. A cost benefit analysis would provide additional critical information about the viability of this program and could be used to build on the robust information about program implementation presented in this report.

The UEPC looks forward to continuing our partnership with the MfA leadership team to support the interpretation and use of the findings presented here, as well as to continue to explore strategies for tracking the impact of this program on student achievement in the future.

References

The following list of references is inclusive of all of the literature reviewed by the UEPC evaluation team to inform this evaluation study.

Ball, D. L., & Forzani, M. (2010). What does it take to make a teacher? *Teacher Education, 92*(2), 8-12.

Ball, D. L. (1990). The mathematical understanding that prospective teachers bring to teacher education. The Elementary School Journal, 90(4), 449-466.

Ball, D. L., Hill, H. C., & Bass, H. (2005). Knowing Mathematics for teaching: Who knows mathematics well enough to teach third grade and how can we decide? *American Educator, 29*(1), 14-17, 20-22, 43-46.

Baker, E. L., Barton, P. E., Darling-Hammond, L., Haertel, E., Ladd, H. F., Linn, R. L, Ravitch, D., Rothstein, R., Shavelson, R.J., & Shepard, L. A. (2010). Problems with the Use of Student Test Scores to Evaluate Teachers. EPI Briefing Paper# 278. *Economic Policy Institute*.

Beare, P., Marshall, J., Torgerson, C., Tracz, S., & Chiero, R. (2012). Toward a culture of evidence: Factors affecting survey assessment of teacher preparation. *Teacher Education Quarterly, winter,* 159-173.

Boyd, D. J., Grossman, P. L., Lankford, H., Loeb, S., & Wyckoff, J. (2009). Teacher preparation and student achievement. *Education Evaluation and Policy Analysis, 31*(4), 416- 440. DOI: 10.3102/0162373709353129.

Caperton, G., Moir, E., Bushaw, W. J. (2010). Teachers are the center of education: Mentoring, teaching and improving student learning. The College Board.

Casey, C., & Childs, R. (2011). Teacher education admission criteria as a measure of preparedness for teaching. *Canadian Journal of Education, 34*, 2, 3-20.

Clotfelter, C. T., Ladd, H. F., & Vigdor, J. L. (2010). Teacher credentials and student achievement in high school a cross-subject analysis with student fixed effects. *Journal of Human Resources, 45*(3), 655-681.

Cochran-Smith, M. (2005). The new teacher education: For better or for worse? *Educational Researcher, 34(*7), 3-17.

Curran, B., & Goldrick, L. (2002). Mentoring and supporting new teachers. Issue Brief. National Governors' Association, Washington, DC. Center for Brest Practices.

Darling-Hammond, L. (1992). Teaching and knowledge: Policy issues posed alternative certification for teachers. Peabody Journal of Education, 67 (3), 123-154.

Darling-Hammond, L., Amrein-Beardsley, A., Haertel, E., & Rothstein, J. (2012). Evaluating teacher evaluation. *Phi Delta Kappan*, 8-15.

Darling-Hammond, L., Chung, R, & Frelow, F. (2002). Variation in teacher Preparation: How Well Do Different Pathways Prepare Teachers to Teach? Journal of Teacher Education, 53(4), 286-302. DOI: 10.1177/0022487102053004002.

Darling-Hammond, L. (2010). Teacher education and the American future. *Journal of Teacher Education, 61*(1-2), 35-47.

Darling-Hammond, L., & Sykes, G. (2003). Wanted, A national teacher supply policy for education: The right way to meet the" highly qualified teacher" challenge. *Education Policy Analysis Archives*, *11*(33), 1-55.

Darling-Hammond, L. (2006). Constructing 21st-century teacher education. Journal of Teacher Education, 57(3), 300-314. DOI: 10.1177/0022487105285962.

Floden, R., & Meniketti, M. (2005). Research on the effects of coursework in the arts and sciences and in the foundations of education. In Cochran-Smith, M., & Zeichner, K. M. (Eds.) *Studying Teacher Education: The report of the AERA panel on research and teacher education* (pp. 261-308). Mahweh, NJ: Routledge.

Goldhaber, D. D., & Brewer, D. J. (1999). Teacher licensing and student achievement. In Better Teacher, Better Schools, edited by M. Kanstoroom & C. E. Finn, Jr. Washington, DC: The Thomas B. Fordham foundation, 83-102.

Goldhaber, D., Liddle, S., & Theobald, R. (2013). The gateway to the profession: Assessing teacher preparation programs based on student achievement. *Economics of Education Review, 34*, 29-44.

