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FORMATIVE ASSESSMENT IN THE CLASSROOM

FINDINGS FROM THREE DISTRICTS

Written in collaboration with the Michael & Susan Dell Foundation

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EXECUTIVE SUMMARY

Over the past decade, pressures from new and more rigorous state academic standards and state summative assessments have created an interest in and demand for data-driven instruction and good formative assessments. Teachers are looking for tools that will help them chart a path for students, to help them meet the new standards and show mastery on the new standards-aligned summative tests. With a clear goal of college and career readiness for all students, teachers cannot afford to wait until the end of the year to assess student progress. They need timely information about student performance to inform their lesson planning and help them quickly adjust instruction to meet student needs today, and tomorrow.

When teachers use formative assessment, they improve their instructional skills and content knowledge. Teachers frame better learning experiences for students and personalize instruction to ensure all learners are ready for college and careers.[i] They are more likely to see gains in student achievement, especially among low-performing students.[ii] When effectively implemented, formative assessment practices such as classroom discussions, descriptive feedback and the development of self- and peer-assessment skills yield large and consistent achievement gains.[iii] Formative assessment facilitates teachers' conceptual understanding of the core disciplinary content they teach. When teachers actively use formative assessment, they build and deepen their own understanding of common misconceptions, common learning progressions and better ways of presenting material and skills.

Formative assessment is part of effective daily teaching practice - not an occasional event, test or quiz. Formative assessment is **any teaching practice that elicits, interprets and uses evidence of student performance to improve instruction and learning**. Unlike summative tests, formative assessment is **primarily a teaching tool, not an accountability metric**.

To better understand what formative assessment looks like and better support teachers in implementing formative assessment in their classrooms, the Michael & Susan Dell Foundation studied instructional practice in three urban school districts – Austin Independent School District (Austin or AISD), Denver Public Schools (Denver or DSP) and Metropolitan Nashville Public Schools. This report documents and analyzes teachers' formative assessment practice, drawing on classroom observations, survey data of teachers and administrator interviews across three school districts.

Our findings from this study show that:

1. **Teachers regularly use some types of formative assessment strategies but the implementation of their practice is uneven. Although teachers use some strategies effectively, on the whole, most teachers need more practice and support to improve their implementation, particularly in areas that invite more student participation and ownership of their learning.**

2. **Teachers report that the support provided by districts for formative assessment is insufficient and that they most often turn to their colleagues for support to improve their formative assessment strategies. All three study districts and their schools provide general support for formative assessment practice. However, there isn't always agreement on the importance and definition of formative assessment and the support is not necessarily targeted consistently and clearly on formative assessment per se.**

3 **Significant barriers to implementing effective formative assessment practice still exist. Obstacles to implementing effective formative assessment practice reflect common structural, technical and attitudinal challenges that accompany fundamental changes to education systems and instructional practice. Districts are working to address these barriers and create conditions for successful school and classroom implementation of formative assessment despite competing priorities.**

4 **Teachers who used formative assessment practices more frequently also reported more use of technology, especially if they had school or district support. Use of technology for formative assessment depends on teachers already understanding and using formative assessment in their classrooms.**

You can see more examples of how teachers are engaging in formative assessment in the companion piece to this study, *Formative Assessment in Practice: Teacher Vignettes from Three Districts*.

INTRODUCTION

Students are working on problem solving in Mr. Shah's high school Algebra class. Seated in groups of four, students record their responses on individual hand-held whiteboards, which gives him the information he needs about current student mastery of the standard they are working on. As students complete the second problem, Mr. Shah says, "I see a common mistake. There are a lot of positive answers and the answer should be negative." Students with positive answers immediately go back and check their work. Some students ask a group member for help and adjust their answers. Mr. Shah validates the correct responses and moves on to the next problem. Students show their responses on the whiteboards and Mr. Shah points to the number line. "If we are here, at nine, which way will we go to subtract negative nine? After looking up at the number line, over half of the students still struggle to provide a correct response. Mr. Shah determines that instead of moving forward with the next problem, he will have student groups practice a set of foundational problems using the individually laminated number lines he keeps in the back of the room.

After the lesson, Mr. Shah reflects on his process for using this data to make adjustments during the lesson. "The data [from student whiteboards] influenced the questioning that I focused on within any given example. When students made an error, I would pose questions that would drive groups to talk it out and revise their own errors within their teams. When I saw that most of the class was stuck on subtraction of a negative number, I decided to adjust my lesson and focus on more explicit practice with the number line itself." Mr. Shah's mid-class modification allowed students to make adjustments to their problem solving strategies and deepen their own learning.

Over the past decade, pressures from new and more rigorous state academic standards and state summative assessments have created an interest in and demand for data-driven instruction and good formative assessment. Teachers are looking for tools that will help them chart a path for students, to help them meet the new standards and show that mastery on the new standards-aligned summative tests. With the ultimate goal of college and career readiness for all students, teachers cannot afford to wait until the end of the year to assess student progress. They need timely information about how their students are doing to inform their lesson planning and help them adjust instruction to meet student needs today, and tomorrow—now.

