DEVELOPING OUTCOME-DRIVEN, DATA-LITERATE TEACHERS

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DEVELOPING OUTCOME-DRIVEN, DATA-LITERATE TEACHERS

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ABSTRACT

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Kaycee Ann Salmacia

Robert Zemsky

Outcome-driven data literacy is a relatively new discipline in the field of K-12 education. With the exception of a few researchers, a handful of teacher training organizations, and practices observed in some public schools, there is little guidance for how teacher training organizations interested in developing outcome-driven, data-literate teachers should go about this work. In response to this problem, this study investigates how four teacher training organizations already engaged in developing outcome-driven, data-literate teachers are going about teaching these kinds of knowledge, skills, and mindsets.

Using a qualitative case study approach, the study aims to help teacher training organizations identify approaches for teaching data literacy by sharing promising practices and lessons learned from organizations that have pioneered this work over the last several years.
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Preface

It was in the spring of 2004 that my mentor gathered all the new teachers at our middle school to discuss what we had accomplished that year. The last day of school was quickly approaching, and we were eager to wrap up our first year of teaching. We were tired, and were looking forward to summer vacation just as much as our students. We sat in an empty science classroom and listened to all of our end-of-year directives. At the end of the meeting, our mentor concluded with one final request: that at our end-of-year conversations we were to bring student achievement data quantifying how much our students had learned that year.

I sat in a bit of panic. I thought “What an important question!” But how would I ever answer this question now that it was the end of the year? I knew my sixth graders had certainly learned something that year, but exactly what? And how much? Shouldn’t this question have been something I set out to measure at the beginning of the year? And shouldn’t I have been taught how to answer this question? I couldn’t deny that identifying how much my students had learned was an incredibly important question I should be able to answer, but I also couldn’t deny that I had no way to answer it. I didn’t even know where to start. I believed in the need to be outcome-driven, but I didn’t have the data literacy skills to achieve that need. My mind was blank.

In a way, I have been chasing an answer to the question of just how much my students have learned ever since. For the next several years I worked to answer this question for the middle school students I taught. I worked to find effective assessments, diagnosed my students’ learning at the beginning of the year, and learned more about the...
content and standards I was responsible for teaching. Then, as a teacher coach, I worked to help other teachers quantify their own students’ success. I helped teachers set goals for their students’ achievement, track those goals throughout the year, and use data to improve their instruction. Most recently, as a faculty member at Relay Graduate School of Education, I founded a team devoted to the practice of developing outcome-driven, data-literate teachers, creating guidelines and curricula for how new teachers could measure their students’ academic and character growth. We created the curricula that I wished had existed to help me back when I was a middle school teacher.

Though I had several years of experience measuring students’ academic achievement by the time I became a faculty member at Relay GSE, I now faced a challenge similar to the one I faced as a classroom teacher. When we set out to create a curriculum to develop outcome-driven, data-literate teachers, I found I had little idea of how to go about developing this type of teacher outside of drawing upon my own teaching and coaching experience. I wasn’t taught this content in my own Master’s in Teaching program, and at the time, little research and few resources existed regarding how to measure student achievement, let alone how to teach this content. The one text that was popular at the time spoke to how networks of schools could use data to drive instruction, but little existed devoted to how individual teachers could develop these skills. Just as I had felt many years prior, I knew the work was important, but I struggled to figure out how to get it done.

And so my teammate and I sat in front of blank computer screens and met in empty conference rooms and figured it out for ourselves. We created a conceptual
framework for measuring student growth and achievement, a supporting handbook of policies and best practices related to the framework, and two years’ worth of graduate-level curricula on how to measure, track, and respond to student achievement results. All of this work culminated in a master’s defense capstone project in which students quantified and defended their students’ academic and character growth in front of a panel of Relay GSE faculty and, often, their friends, family, and colleagues.

Since that time, many other educators have stared at blank computer screens trying to figure out the best ways to train teachers to be outcome-driven and data-literate. We’ve been innovating, testing, and learning — from our mistakes as well as from our successes. Our literature and research base is growing; we are beginning to figure it out. For this study, I was compelled to get out from behind my own computer screen in order to learn what other pioneering teacher training organizations have been doing over the past several years to develop data-literate teachers. My goal for this study was to go out and explore what other people in my shoes have done, so that I could bring back examples that would help our field better define what it means to be an outcome-driven, data-literate teacher, and to surface examples of how to develop this type of teacher. That is what this study is all about — sharing stories of how several educators have solved the challenge of staring at a blank screen.

As a researcher on the topic of developing outcome-driven, data-literate teachers, it would be impossible for me to divorce from it my own day-to-day experience with this topic. For the past several years, my job has been to figure out how to develop an outcome-driven, data-literate graduate student at Relay GSE. My positionality is
inextricably linked to my own idea of how we have chosen to develop this type of teacher. I would be remiss in not admitting that any information I gathered, coded, and analyzed through this study was filtered through my own experience as a teacher and faculty member. Saldaña states that, “for the individual researcher, assigning symbolic meaning…to data is an act of personal signature. And since we each most likely perceive the social world differently, we will therefore experience it differently, interpret it differently, document it differently, code it differently, analyze it differently, and write about it differently” (2016, p. 41). In this regard, I admit that my fingerprints are all over this study. However, I have attempted to be aware of my “signature” during all aspects of the study, and have strived to use my proximity to the content of this study as an asset to my research, as opposed to allowing it to become a deficit.

This study is about reporting stories, rather than about proving that one approach to developing outcome-driven, data-literate teachers is better than another. Furthermore, this study is not about proving the effectiveness of a particular approach — including our own at Relay GSE. Instead, the study is about sharing examples of what data-literate educators have produced over the past few years, what they have learned along the way, and what their teachers think about their training. I intentionally omitted Relay GSE’s approach to training data-literate teachers from the literature review and case studies so that the study could be as removed from my daily work as possible. In sum, I have attempted to use my positionality to better gather and interpret evidence, rather than to prove my own case. I know there are times when I have succeeded, and times when I have failed to be objective. My hope is that my successes have outweighed my failures.
Today, the question of “How much have your students learned this year?” is one being asked not just by my former mentor, but is a question being asked of more and more teachers across this country. Developing outcome-driven, data-literate teachers isn’t just going to be the charge of a few pioneering institutions that have already taken on this work, but will be the charge of all teacher training organizations moving forward (Mandinach & Jackson 2012, Mandinach & Gummer 2016). When I started teaching middle school over a decade ago, I had been brought up in the belief system that all kids can learn. I always thought this belief system was imperative to being a good teacher, but subsequently learned that it was impossible to actualize without data literacy training. As a teacher trainer, I struggled to figure out how to best teach this content. Today, as a researcher, I believe every child deserves a teacher who is able to use data and measure student learning in ethical and practical ways that not only improve her own practice, but ultimately lead to increased outcomes for all of her students. I also know there are examples out there of people and organizations who have done this work well, and from whom we can learn. It is my hope that this study is one very small step toward ensuring that our nation’s students have a series of empowered teachers who will possess these data literacy skills.
Chapter 1: Introduction

It is the beginning of the school year. A middle school teacher walks into her 6th grade English classroom to meet her new group of students. She’s excited. What will the students be like this year? What are their backgrounds and interests? What types of texts will they enjoy reading? What are their reading levels? What have they learned in their elementary English classes? Will it be a good year?

These are questions many teachers ask themselves at the beginning of each year. However, they aren’t the only important questions for a teacher to ask. In addition to asking questions about her students, a teacher should also ask questions about her own practice. Questions like: what do my students need to know and be able to do by the end of the school year? How will I know if they achieved those skills? It sounds simple, in theory. In practice, however, it turns out that answering these questions requires a sophisticated set of skills. Specifically, it requires possessing both an outcome-driven mindset about the profession of teaching and the knowledge and skill sets of a data-literate educator. To answer these questions, teachers first have to uncover answers to all sorts of others, such as:

- Who are my students, and what are their interests?
- What can I learn about my students’ families and their communities?
- Where are my students starting academically?
- What content do I teach?
- What assessments should I use to measure that content?
- What other sources of data should I collect and evaluate throughout the year?
- How much learning is enough?
- How do I ensure that all of my students learn?
- How do I track those data, and treat them with care?
- How do I use those data to drive instruction throughout the year?
What is an Outcome-Driven, Data-Literate Teacher?

An outcome-driving teacher is someone who encompasses knowledge, skills, and mindsets about the profession of teaching. On the outcome driven-side, she is a teacher who believes learning can be measured, believes she should be held accountable for her students’ learning, and believes all students can learn. An outcome-driven teacher does not limit expectations for — nor excuse away low performance for — any student because of race, socioeconomic status, disability, or gender. An outcomes orientation is not a skill set that a teacher develops; rather, it is a mindset she develops about her role as a teacher. An outcome-driven teacher defines her success not by her ability to teach a set of content; rather, she defines her success by how well all of her students have learned that content (Salmacia, 2016). An example of an outcome-driven teacher is someone who sets a quantitative academic goal for all students at the beginning of the year based on what students should know and be able to do by the end-of-year, and who works to ensure that all of her students meet that goal.

A data-literate teacher is someone who has the knowledge and skills to measure student learning accurately and meaningfully, and uses those data to drive her practice and improve her students’ learning (Salmacia, 2016). Over the past few years, data literacy experts, advocates, and researchers have made headway in advocating a shared definition of data literacy in the field of education. The Data Quality Campaign, a nonprofit organization that works to improve student achievement through effective data use, and Ellen Mandinach and Edith Gummer, national research experts on data use for teaching, have made the most headway in advocating a shared definition for data literacy.
Both camps agree that adopting common language is an important first step in the teaching of data literacy (DQC, 2014; Mandinach & Gummer, 2016). The Data Quality Campaign urges policymakers to use the following definition for data literacy:

Data-literate educators continuously, effectively, and ethically access, interpret, act on, and communicate multiple types of data from state, local, classroom, and other sources to improve outcomes for students in a manner appropriate to educators’ professional roles and responsibilities (2014, p.1).

Mandinach & Gummer think that this definition is too general to be helpful to teachers, and that data literacy knowledge and cognitive skills should be spelled out in more detail (Mandinach, & Gummer 2016). Their response has been to lay out a definition and to identify the skills, knowledge, and dispositions that comprise the construct of data literacy for teachers:

Data literacy for teaching is the ability to transform information into actionable instructional knowledge and practices by collecting, analyzing, and interpreting all types of data (assessment, school climate, behavioral, snapshot, longitudinal, moment-to-moment, etc.) to help determine instructional steps. It combines an understanding of data with standards, disciplinary knowledge and practices, curricular knowledge, pedagogical content knowledge, and an understanding of how children learn (2016, p. 14).

It is helpful to note that both of these definitions employ the term “data” to signify something more than assessment data. Mandinach & Gummer write passionately about the need to distinguish assessment literacy from data literacy, and they believe the conflation of these two terms is one of the biggest problems currently existing in the field. They espouse that though the Federal Department of Education has “made clear that all educators must become data literate…schools of education generally believe they have courses on data literacy, (when) they really are addressing the more narrow
assessment literacy” (2015, p.1). Mandinach et al. believe that data literacy extends far beyond assessment (test) data. In order to be truly data literate, teachers must draw upon diverse data sources beyond what they can learn about students though classroom assessments (2013, 2015, 2016). An example of a data-literate teacher is someone who is able to triangulate data from academic assessments with other sources of data such as behavioral data, student perception data, health data, attendance data, and family data to interpret student performance and adjust her instruction accordingly.

In short, an outcome-driven, data-literate teacher is one who possesses both a belief system about the importance of data and the knowledge and skills to use multiple sources of data effectively (Salmacia, 2016). Both terms are imperative. An outcome-driven teacher without data literacy skills will have a belief system that all of her students can and will learn, but may lack the skills necessary to achieve that aim. A data-literate teacher without an outcome orientation may have a rich statistical background, participate in collaborative data meetings, or use data to inform her instruction, but may not achieve equitable outcomes for all students or approach her work with the urgency needed to ensure that all students achieve at high levels.

The Emergence of Data Literacy as an Important Teacher Practice

The emergence of data literacy as an important teacher practice has largely stemmed from national, state, and local education policy as well as teacher evaluation systems. Over the past decade, education policy and teacher evaluation systems have played a huge role in the demand for 21st century data literacy skills. Ellen Mandinach argues that “there is no question that educators must be armed with data. Policymakers
Internationally are emphasizing the need for education to become evidence-based. That means using hard data from which to make decisions and inform practice” (Mandinach, 2016, p.3). In the United States, this message has been delivered most clearly by former U.S. Secretary of Education Arne Duncan. In a series of speeches and remarks made early in his tenure as Secretary of Education, Duncan demanded that it was no longer okay for teachers to say they were doing their jobs if kids weren’t learning. Quoting Linda Darling Hammond, Duncan said this would be akin to a doctor saying “the operation was a success but the patient died” (2009b). Instead, he claimed that teachers would now be held responsible for helping students achieve significant academic growth, and that they should be asked to embrace data as a means of achieving this aim. Duncan argued for the need for robust data systems to track student achievement and teacher effectiveness, and said that — for the first time — schools would be closed when the data showed students were vastly underperforming. The message was clear: demonstration of student knowledge was to be at the forefront of the current education reforms, and data use and data literacy would become necessary skills in this new era (Duncan, 2009a, 2009b, 2009c). The importance of data use was also included in two major initiatives of the U.S. Department of Education under Duncan’s leadership: the American Recovery and Reinvestment Act (ARRA, 2009) and the Race to the Top Program (Mandinach, 2016).

In addition to national education policy, data literacy skills are also gaining importance in state and local teacher evaluation systems. Unlike teacher certification exams of the past that were either exclusively focused on content, or concentrated on
pedagogy, (Shulman, 1986), current teacher certification exams now have — or will have — data literacy components. This content is already a part of the edTPA assessment, and it will soon become a part of the Praxis examination (Mandinach & Gummer 2015). State licensure policies are also beginning to follow suit by incorporating data literacy skills into state teacher licensing programs. The 2013 Data for Action survey administered by the Data Quality Campaign identified that data literacy skills have already been incorporated into teacher licensing programs in 19 states. The Data Quality Campaign believes that these results “demonstrate the commitment that states are beginning to make to have policy drive data-use practices” (DQC, 2013, p. 4). Furthermore, local school districts are beginning to implement student outcomes based evaluation systems. One notable example of this practice is IMPACT, the District of Columbia Public School’s system for assessing and rewarding the performance of teachers. Under the IMPACT system, D.C. teachers are held accountable for the academic outcomes of their K-12 students as a portion of their annual performance evaluation (dcps.dc.gov/page/impact-overview).

Data literacy skills are also making their way into professional teaching standards. In 2013, the Council of Chief State School Officers’ Interstate Teacher Assessment and Support Consortium published the Model Core Teaching Standards and Learning Progressions for Teachers 1.0, which calls for an improvement in teachers’ data literacy skills. The progression includes numerous data literacy standards, such as “the teacher understands and uses multiple methods of assessment to engage learners in their own growth, to monitor learner progress, and to guide the teacher’s and learners’ decision
making” (CCSSO, 2013, p. 9). A Blue Ribbon Panel report released by the National Council for Accreditation of Teacher Education in 2010 also states that a teacher candidate’s progress should be “continuously judged on the basis of data…students’ outcome data, including student artifacts (and) summative and formative assessments” (p. 5). As these examples demonstrate, data literacy is now a major part of education policy and teacher evaluation processes. Accordingly, data literacy skills are now also an important aspect of teacher practice.

**Data Literacy Teacher Training Lagging Behind**

Though the call to action has been clear, teacher training in data literacy is lagging behind. In 2009, Secretary of Education Arne Duncan remarked that “America’s university-based teacher preparation programs need revolutionary change — not evolutionary tinkering” (2009b). However, Duncan is not the only one with these sentiments. In fact, they are echoed throughout the literature on data literacy education for teachers. Though teachers are being evaluated on student outcomes, research reveals that teacher preparation organizations have not caught up to the demand (Boudett, City, & Murnane, 2005; Data Quality Campaign, 2013; Elmore, 2002; Love, 2014; Mandinach & Gummer, 2013; Mandinach & Friedman, 2015; Mandinach, Friedman, & Gummer, 2015; Mandinach, 2016; Nunnaley, 2013; Wayman & Jimerson 2014).

Researchers and data literacy professional development providers also believe that the way data literacy is currently being taught to teachers is a problem. First, data literacy is complex (Wayman & Jimerson, 2014). Relying on a single professional development workshop isn’t an effective way to infuse data literacy skills into a teacher’s
practice (Mandinach, 2016; Boudett, City, & Murnane, 2005). Too often, data literacy instruction will focus on teaching teachers how to use a particular data tracker or technology tool rather than focusing on the actual content (Nunnaley, 2013). Furthermore, Elmore argues that “American schools and the people who work in them are being asked to do something new…subject themselves to the discipline of measuring their success by the metric of students’ academic performance. Most people who currently work in public schools weren’t hired to do this work, nor have they been adequately prepared to do it either by their professional education or by their prior experience in schools” (2002, p. 3). In sum, data literacy content isn’t being taught in the right way, for the right duration, by the right people.

Data literacy advocates also argue that this issue extends beyond training, and that it is also affected by infrastructure needs in schools. If teachers learn how to use data to inform their practice but the systems, time, and culture needed to infuse data into their daily practice are absent from their schools, then data literacy skills will not take hold (Mandinach & Jackson, 2012, Mandinach, 2016, Mandinach & Gummer, 2016). Love also makes the case that more and more data are being captured and reported by schools and districts. However, more data do not necessarily mean more information or more action. Unless schools know how to interpret those data and act upon them appropriately, they will not translate into the results that teachers want for their students (2004).

With regard to institutions of higher education, a 2015 WestEd study sought to explore whether — as well as how — schools of education were preparing teachers to become data-literate. The study revealed that little data literacy education is actually
taking place in institutions of higher education. WestEd researchers examined the degree to which schools of education were offering stand-alone data literacy courses or were integrating data literacy instruction into existing courses. The study found that, while the majority of schools of education self-reported that they were incorporating data literacy skills into their curricula, the instruction these schools were providing (as revealed by a syllabus review) was actually on the topic of assessment literacy, rather than the larger and more inclusive field of data literacy. Moreover, the researchers stated that “having a school of education include a so-called data course does not guarantee that the course actually is about data-driven decision making. (Researchers) strongly suspect that, although the schools of education say they are teaching data literacy, they really are not” (Mandinach, Friedman & Gummer, 2015, p. 31). These examples showcase some of the ways in which teacher training is lagging behind.

**Outstanding Questions in the Field**

As more teacher training organizations begin to create curricula aimed at developing outcome-driven, data-literate teachers, there are several outstanding questions in the field about how best to develop this type of teacher. First, since no agreed-upon list of data literacy skills currently exist, there is a question of *what* content should be taught. For instance, should all teachers need to learn basic statistics and assessment writing principles before they learn how to analyze and respond to their own student data, or is it possible for teachers to get by without these skills? Second, since there are no exemplar courses for developing outcome-driven data literacy, there is a question of *how* this content should be taught. For instance, should outcome-driven data literacy be taught in
stand-alone courses by data experts, or should this content be embedded within existing coursework and taught by content experts? Furthermore, as teacher training organizations in this country are rapidly becoming more diverse in their approach to training teachers, how should this content be taught in pre-service training programs versus in-service training programs?

**The Need for More Examples**

The need for more examples of how to develop outcome-driven, data-literate teachers is threefold. First, while policies and calls to action are helpful when it comes to setting a stage for change, they do not in and of themselves enact change. Simply saying that more teachers must be data literate does not make it so (Mandinach & Gummer 2016). In order to help more teachers become both outcome-driven and data-literate, more examples of how to develop this type of teacher are needed. Second, relatively few schools of education are currently teaching data literacy as a part of their curriculum, and those that claim they are teaching this content are more likely teaching assessment literacy instead of data literacy (Mandianch, Friedman, & Gummer, 2015, Mandinach & Gummer, 2016). The need for accurate examples of how to develop outcome-driven, data-literate teachers is therefore quite clear. Third, few faculty members at schools of education have themselves been trained in outcome-driven data literacy. In many schools of education, data literacy is not being taught because schools do not have faculty members with the content knowledge and experience necessary to teach such courses (Mandianch, Friedman, & Gummer, 2015, Mandinach & Gummer, 2016).
Purpose of the Study

The purpose of this study is to document examples of how teacher training organizations have gone about developing outcome-driven, data-literate teachers. With exception of a few researchers, a handful of teacher training organizations, and practices observed in some public schools, there is little guidance for how teacher training organizations interested in developing outcome-driven, data-literate teachers should go about this work. The field is only beginning to agree on a definition and set of skills describing an outcome-driven, data-literate teacher, and more examples of effective practices for developing this type of teacher are required. This study aims to help teacher training organizations further define and identify approaches for teaching data literacy by sharing examples as well as promising practices and lessons learned from organizations that have pioneered this work over the last several years.

Research Questions and Methods Overview

To document examples of how teacher training organizations are going about developing outcome-driven, data-literate teachers, this study utilized a qualitative case study approach to explore the curricular choices taking place at four different teacher training institutions. The study examined the Seattle Teacher Residency, a teacher residency program for new elementary and special education teachers; Aspire Public Schools, a K-12 school network located in California and Tennessee; Texas Tech University, a pre-service undergraduate school of education located in Lubbock, Texas; and Sposato Graduate School of Education, a new residency-based graduate program located in Boston, Massachusetts. The study addressed four research questions:
1) What data literacy content are sites teaching teachers?

2) How are sites teaching this data literacy content?

3) What promising practices and lessons learned have sites discovered from their experience teaching data literacy content?

4) What views do teachers at each site have about the data literacy content and instruction they have received?

Data was collected across multiple rounds of faculty interviews, document requests, and teacher interviews. All interviews followed a semi-structured interview format and took place via online video conference or via telephone. Documents collected included curricular scopes and sequences, course syllabi, lesson plans, assignment descriptions, and evaluation rubrics.

**Rationale and Significance**

While the call for developing data-literate teachers is clear, and the understanding that teacher training is lagging behind has been established through research, more study is needed on how schools of education and other teacher training organizations can go about developing this type of teacher. Current research on data literacy for teaching is minimal and, as Mandinach & Gummer note, “research has an important role in rolling out data literacy in practice” (2016, p. 124). Furthermore, Mandinach & Jackson espouse the view that “research cannot measure what has not been implemented broadly or deeply. Research must mirror practice. Then the body of rigorous research will grow” (2012, p. 23). This study aimed to show how data literacy for teaching is being
implemented in practice, and is part of the necessary research base needed for the data literacy instruction to continue to develop.