Goldrick, L., Osta, D., Barlin, D., & Burn, J. (2012). Policy paper: Review of state policies on teacher induction. New Teacher Center. Santa Cruz, CA.

Grossman, P., & McDonald, M. (2008). Back to the future: Directions for research in teaching and teacher education. *American Educational Research Journal, 45*(1), 184-205. DOI: 10.3102/0002831207312906.

Groth, C., Shooter, W., & Raphael, R. (2011). *Support and Mentoring in an Alternate Route to Teaching (SMART) Annual Evaluation Report 2010-2011*. Utah Education Policy Center: Salt Lake City, UT.

Hanushek, E. A., & Rivkin, S. G. (2010). The quality and distribution of teachers under the no child left behind act. *Journal of Economic Perspectives, 24*(3), 133-150.

Harris, D. N., & Sass, T. R. (2011). Teacher training, teacher quality and student achievement. *Journal of Public Economics, 95*, 798-812.

Henry, G. T., Purtell, K. M., Bastian, K. C., Fortner, C. K., Thompson, C. L., Campbell, S. L., & Patterson, K. M. (2013). The effects of teacher entry portals on student achievement. *Journal of Teacher Education, 65*. DOI: 10.1177/0022487113503871.

Hightower, A. M., Delgado, R. C., Llyod, S. C., Wittenstein, R., Sellers, K., & Swanson, C. B. (2011). *Improving student learning by supporting quality teaching: Key issues, effective strategies.* Bethesda, MD: Editorial Projects in Education.

Hill, H. C., Rowan, B., Ball, D. L. (2005). Effects of teachers' mathematical knowledge for teaching on student achievement. *American Educational Research Journal, 42*(2), 371-406, DOI: 10.3102/00028312042002371.

Hobson, A. J., Ashby, P., Malderez, A., & Tomlinson, P. D. (2009). Mentoring beginning teachers: What we know and what we don't. *Teaching and Teacher Education, 25*, 207-16.

Ingersoll, R. & Strong, M. (2011). The impact of induction and mentoring programs for beginning teachers: A critical review of the research. *Review of Education Research, 81*(2), 201-233.

Kee, A. N. (2012). Feelings of preparedness among alternatively certified teachers: what is the role of program features? *Journal of Teacher Education, 63*(1), 23-38. DOI: 10.1177/0022487111421933.

Mewborn, D. (2001). Teachers content knowledge, teacher education, and their effects on the preparation of elementary teachers in the United States. *Mathematics Teacher Education and Development, 3*, 28-36.

Qu, Y., & Becker, B. J. (presented 2003, April). *Does traditional teacher certification imply quality? A meta-analysis*. Paper presented at Annual Meeting, American Educational Research Association, Chicago, IL. (National)

Rice, J. K. (2003). *Teacher quality: Understanding the effectiveness of teacher attributes.* Economic Policy Institute. Washington, DC.

Sayeski, K. L., & Paulsen, K. J. (2012). Student teacher evaluations of cooperative teachers as indices of effective mentoring. *Teacher Education Quarterly, 39*(2), 117-130.

Scherer, M. (2012). The challenge of supporting new teachers. Educational Leadership. Retrieved from www.ascd.org.

Shober, A. F. (2012). From teacher education to student progress: Teacher quality since NCLB. American Enterprise Institute, Special Report 1.

Shooter, W., & Groth, C. (2012). *Support and mentoring in an alternate route to teaching (SMART) annual evaluation report 2011-12*. Salt Lake City, UT: Utah Education Policy Center.

Shulman, L. (1987). Knowledge and teaching: Foundations of the new reform. Harvard *Educational Review, 57*(1), 1–22.

Silvernail, D.L. (1998). *Findings from an initial analysis of the New York City Teacher Survey*. New York: New Visions for Public Schools

Strauss, A. & Corbin, J. (1990). *The basics of qualitative research*. Thousand Oakes, CA: Sage.

Tatto, M. T., Schwille, J., Senk, S., Ingvarson, L., Peck, R., & Rowley, G. (2008). Teacher Education and Development Study in Mathematics (TEDS-M): Policy, practice, and readiness to teach primary and secondary mathematics. Conceptual framework. East Lansing, MI: Teacher Education and Development International Study Center, College of Education, Michigan State University.

The Alliance. (2004). Tapping the potential: Retaining and developing high-quality new teachers. Alliance for excellent education.

Utah State Office of Education (2013). Entry years enhancements: Utah's support and enhancement program for Level 1 educators. Retrieved from www.schools.utah.gov/cert.