As the opening vignette highlights, active use of formative assessment helps teachers frame better learning experiences for students and personalize instruction to ensure all learners are ready for college and careers.[iv] When teachers use formative assessment, they are likely to see gains in student achievement, especially among low-performing students.[v] Instructional practices such as classroom discussions, descriptive feedback and the development of self- and peer-assessment skills yield the largest achievement gains when done well.[vi] Formative assessment also facilitates teachers' conceptual understanding of the core disciplinary content they teach. When teachers actively use formative assessment, they build and deepen their own understanding of common misconceptions, common learning progressions and better ways of presenting material and skills.

For many, the term "assessment" conjures up visions of quiet classrooms, with students in neat rows in front of computers or filling in dots on the ubiquitous Scantron sheets. This kind of formalized testing, currently the focus of a national anti-testing movement, has its place and purpose in signaling the

quality and breadth of understanding students must achieve to meet college- and career-ready standards. However, unlike formal summative assessments, formative assessment is indivisibly woven into daily instructional activities and is a critical component of effective classroom instruction.[vii] To improve formative assessment, teachers must improve their instructional practice. This is a deeper challenge to districts and others providing support, involving ongoing coaching, reflection and feedback, in addition to tools and training.

Our findings from this study show that, although most teachers use some kind of formative assessment in their classrooms every day, there needs to be a much broader understanding about what formative assessment is and what it looks like. We also need to identify and elevate what constitute best practices in formative assessment and find ways to effectively support such practices. We found that most teachers have a limited repertoire when it comes to formative assessment strategies and the current tools and training that districts provide are not sufficient. While districts play a key leadership role, any support to school districts needs to ensure that resources are focused at the school level where teachers say they receive their best support—from school-based coaches, instructional leaders and their peers.

What is Formative Assessment?

Formative assessment—a collection of formal and informal processes used to gather evidence for the purpose of improving student learning—provides teachers and students with continuous, real time information that informs and supports instruction.[viii] Figure 1 describes types of formative assessments teachers use to collect information about student learning. Long- and medium-cycle assessments are considered formative because they provide data that teachers can use in their classrooms to adapt their instruction according to the needs of their current students. Periodic assessments, such as interim assessments (long-cycle formative assessments), provide teachers and administrators with benchmarks for student learning throughout the year. Short- and medium-cycle formative assessments conducted within lessons and instructional units provide teachers and students with more immediate information about student learning and have a more direct impact on improving student achievement.[ix]

Figure 1: Types of Formative Assessment[x]

Type	Long-cycle	Medium-cycle	Short-cycle (day-by-day)	Short-cycle (minute-by-minute)
Focus	Across marking periods, quarters, semesters, years	Within and between instructional units	Within and between lessons	Within and between lessons
Length	4 weeks to 1 year	1 to 4 weeks	24 to 48 hours	5 seconds to 2 hours

Our study focused on short cycle formative assessments that happen daily in classrooms. Teachers use a variety of strategies in the classroom (short cycle assessments) to formatively assess student progress, including performance-based activities and multiple-choice items (see Figure 2 for additional examples). Although teachers can use any form of assessment as a formative assessment, the key to formative assessment is *how* and *when* that information will be used. Teachers use formative assessment data daily, even minute-by-minute, to diagnose student progress, to identify gaps in knowledge and

understanding, and to determine how to make immediate adjustments in instruction to improve student learning of specific concepts, skills or standards. Formative assessment also allows students to take ownership of their learning. As teachers clarify learning targets and share immediate feedback, students can identify gaps in their own learning and work to fill them.

Formative assessment is part of daily teaching practice, not an occasional classroom event. It includes ***any teaching practice that elicits, interprets and uses evidence of student performance to improve instruction and learning***. As one teacher explained, "I look at what is going to be the best way for me to very quickly know where we need to go next, to know if we have done what we needed to do." Key strategies in *effective* formative assessment practice include: clarifying and sharing learning goals; engineering effective classroom discussions; providing regular feedback; and supporting students as drivers of their own learning and as instructional resources for one another.[xi]

Figure 2: Examples of Formative Assessment

Much of the focus in states recently has been on summative assessments as most states have rolled out new or updated annual tests aligned to higher standards and often delivered via technology. This kind of formalized testing, currently the focus of a national anti-testing movement, produces data that is retrospective at best and cannot drive daily improvement in instruction with current students. Unlike summative tests, **formative assessment is primarily a teaching tool, not an accountability metric**.

Researchers and educators are still debating whether formative assessments should be graded and whether formative evidence can be used for summative purposes.[xii] Continuing confusion and lack of clarity about what formative assessment is and how to use it make it difficult for teachers and school leaders to embrace it and create barriers for district and school leadership looking to support effective implementation.