Developing outcome-driven, data-literate teachers continues to be an emerging content area within the larger teacher training field. As organizations that have already begun this work strive to improve their approaches, and as additional organizations begin to take on this charge, more examples of how to develop outcome-driven, data-literate teachers will be needed in order to advance the field. With more examples to share, organizations that are already beginning to develop outcome-driven, data-literate teachers will be able to learn from choices made by their pioneering peers, and organizations new to this work will be able to draw from examples already in place in order to create and adapt a curriculum and approach appropriate to their context. As this field evolves, the understanding of what it means for a teacher to be data-literate will continue to develop (Mandinach & Jackson, 2012). This study helps to advance the meaning of what it means to be an outcome-driven, data-literate teacher, and provides examples of how several organizations have gone about developing this type of educator.
Approaches to Data Literacy for Teaching

Over the past several years, researchers, professional development providers, and educators have been making strides in defining data literacy for teaching. A review of current literature reveals four organizations that stand out in advancing the work of data literacy in K-12 education: WestEd, the Using Data initiative at TERC, the Data Wise project at Harvard Graduate School of Education, and Uncommon Schools. These organizations stand out as some of the most major contributors to the field. Table 1 describes the function and mission of each organization.
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<tr>
<td>WestEd</td>
<td>WestEd is a “non-partisan, nonprofit research, development, and service agency working with education and other communities throughout the United States and abroad...to improve education and other important outcomes for children, youths, and adults” (<a href="http://www.wested.org/about-us">www.wested.org/about-us</a>). WestEd is headquartered in San Francisco, California and has 17 offices nationwide with over 650 staff. WestEd’s annual revenue is approximately $140 million with more than 400 funding sources with staff members working on 450-700 projects. “WestEd is committed to the belief that all students should succeed in our schools and that all learners — from infants to adults — should thrive in our communities, despite the circumstances they were born into” (<a href="http://www.wested.org">www.wested.org</a>).</td>
</tr>
<tr>
<td>TERC’s Using Data Initiative</td>
<td>TERC is a not-for-profit education and research development organization “dedicated to engaging and inspiring all students through stimulating curricula and programs designed to develop the knowledge and skills they need to ask questions, solve problems, and expand their opportunities. TERC’s mission is to improve mathematics and science education” (<a href="http://www.terc.edu/display/About/About+Us">www.terc.edu/display/About/About+Us</a>). Founded in 1965 as the Technical Education Research Centers, the organization now known simply as TERC is located in Cambridge, Massachusetts and provides programming to over 3.5 million students each year. TERC’s Using Data Initiative “provides professional development programs for district leaders, school administrators, and teachers to help them use data effectively — in ways that can lead to positive changes in organizational culture, instructional pedagogy, and classroom practices.” (<a href="http://www.terc.edu/display/About/Using+Data+Initiative">www.terc.edu/display/About/Using+Data+Initiative</a>).</td>
</tr>
<tr>
<td>Data Wise Project at Harvard Graduate School of Education</td>
<td>The Data Wise Project was established by the Harvard Graduate School of Education in 2006 to “support educators in using collaborative data inquiry to drive continuous improvement of teaching and learning for all students” (<a href="http://datawise.gse.harvard.edu/about">http://datawise.gse.harvard.edu/about</a>). The Data Wise project is based on an eight-step Data Wise Improvement Process that guides teams of educators from schools or systems to come together to use data to drive instruction. The project offers on-campus and online courses that teach principals, teachers, and other educators how to use the Data Wise Improvement Process. The Data Wise website lists one Data Wise director, two leaders, four advisors, and 23 certified Data Wise coaches. (<a href="http://datawise.gse.harvard.edu/about">http://datawise.gse.harvard.edu/about</a>).</td>
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<tr>
<td>Organization</td>
<td>Mission</td>
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<tr>
<td>Uncommon Schools Charter</td>
<td>Uncommon Schools are a non-profit network of 49 public charter schools across New Jersey, New York, and Massachusetts. The Uncommon Schools Charter Management Organization manages all 49 schools through a Home Office in New York City by providing “management and coaching of school leaders, professional development, staff recruitment, and fundraising” so that schools “can focus on teaching and learning” (<a href="http://www.uncommonschools.org/our-approach/faq-what-is-charter-school">www.uncommonschools.org/our-approach/faq-what-is-charter-school</a>). The mission of Uncommon Schools is “to start and manage outstanding urban charter public schools that close the achievement gap and prepare low-income students to graduate from college” (<a href="http://www.uncommonschools.org/our-approach/the-opportunity-gap">www.uncommonschools.org/our-approach/the-opportunity-gap</a>). The Uncommon Schools website reports that “Uncommon reverses the achievement gap with white students in the states we serve in math in every one of our regions. By 6th grade, 75% of our regions outperform the state in reading, and continue to outperform the state in 7th and 8th grade” (<a href="http://www.uncommonschools.org/results-for-charter-schools">www.uncommonschools.org/results-for-charter-schools</a>).</td>
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<tr>
<td>School Network</td>
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**Similarities and Differences in Approach**

While each of these respective organizations serve different purposes, from providing a thorough research base, to delivering professional development, to teaching K-12 students, each is currently working to educate the field on data literacy, and all have distinct approaches to developing outcome-driven, data-literate teachers. Nevertheless, there are several areas where each organization’s beliefs and approaches overlap. The first area of overlap is that each organization has articulated discrete steps and a specific process for engaging in data inquiry. Each of these processes focuses on student learning. Next, each organization recommends that the data inquiry process should be collaborative. Rather than stand-alone courses, or a single teacher working in isolation, data inquiry should be done in context and with others. Taking this a step further, the organizations believe data literacy work should be embedded in content. Rather than
teachers learning how to analyze data in general, they should learn how to analyze data for the 6th grade English class they are teaching that year (or will teach in the future). To the greatest degree possible, teachers should also be able to focus on their actual students. All claims about students should be based on real evidence from classrooms. Finally, each organization agrees that teachers need to be given the time and resources necessary for data inquiry. This includes providing time after school and during staff meetings, and providing resources such as assessment and data systems support (Bambrick-Santoyo, 2010; Boudett, City, & Murnane, 2005; Love, 2014; Mandinach & Gummer, 2013; Mandinach & Friedman, 2015; Mandinach, Friedman, & Gummer, 2015; Mandinach, 2016; Nunnaley, 2013).

Not surprisingly, given the different missions of each of the organizations, their beliefs and approaches also differ. The first important way in which these organizations differ concerns how each organization developed its approach. Researchers at WestEd took the most academic approach to their learning, basing their work on a series of qualitative studies over several years. TERC’s Using Data and Initiative and Harvard Graduate School of Education’s Data Wise Project embedded their academic work in the field, working alongside teachers, schools, and districts to field-test their approaches. Instructional leaders at Uncommon Schools developed their approach outside of an academic context, drawing from the day-to-day experiences at their K-12 schools.

These organizations also differ in their starting points for engaging in data inquiry. WestEd researchers believe teachers need to first start with a problem of practice. A problem of practice may be about “a student, a group of students, a topical
area, the curriculum, or an aspect of instruction” (Mandinach, 2016, p. 16). Professional development providers from HGSE’s Data Wise Project and TERC’s Using Data Initiative believe data inquiry should begin with a learner-centered problem (Boudett, City, & Murnane, 2005; Nunnaley, 2003), a term meant to imply that it “is about learning, not that learners are the problem” (Boudett, City, & Murnane, 2005, p. 90).

Bambrick-Santoyo, the lead architect of Uncommon’s Driven by Data approach, is adamant that data inquiry must begin with assessment. Bambrick-Santoyo believes that only assessments can define the level of rigor of a content standard, and are therefore where the data inquiry conversation should begin (2010).

Another area of divergence is how and when a data-driven culture should be built in schools. Both TERC’s Using Data Initiative and HGSE’s Data Wise Project begin their data inquiry process with building culture. Whether it is Using Data’s desire to “build a foundation,” or Data Wise’s step of “organizing for collaborative work,” both organizations believe schools need to begin by building an effective community centered on collaboration. Until a culture of trust and collaboration is established, both camps believe the real work of data inquiry cannot be done (Boudett, City, & Murnane, 2005; Nunnaley, 2003). The Using Data Initiative defines a trusting culture as one where “relationships are based on trust, candid talk, and openness” (Love, et. al. 2008, p. 19) and defines a collaborative culture as one with “shared norms and values, ongoing data-driven dialogue, collaborative inquiry, [and] time and structure for collaboration” (Love, et. al., 2008, p. 19). Bambrick-Santoyo flips this belief on its head. He asserts that a data-driven culture is created by doing the work and seeing its positive results. Bambrick-
Santoyo says that schools can’t wait until they have everyone bought-in on the importance and effectiveness of data-driven instruction — that it is important to start the work right away, even if an administrator only has a few allies in her efforts. Bambrick-Santoyo believes there will always be initial critics, though those critics will be swayed when they see the improvement in student learning that results from a data-driven practice (2010). Mandinach et al. speak less about building culture in their work, but ideologically lean toward the need for building systems and providing resources ahead of time.

Finally, each organization differs in its opinion on whether the data inquiry process necessitates a quantitative goal. Said differently, should teachers, schools, and districts set a quantitative academic achievement goal for students at the beginning of year? The Data Wise Project takes the strongest stand on this issue. They believe it is important for teachers to “set short-term, medium-term, and long-term goals so teachers have targets to aim for and benchmarks by which to assess their students’ progress. Setting goals is part of establishing a culture of internal accountability and high expectations, and of envisioning what’s possible” (Boudett, City, & Murnane, 2005, p.162). The Data Wise process recommends that teachers set growth- and competency-based goals for students. The Using Data process also advocates the use of goals, specifically S.M.A.R.T. goals—i.e., those that are specific, measurable, attainable, relevant, and time-bound. Using Data authors believe these goals should be in response to a student learning problem (Love, et. al., 2008). Bambrick-Santoyo isn’t as convinced. He states that, though “S.M.A.R.T. goals have reached almost universal acceptance as a
driver of change in education…there is no consensus on their importance. While some schools have found them useful to help drive achievement, others have not” (2010, p. 142). Because of this, quantitative academic goals are not a part of the Driven by Data process. Mention of year-long quantitative goals are notably absent from literature published by WestEd researchers.

**A Deeper Look at Each Data Literacy Organization**

Though it is useful to begin by synthesizing the similarities and differences among these organizations’ approaches, it is also helpful to analyze each organization’s approach independently to gain a full understanding of how they articulate and approach data literacy. Reviewing each organization in depth reveals additional nuances in its particular view of what data literacy means and how it should be taught to teachers.

**WestEd**

WestEd is a “non-partisan, nonprofit research, development, and service agency working…to improve education and other important outcomes for children, youth, and adults” (wested.org/about-us). WestEd’s data literacy research agenda is led by Ellen Mandinach, senior research scientist and director of the Data for Decisions Initiative. Mandinach has published two texts on the topic of data literacy: *Transforming Teaching and Learning Through Data-Driven Decision Making*, and *Data Literacy for Educators: Making it Count in Teacher Preparation and Practice*. First and foremost, WestEd researchers are concerned with the need to define data literacy. A noteworthy component of their writings is a focus on the conflation of assessment literacy and data literacy. Mandinach et al. are adamant that the lack of a clear, accurate, and shared definition of
data literacy is plaguing the sector and that this issue should be clarified as a first step for providers interested in teaching data literacy to teachers (Mandinach, 2016). In this way, WestEd’s writing speaks to several audiences, be they composed of policy makers, graduate schools of education, professional developers, or K-12 schools. This is in contrast to the other three organizations, all of which are primarily interested in effecting change at the K-12 school level.

WestEd researchers believe data literacy skills should not be taught in isolation. Rather, they believe data literacy skills should be taught in conjunction with content knowledge and pedagogical content knowledge (Mandinach, 2016). For instance, a 3rd grade math teacher teaching fractions will most effectively learn how to use data to drive her practice if she is able to do so through the lens of analyzing 3rd grade math assessment data (as well as other supporting forms of data beyond assessment data). The incorporation of data usage into the understanding of content, pedagogy, curriculum, and a knowledge of learners is an important part of this approach. Mandinach and Guummer’s complete approach is diagramed in the following conceptual framework.
In addition to the information that should be infused within data use, Mandinach et al. also lay out 53 “data use for teaching skills” within the five domains of Data Use for Teaching: Identify Problems/Frame Questions, Use Data, Transform Data into Information, Transform Information into Decision, and Evaluate Outcomes. Sample skills include “understand context at the student level,” “develop sound assessment design and implementation,” “understand how to analyze data,” “generate hypothetical connections to instruction,” “determine next instructional steps,” and “compare performance pre- and post-decision” (Mandinach, 2016 pp. 16-25). WestEd researchers also believe teachers should possess six dispositions or habits of mind such as “a belief that all students can
learn,” and the “ethical use of data, including the protection and privacy and confidentiality of data” (Mandinach, 2106, pp. 26-27). These skills are the most thorough of any outlined across all four organizations. They speak to a desire to be inclusive of all content related to data literacy, rather than a prioritization of content based on what can reasonably be taught to a teacher within a higher education course or module, or over the course of a year of professional development within a K-12 school.

Perhaps because they are not engaged in training actual teachers, WestEd researchers’ focus on how to teach these 53 skills and six habits of mind are described only in general terms. Researchers believe that embedding data literacy into the content areas and all teacher training courses is preferable to stand-alone data literacy courses. They advocate teachers begin learning data literacy skills in pre-service coursework and supplement their learning through professional development once teachers are working in schools. WestEd’s approach may best summarized as an integrated and continual approach to teaching data literacy. However, training examples and resources on how to teach data literacy are not included in their materials. This is in stark contrast to the other three organizations.

**TERC’s Using Data Initiative**

TERC’s Using Data Initiative “provides professional development programs for district leaders, school administrators, and teachers to help them use data effectively — in ways that can lead to positive changes in organizational culture, instructional pedagogy, and classroom practices” (https://www.terc.edu/display/About/Using+Data+Initiative). Unlike WestEd, The Using
Data Approach is far more integrated into the daily work of K-12 schools. Using Data employs a collaborative inquiry approach where teachers and school leaders come together to make sense of — and respond to — student data. The Using Data approach follows a five-step process outlined in the following conceptual framework.

**Figure 2: Using Data Conceptual Framework**

Using Data's professional developers work with teachers in school-based teams. The process is agnostic to the source of the data teachers evaluate. Being data-agnostic is an attribute Bambrick-Santoyo would take issue with, as he believes that the true power of data-driven instruction comes from using a common, rigorous, school-based assessment. According to Bambrick-Santoyo, a standardized state test, or a teacher-created unit assessment do not provide the right level of student information necessary to drive meaningful teacher action (2010). However, the Using Data process doesn’t take such a stand, and prioritizes being applicable in all school contexts regardless of what assessment systems are in place.
The focus of the Using Data process is primarily for teachers, but professional development is provided for all levels of school leaders. The Using Data Initiative lays out 18 beliefs, skills, and pieces of knowledge that they believe are essential to data-driven decision-making, including skills such as “administrators and teachers understand the subtle differences in what can be learned from different types of data (e.g., state criterion referenced assessments, benchmark assessments, formative assessments, common assessments, student work) and how to use them together to understand gaps in student learning” (Nunnaley, 2013, p. 45). Professional developers have also created a data capacity rubric where data use can be scored across a continuum of low- and high-capacity across 13 drivers. The Using Data approach believes that collaborative inquiry (the building of leadership and capacity, collaboration, data use, instructional improvement, culture, equity, and trust) is the bridge between data and results (Love et. al., 2008).

Using Data leaders believe professional development should be delivered over time as opposed to in one session. However, their website explains that they provide professional development in many forms. Using Data's leaders have published two texts: *Using Data to Improve Learning for All* and *A Data Coach’s Guide for Improving Learning for All Students*. The Using Data Initiative also provides an online course in data literacy as well as comprehensive Using Data Institute, a Data Leadership Academy, and one-day Using Data workshops (http://usingdata.terc.edu/workshops/).
HGSE’s Data Wise Project

The Data Wise Project was established by the Harvard Graduate School of Education to “support educators in using collaborative data inquiry to drive continuous improvement of teaching and learning for all students” (datawise.gse.harvard.edu/about). Like TERC’s Using Data Initiative, HGSE’s Data Wise Project is embedded in the work of K-12 schools, specifically Boston Public Schools. Data Wise employs a three-phase, eight-step process for data literacy outlined in the following conceptual framework.

Figure 3: Data Wise Conceptual Framework


Teachers and schools using the Data Wise approach follow a cyclical process of preparing, inquiring, and acting upon data. While following these phases, the ACE Habits of Mind (action, assessment, adjustment, collaborating, and evidence) should be infused
through each of the eight Data Wise Steps. The process starts by developing a collaborative culture and building background knowledge of assessment literacy necessary to engage in data-driven inquiry. Unlike the Driven by Data model which believes that school leaders alone should be responsible for creating rigorous, standards-aligned, college-aligned assessments, Data Wise professional developers believe all teachers should develop background knowledge on assessment literacy. Through discussion of topics such as assessment sampling, discriminating items, measurement error, reliability, and score inflation, teachers develop the foundational knowledge needed to examine their own students’ data (2005). Then, using a series of meeting protocols, teachers and school leaders are able to analyze and respond to student data collaboratively. The Data Wise approach also advocates observation of teachers and students in order to gather evidence about student learning and implementation of teacher action plans (Boudett, City, & Murnane, 2005).

There are several ways teachers and school leaders can access Data Wise trainings. Project leaders have published two texts — Data Wise and Data Wise in Action — and offer online access to resources and meeting protocols. The Data Wise project also provides week-long online and on-campus Data Wise Institutes, as well as a four-month online Data Wise in Action program. Finally, the project offers a year-long blended online and on-campus Data Wise Coaching Certification program (http://isites.harvard.edu/icb/icb.do?keyword=datawise).
Uncommon Schools

The mission of Uncommon Schools is “to start and manage outstanding urban charter public schools that close the achievement gap and prepare low-income students to graduate from college” (www.uncommonschools.org/our-approach/the-opportunity-gap). Uncommon’s approach is taught primarily through the text Driven by Data and by data-driven instruction professional development created by Bambrick-Santoyo, Uncommon’s Chief Schools Officer for High Schools and K-12 Content Development. Though not born out of the academic model of conceptual frameworks, Driven by Data also follows a sequential process for data-driven instruction: assessment, analysis, action, and culture. Each step in the process has a rubric by which leaders and teachers may be evaluated on the implementation of a particular step (2010). It is important to highlight that the content of Driven by Data focuses on what Mandinach et al. would assert is assessment literacy only, as opposed to data literacy, which is more thoroughly addressed by the preceding three models. Bambrick-Santoyo is most adamant in his demand that common, interim assessments be the starting point for all data-driven instruction. This insistence and narrow focus is another way in which Driven by Data differs from the other three models.

As might be expected from a school-based program, Bambrick-Santoyo’s materials are practical and applicable. The second half of Driven by Data is focused on how to lead data-driven professional development for teachers. Bambrick-Santoyo is a believer in adults “living the learning.” Rather than leading an “I-, we-, you-do” lesson as a teacher might do with younger students, Bambrick-Santoyo believes adults should start by doing the thinking and figuring out for themselves. By designing “airtight activities,”
professional developers can create learning experiences through methods such as case studies or simulations that allow teachers to tackle new concepts in context. Bambrick-Santoyo is also a big believer in giving adults time to reflect on and share out their learning. He believes professional development should inspire. As with the Using Data and Data Wise models, Bambrick-Santoyo also advocates schools making time for collaborative data meetings or “data days.” Another flagship method of the Driven by Data approach is for coaches to hold one-on-one data meetings with teachers to discuss their students’ assessment data and teacher action plans (2010).

What We Don’t Know About Developing Outcome-Driven, Data-Literate Teachers

Though these literatures expose how a small group of researchers, professional development providers, and a charter school network approach defining and teaching data literacy, they say very little about whether any of these approaches have been embraced within schools of education and K-12 schools across the country. What data literacy content are teacher training organizations teaching, and how are they teaching this content? What approaches are working? What approaches aren’t working? Finally, have these organizations surfaced any specific data literacy practices that their teachers see as particularly helpful to improving their practice and increasing K-12 student achievement?
Chapter 3: Methods

Rationale for Qualitative Approach

Because the aim of this study was to share examples of how pioneering organizations have gone about developing outcome-driven, data-literate teachers, a qualitative approach was the most appropriate research method. Using a qualitative approach allowed me to explore questions of “what” and “how” at each site (Bloomberg & Volpe, 2016). As Erickson describes, “qualitative inquiry seeks to discover and to describe in narrative reporting what particular people do in their everyday lives and what their actions mean to them” (2011, p. 43). The purpose of this study was not prove an immutable “truth” about how a teacher training organization should develop outcome-driven, data-literate teachers, nor was it about proving the effectiveness of a particular approach. Rather, the study sought to understand the choices instructors made, what data literacy content they most valued, and their teachers’ perceptions of the instruction they received. These aims best lend themselves to qualitative inquiry. As Ravitch & Carl state, “qualitative researchers are precisely interested in people’s subjective interpretations of their experiences” (2016, p. 9).

In order to uncover several examples and gain multiple perspectives, I used a multiple case study design. This study addressed four research questions:

1) What data literacy content are sites teaching teachers?

2) How are sites teaching this data literacy content?

3) What promising practices and lessons learned have sites discovered from their experience teaching data literacy content?
4) What views do teachers at each site have about the data literacy content and instruction they have received?

**Site Selection Process**

In order to answer each of the research questions thoroughly, a full understanding of each site’s data literacy practices was essential. As a result, the study focused on a small group of teacher training organizations. Specifically, the study focused on four teacher training organizations that were currently engaged in developing outcome-driven, data-literate teachers. Because the quality of the recommendations stemming from the study depended on the quality of the sites included in the research, I used a purposeful sampling strategy in order to find “information-rich cases with the objective of yielding insight and understanding of the phenomenon” (Bloomberg & Volpe, 2016, p. 148).

In order to select aligned, high-quality sites for this study, I began by learning which types of teacher training organizations were most involved in teaching data literacy within the field at large. This research included considering traditional undergraduate schools of education (pre-service training), K-12 public schools (in-service training), and residency-based teacher training organizations and/or graduate schools of education (in-service training). A review of the literature surfaced that data literacy instruction is not, by and large, taking place in traditional schools of education (Mandinach, Friedman & Gummer, 2015). This finding led me to believe that in-service training sites would be better suited for this line of research. However, one concern I had with only including in-service (and more non-traditional) organizations in the study is that this might enable critics to contend that an outcome-driven, data-literate teacher could only be developed in
an in-service training context. I believed this to be a false choice. The simple fact that traditional schools of education have been slower to adopt data literacy content in their curricula does mean that they are not able to develop this kind of teacher. Therefore, I deemed it essential to include at least one traditional undergraduate school of education in the sample. I also believed it would be interesting to see whether any differences existed between how pre-service and in-service training programs approached teaching data literacy skills.

Next, I identified participation criteria necessary to be included in the study. These criteria were mapped directly onto the study’s four research questions. In order for a site to be included in the study, the organization had to have the ability to provide insight into all four research questions. Only sites that had direct alignment with the study’s four selection criteria were chosen to participate in the study. The four criteria for participation in the study were as follows:

1) The organization should have a belief in measuring student outcomes. The organization should believe that all students can and will learn, that learning can be measured, and that teachers should be held responsible for students’ academic outcomes.

2) The organization should have a clear, codified approach for teaching data literacy. The approach may be coursework at a graduate school of education, professional development in a school setting, etc.

3) The organization should be willing to share lessons learned as well as areas of strength.
4) The organization should be willing to let the researcher independently contact and interview teachers who have received data literacy instruction from their organization.

Next, I needed to identify a set of pre-service and in-service teacher training organizations that met my criteria. Because developing outcome-driven data literacy skills is a relatively new field within teacher education, I had to identify pioneering institutions that had begun innovating in this area over the past few years. I also had to find organizations possessing the philosophical beliefs that all students can learn and that it is a teacher’s responsibility to lead her students to demonstrable academic gains. This search led me to the newly formed Teacher Preparation Transformation Centers created and funded by the Bill & Melinda Gates Foundation. The Gates Teacher Preparation Transformation Centers were created to “bring together higher education institutions, teacher-preparation providers, and K-12 school systems to share data, knowledge, and best practices” (www.gatesfoundation.org). These Teacher Preparation Transformation Centers are made up a diverse set of educational organizations, ranging from traditional schools of education such as Teaching Works Center at the University of Michigan, the EPIC Center at the Massachusetts Department of Elementary and Secondary Education, to teacher residency programs supported by the National Center for Teacher Residencies.

To learn more about the Teacher Preparation Transformation Centers and identify specific sites for the study, I attended two two-day Teacher Preparation Transformation Center conferences over the span of one month. During each conference I attended presentations about each Center, both to learn more about the composition and purpose of
the centers and to identify which sites might be appropriate for the study. I also used conference time to share the objectives of my research, and to see if any organizations would be interested in participating the study. At one conference, I gave a presentation on my study and asked if anyone felt their organization would be a good match for the study and would like to participate. At the other, I met one-on-one with Center leaders to see if any other organizations would be a good fit for the study. At the culmination of both conferences, I identified four teacher training organizations that met the study participation criteria and were interested in and willing to participate in the study. Comprised of three in-service training organizations and one pre-service school of education, these sites included:

- Aspire Public Schools, (K-12 school network providing in-service training located in California and Tennessee)
- Seattle Teacher Residency (Elementary and special education public school residency program providing in-service training located in Seattle, Washington)
- Sposato Graduate School of Education (Graduate school of education providing in-service residency-based training in Boston, Massachusetts)
- Texas Tech University (traditional undergraduate school of education providing pre-service training in Lubbock, Texas)

**Data Collection Methods**

Answering each research question required the collection of multiple types of data from multiple constituents. Specifically, I completed multiple semi-structured interviews with faculty members and teachers at each site, and conducted a document request for each as well. As a first step, I needed to learn what data literacy content each site taught,
as well as how they went about teaching this content. This line of inquiry addressed the first and second research questions of this study. To answer these questions, I conducted 60-minute interviews with the lead data literacy personnel at each site. These interviews took place via phone or on an online video conference call and followed a semi-structured interview protocol. Following each interview, I created verbatim transcripts and wrote a data collection memo to document my learnings.

At the end of each interview I asked each respondent which documents, syllabi, course materials, professional development sessions, and/or online coursework I should review to get a more thorough understanding of how their site approaches teaching data literacy. Because each site differed in its structure and approach, the documents I reviewed from each site varied. After receiving materials in response to these document requests, I reviewed all documents and precoded the data in order both to familiarize myself with the information I received and to make the data less opaque (Ravitch & Carl, 2016, p. 243). I highlighted, underlined, and annotated any information that struck me as a “codable moment” (Saldaña, 2016, p. 20) and wrote precoding memos summarizing the information I found.

This first round of data collection allowed me to get a baseline understanding of what data literacy content each site taught, and of how they taught it. This level of understanding allowed me to follow up with each site for a second 60-minute, semi-structured interview with the same data literacy personnel at each site. The purpose of these follow-up interviews was twofold. First, I used the interview to check the accuracy of my understanding of each site’s approach to teaching outcome-driven data literacy.
Next, I used these interviews to answer the third research question of this study. Using a semi-structured interview protocol, I asked each site to share what promising practices have emerged in their practice, as well as lessons learned. I sought to understand what they intend to keep or to change within their instruction and why. These follow-up interviews were used to get more in-depth, perceptual information as opposed to the background, contextual information collected in the initial interviews and document review. When applicable, I made additional document requests for any new information that surfaced during the interviews. Like previous interviews, I created verbatim transcripts of each interview I conducted and wrote data collection memos to document my learnings.

To answer the fourth and final research question of the study, I interviewed teachers at each site in order to learn about the teachers’ or teacher candidates’ perceptions of the data literacy instruction they received. Specifically, I held 60-minute semi-structured interviews with two-to-three teachers at each site to learn about their experiences with data literacy instruction. These interviews took place via phone and online video conference. Using a semi-structured interview protocol, I asked teachers about the data literacy instruction they received, what learning experiences helped them achieve this knowledge and these skills and mindsets, and whether they believe this training has had an impact on their K-12 students’ education. I also asked each teacher what they thought their program was doing well in terms of developing outcome-driven, data-literate teachers, and how they could improve their data literacy instruction. As
before, I created verbatim transcripts of each interview I conducted and wrote data collection memos to document my learnings.