Wang, J., Odell, S. J., & Schwille, S. A. (2008). Effects of teacher induction on beginning teachers' teaching: A critical review of the literature. *Journal of Teacher Education, 59*(2), 132- 152. DOI: 10.1177/0022487107314002.

Wayman, J. C., Foster, A. M., Mantle-Bromley, C., & Wilson, C. A. (2003). A comparison of the professional concerns of traditionally prepared and alternatively licensed new teachers. *The High School Journal 3*(86), 35-40.

Wenglinsky, H. (2001). Teacher classroom practices and student performance: How schools can make a difference. Research Report. Educational Testing Services, Princeton, NJ.

Winters, M. (2011). Measuring teacher effectiveness: Credentials unrelated to student achievement. Issue Brief by the Manhattan Institute for Policy Research.

Zeichner, K. (2010). Rethinking the connections between campus courses and field experiences in college-and university-based teacher education. *Journal of teacher education, 61*(1-2), 89-99.

Appendix A. Coursework

The following Table 7 and Table 8 offer a comparison of the MfA math coursework and licensure coursework compared to the same for a Bachelor's degree.

Table 7 Mathematics Requirements Comparisons

MfA Prerequisites	Math Teaching Bachelor's Required courses (UofU):	Math Teaching Bachelor's Required courses (USU):
2210 Multivariate Calculus	Math 1210, 1220, 2210-Calculus I, II, III	MATH 1210; MATH 1220; MATH 2210 - Calculus Series
	Math 2200- Discrete Mathematics	MATH 3310 - Discrete Mathematics
2270 Linear Algebra	Math 2270- Linear Algebra	MATH 2250 - Linear Algebra and Differential Equations OR MATH 2270 - Linear Algebra and MATH 2280 - Ordinary Differential Equations
2280 Differential Equations	Math 2280-Differential Equations	
	Math 3010-History of Mathematics	MATH 4400 - History of Mathematics and Number Theory
3070 Applied Statistics I	Math 3070-Applied Statistics I	STAT 2000 - Statistical Methods or STAT 3000 - Statistics for Scientists
3210 Foundations of Analysis	Math 3210-Foundations of Analysis I	MATH 4200 - Foundations of Analysis
3100 Foundations of Geometry	Math 3100- Foundations of Geometry	MATH 3110 - Modern Geometry
4030 Foundations of Algebra	Math 4030- Foundations of Algebra	MATH 4310 - Introduction to Algebraic Structures
4090 Methods of Teaching Secondary Mathematics	Math 4090- Teaching Secondary School Math	MATH 4500 - Methods of Secondary School Mathematics Teaching

	Math 4095- Practicum for Secondary Math Teachers	MATH 4300 - School Laboratory for Mathematics Teachers Level II
	Math 5700- Capstone Course in Mathematics	MATH 5010 - Capstone Mathematics, Statistics, and Technology for Teachers
One of the following: Math 3010 History of Mathematics, Math 4400 Number Theory, Math 5700 Capstone Course	One of the following: Math 3220 Foundations of Analysis II, Math 4400 Intro to Number Theory, Physics 2210, Physics 3210	MATH 5710 - Introduction to Probability
		MATH 5020 - Mathematical Cognition and Assessment of Mathematical Achievement

Master's Coursework MfA (UofU)[9]		
Math 6080 Contemporary Math		
Math 6090 Advanced Topics in the History of Mathematics		
Math 5150 and 5160- Mathematics Curriculum and Instruction I&II.		
Math 5155 and 5165- Curriculum and Instruction Practicum I&II.		
Electives approved by the supervisory committee, 9-12 credits		

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[9] At USU specific courses are not required. Instead students must take a minimum of 21 credits of mathematics courses at the 5000 level or higher. Coursework requires department approval. Students are required to complete 15 more credits in the College of Education. These credits are more than enough cover the classes required for licensure listed in Table 7.