Formative assessment:

- Is a systematic, continuous process used during instruction
- Evaluates learning while it is developing
- Is integrated with teaching and learning
- Actively involves both teacher and student
- Provides feedback loops to adjust ongoing instruction and close gaps in learning
- Includes students' self- and peer-assessment
- Is actionable and supports instruction while learning is taking place

A significant challenge to large-scale use of formative assessment is that most current classroom teachers do not receive training in effective formative assessment practice in their preparation programs, and require significant and ongoing training to develop this practice.[xiii] Although teachers commonly use some form of formative assessment to collect information about their students, they are less skilled at using that information to improve their instructional practice. Teachers need support to engage in formative assessment practice successfully—from learning how to systematically collect evidence of student learning in real time to differentiating and adapting their instruction to address the range of student needs. Changing classroom practice overall is an arduous task without high-quality professional development support.[xiv] Sufficient time and resources are also critical to implementing formative assessment into classrooms on a daily basis.

The Formative Assessment Cycle

Figure 3 illustrates a common process for formative assessment. Though there are other formative assessment process examples available, they all have the same core components—1) collect data about student learning in real time, 2) analyze data in real time and after the lesson, and 3) respond to student data immediately and in future lessons. We selected this particular formative assessment cycle, developed by the National Center for Research on Evaluation, Standards and Student Testing (CRESST) and WestEd, because of its research-based steps.[xv] In real classrooms, formative assessment may not include every element of the cycle in every lesson for any number of reasons—shortened classes, adjusted pacing of the lesson due to particular student needs, etc.—but formative assessment should be considered a cyclical process or a continuous feedback loop. See Appendix A for a brief description of each element of the cycle. Also see our companion piece *Formative Assessment in Practice: Teacher Vignettes from Three Districts* for annotated examples from classroom observations and teacher interviews.

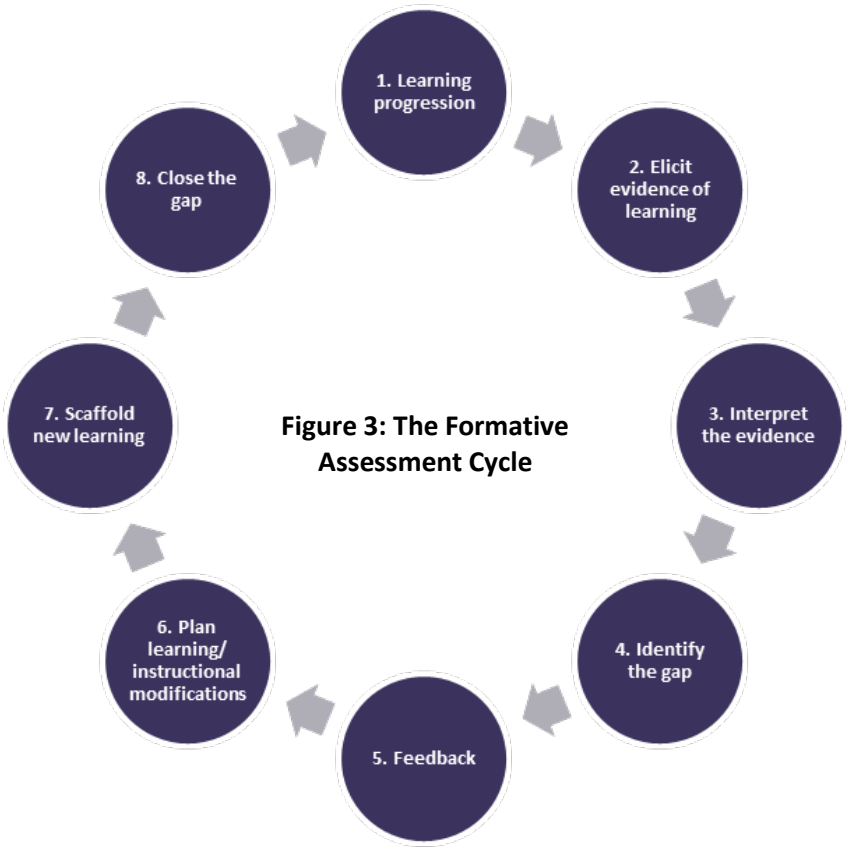

Figure 3: The Formative Assessment Cycle

About This Study

The Michael & Susan Dell Foundation has a long history of making investments to support effective data use in education. To help the foundation better understand and support teachers in implementing formative assessment in their classrooms on a routine basis, Education First led a study in three urban school districts to learn more about what exemplary data-driven instructional decision-making looks like in practice.

From March through December 2015, Education First researchers collected data in each district using a variety of qualitative and quantitative methods: interviewing district and school administrators; administering district-wide surveys of teachers on their formative assessment practices; conducting observations of teachers to see firsthand their formative assessment practice (observations included pre- and post-observation interviews); and collecting relevant artifacts and materials (see Appendix B for a full description of our methodology). The teachers we observed were all recommended to us by district and school leaders as teachers who were strong and effective users of formative assessment practices. We wanted to see best practices in action.