Data Analysis

Data analysis for this study took place in two phases. The first part was a descriptive reporting of each site’s approach to teaching data literacy. By coding and triangulating data from multiple rounds of interview transcripts and document reviews, I sought to tell the story of how each site has chosen to approach this content. For each site I reported:

- What data literacy content the site teaches
- How the site teaches their data literacy content
- The promising practices the site has identified in their approach to teaching data literacy
- The lessons learned and/or areas of growth identified in their approach to teaching data literacy
- Teachers’ perceptions of the importance of data literacy
- Teachers’ perceptions of the data literacy instruction they received

The descriptive reporting of each site’s approach to teaching data literacy was told through the perspective of one faculty member and one teacher for each site. In order to maintain the confidentiality of each individual participant in the study, and to protect any one person from being identified via their educational background or a particular quote, each faculty member and teacher was written as a composite. Therefore, each faculty member and teacher introduced in each case study does not represent an actual person,
rather, they represent the stories and data shared by all faculty members or teachers at each site. Each case study concludes with a brief analysis of how the case answered the study’s research questions.

The second phase of data analysis employed a cross-case synthesis strategy to look at trends among each of the sites included in the study. Drawing on the literature review and wisdom of practice, I created a series of deductive codes (Ravitch & Carl, 2016, p. 249) describing the various components of data literacy. When I found practices in the data that were not included in my original set of codes, I added these inductive, or emic codes to my code set on an ongoing basis. When focusing on a descriptive research question such as “what data literacy content are sites teaching?” I used a descriptive coding approach, and when focusing on a perceptual research questions such as “what views do teachers at each site have about the data literacy content and instruction they have received?” I used an emotional or values coding approach (Saldaña, 2016, p. 78). Finally, I analyzed all coded data to surface trends, themes, and highlights from the data. The purpose of this analysis was not to conclude that the most common practices were necessarily the most promising practices — rather, it served as another way to view the data and shed light on how data literacy instruction is currently manifesting in the field.

**Strategies for Achieving Validity**

In order to ensure that my research “clearly reflects the world being described” (Bloomberg & Volpe, 2016, p. 162), I employed several strategies to achieve validity. First, I employed a strategic sequencing of methods. Because the order of information I received would have an impact on the quality of data I collected (Ravitch & Carl, 2016,
I first sought to understand what content and which methods each site used to teach data literacy skills. In order for me to understand the effectiveness of a particular approach, or appreciate a teacher’s perspective, I first needed to understand each site’s process thoroughly. Second, I used data triangulation as a way to confirm my understanding of the phenomenon. For instance, I reviewed primary source data through document requests in addition to conducting personal interviews. Third, I identified three data literacy colleagues with whom to partner as critical friends during the study: Ellen Mandinach, senior research scientist and director of the Data for Decisions Initiative at WestEd; Liam Honigsberg, assistant director of student growth and achievement at Relay Graduate School of Education; and Brent Maddin, provost of Relay Graduate School of Education. As Ravitch and Carl (2016) state, “the goal of sharing your research with others is to create the conditions in which others (and yourself) can challenge your interpretations of the research process and data” (2016, pp. 201-202). In order to ensure that I sufficiently challenged my own interpretations, I reviewed my questions, methodology, writing, and findings with these colleagues throughout the study.

Finally, I conducted several member checks throughout the study. The purpose of these member checks was both to confirm that I had accurately reported on the practices of each site and to get participants’ feedback on my reporting. These member checks also served as an opportunity to ask any remaining follow-up questions I had about each site’s practices. During each member check, I asked questions such as “Does my interpretation/description resonate with you? What have I misunderstood? Is there anything I’m missing?” (Ravitch & Carl, 2016, p. 198).
Specifically, I conducted three member checks throughout the study. The first member check was conducted orally during follow-up faculty interviews. During each interview, I restated my understanding of our conversation and checked the accuracy of my conclusions. The second member check I conducted in writing by sharing written interview transcripts with each interviewee. Each interviewee was given the opportunity to read, edit, and provide written feedback on their interview transcripts. All changes made to transcripts by interviewees replaced the original transcripts. The third member check I conducted in writing by sharing my descriptive composite reporting with the respective faculty members I interviewed at each site. Each person who reviewed a descriptive composite report was able to read, edit, provide written feedback, and ensure the veracity of my composite reporting. All feedback shared during this member check was incorporated into the final report.

**Ethical Considerations**

There are several ethical considerations for this study. Because the study both sought to expose the approaches that did not work and/or were abandoned and asked teachers to provide critical feedback on their programs, individual participant names remained confidential, and faculty members and teachers were written about in the composite. This action was taken to create a safe space in which each participant could share their thoughts without fear of attribution or retaliation. Though every single person I interviewed for this study spoke about her or his program with a high degree of respect and professionalism, individual confidentiality was a promise made to each study participant.
Another ethical consideration is my relationship to the National Teacher Preparation Transformation Centers. The graduate school of education for which I work, Relay GSE, houses TeacherSquared, one of the Centers in the Teacher Preparation Transformation grant program. Relay’s participation in the grant program is how I first learned about the initiative, and how I was granted guest access to Transformation Center conferences. Although, for ethical and research-quality purposes, I did not include Relay GSE in the study, it remains important to situate my work on this study in the context of my daily work. As I stated in the preface, I was highly aware of my proximity to the content of the study and aimed to use my proximity to Transformation Centers as an asset to my research — i.e., to establish that I am a trusted confidant and colleague in the field — as opposed to using my research to further my own agenda.

I must also be aware of selection bias. One might conclude that I only sought to select sites that “think like I do” and therefore only examined one narrow aspect of teacher preparation. In one way, this sentiment is correct. As a function of my definition of an outcome-driven, data-literate educator, I omitted any organization from the study that does not hold its teachers accountable for their K-12 student outcomes, and that is not developing teachers’ data literacy skills. However, I sought to counter this critique by creating exacting selection criteria for my site selection. Starting with like-minded organizations helped me narrow in on potential sites for the study, but was not the method by which final sites were selected. Only when sites met all four selection criteria were they chosen to participate in the study. I also sought to select sites with different
structures and models for preparing teachers, including a traditional undergraduate school of education.

Finally, as part of my work at the Relay Graduate School of Education, my colleague Liam Honigsberg and I have spent the past several years creating our own conceptual framework for outcome-driven data literacy. I have clear opinions regarding both how we should define data literacy, and how this content should be taught. It is important to state that I did not conduct this study to confirm our approach; rather, I conducted the study to discover new examples. Like the members of this study, I stand to gain from the promising practices and lessons learned that were surfaced through the study. Like the sites included in this study, I too want to improve my ability to develop an outcome-driven, data-literate teacher. Though the findings of this study are not generalizable across all teacher training organizations, the findings are applicable to the field at large. Throughout the study I was aware that my research mission was to discover new information, as opposed to confirming my own perceptions concerning methods of developing data-literate teachers.
Chapter 4: Seattle Teacher Residency

Overview of the Program

The Seattle Teacher Residency is a 14-month, kindergarten-through-fifth-grade urban teacher residency program located in the city of Seattle, Washington. Mirroring the medical residency model, the Seattle Teacher Residency combines one year of graduate-level coursework, an elementary classroom apprenticeship, and intensive mentoring to train and certify novice teachers interested in working in Seattle Public Schools. The program is currently marketed toward candidates with a bachelor’s degree who want to pursue a Master’s in Teaching degree, as well as toward professionals looking for a career change. The Seattle Teacher Residency was founded in partnership with four institutions: Seattle Public Schools, The University of Washington, the Seattle Education Association, and the Alliance for Education. The program’s mission is “to accelerate student achievement through the preparation, support, and retention of exceptional teachers who reflect the rich diversity in Seattle Public Schools” (seattleteacherresidency.org). The founders of the Seattle Teacher Residency program believe that “income, language, and race too often predict academic achievement” (seattleteacherresidency.org) within the city of Seattle, and they created the residency program in order to create a new pipeline of effective and diverse teachers. Partnering with the University of Washington College of Education, graduates of the Seattle Teacher Residency earn a Master’s in Teaching degree with an endorsement in special education or English language learner instruction (seattleteacherresidency.org).
The 14-month residency begins in June and culminates the following summer. Seattle Teacher Residents take coursework at the University of Washington while concurrently teaching and learning alongside a mentor in a K-5 Seattle Public School classroom. Residents teach in their mentor classrooms four days a week and attend class one day a week. For coursework, residents take traditional courses such as math methods, literacy methods, and classroom management while also taking courses such as community and politics that focus on issues of equity and social justice. Residents also participate in a year-long field experience course with support from a coach through the University of Washington College of Education, where residents have the opportunity to learn the knowledge, skills, and mindsets of an outcome-driven, data-literate teacher. For their classroom apprenticeship, residents teach alongside a mentor teacher who is a Seattle Public School teacher. It is incumbent on mentors to provide opportunities for residents to enact practices from their coursework and fulfill teaching requirements in a gradual release of teaching responsibility. Mentor teachers are also responsible for providing regular feedback to residents.

The Seattle Teacher Residency partners with the National Center for Teacher Residencies to collaborate with other residency programs and experts in the field to support and strengthen programmatic impact. The National Center for Teacher Residencies, located in Chicago, Illinois, is a national, not-for-profit organization that helps develop, launch, and support high-performing teacher residency programs across the country. One of the National Center for Teacher Residency’s main goals is to “develop customized and responsive programming to strengthen program goals and
troubleshoot identified barriers to success” (nctresidencies.org). The data literacy curriculum that the Seattle Teacher Residency now teaches its residents is one example of curricula created in partnership with the National Center for Teacher Residencies. In conjunction with the Seattle Teacher Residency and other state residency programs, the National Center for Teacher Residencies conducted a multiple-year study to research data literacy, and to create a year-long data literacy curriculum based on their findings. The result was the creation of the National Center for Teacher Residencies Assessment and Data Literacy Continuum and Scope and Sequence. This curriculum has now been shared nationally by the National Center for Teacher Residencies and is being implemented by faculty at the Seattle Teacher Residency.

**Faculty Perspective**

The National Center for Teacher Residencies is a small non-profit organization with a staff of approximately 20. Several staff members at the National Center for Teaching Residencies serve in an instructional capacity, working to develop curricula and programming for the teacher residencies within their network. Shannon is one such instructional leader at the National Center for Teacher Residencies. Shannon was trained to be a teacher as an undergraduate and went on to become a public school elementary teacher for several years. Shannon doesn’t remember being taught the knowledge, skills, and mindsets of an outcome-driven, data-literate teacher. She often reflects that had she chosen to enter the field of teaching now — as opposed to over 15 years ago — that she would not have the mindset or skills to be an effective teacher given all the demands that exist for educators today where data are concerned. However, Shannon began to develop
data literacy skills during her time in the classroom and, later, during her doctoral coursework in education. Shannon was one of the chief architects of the National Center for Teacher Residencies Assessment and Data Literacy Scope and Sequence. Shannon believes her doctoral training had an impact on her ability to develop this content, and describes her curriculum design work as being like “mini dissertations.” Shannon reports that it was in her doctoral training that she developed a data-focused mindset and became data savvy.

Shannon thinks it is very important for a teacher today to be outcome-driven and data-literate, but that it is important to be thoughtful in how teacher trainers develop this type of teacher. Like researchers Mandinach and Gummer, Shannon is concerned with the conflation of assessment literacy and data literacy: “I think we pigeonhole new teachers into thinking, ‘oh, if I can assess my students’ knowledge, I’m data-literate.’” Shannon argues that becoming data-literate includes both learning how to use multiple sources of data to inform instruction and being able to think about a student holistically in addition to what the assessment data say: “We were thinking really globally around word choice when we were doing this work, and assessment felt like it was stifling and it wasn’t as encompassing as we wanted it to be.” Shannon and her colleagues fear that when people hear the term “data literacy” they will default to thinking of multiple-choice tests with data populated in easy-to-use spreadsheets: “There’s obviously lots of affordances this type of data gives you. But it also isn’t the whole picture. You have to think about the best ways in which students learn and can show what they know.”
Shannon and her colleagues at the National Center for Teacher Residencies were incredibly systematic and intentional in how they went about creating their assessment and data literacy coursework. First, they contacted four residency programs in order to identify what these programs were already doing to prepare data-literate teachers. Next, Shannon and her colleagues codified what these programs were doing and created a year-long scope and sequence that described what a data-literate teacher needs to know and be able to do. A scope is “the breadth and depth of content that an educator covers…(and) sequence is the order in which the educator presents the content” (reference.com). During their research, Shannon and colleagues posed questions such as “What content and theoretical foundation do teachers need? What strategies or tools do they need to understand? When should they practice applying these strategies? How should programs measure resident success and acquisition of this knowledge? What professional development experiences might they need to provide to mentors and coaches to support this work?”

Next, Shannon and her colleagues created a conceptual framework for how they would go about answering these questions and gathered a rich research base to understand everything that had been written on the topic of outcome-driven data literacy to date. Shannon also reached out to colleagues working at different teacher training organizations who were also beginning to develop data-literate teachers, in order to learn how they were approaching this work. From there, Shannon and her colleagues identified a set of foundational texts, created core principles for developing data-literate teachers, and created a data-literate teacher continuum and year-long scope and sequence for
developing novice data-literate teachers. The initial curriculum was then piloted across multiple residency programs — including the Seattle Teacher Residency — and has been improved upon in years since based on learnings from pilot programs.

The National Center for Teacher Residency Data Literate Teacher Continuum contains five stages of development. The first stage of the continuum, termed assessment knowledge, is the one at which residents learn about different types of assessments and the purposes of those assessments. In the second stage of the continuum, termed assessment analysis, residents learn how to create or choose an appropriate assessment to measure academic and non-academic competencies that yield useful data. The third stage, termed data collection and management, is where residents begin to collect and track academic and non-academic data and begin to analyze those data. In the fourth stage, data analysis, residents learn how to use data analysis skills to identify patterns, strengths, and weaknesses within their data sets. The fifth and final stage, termed enacting data-driven instruction, is that at which residents set both long- and short-term learning goals for students, collect data related to those goals, use data to drive their instruction, and use data to communicate with students and families (NCTR Data Literate Teacher Continuum 2014).

Seattle Teacher Residents have had the opportunity to develop the knowledge, skills, and mindsets encompassed in the five stages of the Data Literate Teacher Continuum through a nine-module scope and sequence taught within the year-long field experience course. This scope and sequence mirrors the Data Literate Teacher Continuum and includes the following nine modules: assessment knowledge; assessment knowledge
and quantitative assessment analysis; assessment knowledge and qualitative assessment analysis; data collection, management, and analysis; assessment literacy checkpoint; a data-literate teacher and focal student learning; data analysis and collaboration; summative assessment data; and data for student and family conferences (NCTR Assessment and Data Literacy Scope and Sequence 2014).

Each module within the scope and sequence includes stated objectives, suggested resident learning experiences, and performance assessments. As an example, in the assessment knowledge module, the first module in the scope and sequence, the module’s stated objective is that “residents will demonstrate an understanding of the foundational knowledge of an assessment-literate teacher, the components of a unit plan, a process for assessing student learning (data cycle), and how to articulate measurable, attainable, standards-based lesson objectives for students” (NCTR Data Literate Teacher Continuum 2014). During this module, residents engage in learning experiences such as the following:

1) Learn how teachers (not just mentors) execute data cycles through observation, discussion, and analysis with a resident or school-based cohort.

2) Articulate the importance of a cycle of inquiry or data cycle.

3) Read critical texts about unit design and backwards planning (e.g., *Understanding by Design* by Wiggins and McTighe and *Teaching for Understanding* by Tina Blythe).

4) Create measurable, attainable, and standards-based lesson objectives.
5) Identify the different ways a teacher can collect data that inform her or his practice (e.g., “Ms. Bullen’s Data-Rich Year”) (NCTR Data Literate Teacher Continuum 2014).

Finally, residents have been assessed in this module in three ways: through the NCTR Assessment Literacy Diagnostic, a pre- and post-assessment on the data cycle, and through a unit plan. Each module in the nine-module scope and sequence includes objectives, resident learning experiences, and performance assessments stated at this level of specificity.

The National Center for Teacher Residencies Assessment and Data Literacy Scope and Sequence was created to be a “plug and play” resource that residencies could adapt and integrate into their existing coursework, and it is therefore content agnostic (NCTR Assessment and Data Literacy Scope and Sequence 2014). Although the NCTR assessment and data literacy scope and sequence was created so that it could be implemented as a stand-alone course, Shannon’s recommendation was that the content of the data literacy course be integrated into an existing field experience course. One of Shannon’s concerns was that, if data literacy “sat as a standalone course, it would feel like a standalone thing.” Shannon reiterated that “data literacy isn’t data for the sake of data; it’s data that informs instructional practice. And so, if data literacy is in the absence of content, we’re not thinking about the students. And the most important thing is that we are using data in service to the students.” In this way, Shannon and her colleagues believe that data literacy cannot be divorced from the content a resident is going to teach. Furthermore, Shannon believes that embedding data literacy practices within existing
content and methods coursework will help them to be seen as part of instruction, rather than as an extra thing teachers do on the side.

Shannon believes the biggest win in creating the curriculum to develop outcome-driven, data-literate teachers is that people are generating new conversations among teachers and principals across grade levels and schools. Shannon has also seen strength in the continuum model — that data literacy isn’t something that is developed in one course, or even one residency year, but rather is something that is developed over time. Shannon is also proud that the very simple data tracker they developed in year one is still in use, and is being reviewed and modified each year. Finally, Shannon is proud of the data literacy mindsets they are developing in their residents. “I feel like what we are trying to push residents to do is to be curious about the kinds of things they can learn from students…that assessments give them one tiny piece, but it’s not the whole picture.”

Shannon identified the two main lessons learned from her work developing outcome-driven, data-literate teachers. First, it is hard to figure out how to measure student learning accurately over the course of a school year. Shannon believes it is easier to train a resident in how to align a daily lesson objective with a daily assessment, and that residents are only learning year-long measurement principles at a very surface level. The second lesson is that “more is not better,” which she says is a difficult one: “There’s so much I want to dig into with them, particularly around doing deep analysis of student work. But I’ve learned that you have to decide what is actually most critical to expose them to, versus trying to do a really in-depth look at something, because it is only 14 months.” Shannon shared that the “less is more” mentality was a push for the program.
overall. We’ve been “thinking about how to avoid redundancy because we strive to
consider how much content residents can truly absorb in one year.”

Ultimately, Shannon believes there is still a lot of fear surrounding data.
However, she and her National Center for Teacher Residency colleagues are trying to
overcome this fear with their work. “Data is actually power…what it does for you as a
teacher is it allows you to become a more effective teacher. It’s not about data for
evaluating teachers; it is about data teachers need to do their job better.” Shannon and her
colleagues hope that more people realize we must develop data-literate teachers because
we are “in this for K-12 students,” not because we want to find a better way to prove a
particular teacher’s effectiveness. “I think if you can create a culture where people are
focused on the fact that data use is in service to student learning, I think we are really
going to accelerate the use of data.”

**Teacher Perspective**

Eva is a third grade teacher, a Seattle native, and a graduate of the Seattle Teacher
Residency program. Eva grew up in Seattle Public Schools and, when she chose to
become a teacher, decided she wanted to work in the same district where she attended
school. Eva started her work with students as a tutor and had several jobs in non-profits,
but was having a hard time making a commitment to a career. The one interest that
remained constant throughout all of her first jobs was working with students. That
interest brought her to the Seattle Teacher Residency, where she was excited about the
immersive residency approach and social justice focus of the program. Eva liked that
Seattle Teacher Residency focused on “how we can make a more equitable learning environment for kids, including kids who are not a part of the majority.”

Through the Seattle Teacher Residency, Eva became committed to being an outcome-driven, data-literate teacher. An idea that resonates with her beliefs about teaching is that “all learning can and should be measured…and all the data you get is [sic] guiding your instruction.” Eva believes it isn’t good enough to think or feel something about students’ progress, but that learning must be documented: “In order to illustrate growth, there has to be something concrete that we can hold onto that really shows and displays and measures progress.” Eva feels becoming outcome-driven and data-literate is of the utmost importance to a teacher’s success in her classroom. In fact, Eva doesn’t know how she would help her students meet grade-level standards without data. Without data, “how would you even do your planning…or get students what they need?” Eva believes that having data, or “cold, hard evidence,” helps her better to advocate for the resources her students need in order to succeed.

As a Seattle Teacher Resident, Eva appreciated both what data literacy content she was taught and how she was taught that content. Eva appreciated that the Seattle Teacher Residency instilled in its teachers the belief that “every student can learn regardless of perceived ability level, race, socioeconomic status, et cetera.” However, Eva also appreciated that the Seattle Teacher Residency backed up this mindset with a skillset for using data. “It’s one thing to have data use as a belief, but if you’re not using data, then you’re not enacting that belief, right?” As a current Seattle Public School teacher, Eva also appreciates that her Seattle Teacher Residency data literacy coursework was
aligned with the expectations of the Seattle Public School District. “It’s an expectation at
my school that everything I’m doing is based on data. My principal expects that I’m
pulling data groups once a week.” Eva stated that she is consistently drawing upon
everything she learned in the Seattle Teacher Residency in order to think of ways in
which to formatively and summatively assess her students, and subsequently to use those
checkpoints to inform her instruction.

One of Eva’s biggest pieces of praise for the Seattle Teacher Residency is the
residency model itself. Eva valued that all of her coursework was aligned with what she
was doing with real students in her apprenticeship class each week. Eva liked that she
was able to administer real assessments and collect real student data alongside her mentor
teacher: “Our work was based on what I was actually doing, which made me understand
it better, and also made it a better use of my time. And it allowed me to see results like,
‘Wow! Planning it this way and using the data really allowed my students to understand
this content better than before.” Eva also valued the continuum of her development:
“What really worked for me is, first, giving me an opportunity to know my students and
not forcing data literacy at the beginning of the program, but giving us an opportunity to
get acclimated into the classroom and make sense of the curriculum…at the beginning of
the year I didn’t know enough about instruction to figure out how I could change or
improve it, so it wouldn’t have been an effective tool at that time.” Eva also liked that
data literacy instruction started with foundational assessment knowledge. Finally, Eva
appreciated that she was given the opportunity to talk about data with her residency
colleagues during class time, which helped her make better sense of her data.
In addition to the strengths Eva identified in Seattle Teacher Residency’s data literacy instruction, she surfaced two ways in which Seattle Teacher Residency’s data literacy instruction could be improved. First, Eva believes more time is needed to teach challenging content, particularly the backwards planning aspect of data literacy. Backwards planning is “a process that educators use to design learning experiences and instructional techniques to achieve specific learning goals. Backward design begins with the objectives of a unit or course — what students are expected to learn and be able to do — and then proceeds ‘backward’ to create lessons that achieve those desired goals” (edglossary.org/backward-design/). “I wish we had learned backwards planning a little bit earlier in the year, and that we had time to practice it more…it’s really hard to think that way if that’s not how you are used to planning.” Another challenge Eva faced was the lack of alignment between her coursework and clinical experience. While Eva says that Seattle Public Schools have been fairly consistent in training their teachers in data collection and data analysis, their knowledge is “superficial knowledge and not a part of their core philosophy, necessarily, as it is with someone like me, where this is kind of ingrained in my teacher blood.” Unfortunately, the mentor teacher with whom Eva was paired with was not an outcome-driven, data-literate teacher. Eva thinks it would be helpful if mentor teachers possessed sophisticated data literacy skills and had data systems in place in their classrooms from the beginning of the year, so that residents would not have such a disconnect between their data literacy instruction and the skill sets of their mentor teachers.
Eva’s commitment to being data-driven extends beyond the training she received: “My investment in the community and serving people is very important because I’m a person of color, and my family is not from this country. I see myself in the students that I serve because I know that if I had been dismissed the way that so many of my students were, I would not be able to have the opportunities that I have. So it’s a different narrative for me…because any one of these students could’ve been me, and that’s why I care so deeply about ensuring their success.” Eva says her professors, instructors and staff members also cared deeply about her success and “went above and beyond anything I needed to make sure that I succeeded. I had a really rich and meaningful experience that I reflect upon with absolute fondness, and I feel absolutely prepared for being a first-year teacher because of it.” Finally, Eva believes outcome-driven data literacy is “critical to teaching.”

Summary

As a brand-new program, the Seattle Teacher Residency has yet to publish any information about the effectiveness of its graduates. At the time of this study, the Seattle Teacher Residency Website reported that “two cohorts of residents are currently teaching in Seattle Public Schools. The 31 Residents (25 elementary + 6 special education) of Cohort Three began graduate coursework in summer 2015 and start in Seattle Public School classrooms in Fall 2016” (seattleteacherresidency.org/about/). It is unclear how the effectiveness of graduates from the Seattle Teacher Residency compares to the effectiveness of other Seattle Public School teachers who were trained through other programs and schools of education.
The National Center for Teacher Residency’s Assessment and Data Literacy Scope and Sequence implemented by the Seattle Teacher Residency is a thorough and well-researched example of outcome-driven data literacy curriculum for new teachers. The NCTR Data Literate Teacher Continuum is an example of a curriculum that develops an outcome-driven mindset in new teachers, as well as concrete data literacy skills. Furthermore, the NCTR Data Literate Teacher Continuum is a curriculum that specifically calls out the difference between assessment literacy and data literacy and works to develop both skill sets in its teachers.