Math 6960 (Master's project)- Credit towards working on master's project		

Table 8 Licensure Coursework Comparison Utah State University

MfA Teacher Licensure Courses (USU)	Math Teaching Bachelor's Licensure Coursework (USU)
TEAL 6100 Motivation and Management in Inclusive Settings	SCED 3100 - Motivation and Classroom Management
TEAL 6710 Diversity in Education	SCED 3210 - Educational and Multicultural Foundations
MATH 6300 Practicum Associated with Math 6500	SCED 3300 - Clinical Experience I
SPED 4000 Education of Exceptional Individuals	SPED 4000 - Education of Exceptional Individuals
TEAL 6310 Reading and Writing in the Content Areas OR TEAL 6340 Adolescent Literacy Development	SCED 4200 - Language, Literacy and Learning in the Content Areas
MATH 5020 Mathematical Cognition and Assessment of Mathematical Achievement	SCED 4210 - Assessment and Curriculum Design 3
SCED 5500 Student Teaching Seminar	SCED 5500 - Student Teaching Seminar
TEAL 6210 Student Teaching (full-year, half-day)	SCED 5630 - Student Teaching in Secondary Schools
MATH 5010 Math, Stat, and Technology for Teachers	ITLS 4015 - Technology Tools and Integration for Teachers
TEAL 6770 ESOL Instructional Strategies in the Content Areas	

Appendix B. Focus Group Protocols

MfA Teaching Fellows Focus Group

Introduction and Purpose
Thank you for taking the time to talk with me about your experiences with the MfA Program. My name is _____ I am a research associate with the Utah Education Policy Center. I'm glad to have this opportunity to talk with you about your experiences in the MfA program. Everyone should have signed the roll. We realize you are busy and we value your time so we will be conscientious to finish on time.

Goal of the Focus Group:
We have asked you to participate in this focus group to learn more about your experiences in the program to see how your experience in the program has influenced your teaching. Specifically, we hope to learn about the support that you have received, as well as your perspectives on how the MfA program has prepared you to be an effective math teacher.

Procedures and Confidentiality:
We welcome your honesty and openness. We hope to have an open discussion now about your experiences in the MfA program and your experiences as an early career math teacher. I encourage you to speak up and be as candid as possible. Ideally we will hear from each of you, so please share your experiences freely and let's create a space for others to do the same.

I will be audio recording our discussion as a way to capture everyone's ideas, but please be assured that only the UEPC will have access to the recordings and written transcripts. None of you will be identified individually.

Use of the Information You Provide:
We will use the content of our discussion in a final summary report, but will not identify individual interviewees. Where quotes or specific schools are described, schools will be referred to anonymously.

MfA Fellow Focus Group Protocol

Context

To start, please share your name and your current teaching position.

MfA Program Activities

In what ways has your ongoing engagement with the MfA program supported you and your teaching effectiveness during your first years of teaching?

- The support provided by the MfA program activities (e.g., new teacher advisor meetings, cohort meetings, workshops, seminars, and Park City Math Institute)
- The support provided by MfA peers, mentors, faculty members, and others

Support and Mentoring

What about the support you have received from your school? In what ways has support provided in your school contributed to your teaching effectiveness?
- Was the school support structured through the Entry Years Enhancement program or through another specific induction program at your school?
- Probe for: Collaborative and supportive peer community, supportive school administration, quality of engagement with content or grade level teams or PLCs, and other school structures or programs?

Please tell me about your experiences with your mentor(s)? Did you have an MfA mentor and a mentor assigned to your from the school? (probe to explore overlap)
- What role has your mentor(s) played in supporting you during your first years of teaching?
- Probe for: teaching observations, structured feedback, lesson planning, using assessment data, teaching practices, integrating into the school community, etc

Who or what has had the greatest influence on your teaching effectiveness since you started teaching?

Preparedness and Effectiveness

To what extent did the MfA program prepare you to be an effective math teacher? How prepared were you for your first years teaching? Ask specifically about the following:
- Classroom management
- Lesson Planning
- Working with Diverse Populations
- Use of data to inform classroom instruction
- Instructional practice

How has your instructional practice changed since you started teaching?

Do you have anything else to add about the ways in which the MfA program did or did not prepare you to be an effective math teacher?

MfA Mentor Focus Group

Goal of the Focus Group:
We have asked you to participate in this focus group in order to learn more about your experiences as mentors of teaching fellows in the MfA program. We hope to learn about the support and mentoring that you provided to your fellow, as well as your perspectives of your fellow's preparedness and effectiveness in the classroom.

Procedures and Confidentiality:
We welcome your honesty and openness. I hope that we can have an open discussion about your experiences in the MfA program and your experiences as mentors of early career math teachers. I encourage you to speak up and be as candid as possible. I hope to hear from all of you, so please share your experiences and let's create a space for others to do the same.

I will be audio recording our discussion as a way to capture everyone's ideas. Please be assured that only the UEPC will have access to the recordings and written transcriptions. None of you will be identified individually.