Using these data, our study sought to add to the foundation's understanding by answering these questions about formative assessment:

- *To what extent do teachers engage in true formative assessment practice?*
    - *How do teachers alter instruction based on formative data?*
    - *How do teachers manage the logistics of individualizing and differentiating instruction?*
- *To what extent do technology tools aid teachers in collecting, analyzing and/or acting upon formative data?*
- *What kind of support do districts and schools provide for formative assessment?*
- *What barriers exist to classroom instruction that is routinely adjusted based on formative data?*

This report analyzes 28 teachers' formative assessment practice based on classroom observations and interviews, survey data from 1098 teachers and 26 administrator interviews across three school districts to look at common practices, supports and barriers to implementation.

CROSS DISTRICT FINDINGS

Our analysis looks across the three study districts and highlights common themes based on survey responses, classroom observations and interviews. Although we provide district context, we reference districts by pseudonym in the findings. The purpose of this report is not an efficacy study or analysis of the specific districts but rather an examination of common patterns, strengths and challenges across districts that can inform the foundation and the field. After a short description of each district's context, we discuss our findings in relation to the study research questions.

We have grouped the first three questions into one set of findings that highlight classroom formative assessment practice. You can see more examples of how teachers are engaging in formative assessment and altering instruction in the companion piece to this study, *Formative Assessment in Practice: Teacher Vignettes from Three Districts*. We outline findings for technology use, support for and barriers to implementation of formative assessment in the subsequent sections.

District Contexts

Our study districts were invited to participate by the Michael & Susan Dell Foundation. All three are large urban districts whose student populations are racially, ethnically and socio-economically diverse (see Table 1 for district demographics). Each district supports the implementation of formative assessment in classrooms, with principals and with district leadership. All three districts agreed to participate in the study to learn about formative assessment use and to improve their support to classrooms and schools.

While minor differences exist between them, district leaders have given some thought to what formative assessment is: They see it as part of a continuum of assessment and as an important classroom practice. Generally district leaders from all three districts define formative assessment as a daily practice that assesses student learning in the moment and helps teachers to adjust instruction to meet students' needs. However, a common understanding of the actions required to effectively execute formative assessment is not necessarily shared across school leaders and teachers in each district. Each district approaches implementation in a unique way and provides varied levels of support to classroom teachers.

AISD district leaders encourage formative assessment, but campus leaders drive instructional practice and set instructional priorities. District leaders share a common definition of formative assessment but this definition is not necessarily shared at the school and teacher level. AISD has structures to support high-quality teaching and formative assessment, including provision of collaborative planning time in all schools to review data and plan lessons and assessment, and a new data warehouse to provide teachers with timely access to student data. Next year (2016-17) the district will fully implement a new teacher evaluation system, holding AISD teachers accountable for formative assessment practices. The district continues to invest in instruction, including professional development to support new technologies and campus-based innovation coaches, creating more opportunities to continue support for formative assessment practices.

Of our three study districts, DPS has the most explicit and targeted focus on formative assessment and what it calls the "data cycle." As part of its strategy to shift decision-making to schools, the central office serves as a resource provider and capacity builder, working to strengthen school leaders' abilities to support teachers' instructional practice. The district provides schools with online resources and a toolkit including protocols for data conversations as well as teacher effectiveness coaches. DPS district administrators, principals and teachers share a common definition of formative assessment and hold teachers accountable for these practices with a robust teacher evaluation system. As in the other districts, technology use for formative assessment in DPS is low.

MNPS administrators encourage and support a continuous improvement model for professional learning and growth across the district. The district prioritizes school-based autonomy, so district leaders provide training to principals and data coaches. These train-the-trainer sessions empower school leaders to support formative assessment practices in classrooms. MNPS administrators share a common definition of formative assessment that supports the district's emphasis on data-driven instruction, but this definition is not necessarily shared at the school and teacher level. Nashville's teacher evaluation system holds teachers accountable for a variety of formative assessment practices. As in the other districts, technology use for formative assessment in MNPS is low.

Table 1: Study Districts At-A-Glance*

	AISD	DPS	MNPS
Total Student Enrollment	83,634	90,150	84,070
African American	7.8%	14.1%	44.3%
Asian	Not available	3.3%	4.1%
Hispanic/Latino	58.8%	56.7%	20.7%
White	26.6%	21.9%	30.7%
Economically Disadvantaged (FRL)	57.1%	69.7%	75.3%
English Language Learners (ELL/LEP)	27.8%	38.2%	16.2%
Students with Disabilities (SWDs/SpEd)	10.2%	10.5%	12.4%
Number of Teachers	6,353	5,948	5,314
State Standards	TX Essential Knowledge and Skills (TEKS)	CO Academic Standards (aligned to the CCSS)	Common Core State Standards (CCSS)**
Summative College-Ready Assessment	State of TX Assessments of Academic Readiness (STAAR)	CO Measures of Academic Success (CMAS); PARCC	TNReady (TCAP)
Teacher Evaluation	Professional Pathways for Teachers (PPfT)	Leading Effective Academic Practice (LEAP) Framework	TN Educator Acceleration Model (TEAM)

*Source: District websites and state report cards; AISD data is from2015-2016, DPS and MNPS data are from 2014-2015.
**In 2015 the Tennessee legislature voted to repeal the CCSS and the state is currently working on new standards for 2017.