Though the National Center for Teacher Residencies Data Assessment and Data Literacy Scope and Sequence was created to be a stand-alone, year-long course that national residency programs could “plug and play” within their existing curricula, it was faculty members’ recommendation — and intention — that this content be embedded in existing coursework within each residency program. For instance, one faculty member felt that the Assessment and Data Literacy Scope and Sequence could be embedded in a course such as math methods, where residents could not only learn data literacy skills, but learn these skills within the content they were teaching in their K-12 classrooms. NCTR faculty not only felt that embedding content was a better pedagogical approach for teaching data literacy skills, but that the embedded approach was necessary in order for teachers to see outcome-driven data literacy as a part of their daily work. One faculty member noted that if data literacy content is taught as a stand-alone course, it will feel like a stand-alone skill — when really, data literacy is both broadly and crucially relevant to everything a teacher should be doing with her students.
Though National Center for Teacher Residencies faculty members are pioneers who may not have been thoroughly trained to be outcome-driven, data-literate teachers in their own teacher training, it is nevertheless the case that their classroom experience, coupled with their doctoral research, has made them incredibly well-versed in data literacy for teaching. Furthermore, the research-based approach to developing their data literacy curriculum shows a thorough understanding both of what the literature says about data literacy for teaching, and of how these practices are currently manifesting in the field.

The description of data literacy instruction by National Center for Teacher Residencies staff, Seattle Teacher Residency faculty, and Seattle Teacher Residency graduates largely resonated across respondents. Faculty members and teachers interviewed for this study shared a sophisticated understanding of outcome-driven data literacy. Perhaps the most promising practice that surfaced from the National Center for Teacher Residency data literacy curriculum is that it was developed as a continuum of development — i.e., faculty were able to gradually develop residents’ outcome-driven data literacy skills over the course of a year. Through this approach, faculty attempted to meet residents at their zone of proximal development. Seattle Teacher Residency’s embedded approach to teaching this content also appears to be a success. Far from a faculty member’s concern that teachers would see outcome-driven data literacy as stand-alone content, the teachers interviewed for this study spoke about data literacy as both a key driver in their practice and a skill essential to their daily work as teachers.
A main challenge the Seattle Teacher Residency faces — along with other residency programs that place teachers in classrooms with mentor teachers who were not trained through the same program — is finding alignment between the content teachers learn in coursework and the teacher habits they learn from their mentor classrooms. One teacher interviewed for the study did not have the opportunity to work in a classroom with a mentor teacher who was data-literate, or who had data systems in place in her classroom. Not only can this misalignment send mixed messages to a novice teacher, but it may work to undermine the importance of data literacy for new teachers — for instance, new teachers may see data literacy work as something they learned in their training but don’t actually have to do in practice.
Chapter 5: Aspire Teacher Residency

Overview of the Program

Aspire Public Schools is one of the first charter management organizations in the United States. Started in 1998 by educator Don Shalvey and Silicon Valley entrepreneur Reed Hastings, Aspire Public Schools was created to provide high-quality, college preparatory K-12 public schools in low-income neighborhoods. Aspire’s mission to improve K-12 public education is three-pronged: the charter management organization seeks to prepare underserved students for college, train highly effective teachers, and share innovative practices. Today, Aspire serves over 16,000 students within 40 schools across the state of California and the city of Memphis, Tennessee. Aspire’s mantra is “college for certain,” and this statement is backed up by the fact that all graduates of Aspire Public schools have been accepted to a four-year college or university (aspirepublicschools.org).

In 2010, as a part of Aspire’s mission to train highly effective teachers, the charter management organization created the Aspire Teacher Residency. The Aspire Teacher Residency is a one-year residency similar to the medical residency model, in which residents take a year of master’s-level coursework while simultaneously working, teaching, and learning alongside a mentor teacher in a K-12 Aspire classroom. Teachers complete the program with a master’s degree from a partnering graduate school of education in their region, as well as a preliminary teaching credential in the grade(s) and subject(s) of their specialty such as elementary education, special education, or subject-specific secondary certifications in the areas of math, English, social studies, and science.
Upon completion of the residency program, graduates are given hiring priority at Aspire Public Schools and receive one-on-one coaching during their first three years as full-time classroom teachers (aspirepublicschools.org).

The structure of the Aspire Teacher Residency is based on master’s-level coursework, an in-classroom teaching residency, and classroom observation by residency directors. The Aspire Teacher Residency is led by a director within each region. Regional Teacher Residency directors are responsible for designing and teaching coursework, coaching, developing, and overseeing mentors, observing classroom instruction of mentors and residents, as well as for overseeing the overall residency program within their region. Aspire Teacher Residency residents are placed in an Aspire classroom and are mentored by that class’s teacher for the entire year. Residents spend four days a week observing and co-teaching alongside their mentors, and spend one day a week taking coursework via the Residency seminar class taught by regional Teacher Residency directors, and by attending classes through their local graduate schools of education. Aspire Residents in the Bay Area attend classes at the Gladys L. Benerd Graduate School of Education at the University of Pacific located in Stockton, California.

Within an Aspire classroom, residents observe mentor teachers and begin to apply what they are learning in their coursework. Residents participate in three “take-overs” throughout the school year, where they effectively take over 100% of classroom instruction for anywhere from four to seven consecutive days of instruction. The takeover experience is provided to give residents the opportunity to practice what it is really like to teach a class for a whole day or whole week, as opposed to only being able to co-teach, or
to independently teach one lesson. In addition, residents are simultaneously working toward passing four “gateways” which are competency-based assessments that assess a resident’s ability to be a successful teacher. The first gateway addresses a resident’s ability to adhere to Aspire’s professional norms, and the final gateway focuses on a resident’s ability to design and deliver an effective lesson. A resident must pass all gateways to remain in the program.

Aspire Teacher Mentors must have taught at Aspire for at least three years and go through a rigorous vetting process before being hired to work as a mentor. Originally, mentors were given a lot of leeway in terms of how they trained and worked with residents assigned to their classrooms, but in the past few years this mentorship has become more structured. Aspire Teacher Residency mentors now follow a year-long structured scope and sequence that provides a gradual release of classroom responsibility to the resident throughout the year. Mentors also receive professional development and coaching from the regional director to develop their coaching abilities. Both mentors and residents are observed by regional Teacher Residency directors throughout the year. Residents’ outcome-driven data literacy skills are developed through all aspects of the Aspire Teacher Residency. Residents take data literacy coursework, and learn how to be outcome-driven and data-literate teachers through their residency in a data-driven K-12 classroom.

In addition to creating the Aspire Teacher Residency, Aspire Public Schools also possess a highly data-driven culture. Aspire was founded upon the use of data. From the early stages in the late 1990s, Aspire used internal assessments to measure student
outcomes and, in turn, used those data to drive instruction. Since then, data use in Aspire Public Schools has only continued to grow. Today, all Aspire employees (even non-teaching staff) participate each year in a professional learning plan, which is an annual performance system based on data. Each employee sets measureable goals at the beginning of the year, and her or his performance (and pay) is evaluated based on the ability to meet those goals. Classroom teachers and school principals set quantitative student achievement goals for their students each year, and they use peer, student, and parent survey data to drive their practice. Each Aspire campus also now has a “data driver,” a leadership role created to help each school analyze and use data to the best of its ability. In the future, Aspire Public Schools hopes to further formalize the residency program by becoming its own accredited school of education. Aspire is currently in the accreditation process and hopes be able to award its own teaching credentials and master’s degrees by 2019.

Faculty Perspective

Miles began his work at Aspire Public Schools as an elementary school teacher. After teaching for several years, he became a teacher coach. Today, Miles works as a director of the Aspire Teacher Residency. As a long-time employee of Aspire Public Schools, Miles believes deeply in data. However, Miles’s love for data didn’t begin at Aspire. Growing up, Miles liked math and loved playing sports. It was at that time that he started to see data all around him. He remembered studying the data on the back of his baseball cards and thinking about how his little-league coach used data to drive the team: “I remember our coach had a stat sheet that he would handwrite. He would highlight
them in blue if your stats were improving, and he'd highlight them in yellow if they were the highest on the team, and I just thought that was super cool. I kind of fell in love with this idea.” Miles credits this experience with helping to develop his data-focused mindset—a mindset he carried with him as he became a teacher at Aspire.

“I think I’ve always been a little intrigued by data,” explains Miles. “Not necessarily comfortable with it, but not scared of it. During my first year of teaching at Aspire there was [sic] data all over the place.” Miles remembers having a quantitative student achievement goal that he and his students were supposed to meet by the end-of-year, and engaging in “cycles of inquiry” during which he analyzed his students’ progress toward that goal throughout the year. As Miles transitioned to a lead teacher role and eventually into his role as a director of the Aspire Teacher Residency, he continued to think about how data could be used to motivate teachers and to improve their practice. He thought about how Aspire uses “data talks” wherein a group of teachers who teach similar grades and subjects come together to talk about their assessment results, and about how this process could be challenging for new teachers: “I thought about being a new teacher, and how it’s not that fun to go to data talks because I know going in I’m probably going to have the worst data, and then, you know, the first thing we'd do in a data talk is to have people celebrate. So now I've got to hear our veteran teacher talk about all the great things she’s doing, which wasn’t helpful. So I changed the way that we did data talks, starting with a question of what we can all improve. Now we ask a question like ‘What is [sic] some data that you have that's [sic] been a struggle, and how did you overcome that?’ This allowed us to reframe data talks as, 'We all make mistakes,
and now I'm sharing a strategy with you; maybe you can take something away from what
I’ve learned.”” As a director of the Aspire Teacher Residency, Miles spends most of his
time observing and coaching residents and mentors in their classrooms, as well as
teaching a weekly seminar class for residents. Throughout all these interactions, Miles
helps his residents to become outcome-driven and data-literate.

Miles grew up with a love of math and for the use of data, and he also believes
that data literacy skills are necessary for students, teachers, and school systems to
achieve: “Data is [sic] a part of everything we do at Aspire, from students on up, like how
professionals are evaluated from how well our students are doing.” Miles believes it is
very important for a teacher today to be data-literate, and he also believes that data
literacy goes beyond assessment literacy: “When folks think about data, they think about
assessment and standardized testing. And I don't necessarily feel that all of our data
should come from standardized testing — I think that that's just kind of the way people
perceive it. If we were to broaden our mind and our understanding of what data literacy
means and how it can be beneficial, I think there's a lot of power in it.” Miles believes the
first type of data teachers should collect are about the community, families, and kids they
are serving. Miles believes in collecting social, emotional, and behavioral data that can
inform how teachers tailor lessons and manage their classrooms. Miles believes that these
types of data, along with academic data, “should be put together to provide the best
service for the whole child.”

Miles and his residency director colleagues are responsible for creating the
curricula Aspire residents receive in and out of their mentor classrooms. To create this
content, Miles and his colleagues meet weekly to collaborate on the creation of curricula and to divide the work up amongst the team. After the curricula have been taught to residents, the director team meets to provide feedback to one another on their work, and the team also uses survey data from residents, mentors, and principals to improve instruction moving forward. In addition to aligning residency instructional materials with the Aspire residency scope and sequence, Miles and his team also work to align the residency curriculum with the knowledge and skills residents need to earn teaching credentials in their states. Most recently, this work included aligning Aspire coursework with the edTPA teacher certification exam. As part of that exam, teachers must design and administer a student assessment, analyze student data, and provide feedback to students. Miles and his colleagues worked to mirror this expectation in their course assignments “as a guiding light for what we want them to do.”

The Aspire Teacher Residency is intentional in how it develops its residents to become outcome-driven, data-literate teachers. Through the use of multiple stand-alone data literacy courses and an embedded instruction approach, Aspire residents receive data literacy instruction every week — if not every day — of the program. At the heart of the Aspire Teacher Residency is a document called “SUMs,” which stands for skills, understandings, and mindsets. In this document, Aspire lays out three overarching residency program goals and 10 student learning outcomes for residents, as well as 63 discrete skills, understandings, or mindsets a resident should possess by the end of the program. The content of the SUMs document aligns directly with the knowledge, skills, and mindsets needed to be an outcome-driven, data-literate teacher. Programmatic goals
speak to the need for residents to understand theory, approach their work with concerns for social justice and equity, and possess rigorous pedagogical skills. Of the 63 skills, understandings, and mindsets shared in the document, 22 directly relate to data literacy skills, and the majority of the remaining SUMS are skills support the work of a data-literate teacher (2016, Skills, Understandings, and Mindsets).

The Aspire Teacher Residency uses coursework and the in-class residency to help them achieve program goals and achieve the skills, understandings, and mindsets that are laid out in the SUMs document. Aspire teaches two stand-alone courses that explicitly address outcome-driven data literacy skills: Data-Based Decision Making, taught in the fall; and Research in Action, taught in the spring. Data-Based Decision Making is an eight-week hybrid online and in-person course taught by Miles and other residency directors in their respective regions. The purpose of the course is to introduce residents “to the systematic processes used by school psychologists, educators, mental health professionals and other school personnel to collect and analyze academic data and design and implement academic interventions” (EDUC 345 Fall 2016 syllabus). The course draws upon the work of Paul Bambrick-Santoyo’s Driven by Data and immerses students in “the perspective that data is [sic] powerful, useful, and should be used to drive instruction” (EDUC 345 Fall 2016 syllabus). Within the course, residents learn content such as: elements of a data-driven culture, how to create an action plan based on data, characteristics of oral and written feedback, how to use summative assessments to gather evidence and make sense of what students have learned, how to use formative assessments to check for understanding throughout a lesson, and how to use data to guide
lesson planning. During the course, residents practice by bringing assessments and student achievement data from their residency classrooms to analyze data, look for common misconceptions on the assessments, and think about what next steps they should take with their students. The culminating assessment for the course is to design and administer an assessment, collect and organize the results, and analyze the results in order to create an action plan for re-teaching. This assignment aligns with the knowledge, skills, and mindsets residents must demonstrate on the edTPA teacher certification exam.

In the spring term, residents take another data literacy course titled Research in Action. The purpose is to teach residents how to use “classroom-based action research as a vehicle for systematically addressing issues of concern in (the) classroom” (EDUC 274 Spring 2018 syllabus). In this course, residents select an equity-related issue present within their residency classrooms and learn how to use quantitative student achievement data, as well as qualitative data, to “understand and implement differentiation techniques to meet the individual needs of students” (EDUC 274 Spring 2018 syllabus). Within the course, residents develop a basic understanding of qualitative and quantitative research methods, including how to write a good research question, research ethics, how to write a literature review, how to conduct research on a topic of interest, how to identify common trends within the research, testing interventions to meet a chosen academic need, collecting data to test the effectiveness of the intervention, and reflecting on how research outcomes have impacted the residents’ educational philosophies and beliefs. The final assessment for the course is for residents to complete their own equity-based action research projects.
Though the Aspire Teacher Residency devotes two stand-alone courses to data literacy content, residency directors also work to infuse outcome-driven, data literacy content within other courses residents take throughout the year. One concrete example of this is within residents’ courses on supporting special education students and English language learners. Within each of these courses, residents are asked to look at student achievement data within Aspire’s data portal to get a sense of how students are performing, and to gain access to Individualized Education Plans. Miles shares that “most, if not all, of residents’ coursework, even if it’s mostly an online course, requires some access and reflection on their own students’ data.”

In addition to graduate-level coursework, Aspire residents also learn how to become outcome-driven, data-literate teachers through their K-12 classroom residency. Resident mentors, who are also the full-time teachers of record in their residency classrooms, follow a year-long mentorship scope and sequence that provides a gradual release of responsibility to residents throughout the year. This document includes week-by-week instructions on what content the resident and mentor should co-teach, what content the mentor will observe and provide feedback on, and what content the resident should plan and lead on his own. Many outcome-driven data literacy skills are included in this scope and sequence. Examples of data literacy content included in the gradual release scope and sequence include: checking for understanding, formative assessment, data-based decision making, assessment creation, data analysis, teaching toward an instructional goal, giving feedback to students, using data to address student needs,
working with students in small groups to address needs, and action research (2016, Full Year Gradual Release Template 2016-2017).

Residents also develop outcome-driven data literacy skills as a result of the observation and check-ins they receive from residency directors. Directors visit residency classrooms frequently throughout the year to observe resident teaching and mentor teaching. Following each observation, directors hold a group check-in with the mentor and resident, as well as one-on-one check-ins with each individual. Miles shares that he and his director colleagues use these check-ins as opportunities to develop data literacy skills: “We’ve made a goal of it this year…to bring student data to the forefront when we are doing our check-ins and meetings. So instead of just having a broad reflection, like ‘How did your lesson go?’ we say ‘Let’s look at the data; what does [sic] the data tell us? Now, how did the lesson go? What would you do differently?’” Miles believes these questions give residents a lot of small-scale practice and help to develop the mindset that using data is part of what a teacher does in order to be effective.

Finally, Aspire residents develop their outcome-driven data literacy skills by working within the culture of Aspire schools. Outside of formal residency training, Aspire residents participate in the same meetings and cultural activities as their mentors throughout the year. One major aspect of Aspire’s data culture is the Cycle of Inquiry process. The Cycle of Inquiry process is a protocol and structure for analyzing data used across school sites. The process begins with administering a pre-assessment that teachers use to inform their instruction for the upcoming unit. At the end of the unit, teachers administer a post-test to see what students have learned. From there, teachers engage in a
“data talk” with other teachers at the school. To participate in a data talk, teachers complete a data analysis template wherein teachers answer questions such as “Which students got it? Which students didn’t? Which questions did students do worst on? What surprised you?” Recently, schools have also begun to include equity-related questions on data analysis templates, such as “What differences exist among subgroups (race, gender, ethnicity, language, class etc.)? How do I engage all students in all subgroups? How might my own race/gender/ethnicity/class influence my teaching in any ways that contribute to any inequitable patterns?” (Aspire Data Analysis Form). Teachers then use the responses to these questions to talk about the data and share ideas about how they can further student learning and improve their own instruction.

Miles reports the promising practices within Aspire’s approach to developing outcome-driven, data-literate teachers have to do with their residents being embedded in a data-rich culture. First, Miles believes Aspire has succeeded in developing a data-driven mindset in its residents: “I think the mindset about data is most important. We talk about growth mindset all the time at Aspire…believing in students is really important.” Miles sees this mindset emerge most perceptibly during data talks: “You have to be extremely professional when you’re looking at data. You may have data that is [sic] really hard to look at where your students didn’t do as well as you wanted. Maybe there’s an outlier in your group; maybe one person did really well; maybe one person did really poorly. But being able to go into that objectively and thinking about ‘I want to come out of this meeting with some solid next steps of what I should be doing’ and separate myself from any failure is extremely important.”
Miles also sees that consistent, small-scale practice has been a huge win for the residency program. This small-scale practice takes place within coursework, and within the residency classroom. Within the Data-Based Decision Making course, Miles recently redesigned sessions to give residents more opportunity to practice data literacy skills with data from their own residency classrooms: “A lot of practice on a small scale has been a huge success.” Miles shares that a lot of small-scale practice (such as analyzing formative assessments) helps residents translate their data literacy skills into larger-scale summative assessments. Residents also receive multiple rounds of small-scale practice within director observation meetings, as well as within Aspire’s cycle of inquiry and data talk practices. Miles shares that, overall, multiple rounds of short practice have “been a nice home run for us.”

Finally, Miles thinks it is helpful that residency directors are the ones teaching data literacy courses within the Aspire Teacher Residency. “Our director team uses data all the time in our weekly calls, whether it's looking at seminar data or giving surveys to residents to make sure we're doing the best job we can. So we're all very comfortable with data. We were all either Aspire teachers or principals before we came into this position, so we have a really great context for the data mindsets and the skills of doing a data talk and looking at data.” Miles sees it as a nice benefit that the people who are most comfortable with data are also the ones teaching this content within their program.

Miles also shared lessons learned from developing and implementing Aspire’s data literacy curriculum. First, Miles and his colleagues believe it is important to go “deep not wide” when developing data literacy curricula. “Our mantra for the past couple
of years has been to go deep so residents understand what they are doing; so they understand the why and the how.” With regard to data literacy instruction, Miles and his team believe instruction should begin with developing a data-focused mindset and then focus on a couple of specific topics such as addressing misconceptions, checking for understanding, and adjusting instruction. Miles says that it is important for folks in education preparation to focus on the cake and not the icing: “The cake is having a resident exit the program ready for his or her first year of teaching as data-literate: comfortable with data, having the right mindset, and having an understanding of small pieces.” Miles believes the “icing” of data literacy can be developed after teachers begin teaching full-time, as long as they begin their teaching with a strong foundation in data literacy.

Miles and his colleagues have also learned that it can be difficult to use real student data in a residency context: “We wanted to be extremely practical and wanted students to use their own data. But it’s challenging because residents don’t necessarily have their own Aspire data portal accounts or their own data, and so they have to use their mentors’ data.” Not only are there logistical struggles to getting residents access to data, but regions and schools use data differently and focus on different areas. Therefore, it can be a challenge to get every resident to come to class with a meaningful set of data that relate to her or his classroom and students. Miles feels a data literacy class can feel alienating to residents who don’t have real-world data to analyze when they are in the same class as residents who were able to gather real-world data.
Moving forward, Aspire is thinking of three ways in which they would like to improve their data literacy instruction. First, Miles and his colleagues are thinking of more ways to teach residents to use data through an equity lens. One example of this lens is the equity-related questions Aspire recently added to their data analysis template. Aspire residents are also “bringing our own selves, our own privilege, our own whatever that we bring as educators and instructors, and considering how that may inform some of the results of our data.” Second, Miles and his colleagues are continuing to think about ways in which they can make sure that the data literacy instruction residents receive during their training year represents the cake, and that whatever data literacy instruction they receive after becoming full-time teachers is the icing. Finally, Aspire is beginning to think of new and different ways to capture data beyond traditional assessments: “We’re starting to get more into video observations and utilizing not only teachers recording themselves in their practice, and getting good at practicing ourselves, but also getting kiddos involved in recording their responses. That still blows my mind. I get so excited about it!”

Miles and his colleagues believe that many residents come out of college more comfortable with the evaluative types of data, and that residency directors must help these residents see data in other ways: “It’s what they’re used to; they’re coming out of college getting a grade every semester. We want to undo those misconceptions as quickly as possible.” The Aspire Teacher Residency directors believe a data-literate teacher is one who uses data in everything they do. Data-literate teachers “are super purposeful. They don’t spend endless hours differentiating assignments on the front end; instead, they
use data to make teaching purposeful. They are constantly checking for understanding and not using old, stale data to try to plan a lesson.” Finally, Miles and his colleagues believe that all Aspire educators can’t be afraid to ask themselves and their teammates essential questions: “There may be some questions we have to ask ourselves…and the data may not be pretty and may not be the response or numbers that we want, but if it’s true and it’s real and it’s what it is [sic], then let’s take it [sic], and let’s see what we can do to improve. Sometimes I think we overlook some really important trends in the data that’s [sic] there. It’s [sic] speaking to us.”

**Teacher Perspective**

Phillip is a 4th grade teacher at an Aspire Public School. A graduate of the Aspire Teacher Residency program, Phillip is now in his second year of full-time teaching at Aspire. As a child, Phillip struggled in school and had a poor experience with his teachers: “As a student, I needed the right environment to thrive, and if I didn’t have the right environment I wouldn’t fail, but I also wouldn’t be motivated.” Phillip says he was also quick to notice when he had an exciting and passionate teacher. The importance of a motivating teacher stuck with Phillip as he grew up, “so I always knew teaching was going to be at the back of my mind.”

After graduating college, Phillip had no idea what he wanted to do as a career and decided to go into athletic coaching. Phillip was a college athlete and liked kids, so this felt like a good fit. Phillip ended up loving coaching and working with kids. His experience was such a positive one that Phillip decided to go back to school to become a teacher. Phillip enrolled in a traditional education program at a local graduate school of
education and was on his way to becoming a school teacher. However, like his K-12 experience, grad school wasn’t a good fit and wasn’t motivating. Despite his leaving grad school, Phillip’s interest in becoming a teacher did not wane. He eventually secured a position teaching high school French.

Phillip taught French for one year with no formal training, which proved to be a tough task. Phillip thought his experience was a pretty terrible one: “I thought ‘this is awful!’ I didn’t feel like I’d done a good job teaching my students.” This experience led Phillip to seek out other teacher training organizations. “I knew I loved working with kids, so I was like, I can figure this out.” This search led Phillip to learn about the Aspire Teacher Residency. Phillip researched the residency program and was taken by Aspire’s mission. “I remember thinking ‘I love all of this!’ I liked the mission and their outlook on how education should work, and how all kids should be served in an equitable way.”

Phillip eventually applied for the Aspire Teacher Residency and now says he is “super happy!” “I do feel,” he adds, “that I’ve come a long way from the French teacher who didn’t know anything, to now, this fourth grade teacher who doesn’t even have the time to implement all the things I’ve learned. It’s super exciting!”

Phillip completed the Aspire Residency Program with an outcome-driven mindset. According to Phillip, being outcome-driven and data-literate is “definitely mission-critical...I think that education has changed a lot — even since I was in elementary school — and I think that’s a good thing. I think that we're doing so much for kids individually, instead of one-size-fits-all. There's huge gaps in education and what kids are getting based on their zip codes. If we ever want to close the gaps, it has to be
data-driven or the gaps will never close.” Phillip says that a lot of time is devoted to becoming data-literate within the Aspire residency model: “We've talked at length about using data to drive instruction, and we've had multiple professional development days where we're talking about using data and learning how to look at data, learning how to analyze data. So it's not just saying, 'Hey, we're using data.' We work to better ourselves and to norm our expectations so everyone's on the same page...I definitely feel like there is a commitment to not only believing that data drives instruction, but also creating opportunities to where we can become more data-literate.”