Use of the Information You Provide:
We will use the content of our discussion in a final summary report, but will not identify individual interviewees. Where quotes or specific schools are described, schools will be referred to anonymously.

Focus Group Agenda
- Mentoring and Support
- Preparedness and Effectiveness
- Suggestions for Improvement

Mentor Focus Group Protocol

Introduction

To start with, please share your name and a brief history of your involvement as a mentor in the MfA program, including how you were selected to be a mentor, how you were matched with the MfA fellow(s), and briefly introduce us to your fellow.

Mentoring and Support

What type of training did you receive as a mentor of MfA teaching fellows?
- Was the training sufficient?
- What are the expectations for your role and have those been made clear to you?

Please explain the types of support that you have provided to your fellow.
- Probe for examples of the types of support they provided:
    - classroom observations,
    - structured feedback,

- lesson planning,
- using assessment data,
- Mathematics teaching practices,
- Working with diverse students (e.g., English learners and students with disabilities)
- integrating into the school community, etc

Did you have specific goals and objectives that you worked toward with your fellow? How did you identify those goals and objectives?

How often do you meet with your fellow and what is the structure of the meetings? For example, what do you discuss with your fellow during meetings?

How well can you predict a fellow's effectiveness? How much influence can you have on your fellow?

How have you participated in MfA program activities with your fellow since she/he started teaching? (e.g., cohort meetings, workshops, seminars, and Park City Math Institute).

In what ways have those program activities supported your own teaching effectiveness?

Preparedness and Effectiveness

As we have reviewed the Fellow's preliminary responses to our survey, they have shared different opinions about the degree to which they were prepared to be effective math teachers. Based on your observations, what is your assessment of the fellows' effectiveness at teaching secondary mathematics?

- Probe for specific examples and evidence of classroom practices.

We are trying to document the ways in which the MfA program is successful in preparing math teachers. Given your observations, in what ways was your fellow most prepared to teach?

- To what extent did you see evidence that the fellow's MfA program experience prepared them to be effective math teachers?

What has been the most difficult aspect of teaching for your fellow? In what ways was your fellow least prepared to teach?

What MfA program or school conditions have contributed to your fellow's effectiveness in his or her early years of teaching?

- Probe: support structures, coursework, student teaching, program activities, peer support

For those of you who have mentored other new teachers, do you see differences in the level of preparation between MfA fellows and teachers coming out of other programs?

Suggestions for Improvement

As the MfA program continues to make improvements to their program, they are very interested in your suggestions for improvement. We would greatly appreciate your suggestions about how you think the program could be improved.

Do you have anything else to add about the ways in which the MfA program did or did not prepare your fellow to be an effective math teacher?

Appendix C. Limitations of Student Achievement Data

The UEPC evaluation team accessed teacher data from the USOE Comprehensive Administration of Credentials for Teachers in Utah Schools (CACTUS) and student data from the USOE Student Information System (SIS)[10]. We constructed a dataset from these sources to answer the questions about secondary student achievement, including the differences between MfA Fellows and other secondary math teachers. The goal of compiling these data was to study the SGPs on state assessments between MfA Fellows and the following four comparison groups:

- All non-MfA math teachers
- First and second year math teachers (i.e., similar years of experience), First and second year math teachers who are ARL, but not MfA, and First and second year math teachers who are also from U of U and USU, but not MfA

In order to be included in the SGP analyses, teaching Fellows had to meet the following criteria:

- The Fellow was assigned to teach a math course with a corresponding CRT test
- Students with valid CRT tested math course had valid SGPs

Fellows were *excluded from the analysis* for the following reasons:

- The fellow was not teaching a math course or not teaching a math course with a corresponding CRT (e.g. statistics, calculus, physics)
- The fellow was teaching a math course with a corresponding CRT test, but there were not valid SGP scores associated with the course (e.g. Algebra I).

There were limitations in the dependence on CACTUS and SIS, which prevented matching teachers directly to students. In the CACTUS database, courses are assigned to teachers. In the SIS database, students are assigned to teachers. There were several discrepancies between the CACTUS and SIS data sources. In some cases, courses were assigned to fellows in CACTUS, but no students could be located in SIS. In other cases, fellows were assigned to students in SIS, but the assignment did not appear in CACTUS. In order to properly match teachers and students, course assignments in CACTUS and SIS had to match in order to be used in the analysis and this limited the number of fellows that could be included in the analysis.

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[10] Data are available to the UEPC under a data sharing agreement established between the USOE and the UEPC in February 2010 and according to the partnership agreement of the Utah Data Alliance.