Specific Findings by Question

To what extent do teachers engage in true formative assessment practice?

1 **Teachers regularly use some form of formative assessment but the implementation of their practice is uneven. Although teachers use some strategies effectively, on the whole, most teachers need more practice and support to improve their implementation, particularly in areas that invite more student participation and ownership of their learning.**

To understand the extent to which teachers engage in true formative assessment and alter their instruction based on formative data, we looked at five domains of classroom practice, drawn from research on effective formative assessment practice[xvi]:

Domain A: Learning Intentions and Criteria for Success	•Successful formative assessment practice begins with clear, high-quality learning goals, transparent criteria and alignment to past and future learning so that students understand what they should already know, what they are about to learn and how that learning ties together.
Domain B: Engineering Effective Classroom Discussions (Questioning)	•Effective questioning and judicious use of wait time by skilled teachers will elicit evidence of learning from students. Questioning can be used to assess student progress toward instructional goals.
Domain C: Engineering Effective Classroom Discussions (Collaboration)	•Collaboration can be used as an instructional strategy to engineer effective classroom discussions to assess student thinking. Collaboration can also generate students' ownership of their thinking and work.
Domain D: Learning Tasks	•Skilled teachers connect to learning goals, clarify learning tasks and use evidence to adjust their instruction as needed both in the moment and in planning for future lessons. Teachers design learning tasks that build on learning progressions as part of their day-to-day instruction.*
Domain E: Feedback on Instruction	•Successful formative assessment allows teachers to assess student progress during a lesson and design ways to offer individualized feedback. Formative assessment strategies can help students offer feedback to their peers and attend to their own learning.

* Learning progressions map the routes students typically follow as they gain increasingly sophisticated levels of knowledge and skills during the passage from novice to expert levels of understanding.

We used these domains as the basis of our teacher survey and classroom observation rubric so that we could compare the two sets of data. For each survey item, we asked teachers to indicate whether they used the specific practice in each domain and how frequently (see Appendix D for the survey questions).

In observations, we noted whether we saw evidence of each practice and rated the quality of what we saw on a rubric (see Appendix C for the Classroom Observation protocol).

As Table 2 shows, on average teachers across all three districts use practices in these domains weekly with the exception of domain E where practices are used less frequently. **The percentage of teachers using various practices daily is highest in domains B and D.** While weekly use is a good sign, formative assessment should be a daily practice. Teachers should be continually collecting data to diagnose student progress, identifying gaps in knowledge and understanding, and determining how to make immediate adjustments in instruction to improve student learning of concepts, skills or standards. Teachers may not use every practice listed in every domain every day, but many of these practices make up elements of a high quality lesson and should be done daily.[xvii] Table 2 also notes that the teachers we observed demonstrated mixed effectiveness among the various domains. **Teachers are more effective in their use of practices within domains B and D and less effective in practices within the other domains.** Detailed survey and observation results by district are located in Appendices F and G.

Table 2: Effective Formative Assessment Domains with Survey and Observation Results

	% Teachers Who Use Daily (Survey) N=1098	Average Frequency of Use (Survey) N=1098	Average Effectiveness Rating (Observations) N=28
Domain A: Learning Intentions and Criteria for Success			
Connection to Future Learning	52%	Weekly	Developing
Learning Goal Quality	85%		
Learning Goal Implementation	65%		
Presentation of Criteria	38%		
Domain B: Engineering Effective Classroom Discussions (Questioning)			
Use of Questioning	89%	Weekly	Effective
Wait Time	91%		
Eliciting Evidence of Learning	62%		
Determining Progress	89%		
Domain C: Engineering Effective Classroom Discussions (Collaboration)			
Climate	68%	Weekly	Mixed results (Developing to Exemplary)
Student Collaboration	48%		
Student Viewpoints	67%		
High Expectations	96%		
Domain D: Learning Tasks			
Connection to Learning Goals	91%	Weekly	Effective
Clarity of Task	72%		
Adjust Instruction within the Lesson	82%		
Use of Evidence to Inform Future Instruction	77%		
Domain E: Feedback on Instruction			
Assessing Progress During Lesson	40%	Monthly	Developing
Individualized Feedback	53%		
Self-Assessment	28%		
Peer Assessment	14%		
Feedback Loops	40%		

Although observation data varied with domain, in all three districts we did see examples of effective use of many of the strategies listed above. In what follows, we highlight the relative strengths and challenges in each domain and include some examples drawn from our observations. Overall, teachers seemed to be stronger in assessing student learning in the moment and addressing learning goals and other immediate lesson-based practices. Teachers were much less strong in all of the areas that asked them to invite more student participation and ownership of their learning, such as creating a student-centered climate, peer assessment and sharing and/or developing criteria for success with students.