Phillip is thankful for all the outcome-driven data literacy skills he has received at Aspire, and he appreciates the data-driven culture that has been created within Aspire schools. “I'm really thankful because I think this work is hard, and it's super rewarding. Aspire believes in a certain caliber of teacher. If you don't believe that all kids can succeed, and if you don't believe that you should be held accountable, then I, personally, don't really want to work with you. Because these are all of our kids, and if you don't feel like you can be held accountable for what you're doing with them, or that every single one of them can learn in your classroom, then I'm not sure about you as a teacher. I really admire so many people at Aspire — I know we're all working toward a common goal.”

Phillip feels that data can be used in many ways, but that their use is essential. “I feel like if you're not using data, the data that you have in your hands, whether it [sic] be assessments, exit tickets, or whatever it [sic] be, and you're not using it [sic] in some way, shape, or form, even if it is just creating a different seating chart or creating groups based
on students’ needs, if you’re not using that [sic] data somehow, I feel like you're doing yourself and your students a disservice, you know?”

It’s not surprising that Phillip sees many strengths in Aspire’s approach to teaching outcome-driven data literacy. First and foremost, Phillip believes Aspire is doing a good job of creating a data-driven culture: “I think first you have to establish a culture of people who are willing to change. I feel like data wouldn't work in a setting or in a school where you have people who are complacent. I feel like you have to have an environment where people are willing to change, because with data, you're going to see that you're not “all that” as a teacher.” Phillip also remembers some of his first experiences building this outcome-driven mindset: “I can remember the first day of resident training and just being inundated with all of these ideas of what Aspire is about, what they believe, and what those things look like. We were shown videos and given articles about educational equity and how that affects us as teachers. We discussed what equity looks like for our students based on their race and socioeconomic status. It was just like, if you're going to be at Aspire, you have to believe these things, because if you don't believe these things, you shouldn't be doing the work here. And so it's just constant. We start every single staff meeting or professional development talking about our core values.” Phillip has also observed how these values and this culture extend across all people who work in the organization: “No one at this school, including the principal, is afraid of feedback. No one's sitting here saying, you know, 'I'm a seventh-year teacher; I've got it, I've learned it all,' you know, or, 'I'm a 10-year, 15-year teacher.' I think that's the difference, and I think that has a big, big part in being data-literate.”
In addition to creating and maintaining an effective outcome-driven culture, Phillip sees strength in how he was taught the data literacy skills necessary to enact his belief that all kids can learn. First, Aspire provided a foundation of data literacy skills through looking at student data within residency coursework. “They gave me the building blocks. It was like, okay now we are grading all of our students’ assessments, and now we are going to create SMART goals. It was professional development session after professional development session, after professional development session of ‘This is how we're going to look at this. This is how we're going to go forward on this.’ It was a lot of in-the-trenches work…they taught me what data was [sic], in this huge sense, and they gave me the tools to use it [sic] effectively.” One tool Phillip found helpful was Aspire’s cycle of inquiry data analysis template: “Aspire has this worksheet, that’s used to work through any data that we pull. We use it to look and see where most kids are falling down and how we can help those kids. I remember, it was this big thing — we spent multiple hours on it in one day. We brought in an assignment, and we went over it and talked about what the criteria for success would be, and we put students into these different bands like below, meeting, and exceeding and then thought about what the misconceptions were for students who were below. And for the students who were exceeding, what are they doing? Then we thought about next steps and goals from there. I remember that being mind-blowing for me as a teacher at that point; as a resident. I was like ‘Wow, this is super purposeful, as far as knowing what to do now.’”

Phillip also remembers having conversations with Miles and his mentor teacher about his data, and about the practices he uses now that he is a full-time teacher: “One
thing that we did that I thought was so powerful, which is something I'm doing today, was just simply taking exit tickets from my class in my student teaching year and learning how to separate them and learning how to organize them based on students’ needs, and then talking and having a conversation with my cohort and with my director and with my mentor about how to move forward with the data that I have.” Now that Phillip is a full-time teacher, he still feels he is receiving data literacy professional development: “We have professional development where we have presenters for half an hour, and then our team gets together for half an hour, and we talk about what we're going to do, and then we simply do it. I guess the emphasis here is that it’s on a consistent basis. I would say at least once a month we have opportunities to learn more about how we can analyze data. It’s just a constant conversation of how we can better ourselves. Pretty simple.”

While Phillip says he and his peers possess both a mindset about the importance of data and the skills for using them, he admits that he still feels overwhelmed about how to use data and craves more techniques for responding to them now that he is in the classroom. Phillip believes Aspire could improve its data literacy instruction by discussing the realities of using data: “We talk a lot about data — here’s where your kids are at, and this is what you need to do. But I think sometimes it would be really nice to have more honest conversations about how to make data more manageable in your classroom.” Specifically, Phillip thinks Aspire does a good job of analyzing and acting upon larger, summative assessments, but he’d like to know more about how to act upon data on a day-to-day basis: “Sometimes it’s hard to know where to go with the data, and
how to make the executive decision as the only teacher in the classroom. That’s the piece I’m learning to work with — I have a good idea of how to use data, but making decisions for students is something I want to learn how to do better.”

One specific challenge Phillip identified was knowing what to prioritize in response to his student achievement data: “One thing that’s frustrating for me as a new teacher is knowing that I can’t go back and re-teach everything. But knowing where to circle back, where we’ll get the most bang for our buck, and what’s going to be the best for our students can be a struggle.” Phillip also expresses a desire to learn how better to support those of his students who struggle the most: “I’ve felt very frustrated, in a way, with kids that aren’t going fast enough.” “There were conversations upon conversations, and readings upon readings, and data and statistics, and data, data, in our residency training, and it was overwhelming…I would love to know how to really use the data.”

As Phillip reflects on his residency training, he knows he’s come very far but still has a long way to go: “Sometimes I think ‘Oh gosh, look at this basket of exit tickets,' you know? It’s like, 'I'm never going to get a handle on this.' But then I like to think back on where I was as a French teacher that didn't know anything to now, and I'm so much more empowered, because I know how my kids are doing…I know where they're at, or I can always find out where they're at, and so I know what I need to do. I know that the ball is always in my court, which is super empowering.” Phillip also intends to stay teaching at Aspire because of its rigorous, outcome-driven culture: “Aspire has basically kept me here with their culture. What can I say, they’re just amazing. They’re constantly working to make this culture and this environment where students are being pushed to the
highest levels they can be pushed to, and the same for teachers…there’s a rigor with being a teacher at this school, and I believe that is important to the education system.” Ultimately, Phillip sees data as an important part of being the motivating teacher he always wanted to have as a student: “If I'm looking at data, I know my students better, and I can move forward with them. And if and when I give work back to them with proper feedback, then they know where they are, and that can either light some kind of internal fire within them, or we can have a conversation about how we can best support them. But I think most importantly, you know, data brings me closer to my students, in a way, and understanding just where they are. If I don't understand where they are, I can't take them anywhere or guide them anywhere.”

**Summary**

Quantitatively, the Aspire Teacher Residency appears to be achieving strong results. As a highly data-driven school system, Aspire collects effectiveness data for all of its teachers. According to Aspire’s internal measure of teacher effectiveness, 95% of Aspire Teacher Residency graduates were rated effective or highly-effective teachers in their first years as full-time teachers. Furthermore, graduates of the Aspire Teacher Residency are outpacing their Aspire teaching peers who did not participate in the residency program on Aspire’s internal measure of teacher effectiveness. Former Aspire residents achieve the highest teaching effectiveness level, termed “master teacher,” three times faster than their non-teacher resident peers. So, not only are Aspire Teacher Residents effective teachers out of the gate according to Aspire’s internal rating system,
but they continue to increase their teaching effectiveness at a rate greater than that of other Aspire teachers receiving the same in-service professional development.

From an outcome-driven data literacy standpoint, the Aspire Teacher Residency is placing a premium on developing data-literate teachers within its program. The Aspire Teacher Residency focuses on both sides of outcome-driven data literacy: the mindset that all kids can learn, and the skill sets needed for using data to achieve those outcomes. Furthermore, while Aspire’s model is heavily focused on assessment data, its work encompasses true data literacy. At many points, through faculty and teacher interviews, Aspire staff spoke about data in a broader sense than just assessment data, including thinking about student perception data, behavioral data, and in-class observation data. These non-academic assessment data are not as prevalent in formal data literacy coursework or assignments, though the notion that data are more than test results was clearly discernible throughout the comments of all teachers interviewed for this study.

The Aspire Teacher Residency has chosen to use stand-alone data literacy courses in addition to the data literacy instruction already embedded in the classroom teaching apprenticeship. Within the one-year program, residents take one data literacy course in the fall and one in the spring. Data literacy skills are also a part of the gradual release scope and sequence that mentors lead for residents within their K-12 classrooms. Furthermore, as staff members of an Aspire Public School, residents are privy to the day-to-day practices taking place in a highly data-driven culture. One strength of Aspire’s approach is that faculty who are well versed in data literacy skills are teaching data literacy content. Aspire residency directors personally teach the data literacy courses in
their respective regions, and residents are developed by rigorously vetted mentors who have displayed strong data literacy skills within their own K-12 classrooms. A structural strength of the Aspire Teacher Residency in comparison to the Seattle Teacher Residency is that, in the Aspie model, the one-year classroom apprenticeship is completely aligned to coursework. While teachers in the Seattle Teacher Residency sometimes struggled with their mentors’ abilities to enact data-driven practices, Aspire’s mentor teachers are able to model and reinforce the data literacy skills taught in Aspire’s stand-alone data courses. Though not all residency programs can replicate the structure of the Aspire Teacher Residency, Aspire’s rigorous vetting and training of its mentor teachers, as well as its mentor teacher gradual release scope and sequence, may be seen as promising practices that can be implemented across contexts.

The descriptions, experiences, and perceptions of Aspire’s data literacy training were largely consistent across the faculty members and teachers interviewed for this study. The data literacy instruction faculty members described mirrored the experiences teachers described. Furthermore, both groups of Aspire staff possess a shared mindset about the meaning of — and purpose of — data. The only difference between faculty and teacher perception that surfaced during interviews was the teachers’ feeling of being overwhelmed by the program in general, as well as of being overwhelmed by how much rationale was shared for the need to be data-literate. In regards to the use of data, teachers seem to be most overwhelmed by the matter of what to do in response to their data once they become full-time teachers of record in an Aspire classroom. All the teachers interviewed expressed a very deep commitment to data and to meeting the needs of all
students, but seemed to struggle with what to do when their teaching wasn’t getting the results they wanted for all students. Furthermore, teachers expressed a desire for data systems to be more streamlined. Teachers broadly and clearly communicated that they found data use to be of the utmost importance, but that acting on data was still challenging for them.

The Aspire Teacher Residency stands out as an organization that is developing outcome-driven, data-literate teachers through an immersive culture of data-based decision making. While Aspire has developed an intentional set of learning experiences to develop outcome-driven, data-literate teachers, comments by Aspire faculty and teachers point to Aspire’s data-driven culture as the real driver of this work. Developing data literacy skills in its residents is just one small way in which Aspire brings data to the work of ensuring “college for certain” for all of its students. All Aspire employees set performance goals each year, and data are used to drive all aspects of practice across the organization. As one teacher said, even principals and veteran teachers used data to improve their practice. Nobody at Aspire believes they don’t have room to grow. Furthermore, Aspire’s equity-related data literacy practices also stand out as a promising practice. Not only is Aspire asking its teachers to evaluate student achievement results through an equity lens, but they are also asking their teachers to consider how their own identities and backgrounds may be impacting their teaching and student learning.
Chapter 6: Texas Tech University

Overview of the Program

Texas Tech University is a comprehensive university that awards 150 undergraduate, 100 master’s, and 50 doctoral degrees and currently enrolls over 35,000 students. Located in Lubbock, Texas, the school’s College of Education provides two undergraduate, 12 master’s, and eight doctoral degrees and currently enrolls over 1,900 students. The vision of Texas Tech’s College of Education is to “produce measurably best educators in the U.S., and provide programs, services, and research that maximize student success from early childhood through graduate education” (www.depts.ttu.edu). The college seeks to achieve this vision through partnerships with K-12 schools and the communities they serve. Undergraduates who are interested in becoming teachers participate in a traditional four-year undergraduate teacher preparation program. For their training, students take three years of generalist coursework, followed by a senior-year teaching residency in a neighboring K-12 school district through the TechTeach program. Most students in the program graduate with bachelor’s degrees in multidisciplinary studies along with teaching certificates in their areas of specialization. Some teaching specializations offered include elementary generalist with an ESL certification, middle school math and science, middle school reading and social studies, and secondary certifications in over 20 subjects (ttu.edu).

The TechTeach program reports that it “is a clinically intensive, competency-based program designed to prepare teachers who will improve the academic achievement of K-12 students. It is among the first in the nation to combine intense, clinical
experiences with opportunities to dramatically improve effective teaching behaviors in order to impact student learning” (www.depts.ttu.edu). As a pre-service training program, TechTeach provides each teacher candidate with a full-year teaching residency in her or his final year of the program. During this year-long residency, each teacher candidate has the opportunity to work in a single K-12 classroom alongside a veteran teacher who also serves as her or his mentor teacher. Teacher candidates work in their K-12 classrooms four days a week and take traditional coursework on Wednesdays. Teacher candidates are also supported by a Texas Tech faculty members called “site coordinators” during their residency year. Each site coordinator works with a small group of teacher candidates within a particular district, providing them with coaching and observation throughout the school year.

Outside of Wednesday coursework, the TechTeach program is based on a coaching and mentorship model. K-12 classroom mentors are expected to mentor their teacher candidates and provide them with opportunities to lead teach within their classrooms throughout the year, but they are not given a specific curriculum or scope and sequence to follow. The same is true of TechTeach site coordinators. Site coordinators are Texas Tech faculty members who work with a cluster of teacher candidates within a particular Texas school district. Site coordinators also serve as mentors to teacher candidates. Throughout the year, site coordinators visit teacher candidates’ classrooms several times and evaluate their lead teaching by the TAP rubric, a teacher effectiveness rubric designed by the Student System for Teacher and Student Advancement created out of the National Institute for Excellence in Teaching. Site coordinators conference with
teacher candidates before and after their student teaching observations and identify areas of reinforcement and areas of refinement related to TAP rubric indicators. Site coordinators also lead weekly 90-minute “cluster meetings,” in which teacher candidates come together for professional development and to discuss possible areas of improvement in their teaching.

**Faculty Perspective**

Mira is a site coordinator for the TechTeach program and an instructor in Texas Tech’s College of Education. Mira teaches methods coursework in addition to her role as a coach to approximately 30 teacher candidates in a cluster group. Mira began teaching as an elementary teacher and taught several different grade levels before leaving the classroom to become at teacher trainer at Texas Tech University. Mira attended her local university to learn how to become a teacher, but she doesn’t remember receiving any data literacy training in her teacher preparation: “We didn’t have any courses that went over data.” When Mira first entered the classroom, however, she took it upon herself to learn how to become outcome-driven and data-literate. “I think for me, where I learned to be data-literate was after my first year, seeing my students’ first test scores and thinking ‘this is not where we want to be.’” Even though Mira wasn’t trained to use data in her teaching, she found that using data to drive instruction was a practice being used in schools and “was the direction we needed to move.”

Toward the end of her classroom teaching experience, Mira found that data use comprised a large part of her practice: “I’d say my last five years that I spent in the classroom, they were data-driven. I mean, that’s how we planned; that’s how we talked.
For every assessment we gave, we were analyzing ‘Where are our students?’ ‘What are their needs?’ And so that’s just the habit I was in — so when I moved into teacher prep, that was my world. As a teacher I think you have to think globally; you have to ask, ‘Am I getting them ready for college?’” Mira remains concerned about educational outcomes in the United States. “When we have 65% of our nation not proficient in fourth grade math, to me, that’s critical.” As a parent of two children, Mira also sees the issue from a parent’s perspective: “I know so many students aren’t college-ready. As a parent, it infuriates me, because I’m going to have to pay, or another parent is going to have to pay, for courses that don’t count toward a degree because our students aren’t ready.” Mira also expresses a concern for how student achievement data are communicated vis-a-vis high-stakes tests such as state-administered standardized assessments: “Last year you had to have a 53% in math to pass the state test. Well, to me, as a teacher, that’s not good enough. I shouldn’t be satisfied that 97% of my students made a 53%. To me, that’s false advertising. And when you tell parents ‘we had a 97%!” they don’t understand that the bar for passing was so low.”

As a result, Mira thinks a critical part of an educator’s role is data literacy: “Being data-literate and looking at outcomes, that’s a necessity; that’s a must.” Mira sees data as a lever for change: “I think data moves [sic] us out of the direction of ‘I’m going to do what I’ve done for ten years, or for the last five years, because this is how I have things set up and it works best for me’ to the direction of ‘what does [sic] the data say that our students need?’” According to Mira, data are what should truly guide instruction: “A teacher can be great at planning; she can be great at delivering a solid lesson. But if the
students don’t need the content, then it’s really a waste of time. So I’d put outcome-driven data literacy pretty high up there on importance, because I know I’ve experienced sitting in a classroom with a great lesson being presented that the students obviously didn’t need.” Mira also believes it is crucial for teacher educators to have classroom teaching experience. Mira sees an ideal teacher educator as someone who has classroom experience and is current with research and best practices, but also someone who has the willingness to change to meet today’s needs. “If you have someone who doesn’t have classroom experience, hasn’t been out there, they may be able to create the best course in the world, but the reality of what is happening in schools is a totally different story.”

Because TechTeach site coordinators don’t use a particular curriculum or scope and sequence, Mira spoke less about how curricular choices were made at Texas Tech, and more about how she was trained to be a site coordinator and teacher coach. Mira shared that every faculty member must be trained by the National Institute of Excellence in Teaching (NIET) to learn how to evaluate classroom teaching using the TAP teacher rubric, and that faculty members must also get recertified by the NIET each year. The National Institute of Excellence in Teaching “supports states, districts, and schools in attracting, developing, supporting and retaining high-quality human capital in order to raise achievement levels for all students” (niet.org/who-we-are/our-mission/). The TAP rubric is the evaluation tool that the TechTeach program uses to evaluate teacher candidates on their quarterly performance assessments. Mira and her site coordinator colleagues also meet internally to score norm on the TAP rubric. At the end of the last school year, Mira and her colleagues watched teaching videos of their teacher candidates
to see how well their rubric scores aligned. Though Mira possesses data literacy skills, it is not clear that data literacy skills are a prerequisite for becoming a TechTeach site coordinator. A TechTeach transformation specialist, someone who oversees and supports site coordinators, shares that the “idea is that site coordinators are probably going to have some data literacy skill sets…but that where one site coordinator may have no background with it, there might be another who has a lot of background. As a result, site coordinators receive individualized support.”

Mira and her site coordinator colleagues use a mentorship model to develop outcome-driven data literacy skills in their teacher candidates, as well as to hold teacher candidates accountable for learning this knowledge and these skills and mindsets through assignments and assessments. “It isn’t like teacher candidates go take a data module, but rather it’s a skillset I’m constantly reinforcing.” Rather than having a set curriculum to follow throughout the year, Mira models outcome-driven data literacy by basing her coaching and support on what the data say her teacher candidates need each week. One way this coaching takes place is by having teacher candidates administer pre-assessments to their students prior to teaching a lesson, in order to learn how to create lesson plans in response to student needs: “Everything we do is data-driven. I ask, ‘what does [sic] the data say?’ ‘What do the candidates need?’” By the end of their residency year, all teacher candidates must earn a proficient score on the TAP rubric in order to graduate from the program: “You have this bar you are trying to get all of your teacher candidates to by the end of the year, though how that happens might look different from site coordinator to site coordinator, and from individual conversation to individual conversation.” The TAP
rubric itself calls for data literacy skills. In order to meet proficiency on the TAP rubric, teacher candidates must display a small subset of data literacy skills. The TAP rubric is made up of eight domains and 48 indicators within those eight domains. Of the 48 indicators, seven align with the knowledge, skills, and mindsets of an outcome-driven, data-literate teacher. The TAP rubric is one way the TechTeach program holds its teacher candidates accountable for demonstrating proficiency in data literacy skills (2016, TAP Rubric).

Within the mentorship model, Mira surfaced three main avenues for developing her teacher candidates’ data literacy skills: through classroom observations and coaching, through weekly cluster meetings with her teacher candidate cohort, and through a year-long data-driven assignment based on student perception surveys. A typical classroom observation begins with a pre-observation conference between Mira and a teacher candidate to discuss the results of the student pre-assessment, as well as what the teacher candidate has chosen to teach in response to that assessment. Pre-assessing student knowledge is a common practice taught within the TechTeach program to ensure students are getting access to the content they most need in any given lesson. Mira will also ask her teacher candidate how she plans to post-assess student knowledge after the lesson and will discuss how that assessment aligns with the pre-assessment. These pre-observation conferences often lead to conversations that help develop a teacher candidate’s data literacy skills. In a recent pre-observation conference, Mira helped one of her teacher candidates to think more strategically about how she could use data to drive her instruction. Mira’s teacher candidate was a kindergarten teacher getting ready to teach
her students about two-dimensional shapes. In their pre-conference conversation, Mira asked what the results were on the teacher candidate’s pre-assessment. The pre-assessment showed that 80% of students knew the shapes. However, the teacher candidate persisted: “But we didn’t teach shapes. So I’ve got to teach them!” Mira responded by asking why she would spend 45 minutes on content her students already knew. The teacher candidate went on to say “Well, I’m going to talk about vertices and edges and so forth.” Mira responded again, saying “Then you have to pre-assess that too.” The teacher candidate added the additional content to her pre-assessment and re-administered it with her students. This time, the take-away stuck. In their next meeting, the teacher candidate said “Now I understand why you were saying that I don’t need to spend 45 minutes on a lesson over covering something they already know. They knew (vertices and edges) too.” Mira shares this as an example of just one of the ways in which she uses data on a one-on-one level with her teacher candidates: “We get down to the data with our students.”

TechTeach teacher candidates are also asked to be data-driven in their own teacher development. Following a formal observation using the TAP rubric, Mira will hold a post-conference with her teacher candidate. During this conversation, Mira and her teacher candidate will share how they each scored the teacher candidate on the eight dimensions of the TAP rubric and discuss where their scores aligned and diverged. Mira and the teacher candidate also select an “area of reinforcement” where the teacher candidate should continue to utilize one of her teaching strengths, as well as an “area of refinement” — a growth area on which the teacher candidate should continue to improve.
her lead teaching. In addition, teacher candidates may also set quantitative goals for how they want to improve their scores on particular dimensions of the TAP rubric by the next round of formal observation. Finally, Mira and her teacher candidate identify next steps for how he or she can respond to her rubric data.

Mira also uses these post-conferences to develop data literacy skills in her teacher candidates. Mira shares that, when she and her teacher candidates are reviewing their respective TAP rubric scores, her teacher candidates are quick to jump to feelings. When a teacher candidate shares something like “I felt like I didn’t do this one thing,” Mira pushes the candidate to draw upon actual evidence for that statement: “I’ll say no, let’s go back and watch the video of your teaching; then, I want you to go back and tell me, what was the evidence that led you to that conclusion?” In this way, Mira models to candidates that data are evidence-based and can take many forms — including the qualitative evidence of their own teaching.

In addition to one-on-one observation of her teacher candidates, Mira also uses her weekly 90-minute cluster meetings to develop outcome-driven data literacy skills in her teacher candidates. Like most of her interactions with teacher candidates, the content of these meetings is data-driven. A typical weekly cluster meeting is broken up into two 45-minute chunks. The first 45 minutes focus on data-driven topics that Mira identifies from her teacher candidate data, such as aggregate observation scores on the TAP rubric. For instance, if she sees that, on average, her cluster is struggling with the “academic feedback” domain of the TAP rubric, she will show her teacher candidates those data and will prepare professional development to help bolster their skills in this particular area.
Mira is explicit in calling out that the activity she prepared is in response to her data, and to the needs of her cluster. Mira uses the second 45-minute chunk to respond to student needs and to help them prepare for assignments, such as the year-long student perception survey assignment.

The student perception survey assignment is one of the key learning experiences in which TechTeach teacher candidates participate during their senior-year teaching residency that is designed to develop their outcome-driven data literacy skills. The student perception survey year-long assignment is completed through teacher candidates’ work in their K-12 classrooms, as well as through oversight by their site coordinators. For the assignment, teacher candidates administer a student perception survey developed by the Colorado Legacy Foundation. The survey is administered to find out K-12 student perceptions of teacher candidates’ teaching within their residency classroom. TeachTech believes that the survey “is a unique form of actionable feedback that districts, schools, and teachers can use to inform practice” and cites the Measures of Effective Teaching Project study, in support of the claim that “student perception survey results are correlated to student achievement gains” (Student Perception Survey Yearlong Assignment Description).

Teacher candidates use their student perception survey results at many points throughout the school year. At the beginning of the year, teacher candidates introduce and administer the survey to their students. After receiving survey results, teacher candidates reflect on these results and create a data-driven action plan to respond to them. Specifically, teacher candidates “analyze survey data outcomes and use data to develop
next steps and strategies to improve student perceptions and academics.” (Student Perception Survey Yearlong Assignment Description). A teacher candidate does this work both for her whole class of students and for a focus group of students. During this portion of the assignment, teacher candidates engage in data literacy practices such as analyzing data to find areas of strength and areas of need, triangulating data with other sources of student data, and discussing their data with peers to gain better understanding.

Throughout the middle of the year, teacher candidates work toward improving their student perception data and, ultimately, their students’ academic outcomes. Teacher candidates continue to implement strategies for positively impacting student perception and achievement, and to assess student growth using formative assessments. Specifically, teacher candidates work toward three objectives: “share (with peers and their instructor) the goals and strategies developed for their focus group as a result of their collaboration with their mentor teacher, actively and intentionally implement strategies to positively impact student perceptions (and academic achievement), and document their efforts to positively impact student perceptions and the formative assessment results” (Student Perception Survey Yearlong Assignment Description). The student perception survey assignment refers to this process as progress monitoring. This work aligns with data literacy skills such as tracking progress and using data to inform instruction.

The student perception survey assignment culminates at the end-of-year, when teacher candidates re-administer the same student perception survey they had given at the beginning-of-year. The purpose of this post-test is to see how their students’ perceptions have changed throughout the year. After administering the assessment, teacher candidates
examine their new data and complete a self-reflection. The end-of-year reflection is similar to the beginning-of-year reflection insofar as it asks teacher candidates to reflect on their initial thoughts about the data, to analyze data with an eye towards finding areas both of strength and of need, and to triangulate these data with other sources of student data. The end-of-year reflection also builds upon earlier work by asking teacher candidates to compare beginning-of-year data with end-of-year data, and by disaggregating end-of-year results with respect to gender and ethnicity. The final reflection also asks teacher candidates to consider how their instructional approach, or how their biases and/or predispositions, may have impacted their results (Student Perception Survey Yearlong Assignment Description). Finally, teacher candidates must stand and deliver a presentation on their year-long student perception outcomes and how the actions they took may have positively impacted those outcomes. In addition to developing students’ data literacy skills, Mira believes this assignment is a way that the program helps their teacher candidates to think about each student as a whole child: “I know the student perception survey was definitely included because of the idea that teacher candidates should have the opportunity to think about the actual students in their classroom and how they feel in the classroom. So I think the main idea was to bring in this whole-child piece, that we’re not just only focused on academics; that we impact students in different ways.”

One promising practice contained within Texas Tech’s approach to developing data-literate teachers, as reported by Mira, is that their faculty are modeling the data literacy practices they want to see in their teacher candidates: “Not all higher-ed
institutions are collecting data on their own teacher candidates and using that [sic] to
guide their instruction; however, they may be encouraging their teacher candidates to
collect data to guide their instruction. We’ve chosen to model this best practice and
mindset.” While Mira may not be teaching explicit data literacy content, she models this
knowledge and these skills and mindsets during her varied interactions with her teacher
candidates, giving her students an experiential opportunity to discover data-driven
instruction: “If I use data to guide my instruction and what we’re doing, it models that as
a best practice. Then you, as a student, you feel what it’s like to have a teacher base her
instruction off of data, and it feels relevant, and it feels meaningful.” Mira knows that her
teacher candidates don’t see her as someone who leads a cluster meeting in a particular
way based simply on an impetus of “this is what we’re going to do today because I feel
like it, or this is what I’ve done for 10 years and it’s fun,” but rather because “these are
our actual needs.”

Mira also feels a strength of the TechTeach residency is that teacher candidates
learn the importance of making all of their instruction relevant to students. Graduates of
the program learn not to follow a curriculum map blindly, but to think about what their
actual students need: “We get teacher candidates to think about the bigger picture: ‘Why
do students need to know this?’ ‘What is the relevance of this?’ ‘How are you going to
set this lesson up to where your students aren’t just learning something that’s totally
disconnected?’” Mira feels that teaching shouldn’t be a guessing game: “Tell them what
they’re learning, and teach with the best practices you’ve learned.”
Mira also reported two challenges the program has faced when it comes to teaching data literacy skills to their teacher candidates: mentor alignment, and technical challenges with collecting data. Mira shares that, while learning how to work with unaligned partners can be a helpful professional skill for teacher candidates to learn in their residency year, it can also be challenging when mentor teachers do not provide ample opportunities for her teacher candidates to lead teach, and when they do not possess data literacy skills to model for their residents: “It can be a challenge when our teacher candidates don’t always see the data-driven process being done by their mentors and in everyday teaching. A lot of our classrooms are being driven by district curriculum maps, and that doesn’t always feed into the mindset of data-driven teaching. Because, well, it’s day five, so I should be on the lesson for day five,” as opposed to adapting the curriculum map when necessary in response to what the data say students need. So while teacher candidates may be getting one message about the importance of data-driven teaching by Mira, this knowledge and these skills and mindsets may not be getting modeled for them by their mentor teachers — people with whom they are spending the majority of their time each week.

As the TechTeach program rolls out new assignments such as the student perception survey assignment, Mira also reported that the technological struggles that go along with collecting data can be challenging. First, it takes time to collect and track student achievement data, and it can be hard for teacher candidates to do that work if streamlined processes don’t already exist within their schools. Rolling out the student perception survey has also taken up a lot of time during cluster meetings, as well as
having taken time away from their usual data-driven discussions. Furthermore, the online administration of the student perception survey has been challenging over the past couple of years. In a previous year, site coordinators were not able to gain access to the student perception survey results as those data only went directly to the teacher candidates. Mira felt it was challenging to help her teacher candidates create meaningful plans when she herself didn’t have access to the data: “It was hard. I felt it was disconnected because I didn’t see any of the results.” Mira also shares that gaining access to computer labs can be a challenge for teacher candidates: “Our teacher candidates don’t have control over their computer lab being up to date. You know, so those kinds of questions come up like ‘Is it going to run?’ ‘Is there a certain search engine it has to run off of?’” Mira has seen that teacher candidates may set up their students to take the student perception survey only to get to the computer lab and have a technical snafu keep them from being able to administer the survey. Mira also shares that she thinks there will always be a learning curve to implementing new technologies and that the TechTeach program has consistently gathered feedback in order to improve each year: “There will always be challenges, but with a supportive program such as TechTeach we problem-solve together.” Mira believes that, “once we get all those kinks worked out,” there will be many benefits to tech-based data solutions. But for now, a few of the technical struggles associated with collecting student data still exist.

Moving forward, Texas Tech University is looking at other ways in which the school can develop data literacy skills in its teacher candidates. One new initiative taking place this school year is a personalized learning module created specifically for the
Dallas Independent School District. The personalized learning module focuses on how teacher candidates can use student data to create personalized learning experiences for groups of students. In the module, Mira explains that teacher candidates “look at student data to decide how group students by assignment. It’s not always going to be your high-, medium-, and low-performing groups. You want to mix it up. Sometimes a student who might be high-performing on one assignment may not be on the next assignment.” Within the module, teacher candidates are asked to analyze student work samples to see whether their students met daily objectives, and to analyze what it would take for a student who did not meet a particular daily objective to do so. This module is just one example of how Texas Tech University is beginning to innovate new ways of bringing data literacy skills to the forefront of its teacher training.

Mira reports her belief that, in the end, the purpose of data-driven instruction is to address what she calls the crisis of our education system: “Preparing teachers to go out and teach students who aren’t like themselves is a must. For the training part I think we have set things we do, but I think a lot of the training comes from experience working with real kids in real situations and understanding that it’s my job to educate them. It’s not about my convenience; it’s about ‘What do I need to do to get them there?’” In addition to using data, Mira also feels it is her responsibility to help her teacher candidates build relationships within their teaching communities: “A lot of it is also talking to them and helping them understand the importance of setting up relationships with their students in that community so that their students feel safe, so that their classrooms are a place where students can take risks. Because that’s where we learn.
When you take a risk and you step out of the unknown, that’s where you begin to make sense of your own learning.”

**Teacher Perspective**

Hattie grew up in a small town in Texas. She always knew she had an interest in teaching, but she originally thought she’d go into another field where she could make more money. Despite this plan, she ultimately fell in love with Texas Tech when she came to visit the school: “Texas Tech wasn't even on my radar, and then my sister transferred to law school, and my parents were like, 'Let's just look.' We had known at that point I was already wanting to be a teacher. And so we went and we talked to a few of the people in the program, the education program. They were super sweet, very helpful, gave us a lot of brochures and pamphlets. And I did a little bit of thinking and research, and found out that they did student teaching for a whole year and just the rigor that they had in their courses, it really was something that I wanted to do, because I wanted to have the best experience and the best material for me to be the best teacher for students, because that's always my main concern, is to be the best for students. And so when I got here, I just fell in love with the program.” Now that Hattie is a full-time first grade teacher, she says she loves teaching and really appreciates her Texas Tech training. In the future, Hattie sees herself going into educational leadership or administration.

Hattie completed the Texas Tech program with a strong conviction about the need for teachers to be data-literate: “I think it's a change in today's culture, with technology and everything, that teachers are more data-driven now than when I was in school. The biggest thing for me in teaching students is growth. You look at the data, and you don’t
excuse performance because of race, socioeconomic status, gender, disabilities, anything
like that. Students might not be held to the same standards, but it's them growing; that's
our ultimate goal. That’s how I use data the most, and how I structure my lessons. They
are data-driven, but the ultimate goal is growth, not a one-size-fits-all standard.”

Hattie believes that teachers go into the profession with the desire to do their best
for all students: “I believe that we get into this profession for the sole fact that we want to
be the best for our students and meet every single type of need or type of learner that you
have in your classroom. I think that comes with high expectations of your students —
reachable goals, but high expectations — and also knowing how to set those goals, and
that has a lot to do with data.” As one of Mira’s former students, Hattie believes she
developed much of this mindset through Mira’s modeling: “What was really awesome
about Mira is that she would tell us a lot about her experiences in teaching and the
students that she would have and different challenges that she would face and what she
would do when she was faced with those challenges. And something that she would
always tell us was that we can't control what happens outside of the classroom, but we
can control what happens inside the classroom; we can control students’ learning. That's
something that we have all the power for, and something that we should be striving to
accomplish. That's something that I really take to heart every single day. No matter
what's happening with me outside of school or what's happening with my students outside
of school, as sad as that might be or as challenging as that might be, my goal is to make
sure that my students are successful and that my students are reaching the goals that we
set together, and that they are learning to the best of their ability.” Hattie also believes
that if she is going to ask her students for data or evidence when they are completing their classwork, she should be held to the same expectations herself: “So I feel if I'm telling my students that they need to have data and show me their work and show me their thinking, as a teacher, I definitely need to be showing my data and my evidence and be thinking about it that way and making my choices and my goals by having that evidence and that proof to say, 'This is why we are setting this goal.’”

Hattie doesn’t remember taking any particular class on data use, but rather “that it was completely drilled into us in every class. Somehow, in every single class, somehow we measured data, we measured growth, whether we were measuring ourselves or our students. At Tech it was ‘All kids can learn; all kids can succeed.’” Hattie sees several strengths in how she was taught be an outcome-driven, data-literate teacher. The first was the use of the TAP rubric in observations: “I think the TAP rubric was the best form of teaching for us because it was applied in the classroom. We would pre-assess our students, set goals, and make sure we were aligned in our objectives so that our goals were reachable, and identify what we were going to modify or accommodate for all of our students.” Hattie believes using the TAP rubric helped her become data-driven and goal-focused: “I think it’s because we spent so much time dissecting and applying the rubric that before we even taught a lesson we were getting materials and thinking about how we were going to collect data, and how we were going to reach all of our students.”

Hattie also appreciated how she was asked to set goals for her own teaching performance using the TAP rubric: “I would sit down with Mira before and after my teaching and we would have our little conferences, and I would set goals for myself.” Hattie describes
how she had to score herself on all the dimensions of the TAP rubric, and how she would set goals for self-improvement regarding some aspect of the rubric on which she wasn’t doing as well: “For me, in particular, during my student teaching my biggest goal I set for myself was classroom management, just because it’s hard when you first start and you want to be friends with the kids. And we had been videotaping ourselves, so I had the data to look at, to help me see where I should be redirecting student behavior. I was able to see what my challenges were and what my strengths were.”

Hattie also remembers the student perception survey being a helpful tool in teaching her to meet the needs of all students. The student perception survey “kind of takes the goggles off of you or the magnifying glass off of you, and it says, 'You were teaching this, but how were your students engaged in your lesson? How were you making sure they were engaged?', and that really makes you do an inner reflection of how you're meeting all of the needs of those students.” Hattie says this assignment also helped her in her selected area of improvement, which was classroom management: “I’ve gotten a lot better at managing behavior too, because I think, okay, so if this student is not engaged, it’s either that he or she isn’t being challenged enough, or it’s too challenging and I’m not meeting his or her needs.”

Finally, Hattie attributes most of her data literacy skills to the strengths and passion of Texas Tech instructors such as Mira: “I think they were very honest and real in their experiences, and they gave us the best practices. I think where this magic comes from is that they're there for students, and their students are not only the teacher candidates, but they're also worried about the students that we're going to go out and
teach, and they want to make sure they're making great teachers for those students. I know, in particular, Mira is one of those teachers who said she wants to make sure we're going to be the best teachers we can be, because those are the students that we're going to be teaching, and she wants to make sure she's sending out the best for those students. And I think that's really what resonates with a lot of us and why we tend to take what they taught us and put it into practice — it is because instructors are so passionate and they bring us the best materials and give us so many times to learn and experiment. It's not just sitting in class and taking notes; a lot of it is project-based or application. And that really helps a lot of us, because it's one thing to sit down and read about it, and I think that's very important, but being able to apply it and see it in action and see the impact that it has is what's so important and, I think, what really makes us want to keep on going with that mindset."

In terms of how Texas Tech could improve its outcome-driven data literacy instruction, Hattie wouldn’t change anything about how she was taught, though she did have ideas for additional data literacy instruction that she would have found helpful to receive. As someone who teaches at what she describes as a “meta-cognition campus,” she believes that “students need to have schema, or need to access schema before they can really start delving into and applying certain knowledge.” In this sense, Hattie believes that offering a foundational course on data literacy skills would be helpful for future TechTeach cohorts: “I think by having a class that gives teacher candidates the schema of ‘This is what data looks [sic] like. This is what it looks like to set goals. What is a goal? Let’s define it; talk about it. And then what is [sic] data? Define it and talk
about it. Answering these questions would give everyone the schema. Because not everyone has foundational experience with data. But if teacher candidates have schema, they will be better able to apply it and make relations when they're in that class, in that content, and then more confident in applying it in their student teaching.” Hattie also feels that seeing more examples of how data are being used in classrooms would be helpful: “I think also being able to go out and see teachers or videos of teachers using data and setting goals for themselves and their students — I think this would be really beneficial, because then you would have that visual aspect, too, of what does that really look like.”

Hattie also had ideas for how particular data literacy content could receive additional time and attention within existing coursework: “We really didn’t have that many technology classes, and we are a technology generation. I think having more opportunities on how to use technology to look at our data and set goals would be very beneficial for teachers at Texas Tech.” Hattie also thought it would be helpful to spend more time learning how to re-teach content when the data indicate that re-teaching is in order: “I know to teach something again, but if I’m re-teaching it the same way, they’re probably not going to get it a second time.” Finally, Hattie indicated an interest in learning how to communicate data with parents: “We never really learned how to communicate with parents, either positively or negatively. It just wasn't something that we got to do much.” Hattie wishes she had received knowledge regarding how to better “educate parents on what their kid is doing in class and how they're growing, or how they're not growing.”
The data literacy modeling Mira provided for Hattie has had a clear impact on her own teaching practices: “Something we learned at Tech was that we need to reflect on our teaching and what we’re doing, and ask ourselves if we are meeting our goals. So I have my students reflect too. For instance, I’ll have my students answer the question of ‘how is your comprehension, on a scale of one to five?’” Hattie says she “feels like I’ve become a better teacher in the program, because we’ve been shown how to look at ourselves and our data and set goals for ourselves, and then we’re able to apply it in our student teaching. Seeing the impact and the amount of growth that I’ve had on students of all different types of learning has really just inspired me to continue to do that.” Hattie says learning to be data-driven has not only impacted her teaching, but her life as well: “I think it really has modeled my philosophy in teaching and my philosophy in just kind of being a person, almost. I think you should always be setting those goals and high expectations, and you should have evidence and proof, and the background to kind of be setting those goals.” Overall, Hattie thinks “the TechTeach program is wonderful and prepared me as a teacher for any grade or challenge that has come my way. Texas Tech has done a wonderful job of making confident teachers that are flexible and kind of change with the times, and are not afraid to use best practices, which is being data-driven.”

Summary

Texas Tech University’s College of Education has been collecting multiple forms of data to assess the school’s progress toward its goal of producing the measurably best
educators in the United States. In a public accountability data overview document accessible on the College’s website, the school reports data on metrics such as teacher candidates’ scores on performance assessments (teaching observations) scored on the TAP rubric; K-12 students’ performance on the State of Texas Assessments of Academic Readiness (STAAR) test for students in TechTeach mentor classrooms; and teacher candidate pass rates for the Texas Examination of Education Standards (TExES), the state’s teacher certification exam. The school boasts a 98% initial teacher candidate pass rate for the TExES assessment in school year 2014-15, and an initial pass rate no lower than 92% over the past 14 years (it is unclear, however, how these pass rates compare to those of teacher candidates taught by other teacher preparation programs in the State of Texas). The College of Education also provides TExES pass rate data disaggregated by gender, race and ethnicity, and certification type. Of the 26 certification types, only two certification areas reported a pass rate lower than 92% in school year 2014-2015: bilingual education supplemental Spanish, and English as a Second Language Supplemental. Aggregate TAP rubric evaluation scores across all TechTeach districts show an average improvement of 1.2 rubric levels on a four-point scale rubric from the beginning of the TechTeach classroom residency to the end of the year-long teaching experience. On average, TechTeach teacher candidates begin their senior-year residency with an average score of 2.0, and end the year with an average score of 3.2 on the four-point TAP rubric (Texas Tech University College of Education Candidate Performance Assessment in the College of Education, 2016).
Rather than teaching explicit coursework in outcome-driven data literacy content, the TechTeach program has opted to teach this content via the explicit modeling of its instructors. Over the course of their senior year, TechTeach residency teacher candidates learn how to set academic goals for their students, how to use data to inform their curriculum maps, how to use data to differentiate instruction for students, and how to set performance goals for their own teaching practices. Teacher candidates also learn how to analyze class-wide student perception data, as well as how to create data-driven action plans from those data to inform their instruction. The TechTeach model is a fully embedded model of data literacy. The content is infused across all aspects of the program. Texas Tech teacher candidates do not take any stand-alone courses on outcome-driven data literacy.

The description of teachers’ experiences of learning outcome-driven data literacy skills were consistent across the faculty members and teachers interviewed for this study. Faculty members and teachers described Texas Tech’s data literacy instruction in the same ways, and identified the same learning experiences as ones that contributed to their data literacy development. The most notable transfer of knowledge from Texas Tech faculty to its teacher candidates was the mindset of modeling data use as a teacher. All teachers interviewed for this study shared that they now model data to use for their K-12 students, just as data use was modeled for them by their TeachTech site coordinator. It is unclear whether Texas Tech graduates know how to set a year-long student achievement goal, or how to use tracking tools to collect, sort, and analyze data. Other than the student perception survey assignment, most data literacy instruction focused on daily or weekly
data cycles. Texas Tech was also the only site in the study where teachers discussed data about their own practice, rather than focusing exclusively on data concerning K-12 students. Furthermore, Texas Tech was the only school to teach teacher candidates how to use student perception data throughout a full school year cycle. The importance given to the student perception survey assignment is an example of how the TechTeach program is working to develop data-literate teachers, not just assessment-literate teachers.

Though Texas Tech’s strength lies in its modeling approach to developing outcome-driven, data-literate teachers, there is a risk that this approach may also be its weakness. Since no data literacy standards, nor formal data literacy curricula exist within the TechTeach program, the data literacy skills teacher candidates develop are largely incumbent on the skill set of each site coordinator. The faculty interviewed for this study all demonstrated knowledge, skills, and mindsets of outcome-driven, data-literate teachers. However, as one supervisor noted, while the idea is that all site coordinators should have some data literacy knowledge, the reality is that some may not. The lack of consistency in faculty skill sets is a particular concern given that the literature suggests that one of the main challenges of developing a data-literate teaching force is having enough professors qualified to teach about data (Mandinach & Gummer, 2016). While the experiences of faculty and teachers interviewed for this study were clearly positive ones, it is unclear whether this experience is representative of all teacher candidates who go through the TechTeach program. As with the Seattle Teacher Residency, it also seems that not all mentor teachers in the TechTeach program possess the outcome-driven data literacy skills necessary to develop this kind of teacher.
Chapter 7: Sposato Graduate School of Education

Overview of the Program

The mission of Charles Sposato Graduate School of Education (Sposato GSE) is “to prepare unusually effective novice teachers for schools serving low-income populations, and to develop, validate, and disseminate innovative approaches to teacher preparation” (www.sposatogse.org). Sposato GSE, located in Boston, Massachusetts, believes that there are two common ways people get into K-12 teaching: one is through training in traditional schools of education, and the other is through alternative teacher training programs such as Teach For America. Sposato GSE claims to embody a third way of entering the profession of teaching, and it aims to be a “different kind of graduate school” (sposatogse.org/about/overview). Two ways in which Sposato GSE stands out from traditional schools of education is that its faculty is made up entirely of experienced teachers as opposed to researchers, and its coursework includes practicing teaching, as opposed to merely thinking about teaching and learning theory (sposatogse.org/about/overview).

Founded in 2012, Sposato GSE provides a two-year teacher training program that culminates in students’ earning a Massachusetts initial license to teach in areas such as elementary education, secondary math, secondary English, general science, or history. Students of the program also have the opportunity to earn a Master’s in Effective Teaching. The Master’s in Effective Teaching is a degree that is earned by successfully completing two years of graduate coursework, and by displaying success as a full-time teacher in an actual K-12 classroom. Sposato GSE measures the success of their master’s
candidates “via neutral outside observers, student achievement gains (where we can measure them), student surveys, and principal evaluations” (www.sposatogse.org/about/the-met-degree/).

In the first year of the Sposato program, graduate students participate in a full-time, year-long K-12 classroom residency in a high-poverty, high-performing Boston public school. During their residency year, graduate students spend Monday through Friday in their residency classrooms, working as tutors and/or teaching assistants, and attend Sposato classes on Tuesday and Thursday nights, as well as on Saturdays. In the summer following their residency year, Sposato graduate students teach summer school, supervised by Sposato faculty members. In the second year of the program, graduate students become full-time teachers of record in Boston public schools, or (in far smaller numbers) in schools in areas such as Chicago, Denver, New Orleans, New York City, San Francisco, and the District of Columbia. Sposato graduate students teaching in the Boston area continue to receive ongoing support and coaching in their schools, and all graduate students participate in a year-long distance-learning course related to their teaching positions (sposatogse.org/about/program-sequence).

Sposato’s coursework is based on four main domains of knowledge: relationships with students and families, delivery of effective lessons, classroom management, and use of data. The two specific skills listed under the use of data domain include “master(ing) the implementation of proactive techniques to establish a focused, productive classroom environment,” and “master(ing) the implementation of reactive techniques to minimize class time lost to misbehavior” (sposatogse.org/about/curriculum). At key points
throughout the program, graduate students must pass summative assessments — or “gateways” — that demonstrate their competency in the teaching knowledge and skills learned in the program to date. In accordance with its status as a competency-based program, only two-thirds of graduate students who begin the program actually go on to graduate (sposatogse.org/about/overview).

Faculty Perspective

Sarah has been with Sposato GSE for almost a decade, since the organization was an informal tutoring program in Boston. “We used to be a match-based teacher training program, nothing super formal. Over the years the program evolved, and we eventually applied to be a graduate school through the Board of Higher Education in Massachusetts. But before that, a long, long time ago I used to be a tutor with the program. I worked straight out of college as a tutor before I decided to go back to school and become a teacher.”

After starting her teaching career as a Match tutor, Sarah earned her Master’s in Education and spent a couple of years teaching public school after earning her degree. As a graduate student, Sarah remembers learning very little about how to become an outcome-driven, data-literate teacher. “At graduate school, I learned very little, which is surprising, but also not.” Most of Sarah’s data literacy instruction came from what she learned while teaching at a charter school — a system with which she struggled: “Data literacy was very focused on an approach like 'Let's create a giant colored spreadsheet after a unit assessment, and let's figure out how we're going to re-teach all of this different content to all of these different kids based on what they don’t know.' To me, as a
new teacher, I thought 'This is not totally responsive to what is actually happening in the classroom.' And I think that, to me, if data had been presented on a smaller scale, I think it would've been a lot easier for me to act on it [sic] effectively. I really tried and wanted to help my students, but when you get to the end of a unit, it's hard to have to re-teach a lot of content, whereas if you're responding to data on a day-to-day level, that's much easier to think about.”

After Sarah had been teaching for a few years, the founder of the original Match tutor program (later to become Sposato GSE) reached out to her and asked her to come work for the organization: “They were starting this new teacher training program and needed someone to do a lot of the research and writing for the program. At the time I was burning out on teaching. I did not have the kind of training that we give to our people at Sposato, and back then there were not as many sort of alternate routes into education as there are now. So I really just really struggled with the management aspect of teaching, as well as other things, and I was kind of like 'What am I going to do?' I was going to stay at my school, but I really — it was appealing to think about the idea of creating something, a type of teacher induction that didn't require that kind of trial by fire and that was more conducive to teachers staying in the classroom. So I came back to Boston, and I’ve been with Sposato ever since.”

Sarah says she believes outcome-driven data literacy is very important, and thinks this sentiment is shared across members of the organization: “I think we would all agree that it’s very important.” Sarah says she and her colleagues work hard to instill an outcome-driven orientation in their daily work: “I think everything we do is to try to
communicate that mindset — for growth in terms of academics, and growth in terms of student behavior and character, and graduate students’ basic orientation toward school. An outcome-driven mindset it so foundational to everything a teacher does, and it’s so foundational to our program.” In fact, Sarah believes you can’t be a good teacher without an outcome-driven orientation: “I don’t think that you can do a good job in your first year or any year if you don’t have that outcome orientation, or if you don’t believe students can grow, irrespective of their situation.”