Domain A: Learning Intentions and Criteria for Success

Teachers showed greater strengths in *connecting current lessons to future learning* and addressing the learning goal throughout the lesson (*learning goal implementation*) in this domain. We did not observe strong evidence of *sharing the criteria for success with students* in our observations although a few teachers did do this effectively. Here are some examples of effective practice we observed in this domain:

- **Learning goal quality:** After reviewing place value mats and "greater than" and "less than" meanings and synonyms, a first grade math teacher stated a clear and grade-level appropriate learning goal about using place values to compare two numbers and connected it to the state's standards.
- **Connection to future learning:** A fourth grade reading teacher presented a lesson on predicate expanders as a logical connection to both previous lessons on subjects, verbs and "bare bones" sentences and future lessons on prepositions and complex sentence structures.
- **Presentation of criteria:** A high school science teacher created a small group activity for her students to learn about five types of environment systems, which included creating posters and presenting them to the class. In introducing the activity, she described the criteria she planned to use to evaluate students' posters and presentations. She then provided them with the rubric she created as a reference.

Domain B: Engineering Effective Classroom Discussions (Questioning)

In domain B, we saw stronger practice in *determining student progress during the lesson* and providing *wait time* for students to engage and respond to questions. We did not see as much strong practice in *eliciting evidence of learning*, although again, a few teachers did this effectively. Here are some examples of effective practice we observed in this domain:

- **Questioning:** A high school chemistry teacher asked questions of most students throughout a lesson on atomic theories. She asked students to build off of one another's predictions about and descriptions of scientific experiments and pushed for detailed responses to her questions.
- **Eliciting evidence of learning:** To systematically elicit evidence from all students throughout the lesson, a high school math teacher had his students respond to daily warm-up questions and complete individual practice problems on 360 degree whiteboards posted on the walls. The teacher was able to walk around and immediately provide feedback and ask follow-up questions to students when reviewing their responses. At the end of class, students submitted responses from their small work group via Google Forms. This served as their exit ticket for the day.

Domain C: Engineering Effective Classroom Discussions (Collaboration)

In this domain, teachers showed greater strength in creating *high expectations* and a "we can all learn" attitude with students and in seeking and validating different *student viewpoints* during lessons. We did

not see strong evidence of creating a student-centered *climate*. Here are some examples of effective practice we observed in this domain:

- **Student collaboration:** In one district, most teachers had students' desks organized in groups of three. The triad groupings encouraged regular discussions and collaboration on assignments without requiring students to move around. Most students seemed used to working with their triads, and most were actively engaged with their peers during discussions and collaboration.
- **Student viewpoints:** A high school math class was given a problem to complete in small groups. The teacher encouraged each group to develop as many solution pathways as possible. Groups then shared a range of solution pathways for the same problem with the entire class.

Domain D: Learning Tasks

In domain D, we saw stronger practice in using student responses and work to *adjust instruction within the lesson* and in aligning tasks and activities to the learning goals (*connection to learning goals*). Teachers also showed strength in clarifying the tasks or activities (*clarity of task*). We did not see strong *use of evidence to inform future instruction*. This may have been due in part to only observing one lesson on one day rather than gathering data across several days in one classroom. Here are some examples of effective practice we observed in this domain:

- **Connection to learning goals:** After an initial lesson on multiplying with zero, one and two, an elementary teacher had students complete a worksheet individually with a variety of related multiplication problems and then had a whole group practice session where students developed their own problems and called on other students to answer the problem they posed.
- **Adjusting instruction:** A second grade ELA teacher infused questions to determine student understanding throughout a lesson about fiction and non-fiction texts. She inferred from student responses that the class was struggling to understand the content and adjusted the lesson's activity from an individual exercise to a full group discussion.

Domain E: Feedback on Instruction

In this domain, teachers showed greater strength in *assessing student progress during the lesson* and providing descriptive *individualized feedback* that students could translate into action. We did not see very much *peer assessment* in any of the districts, although some teachers did this well. Here are some examples of effective practice we observed in this domain:

- **Individualized feedback:** A high school algebra teacher provided individualized feedback to students who were working on a group assignment about determining rate. Students had the opportunity to internalize feedback and adjust responses during the lesson.
- **Peer assessment:** A science teacher had her students draft an initial summary of atomic theory they just learned. She had them share their initial drafts with a partner for feedback before finalizing and submitting their summary to the teacher.

To what extent do technology tools aid teachers in collecting, analyzing and/or acting upon formative data?