In terms of data literacy skills, Sarah believes “learning can be measured, and that teachers should be held accountable — and should hold themselves accountable — for their students’ learning even if their districts or schools aren’t holding them accountable.” However, Sarah and her colleagues have strong beliefs about what data literacy skills can and should be taught to a novice teacher in a two-year program: “I think that we have found over the years — both through our own intuition, but also through our experience with what we hear from principals and what our residents report, is that the teachers who are more successful, in terms of student outcomes, are the ones who are more successful in terms of building positive student culture, an efficient and productive classroom, and who can master these simpler forms of data collection in their day-to-day teaching.” Sarah believes it is an extraordinary teacher who can be fully data-literate in her or his first year of teaching.

In previous years, the Sposato program allocated more instructional time to teaching data literacy knowledge and skills, but it has made this content less of a priority in recent years. This curricular decision was based both on the values upon which the
organization was founded, as well as on various lessons learned over time. Sposato’s
decision to spend less time on data literacy and more time on classroom management and
culture goes all the way back to how the organization was founded: “I think at our
inception — the sort of reason we exist — is we’ve seen for years how rookie teachers in
our schools struggle so much with the basic aspects of teaching. Our founder’s primary
focus in terms of preparing new teachers was classroom management. When we started
the program, it was very focused on management and building relationships with
students.” Since then, Sposato faculty have been working to strike the right balance in the
content they provide to their graduate students: “One of our primary challenges has
always been to find the right balance between teaching instructional methods versus
classroom culture and student relationships, and also having teachers dig into their own
identities and work on their teaching practice that way. I think in various years we've
gone too light on instruction, and then I think last year our instructional methods courses
were probably too nuanced and complex for rookie teachers. We had, like, too much of
an opinion about how things should be done, as opposed to trying to adapt to what our
graduate students were going to encounter in the classroom.”

Being responsive to the needs of the schools it ultimately serves has also been a
driving force in how Sposato GSE decides on its curriculum each year: “The feedback
we’ve gotten from schools in the last year is that they want us to train teachers who are
really strong at building classroom culture, which includes management. I think that
would be our number-one priority right now. School leaders have said they can teach new
teachers content and how to write better lessons, but that they don’t have the capacity to
help them build a strong classroom management culture.” Though Sarah and her colleagues believe outcome-driven data literacy content is important content, they’ve decided that, for the novice teachers they train, this content should take more of a backseat to other, more pressing skills: “I think we’ve made peace with the fact that if we tried to go too hard on instructing rookie teachers on data literacy skills — such as how to analyze all of the data from a quiz to inform your next unit or the next couple of weeks of instruction — that it takes away from something else that we could teach, like how to establish stronger relationships with students. And I think the thing that makes or breaks our new teachers tends to be things other than the poor use of data.” Finally, Sarah believes that graduates of Sposato GSE will have the opportunity to learn data literacy skills once they begin working in their schools. In this way, Sposato GSE hasn’t eliminated outcome-driven data literacy content from their program, but has punted some of this teaching responsibility to school leaders and coaches at graduate students’ K-12 schools.

Even though outcome-driven data literacy content is now taking less of a priority in Sposato’s curriculum, it is far from absent in the curriculum. There are many ways in which Sarah and her colleagues are working to ensure that their graduate students become successful, outcome-driven, data-literate teachers. Sposato uses an embedded approach to teaching data literacy skills to its graduate students. Though Sposato faculty members don’t explicitly call out that they are teaching outcome-driven data literacy content, this content is often embedded within both existing coursework and coaching interactions between Sposato faculty members and their graduate students. Sarah also
shares that Sposato instructors are constantly working to instill an outcome-driven mindset through their conversations and coaching sessions with graduate students: “If you go through our coursework, you're not going to see topics like data-driven outcomes or analyzing data. I think that this content is implicitly contained in most classes that we teach.” The one exception to Sposato’s embedded approach to teaching data literacy is a small set of professional development sessions the school provides for its graduate students on data literacy. These data literacy professional development sessions usually take place over one or two days in the summer following residents’ first year in the program. The summer data literacy sessions are outsourced to and led by a local data organization called the Achievement Network. Sposato faculty members are not responsible for designing or teaching these data literacy professional development sessions, though they do collaborate with Achievement Network staff to ensure the session materials are applicable for Sposato graduate students.

At its core, Sposato GSE believes that good teaching includes cycles of practice and feedback. Per this style of teaching, it is a teacher’s job to quickly and effectively set students up to practice a skill, and then to provide students with feedback both on what they are doing well and how they can improve. This is a main focus for graduate students in the first year of the program: “It doesn’t matter what grade level or subject you teach; there are certain foundations that all good teachers abide by. One of those foundations — our instructional base — is that all good teaching is, in general, cycles of practice and feedback.” Sarah has also found that focusing curricula on this teaching foundation has been helpful for rookie teachers in particular. “We find this is the most effective way of
framing against the new teacher inclination to talk a lot. So we frame good teaching as giving opportunities for students to practice something, seeing how they do on that practice, and then giving them feedback on it.” This approach to teaching is inherently data-literate. In this model, teachers are asked to constantly gather and act on the qualitative data they find within their classrooms each day, and to use this information to further student learning: “I think our graduate students’ first foray into data-driven instruction is within a five-minute period in a lesson, like ‘how are you going to give your students something to do, and then how are you going to help them progress on it, based on what you see?’” Sposato faculty members give their graduate students ample time to practice the skill of setting up student practice and providing feedback, and these graduate students thereby develop an ability to respond to student work in the moment.

All of the content Sposato graduate students receive is immediately applicable in both their residency year and their first year of full-time teaching, and data literacy instruction is no different. Sarah says Sposato focuses on helping its graduate students collect and act on in-class qualitative data because it is a form of student data that they can start using very quickly in their classrooms. “Even in the simplest forms of practice, you can look at what students are doing and try to respond to it. And you know, that’s at the heart of all data analysis — looking at where your students are and what you need to do to get them to where you want them to go.” Sarah thinks this method of developing outcome-driven, data-literate teachers is more helpful than teaching graduate students to collect, analyze and act on quantitative, longer-term, summative assessment data: “If we have a session where we teach content that graduate students can’t use until their first
year of teaching — like sharing fake assignments and data so graduate students can practice analyzing data — we’ve found that the learning tends to get lost when there’s a long gap between learning something and actually having to use it.” Instead, Sarah says she and her colleagues work to get their graduate students to think about student content mastery at the daily level within their classrooms. Rather than asking graduate students to see how well students have mastered content on a unit test, Sarah asks graduate students “How do you move your kids to mastery of content skills within a lesson?”

In addition to basing a large portion of graduate students’ instruction on the data-literate practice of giving effective student practice and feedback, Sposato GSE also develops its teachers to become outcome-driven. One key way in which the graduate school does this lies in its subject methods coursework during the first year residency. In these courses — which are based on the subjects graduate students will teach in their full-time teaching placements — graduate students learn how to use standards and assessments to guide their instruction. Within these courses, graduate students “talk about assessment and how you determine whether students have mastered particular content. They also talk about topics like ‘What are we backwards-mapping from? What are the standards?’” During this time, teaching feedback for graduate students is also focused on the quality of instruction within a single lesson and whether teachers are properly assessing student work. These assessments usually take the form of classwork and end-of-class exit tickets used to gauge mastery of that day’s lesson.

Finally, Sposato students who pursue a Master’s in Effective Teaching degree and move on to the second year of the program, have an additional opportunity to develop
their outcome-driven data literacy skills. Now that Sposato graduate students are full-time
teachers of record for their own K-12 classrooms, they are able to begin using data from
their own classrooms to drive their instruction. Beginning in September, graduate
students are asked to draw upon quantitative and/or qualitative data from their classrooms
to identify a problem of practice. This problem of practice could be related to
management, culture, or instruction. Graduate students are then placed in groups based
on the problems they identified within their classrooms. Sposato faculty subsequently
initiate group calls, during which graduate students hypothesize about why these
problems may be taking place and discuss interventions that may help address them.

“Starting in September, we ask graduate students to identify a student-facing
problem in their classrooms. This may start with something like all the students being
off-task, but as the year goes on, the issues usually become more instructional. These
topics are something they want to work on in their classroom. Then, as a team, we curate
several strategies that people could choose from to address that student-facing problem.
So if, for example, there's a problem with 25% of students who are consistently off task
with outside conversations, they may address this issue by re-teaching procedures, more
positive framing, positive narration, relationship building, or more parent phone calls, et
cetera. During the calls, graduate students write down their plans for how to address their
identified problems of practice, and they then begin implementing their plans over the
next six weeks.” Following this group call, Sposato graduate students are held
accountable for implementing their plans in two ways: First, graduate students have
check-in calls with their Sposato coaches to discuss how their plans are going; second,
graduate students are expected to update their peer-based team about how things are going in their classrooms in shared Google documents. In this way, Sposato graduate students are expected to collect data relating to the effectiveness of their teaching methods, and to respond to these data with appropriate interventions: “The whole point is to implement and use strategies they learned to improve the actual stuff that's happening in their classroom in their real first year of teaching. Graduate students are working a lot more on responding to student work and to student data by uploading evidence of student work and analyzing it with their peers. It’s more of an individualized approach. It’s like, ‘These are the goals of my class; here's the evidence that I can get about whether I'm meeting those goals,’ and then having a community to help them analyze the data.”

When asked what promising practices she and her colleagues have identified in their approach to developing outcome-driven, data-literate teachers, Sarah identified several strengths of the Sposato approach. First and foremost, Sarah and her colleagues affirm their belief that novice teachers should only be learning how to collect and react to student data on a small scale, meaning primarily on the daily level: “I think one of the things we came to over the years was trying to talk about data in this more small-scale way, like ‘What are you seeing from your students on their papers in this moment?’ This is data you can use right then, or you can use it [sic] the next day.” Sarah shares that, in previous years, graduate students were overwhelmed when they presented larger-form data in spreadsheets that were supposed to be used for weeks of planning ahead of time: “Our teachers were totally overwhelmed; they were like, ‘Are you kidding? I don’t even know what I’m teaching tomorrow!’ They’d sort of tune out our instruction as something
that didn’t apply to them.” Sarah and her colleagues have found that framing data on a smaller scale, such as “Does this kid understand what you were teaching or not?” has resulted in graduate students’ perceiving its usefulness more readily: “Teachers are much more willing to engage with data on this small scale; they think it’s useful. Then we scale their learning up to questions like ‘Okay, based on how the whole class did, what do you think you might need to reteach tomorrow?’ And so you sort of start small and see success, and then teachers are more willing to be like ‘Oh yes, I see that I can do this and I want to do it, because I see how it’s useful to kids.’”

Sarah also shares that asking graduate students to bring their K-12 students’ work to coaching sessions in year two of the program has been successful: “I think having people bring student work to coaching sessions has generally been really good. Sometimes graduate students need to ground themselves in how their classes are actually doing because they may have an inaccurate view based on their emotional reaction to the class.” Sarah believes the Sposato coaching model is also helpful to developing an outcome-driven mindset in their teachers: “I think coaching is probably the best part of the Sposato program.”

Sarah also credits the program’s consistent focus on cycles of practice and feedback as an approach that helps teachers focus on how they move their students toward mastery of content: “The idea is that you are giving feedback based on what you’re seeing from your kids and letting them know what is good, and what needs to be fixed, and then you’re throwing them right back into practice so students have the time to try and fix it.” Sarah says that teaching graduate students how to provide their K-12
students with effective feedback is a cornerstone of Sposato GSE: “I think the big win for us has really been that we’re not explicitly talking about data, because it’s implicit in all of our teaching. Feedback is a thing that should be happening throughout all of class, throughout all of these cycles of practice and feedback. I think the big thing is we believe in teachers that are outcome-driven.”

Sarah and her colleagues have also reflected on lessons learned in teaching data literacy content to their graduate students, and have identified two main ways in which they seek to improve their instruction in the years ahead: refining what data literacy content they teach, and figuring out how to best use their time in front of graduate students. In general, Sarah shares that she and her colleagues believe they delved too deeply into data literacy content in previous years of the Sposato program. One area where this was the case concerned showing their novice teachers how to write assessments: “I think we started too big, or kind of catapulted people into this world of big data before they were ready for it. One of our early data classes was around writing assessment questions, which is great and interesting, but I don’t think it was really that useful to new teachers because most of them are not writing their own assessments, and assessment writing is incredibly complex work.” Throughout Sarah’s comments, it is clear that the Sposato program places a premium on providing its novice teachers with content that is immediately applicable in the real-world schools in which they will be teaching, and that it deprioritizes content they may not necessarily have to use starting from day one in the classroom. While Sarah believes that writing student assessments is
an important teacher skill, she and her colleagues now believe this to be content that should be deprioritized in the program.

Another data literacy content area where Sarah and her colleagues have decided to dial back their instruction concerns asking their graduate students to pre-identify student misconceptions. Pre-identifying student misconceptions occurs when a teacher identifies what her students are likely to be confused about, or the mistakes her students will probably make during an upcoming lesson. By pre-identifying misconceptions ahead of time, during the lesson planning phase, a teacher is able to create a plan for how she will address these misconceptions if and when they come up in the course of teaching. However, this type of lesson planning requires large amounts of both content knowledge and pedagogical content knowledge that novice teachers usually lack: “Up until last year, we spent way too much time trying to have our teachers pre-identify student misconceptions. We would have them set up this beautiful Common Core aligned classroom and then be like, ‘Okay, so what are kids going to mess up? What are they going to get wrong?’ And what we found is that the answers to those questions are hard to predict. The only way to get better at that skill is exposure to classrooms and seeing kids make the same mistakes over and over again. We’re finally trying to move away from that because rookie teachers don’t have that kind of exposure.”

In addition to refining the data literacy content it teaches, the Sposato program is also thinking about how its instructors can best use their time in front of graduate students. One approach that the school has decided to get rid of is the leading of massive professional development days: “In the past we’ve done professional development
sessions that were gigantic and one-after-another, specifically on data. I think one year we had an eight-hour day, all on data. And I think in the end, people were kind of overwhelmed.” Moving forward, Sarah says that she thinks it would be much better to spread out these sessions across the year, as opposed to holding them all on one or two large professional development days.

Sarah also shares that the Sposato team is working to think about how much time they spend teaching their graduate students how to execute cycles of practice and feedback, the backbone of their instructional approach, and a key aspect of their data literacy training. Specifically, Sarah thinks that she and her team could spend more time teaching graduate students how to provide feedback to students, instead of allotting more instructional time for setting up practice: “I think we spend too much time focused on appropriate ways to teach content; spend too much time focused on what the teacher needs to be doing in the explanation phases, so much so that I don’t think our teachers are as strong at being able to provide feedback and accurately read what’s going on with kids and how to address it.” While Sarah thinks that Sposato graduate students are able to respond to student data collected in end-of-lesson exit tickets, she also thinks that they are less able to respond to student data in the moment. In response, Sarah believes more instructional time should be devoted to teaching the feedback aspect of Sposato’s cycles of practice and feedback approach.

In the end, Sarah says the Sposato program is striving to get really good at developing rookie teachers. This aim includes the need to develop their graduate students into outcome-driven, data-literate teachers, but only ones who are great with this skill set
at the daily lesson level. Sarah also thinks that the Sposato program does a good job of teaching its graduate students to normalize error in the classroom, which she feels is a key component to an outcome-driven classroom: “Normalizing error is essential to learning. You can’t give feedback to groups and individuals in your class and you can’t have that moment of learning happen if kids are closed off to it, or if kids are like ‘Oh man, I got it wrong’ and shut down, or if they’re not used to productively struggling in the first place.” Sarah shares that teaching Sposato graduate students to develop this kind of culture in their classrooms is an essential part of their program: “Setting up that classroom culture, that safe space where mistakes are not just okay, but they’re celebrated and are a part of the collective learning experience, both for our graduate students and their students — I think that plays a big role here at Sposato.”

**Teacher Perspective**

Ross earned his undergraduate degree in cognitive science, which is what he credits with sparking his interest in the processes of learning and, eventually, teaching: “After graduating I was deciding between research and more of a hands-on type of job, and after doing a lot of research projects, I decided that more hands-on work was more appropriate for me, so I started looking into a lot of different types of teaching programs and ways to work in schools.” This search led Ross to learn about Sposato GSE, and he found the structure and approach of the program to be very interesting. “The Sposato program really appealed to me because I wouldn’t be teaching in my first year,” he explains, “but I would have a chance to work on building individual relationships with students and still be involved in their learning process while getting a graduate school
education. I also really liked the Sposato idea of practice being the most important way for people to learn. I thought that was very in line with what I had learned in my undergraduate degree, and it also seemed somewhat new and different for a graduate school.”

Ross shares that he was excited that the Sposato program was based on current research and the idea of being able to change and adapt. “I didn’t go to school for being a teacher, I went to school for teaching. Because I don’t believe getting an education degree necessarily makes you a teacher. Sposato forms you into a teacher that you need to be, and they teach you how to be successful. At Sposato, our instruction is hands-on.”

Ross also likes that Sposato faculty members are highly successful, recent classroom teachers as opposed to professors who have been out of the classroom for decades. “You are being taught by teachers that just got out of the classroom and that’s what I wanted to do. I wanted to work in an inner-city school, and Sposato was exactly what I needed to be a successful teacher.” Ross started out in the classroom as a math tutor and is now working as an eighth grade science teacher; “I've been having a lot of fun so far this year with the students. Yeah, it's been a hard work, but I think I'm seeing payoff for the work I'm putting in.”

When asked how important it is today for a teacher to be outcome-driven and data-literate, Ross reports that the idea of being this type of teacher resonates with him, but that he’s not sure how this got to be his belief system — though he is sure it was through Sposato’s teaching: “I think inherent with the idea of being outcome-driven is that teaching is not magic. It’s not even throwing a coin up in the air and hoping it lands
the right way. I really think you cannot have teaching without data, and you cannot measure how effective your teaching is without collecting that [sic] data and then analyzing it [sic].” Ross also believes that all students can learn. “It doesn’t matter where you come from, who you are — you can learn. You just need to figure out what resonates with the students. I think it’s important that teachers are held accountable for what they’re teaching, and to be able to, on the fly, change curriculum or something else to get students learning.”

“Growing up, I didn’t think like that,” Ross shares. “I just thought you were a smarter kid, and that’s who you were, and kids who got retained, that’s just what it was. It wasn’t until I started working at the Boys and Girls Club that I started to really understand kids from the inner city and backgrounds I’m not familiar with — that there was no difference between that person and me. And going through the Sposato program and really actually seeing the middle school world, where one student was at the beginning of the year to see where he or she ended — it was very eye opening. I was like, wow, anyone can learn… Anyone.” Ross doesn’t understand how someone could be a teacher today and not use data: “I can’t conceive of what teaching would be like if it wasn’t outcome-driven. I just don’t even understand what that would look like. To me, if I’m being perfectly honest, when I think of someone who doesn’t fit that mold, I kind of think you are dropping the bar. Any other job you do, someone collects data on you and tells you how well you’re doing. If data works [sic] in every other job, why wouldn’t teaching be the same?”
Ross doesn’t remember taking any data literacy courses at Sposato GSE, but he
does feel that he was taught to be an outcome-driven, data-literate teacher. “I was looking
back at all of my work from last year, and I couldn’t quite figure out exactly what class I
took for data literacy. But if felt, to me, like everything we did was based around it. I
don’t know how to explain it.” Ross was, however, able to speak to several aspects of his
training that he believed the Sposato program did well to make him the outcome-driven
teacher he is today: “It’s not like we ever had a course that was titled ‘Responding and
Reflecting on Data.’ I think it came in the habits of teaching. An exit ticket is pretty
critical to our practice as a Sposato teacher, so for every class I will have an exit ticket to
assess what percentage of students received mastery and then respond to that. And I think
that that cycle of collecting data at the end of class, that was something that was drilled
into us from very early.”

Ross also appreciates that he was given ample opportunity to practice providing
feedback to students with a group of colleagues before he entered the classroom full-time.
During role-play scenarios with colleagues, graduate students were asked to practice
collecting data in real time, making really quick decisions based on that data, “so really
expanding what you can do within your teacher brain within those couple of moments.”
After the role-play scenario ended, “we would get feedback on whether or not we made
the right decisions. I think in terms of data practices, giving us these very clear-cut
guidelines on what needs to be responded to and how to respond to it was really
embedded in us from the start.” Ross shares that the Sposato program was “obsessive”
about its use of feedback — in a good way. “I think Sposato is obsessive about the
circulation and collecting of real-time data. I think that’s a great thing that came out of my practice — having the brain space to give feedback in the moment.”

Ross also appreciates how the Sposato program developed him to reach all learners: “It’s almost like when they teach you, they’re not teaching you how to deal with what we would call the green kids, which are at a very high level because they are going to learn no matter what. The other kids, they want to learn, but you have to find different ways to grab their attention. Sposato gives you the tools to connect with those students, how to talk to them, and how to build relationships. It’s more like the students who need the help the most are the most rewarding.” As a graduate student, Ross was continually asked to identify what students had or hadn’t learned in a particular lesson; the focus was consistently on student outcomes. During his student teaching, Ross’s Sposato coaches asked him to bring exit ticket data to their meetings and asked questions such as “What did they master? Why did they or did they not master the content?” When Ross wasn’t lead teaching in a classroom, he was asked to observe other teachers at his school and ask the same questions of their lessons: “We were asked to collect data on what students were doing when the host teacher was up at the front of the room.” Finally, Ross says that Sposato GSE is doing a great job of teaching data literacy because their faculty members are all former teachers: “Sposato has teachers who have been in your shoes. They’ve taught a long time. They see all the misconceptions. They know where students are going to have pitfalls; they know where graduate students are going to have pitfalls.”

In addition to the strengths of Sposato’s data literacy instruction, Ross also identified areas in which he thinks the school could improve its ability to develop
outcome-driven, data-literate educators. First, Ross believes that much of Sposato’s curriculum is based on the premise that K-12 schools would be doing a lot of data literacy work for teachers once they began teaching full-time — either providing materials or training — but that this wasn’t always the case. “I think a deficit of the program, in terms of collecting and then analyzing data, was that there was almost an assumption that someone would be making the curriculum decisions for us, and so the standards that we were looking for, I don't think we ever got really a clear idea of that. I think there's this idea that you need to collect data, but the data that you need to collect will be chosen and defined by someone else.” Even though Ross possess a strong outcome- and data-driven mindset about his teaching, he also shares that there are gaps in his knowledge outside of the day-to-day use of data in cycles of practice and feedback. “The idea of data is still abstract for me. I can grasp it, but it takes some mental energy to get there. So I was thinking if Sposato was truly data-driven, I would have more practice, and more comfortability with data. I would be able to have a more articulate conversation.”

Specifically, Ross shared a desire to learn more about data use in longer-term cycles. Ross shares that he believes Sposato did a good of teaching him to look at a student’s paper and then respond in the moment, but that he was never assessed on his ability to be data-literate over the long term: “In terms of being data-literate over the long term, and then looking at summative and formative assessments, I don’t think that was measured at all. I had never heard the terms summative and formative assessment until I started my job.” Now that Ross is teaching full-time, he is working to figure out how he should set year-long goals for his class: “What I’m struggling with now is, what do I
want my overarching goals to be for my students and myself? What is a worthwhile use of my time as their teacher, and then how am I going to get them there?” While collecting data in class in the form of exit tickets comes more naturally to Ross, he is also struggling with how to respond to those data. “Knowing how to respond to data,” he explains, “is something that’s a bit fuzzier. I think I have a lot of room for improvement in knowing how to respond to data. I keep finding myself going to my dean of curriculum and asking all of these questions, and I think that’s inherent in being a new teacher, but I also think some of that reflects a lack of knowing what to do with the data I’ve collected.”

Even though Ross yearns for more data literacy skills, he has noticed — and appreciates — how the data orientation he gained as a Sposato graduate student sets him apart from other teachers at his school. During a recent co-planning meeting with another teacher, Ross shared that he suggested they use content on an upcoming benchmark exam to plan for their next few lessons: “It’s really fascinating to me, because I can’t consider teaching without data, and my co-teacher speaks a lot in terms of ‘I feel this’ or ‘I’ve been seeing this in class,’ but it’s not rooted in the data. That has been super noticeable to me, just in terms of if you care about something enough to teach it to them, then you need to care about it enough to assess them on it. I’m constantly giving my students behavioral and academic feedback. It comes into everything.”

Data use has become an important part of Ross’s philosophy about teaching: “When I walk into my class I have an overwhelming feeling of love and personal responsibility for the kids that are in my room and the problems that they face. My kids come into our school very low academically, and the problems are so real. And so the
urgency of responding to and collecting the data, to ensure that they're progressing, is incredibly high. I feel that everybody wants children to do well; I think that's a very human thing, to want to look after kids. But I think that being a teacher and knowing that you're totally responsible for the academic work that kids are going to do in your class that year — that is the fire under your butt.”

**Summary**

Sposato GSE expects two-third of its graduate students to complete the program and move on to full-time teaching. According to the school’s online content, the one-third of students who exit the program do so because they have either learned that teaching in the types of schools for which Sposato prepares them aren’t the right fit for them, or they leave the school due to their own lack of performance. In a competency-based program such as this, graduate students must demonstrate their teaching ability in various gateway assessments in order to move forward in the program. 100% of Sposato graduates receive teaching jobs upon completion of the program. Another way the graduate school thinks about its effectiveness is in terms of how many graduates remain in teaching for a third year. These numbers have been climbing steadily over the first few years of the program: 79% of graduates from the first cohort taught a third year; 84% from the second cohort, 96% from the third cohort, 97% from the fourth cohort, and 100% from the fifth cohort remained in teaching for a third year (Sposato.org/about/faq/).