2

Teachers who reported more frequent use of formative assessment practices also reported more use of technology, especially if they had school or district support. Use of technology for formative assessment depends on teachers already understanding and using formative assessment in their classrooms.

Technology use in general, and technology use for formative assessment in particular, was consistently low across all three districts, reflecting a national trend indicating that teachers have been slow to transform the ways they teach and particularly to adopt new technology.[xviii] Survey respondents did not agree that the use of technology was important in formative assessment. Our survey asked teachers to select from a list of various kinds of formative assessment technologies and tell us how often they used them. Teacher responses showed that they used all items except for personal computing less than monthly. Personal computing (identified as the use of iPads or laptops) was rated as above monthly use, although this does not indicate that use of personal computing was specifically for formative assessment.

Interview data supports survey findings, indicating that technology use in general varied across schools in each district and was often hampered by outdated equipment, lack of access, lack of familiarity with technological options or applications and lack of training. As one administrator noted, "Lots of teachers aren't as comfortable with technology. I think sometimes some teachers are a little fearful of it. [So we need to provide] access and also training that's engaging and takes teachers step by step through the process." Interviewees mentioned interested teachers who were using technology to collect quick and immediate data about their students' understanding (e.g., clickers, Plickers, Kahoot digital quizzes) and teachers have been creative about finding technology they can use or adapt. But across the districts, teacher and administrator interviews reflect a common feeling that districts have not been able to provide teachers with the kind of classroom-based technology they need in a consistent and ongoing way. "We do not have adequate access to technology. Our streaming is slow. Computers often fail, die and are unreliable. When something is not working it is difficult to have it repaired in a timely manner," one teacher reported.

Teachers acknowledge the important role technology can play in the classroom and almost all of them use the internet to find resources. Teachers who use various formative assessment programs appreciate the speed and ease with which they can gather student data and the instructional options that technology allows them. "Now with technology I feel like it's easier to have a lot more formative assessment, even with BrainPop videos where they do the quiz at the end of the video, you can get feedback from that," one teacher explained.

We analyzed our survey data to determine whether there might be potential connections between formative assessment use and technology use. Statistical analyses (shown in Table 3) revealed that indeed there were relationships between the use of formative assessment practices and use of technology. Teachers who reported that they used formative assessment strategies more frequently also indicated higher use of technology for assessment. This was especially true for practices in Domain E (large effect size and positive correlation strength) but we found a positive relationship between formative assessment use and technology use when we combined all variables as well. An increase in use of formative assessment practice was positively connected with use of technology, and vice versa. In addition, we also found a significant correlation in the relationship between *support* for formative assessment and use of technology for formative assessment. Practically speaking, and perhaps not surprising, teachers who are better supported to implement formative assessment strategies are more inclined to also report increased technology use for instruction, as well as for formative assessment specifically.

Our findings suggest that while teachers who use technology for formative assessment find it valuable, it is not the technology itself that drives increased formative assessment practice. Use of technology for

formative assessment depends on teachers already understanding and using formative assessment in their classrooms.

Table 3: Relationships between Average Technology Use and Formative Assessment Components of the Survey

	Average Technology Use				
	Correlation Strength				Effect Size
FA Variable	***r*-statistic**		***p*-value**	r^2	**Interpretation**
Importance	.096	Slightly positive	.007	.009	Small
Domain A	.311	Positive	.000	.097	Medium
Domain B	.180	Slightly positive	.000	.032	Small
Domain C	.210	Slightly positive	.000	.044	Small
Domain D	.188	Slightly positive	.000	.035	Small
Domain E	.378	Positive	.000	.143	Large
Overall Use	.326	Positive	.000	.106	Medium
Support	.332	Positive	.000	.110	Medium

What kind of support do districts and schools provide for formative assessment?

3 **Teachers across all three districts report that the support provided by districts for formative assessment is insufficient and that they most often turn to their colleagues for support to improve their formative assessment strategies. All three study districts and their schools provide general support for formative assessment practice but there isn't always agreement on the importance and definition of formative assessment and the support is not necessarily targeted consistently and clearly on formative assessment.**

Survey data and teacher observations show that while many teachers do use some form of formative assessment in their classrooms, they have a limited repertoire and they do not necessarily use these strategies daily. Because formative assessment is a fundamental part of instructional practice, asking teachers to change their practice to accommodate more or improved formative assessment requires support for capacity building including time for reflection, in-school modeling and coaching, access to materials and ongoing, targeted feedback. While districts have set up structures that could support such capacity building, such as support for professional learning communities (PLCs), provision of coaching and trainings for school administrators among other things, these supports are not necessarily targeted at formative assessment per se.