The Sposato program believes that all students can learn, and that it is a teacher’s responsibility to lead her or his students to outcomes. Within its two-year program, Sposato GSE is developing outcome-driven mindsets in its teachers by constantly asking
them to review and respond to student work. Sposato is primarily teaching data literacy skills on a daily level through its philosophy that good teaching involves cycles of effective practice and feedback. Through these cycles of practice and feedback, graduate students are asked to plan instruction based on rigorous standards, assess students’ progress toward meeting those standards, and adjust their instruction to move all students toward mastery of standards — all skills of a data-driven teacher. Though Sposato GSE does not ask its graduate students to set quantitative goals for their K-12 students, nor to review data outside of the qualitative data they are collecting on the daily level, Sposato GSE has also held two full-day summer professional development sessions on using quantitative data led by outside consultants.

With exception of the summer professional development sessions on data literacy led by the Achievement Network, Sposato is using a completely embedded approach to teaching outcome-driven data literacy. Sposato GSE does not offer any courses on data literacy, though based on comments from faculty and graduate students it appears that outcome-driven data literacy is present across the program. Relative to other organizations included in this study, Sposato GSE faculty appeared to have less data literacy training than did their peers in other organizations. At multiple points throughout interviews, faculty members shared that this content was not their area of expertise. Furthermore, Sposato GSE is the only site where a faculty member expressed a critique of some common approaches to teaching data literacy taking place at other sites included in the study. While this faculty member believes in using qualitative data on the daily level within cycles of practice and feedback, the faculty member did not see longer-term
data use such as setting year-long quantitative goals and tracking progress to those goals in spreadsheets and creating re-teaching plans — to be a helpful teacher practice for rookie teachers. In this way, Sposato GSE prioritizes training their teachers to be data-driven as opposed to fully data-literate.

As with the other programs included in the study, Sposato graduates had extremely positive things to say about their program. Graduates of the program overwhelmingly showed an appreciation for what they had learned at Sposato and thought the teacher skills that “had been drilled into them” were incredibly helpful now that they are full-time teachers. The description of Sposato’s outcome-driven data literacy instruction was aligned between the faculty and teachers who were interviewed, and all teachers shared comments that demonstrated a highly dedicated outcome-driven mindsets. However, while the teachers interviewed for this study appreciated the data literacy instruction they received, they also yearned for more. When probed for what else they would have liked to learn about during their Sposato coursework, they indicated that they wished they’d had the opportunity to analyze and respond to more types of data, and that they would have liked to learn how to set longer-term quantitative goals for their students. More than one teacher expressed a concern that it was assumed that too much of their data literacy instruction would take place at their school sites after they completed the Sposato program.

In terms of a continuum of outcome-driven data literacy development, Sposato has intentionally veered toward the lower end of the spectrum in that the program believes novice teachers need only baseline data literacy skills in order to be successful in
the classroom on day one. Throughout interviews, it was clear that data literacy content had not been overlooked in Sposato’s curriculum development — rather, it had been intentionally deprioritized relative to other more pressing novice teacher skills. This deprioritization is an important distinction, insofar as it shows that Sposato values outcome-driven data literacy but has also made an intentional choice in their curriculum in light of the population they are serving. Sposato GSE is a program that is all about developing great rookie teachers. The program is not trying to develop mid-career teachers, or master teachers who want to take their practice to the next level. The fact that their teachers display such strong outcome-driven mindsets is a reflection of the fact that this content is an important part of the school’s value system, even if its teachers are receiving relatively little data literacy skills-based instruction as compared to other programs included in the study. At many points during faculty interviews, faculty members shared that one of their biggest challenges is that they have so little time with their rookie teachers, but so much they want to teach them. As the program has aged, it seems as though Sposato program leaders are working to get smarter about what content should be included in that little time, and that one decision that has been made is that the program should simply teach less content — including teaching less data literacy content.

Sposato GSE is also the only site in the study that chose to outsource some of its data literacy instruction to outside consultants. When asked why the school chose to hire outside consultants to do this work, faculty members shared that they wanted to tap into the content expertise at the Achievement Network, which was not data literacy expertise they had on their own team. Through comments from faculty and teachers, it appears that
the Achievement Network data literacy professional development sessions have had little impact on teachers and are not a promising practice. When asked how Sposato could improve its program, faculty members shared a desire to get rid of long, full-day professional development sessions. Multiple teachers interviewed didn’t remember taking the summer data literacy sessions, and the one teacher who did speak about the sessions spoke about the content as being stand-alone, and not something that she had been able to apply in her classroom. This same teacher expressed a desire to receive more long-term data literacy instruction from Sposato faculty. It does not appear that outsourcing data literacy instruction has been a helpful practice at Sposato GSE, and it seems likely that this approach will be abandoned in future years.

The most notable promising practice that stood out in Sposato’s outcome-driven data literacy instruction is their laser-like focus on teaching rookie teachers to be able to provide students with feedback based on real-time data. Providing students with real-time data is a data literacy skill that did not come up in information shared by other sites, and is definitely a progressive data-driven skill. While many sites spoke about assessing student learning at the end of a lesson or at the end of a unit, Sposato GSE was the only site that spoke of and focused on real-time feedback. Providing students with feedback in the moment requires knowledge of the standards, as well as a mastery-oriented perspective on teaching. Teachers who execute this skill effectively in classrooms have a clear vision for student mastery before they have even begun to teach a lesson — a key hallmark of a data-literate educator.
Chapter 8: Themes and Recommendations

The goal of this study was to document examples of how teacher training organizations have gone about developing outcome-driven, data-literate teachers. Even though the literature on data literacy is beginning to grow, there are still relatively few examples of how to develop this type of teacher, and even less documentation of what various pioneering organizations have learned about creating and delivering data literacy content to new teachers. The questions this study hoped to answer involved learning what data literacy content teacher training organizations are actually teaching their teachers, as well as how they are going about teaching this content. The study also sought to surface the lessons learned by these organizations, so that other organizations interested in developing curricula for outcome-driven data literacy could learn from those who have come before them. Finally, this study sought to understand teachers’ perceptions of the data literacy instruction they received, including what was helpful about their training and what could be improved.

What was discovered is that the faculty members and teachers interviewed for this study agreed or strongly agreed that data literacy skills are critical to being a successful teacher. The majority of teachers interviewed thought that data literacy skills were some of the most important that a teacher could possess. These sentiments were consistent across all organizational contexts, be they coming from a teacher participating in a more traditional four-year undergraduate school of education training program such as Texas Tech’s or a teacher in a brand-new one-year residency program such as the Seattle Teacher Residency. While the case that today’s teachers need to be data-literate has been
established through policy, teaching standards, and teacher certification exams, the educators interviewed for this study showed that the need for data literacy skills is critical to the daily work of teachers. No one interviewed in this study shared that they learned to become an outcome-driven, data-literate teacher because these skills were mandated by education policy. Rather, the educators interviewed for the study spoke about how becoming an outcome-driven, data-literate teacher was absolutely necessary in order to become a teacher who was able to do right by all of her students.

What isn’t clear from this study is if there are best ways to develop an outcome-driven, data-literate teacher. Each of the four teacher training organizations included in this study took a vastly different approach to developing outcome-driven, data-literate educators, and all four organizations have seen success with their approaches. Each site chose to teach different data literacy content, and each site taught their content in a different way. Though the methods for developing outcome-driven, data-literate teachers varied considerably from site to site, some themes emerged across these cases. The key themes and recommendations that stem from this study are discussed below.

**Key Themes**

**Mindsets Matter**

Each teacher interviewed for this study possessed an outcome-driven mindset, meaning that teachers saw their work as complete once all students in their class had learned a skill or set of content, rather than being complete simply because they had finished teaching a lesson. Each teacher associated the development of this outcome-driven mindset with the belief systems taught by her or his organization, or by a
particular instructor encountered during his or her teacher training. Across sites, teachers shared that they developed an outcome-driven mindset either because this mindset was modeled for them by a particular instructor in their program, or because this mindset was a core value of their teacher-training organization. In the case of Texas Tech University, teachers shared that a faculty member’s belief that all kids can and must learn had a large and positive impact on how they developed their own perceptions of teaching. At Aspire Public Schools, teachers shared that the organization’s outcome-driven value system came out in everything staff members did within a school building — from new teacher orientation, to coaching meetings, to professional development meetings with peers. Therefore, one promising practice in developing outcome-driven, data-literate teachers may be to ensure that teacher training organizations and individual teacher educators possess and model outcome-driven mindsets for the teachers they are training.

Mindsets matter in one other crucial way that was identified in this study — namely, that having an outcome-driven mindset was what caused many faculty members and teachers interviewed in the study to believe in the importance of data literacy. When faculty members and teachers spoke about the need to develop data literacy skills, they were not discussed as stand-alone skills, but rather as skills in service of student learning and student outcomes. As a teacher in the Seattle Teacher Residency stated, “Without data how would you even do your planning…or get students what they need?” This link between data and student needs further supports the need to couple outcome-driven mindsets with data literacy knowledge and skills in teacher training. In this regard, an outcome-driven mindset may also be seen as a prerequisite to learning data literacy skills.
Faculty Training Has Impact

One struggle with developing outcome-driven, data-literate teachers suggested by the literature is that many faculty members have not received outcome-driven data literacy training themselves and are therefore not best suited to teach this content to new teachers. Within this study, faculty members who expressed a greater interest, knowledge, and belief in data, worked in organizations where data literacy skills represented a larger proportion of their programs. This can be seen in the case of the National Center for Teacher Residencies and Aspire Public Schools. Faculty members interviewed at each of these sites received more data literacy training in their own upbringing, be it in a doctoral research program, or by working for several years in an incredibly data-driven environment, than did other faculty members interviewed at other sites. Faculty members at the National Center for Teacher Residencies and Aspire Public schools also demonstrated a greater personal interest in data use, and spoke more about the positive aspects of data use in schools, as opposed to negative aspects of data use. It was not surprising, then, to see that each of these sites had a well-developed, extensive set of outcome-driven data literacy learning experiences within their programs.

At sites where individual faculty members spoke about receiving less data literacy training, or where individual faculty members spoke about having less of a personal belief in the need to develop data-literate teachers, data literacy content took less of a priority in their respective curricula. In the case of Texas Tech University, this meant that some teacher candidates may work with an outcome-driven, data-literate site coordinator, or that they may be placed with a site coordinator for whom outcome-driven data literacy
is not a strength. At Sposato Graduate School of Education, where outcome-driven data literacy is seen as less of a priority in training novice teachers, this meant that the organization deferred the teaching of this content to the K-12 school sites where their residents would ultimately become lead teachers. Therefore, one theme that emerges from this study is that faculty training may have an impact on what outcome-driven data literacy content makes it into a program’s curriculum.

**Explicit and Embedded Content**

A current outstanding question in the field is whether data literacy coursework should be taught as explicit, stand-alone content, or should be embedded into existing coursework. One challenge of the former approach is that, by making data literacy content a stand-alone course, teacher trainers run the risk of making the content feel like a stand-alone thing. As faculty at the National Center for Teacher Residencies stated in their interviews, data literacy isn’t something teachers do on the side, but rather it is the daily work of teachers, just like planning and delivering lessons. Conversely, a challenge of the embedded approach is that it requires multiple faculty members to be well trained in outcome-driven data literacy, and also requires quality assurance mechanisms in order to ensure that teacher candidates across multiple grades and subjects receive equal access to the content.

A synthesis of the four sites included in this study would suggest that the embedded approach is favored over a stand-alone approach. Firstly, as surfaced by the National Center for Teacher Residencies, the embedded approach allows outcome-driven data literacy instruction to become a part of the main canon of teacher skills, as opposed
to some body of peripheral skills. Second, there is a desire to learn data literacy skills within the context of the grade and subject a teacher is or will be teaching. One reason for this is that knowing grade-level content expectations, how to assess content, and how to interpret and respond to data requires a large amount of content knowledge in order to do this work effectively. Several teachers interviewed for the study expressed frustration over analyzing student work and knowing that they need to respond to the data, but not knowing exactly how to do so. Responding to data requires content knowledge.

An exception to this theme are sentiments shared by students at Texas Tech University and Sposato Graduate School of Education. At least one teacher at each site expressed an interest in having a stand-alone data literacy course to teach data literacy fundamentals, which would help to build schema for future data literacy learning throughout the remainder of the program. These sentiments indicate that some baseline level of understanding of data literacy content may be helpful in order for teacher candidates to be able to apply these skills within their own grades and subjects. While both teachers who made the suggestion for a foundational data literacy course suggested this course be taught as stand-alone content, their greater concern was that foundational material was taught regardless of method. These sentiments may indicate the helpfulness of having a foundational course on data literacy at the beginning of a teacher training program, though this course may be stand-alone or embedded with other content.

**Cake, Not Icing**

One sentiment that was echoed throughout the three residency programs included in the study (Seattle Teacher Residency, Aspire Public Schools, and Sposato Graduate
School of Education) is that figuring out what is most important to teach a novice teacher in a short period of time involves a challenging series of decisions. Faculty members across each of these three sites expressed that prioritization is one of their greatest challenges, as there is far more content they wanted to teach their residents than there is time in which to teach it effectively. One related sentiment that was shared across the residency programs is that each site started out by teaching too much content. As each residency program has reflected on its strengths and weaknesses, each has identified that they need to focus on less content, and to teach this content in greater depth. This is in keeping with, for example, Aspire Public School’s goal to focus on the cake and not the icing, the Seattle Teacher Residency’s mantra that less is more, or Sposato GSE’s decision to focus heavily on cycles of practice and feedback.

When choosing what data literacy instruction was part of the cake and not the icing, faculty members considered what foundational data literacy skills novice teachers needed to learn during their training, versus what data literacy training they could and would receive at their schools upon beginning their full-time teaching positions. This type of prioritization is what led Sposato Graduate School of Education to heavily deprioritize data literacy instruction in their program’s curricula, believing data literacy instruction to be content teachers would learn at their K-12 school sites. Considering what data literacy skills residents need to learn in the one-year residency program versus what data literacy skills teachers can learn during ongoing professional development as a full-time teacher is also a question the Aspire Teacher Residency directors consider when creating future iterations of their residency program. Across sites there was an
outstanding question as to what makes someone a novice data-literate educator and someone else a master data-literate educator, as well as a question about what data literacy skills novice teachers should receive during their teacher training.

**Real World Data**

Another theme in speaking with teachers across all sites is that teachers vastly prefer to learn data literacy skills in conjunction with real-time data about real kids they are teaching. Though this type of learning is easier to support in an in-service residency program in which students are learning how to teach while working at least part-time in a K-12 classroom, this type of learning was also taking place at Texas Tech University through their fourth-year TechTeach residency program. Teachers across all sites expressed an interest in using real-world data to learn data literacy skills. Not only did teachers state that they felt using real data about real students would provide a better understanding of how to use data appropriately, but it also reinforced the belief that data should always be used in service of student learning. Learning data literacy skills through real world data may also help to assuage some teachers’ frustrations about wanting to learn how to manage all of the data they generate and come across in their classrooms. Using real world data also provides an opportunity for learning data housekeeping procedures, as well as the more sophisticated skill sets such as analyzing and responding to data.

**Technology as a Barrier**

Technology was reported as a barrier to teaching data literacy skills at two of the sites in the study. At Texas Tech University, getting access to student perception surveys
online, as well as getting results from those surveys to teacher candidates and site coordinators, has been a struggle in the past. At Aspire Public Schools, getting a resident access to timely K-12 student data through a mentor’s Aspire Data Portal isn’t always easy, leaving some residents with real-time data from which to learn, and other students within their same residency class without any. Because data literacy instruction is often dependent on data tracking software, systems, and/or online platforms, preventing and responding to technology barriers may be seen as an important part of designing and leading data literacy curricula. When a faculty member at the Seattle Teacher Residency was asked to share a strength of the program, one of the faculty member’s first responses was that they are still using the simple data tracker they created in the first iteration of their data literacy coursework. The faculty member shared that this tracker was a small and simple part of all the work they completed, but that it was nice that the tool worked and was still in use.

**Recommendations**

**The Need for Data Literacy Standards and Assessments**

One of the biggest takeaways from this study is that the field has yet to develop a shared understanding of what outcome-driven data literacy is. A review of the literature on data literacy reveals that there are currently two definitions of it: those published by the Data Quality Campaign and by Mandinach & Gummer. However, not a single person interviewed for this study mentioned either of these definitions, nor employed the language of either when speaking about data literacy. Furthermore, both of these definitions speak only to data literacy skills, and omit any reference to the need for a
student-outcomes orientation. During interviews, it became clear that each site used a different approach for teaching outcome-driven data literacy, but it also became clear that faculty and students saw this topic in wholly different terms from one site to the next. For instance, at Texas Tech University, data literacy was most clearly expressed as administering a pre-assessment to K-12 students to see where kids were starting, and as planning lessons in response to those data. At Sposato Graduate School of Education, data literacy was most clearly expressed as being able to set up and execute cycles of practice and feedback, and as a teacher’s ability to provide in-the-moment feedback to students based on their classwork. Neither of these actions are right or wrong, nor is one action better than the other. The point is that these two topics are different.

In addition to needing a stronger, more inclusive, and better adopted definition of outcome-driven data literacy, the field also needs to define the knowledge, skills, and mindsets of an outcome-driven, data-literate teacher explicitly. Specifically, the field needs to create standards for outcome-driven data literacy so that the field may enjoy a shared understanding of the topic at large, and so that teacher training organizations may use those standards to create effective curricula aimed at developing outcome-driven, data-literate teachers. Furthermore, teacher educators have very few ways to know whether a teacher is truly data-literate. At Texas Tech University, there is an indication that teacher candidates possess data literacy skills if they earn particular scores on the TAP rubric, and at Sposato Graduate School of Education there is an indication that residents possess data literacy skills if they can successfully execute cycles of practice and feedback. But who is to say what each of these teachers really knows or can do in
terms of outcome-driven data literacy, and how the data literacy skills of graduates from each program compare to one another once they complete their respective programs? A set of common standards and aligned assessments would provide teacher training organizations with invaluable resources for creating curricula and assessing the effectiveness of their programs’ abilities to develop outcome-driven, data-literate teachers.

The Need for a Data Literacy Continuum

In addition to the need for a set of data literacy standards and aligned assessments, the field also needs an explicit continuum of development for data literacy skills to understand the difference between what data literacy skills a novice teacher should learn, versus what data literacy skills a teacher should possess several years into her teaching career. Many faculty members interviewed for the study expressed a shared struggle in figuring out what content was most important to teach in their respective programs in the little time they have to train their teachers. A data literacy continuum of development would help programs like Sposato Graduate School of Education — which has made an informed decision not to give data literacy high priority in their program for rookie teachers — by providing better guidance about what data literacy skills rookie teachers should possess, and would provide graduates of this program a clearer understanding of what data literacy skills they will need to learn after graduating. A data literacy continuum of development would also help residency programs like the Seattle Teacher Residency and the Aspire Teacher Residency better focus on the high-leverage data literacy skills in their quest to focus on the cake and not the icing. Of the four sites
included in the study, The Data Literacy Scope and Sequence created by the National Center for Teacher Residencies best reflects a data literacy continuum of development, and may serve as a helpful reference for the field.

Training the Trainer

After the need for creating a set of outcome-driven data literacy standards, assessments, and continuum of development, the next most pressing need in the field is to figure out how current teacher trainers and education faculty are going to learn the knowledge, skills, and mindsets of outcome-driven, data-literate teachers. Due to the fact that data literacy content is newer to the teacher education field, many current teacher trainers have not been trained in outcome-driven data literacy content. This finding, stated by Ellen Mandinach and her research partners, was echoed by the faculty members interviewed for this study. Not a single faculty member interviewed shared that she or he received explicit data literacy training as part of formal teacher training, and many had to learn the skills of a data-literate teacher on the job. If outcome-driven data literacy is as important a skill as the literature and educators interviewed for this study believe it to be, then the field is going to have to figure out how to train the trainers if any traction in this content area is going to be made at scale. This may mean getting more faculty access to data literacy training programs already in existence, such as those at Harvard Graduate School of Education’s Data Wise Project, or through TERC’s Using Data Initiative, or there may be a need to create new data literacy training programs specifically for teacher educators.
Faculty Hiring Decisions

The literature on data literacy for teaching — as well as the four sites that were investigated for this study — suggest that faculty members’ knowledge and skills in the area of data literacy may have an impact on a program’s data literacy curriculum in two ways. First, faculty members with stronger data literacy backgrounds were more likely to include data literacy content in their program’s curriculum, and faculty mindsets about outcome-driven data literacy were highly transferable to the teachers they trained. Both of these findings suggest that the quality of a program’s data literacy curriculum may be impacted by the knowledge of its faculty. As a result, competency in outcome-driven data literacy may be one of many important factors in faculty hiring decisions. Program leaders, search committees, and hiring managers may want to consider evaluating faculty applicants’ data literacy skills via data literacy assessments used with teacher trainees, and may want to consider how their faculty body is composed of persons possessing these skill sets.

How Outcome-Driven Data Literacy Applies to Higher Education

Finally, though this study addressed how K-12 teachers are trained to become outcome-driven, data-literate teachers, higher education leaders and instructors should also consider the need for college-level classes to be led by outcome-driven, data-literate teachers. Outcome-driven data literacy is all about defining what students should know and be able to do upon completing a course, as well as about using data to drive instruction and ensuring success for all students. Though outcome-driven data literacy is most prevalent in the K-12 education field, its purpose and impact are also highly
applicable to higher education. Students in college classrooms also deserve teachers who believe that all students can learn and that their job is complete when all the students in their classrooms have learned the content they taught. College students also deserve teachers who are able to use data to drive and improve their instruction. Just as K-12 teachers interviewed for this study shared that outcome-driven data literacy skills are imperative to their jobs, so too may future generations of college-level educators.
Appendix 1: First Faculty and Staff Semi-Structured Interview Protocol

Research Questions Being Answered:

- What data literacy content are sites teaching teachers?
- How are sites teaching this data literacy content?

Interview Questions:

1. Tell me about yourself. What is your teaching background, and how did you come to your current position at XXX? How long have you been there?
2. What kind of work do you do at XX on a daily basis?
3. Tell me about your program. Will you please briefly describe the trajectory of one of your teacher candidates/graduate students/teachers from the beginning to the end of your program?
4. As you know, I’m conducting a study on how organizations develop outcome-driven, data-literate teachers. One of the first steps I had to take in my research was to define what I meant by the statement “outcome-driven, data-literate teacher.” I’d like to show you my definition and get your reaction (show on screen). Does this resonate? Why or why not?
6. How do you teach this content? What types of courses and/or learning experiences do you provide? (Ask for specific examples.)
7. Did you draw upon any particular research or resources when creating your curricula? (Ask for top 3 examples.)
8. How do you assess whether your teachers have learned this content?
9. What priority does this content take in your program, overall?
10. Finally, how important do you believe it is for a teacher today to be outcome-driven and data-literate? Somewhat important? Important? Very Important? Mission-Critical?
11. Anything else…?
Appendix 2: Follow-Up Faculty and Staff Semi-Structured Interview Protocol

Research Question Being Answered:
- What promising practices and lessons learned have sites discovered from their experience teaching data literacy content?

Interview Questions:
*(Begin interview by conducting member check for information gathered in first interview and document review)*

1. How did your organization decide to teach this particular data literacy content?
2. How did your organization decide on the methods for delivering this content?
3. Is there any content/were there any approaches you considered but didn’t use? If so, why not?
4. How well do you think your teachers learn this content? How do you know?
5. Do you think this instruction has had a positive impact on your students’ teaching practice? If so, how do you know?
6. Do you think this instruction has had a positive impact on your K-12 students’ academic achievement? If so, how do you know?
7. What have been your biggest lessons learned in creating your data literacy teaching curricula? What didn’t work, hasn’t worked as well, or has been more challenging than you anticipated? (Ask for several examples.)
8. What are the most promising practices you’ve developed in creating your data literacy curricula? What should other teacher preparation organizations draw from or emulate in your work? (Ask for several examples.)
9. Imagine that a new school of education wanted to create curricula for developing outcome-driven, data-literate teachers. What advice would you give the faculty member in charge of that work?
Appendix 3: Teacher Semi-Structured Interview Protocol

Research Question Being Answered:

- What views do teachers at each site have about the data literacy content and instruction they have received?

Interview Questions:

1. Tell me about yourself. What do you teach, how long have you taught, and how did you come to XX organization?
2. As you know, I’m conducting a study on how organizations develop outcome-driven, data-literate teachers. One of the first steps I had to take in my research was to define what I meant by the statement, “outcome-driven, data-literate teacher.” I’d like to show you my definition and get your reaction (show on screen). Does this definition resonate with you? Why or why not?
3. Describe the data literacy instruction you received at XXX. What specific courses/modules did you take? (Ask for examples, names.)
4. How was your data literacy knowledge assessed after completing this instruction?
5. How well do you think you learned this content? Please share examples of how this learning has played out…
6. Has learning data literacy knowledge, skills, and mindsets had an impact on your teaching practice? If so, how?
7. Has learning data literacy knowledge, skills, and mindsets had an impact on your K-12 students’ academic achievement? If so, how?
9. Imagine another school of education wanted to create curricula for developing outcome-driven, data-literate teachers. What practices should they adopt from XXX? What does XXX do really well on this front? (Ask for multiple examples.)
10. How can XXX improve their data literacy instruction? (Ask for multiple examples.)
11. Anything else you want to share that I haven’t asked?
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