Finding 3a. *There is lack of clarity about the importance and definition of formative assessment.*
Lack of a common definition across a district can lead to misunderstandings about formative assessment practice that create barriers to implementation. For example, if principals and teachers understand formative assessment differently, then what principals see during classroom walkthroughs may not be what they expect. Teachers may be modeling what they think is formative assessment – using whiteboards to check student understanding for example - but if the principal thinks of formative assessment as a quick test or written assignment, this could lead to difficulties for teachers trying to use a variety of formative assessment strategies. A common definition can help administrators and teachers work together to support a wide range of formative assessment strategies.

Most definitions offered by district leaders, school administrators and teachers only focused on parts of the full formative assessment cycle (described on page 9). Generally district leaders from all three districts define formative assessment as a daily practice that assesses student learning in the moment and helps teachers to adjust instruction to meet students' needs. We heard variations on this definition from school-based administrators and teachers as well. Most principals and teachers agree that formative assessment means checking for student understanding and using that information to adjust instruction. But there is much less clarity around what actually constitutes formative assessment in practice. Survey data highlighted in Table 2 show that teachers rely on certain practices (e.g., those in domains B and D) and use them much more frequently than others (e.g., those in domains C and E). These data show that most teachers understand that they need to use questioning to check for understanding, for example, but they may not understand the importance of feedback in the formative assessment cycle or that feedback should be part of their instruction. If districts, administrators and teachers are not clear on a definition of formative assessment that includes all of the various elements of the cycle, then formative assessment practice suffers.

Our interviews found clear intra-district variation in the definition of formative assessment between teachers, school administrators and district leaders in two of the three districts. District administrators highlighted this concern in those two districts and discussions with principals and teachers revealed differing conceptions about what formative assessment looks like in the classroom. In District A for example, school leaders and teachers struggle with the misconception that formative assessment must be some kind of test. As one teacher explained, "That [term] gets confusing for people because the terms are used so interchangeably sometimes. Our weekly quizzes were formative assessments…but sometimes formative assessment isn't referred to as that quiz. It's the hands up exit ticket which is also a type of formative assessment. Some people view the little bitty quizzes as summative."

Administrators and educators showed the closest agreement in their definition of formative assessment when the district had an explicit and targeted focus on formative assessment and deployment of district-trained coaches to schools. Coaches use common language to talk about formative assessment practice, including key strategies such as using multiple methods to gather evidence of student understanding, offering students immediate feedback and adjusting instruction within the class or the next day.

***Finding 3b**. Professional development and other supports for formative assessment practice are not sufficient.*

Survey results, highlighted in Table 4, show that teachers generally feel they have some supports to implement formative assessment. They feel they understand what it is and know how to use it. They have the support from their administrators. Most importantly, they feel they have an existing instructional approach that encourages student interactions and allows for in-class modifications.

Teachers recognize that to effectively use formative assessment they need to intentionally build time into their daily lessons and then take the time to act on the data. According to our survey, this is where teachers feel they have less support from their district and school. They want more time within class periods to gather and act on data, they don't feel they are receiving adequate training specifically in formative assessment strategies, and they do not feel they have adequate access to or training in technology that could support formative assessment. Because of inadequate training, perceived lack of resources or the demands of other priorities, teachers say they need additional support from school and district leaders to elevate formative assessment and implement it consistently. District leaders in all three districts acknowledge that they need to do more, particularly in providing more focused training in

formative assessment strategies across the district, developing stronger school leaders who can support formative assessment and providing access to formative assessment technology, among other things.

Table 4: Survey Results for Support Category

*Support for Formative Assessment**	*District A*	*District B*	*District C*
I understand what formative assessment is and how to use it.			
I have enough time to plan formative assessments.			
The curriculum I use includes support for formative assessment.			
The curriculum I use supports formative assessment and individualized instruction at a range of grade levels.			
My approach to instruction provides me with ample opportunities to interact with all of my students and act on formative assessment data.			
My class periods provide enough time to gather and act on formative assessment data.			
I have administrator support to incorporate formative assessment into my teaching practice.			
My district or school provides me with materials/tools to support formative assessment.			
My district or school provides me with technology to support formative assessment.			
My district or school provides me with adequate training on formative assessment practices.			
My district's pacing guides allow time to incorporate formative assessments and changes to my practice if needed.			
I know how to use data to diagnose underlying learning gaps and identify lessons and instructional strategies appropriate to help students catch up.			

***Green = agree; Red = disagree**

Each district in the study provides materials, training, coaching and other supports to help teachers use formative assessments, as detailed in Table 5. While each district has invested time and money in these learning opportunities, it's not clear that these opportunities are intentionally focused on formative assessment in a sustained and systematic way. For example, District B officials report that they sometimes offer one-time, half-day training opportunities focused specifically on formative assessment strategies but that the district mostly tries to build formative assessment tools and supports into model lessons shared with teachers as a part of ongoing content-area and curriculum trainings.

In District C, most of the district's formative assessment training, resources and supports live within its data-driven instruction and data culture work and are not explicitly called out as formative assessment. District C leaders contended that they "just haven't found a lot of value, in trying to articulate differences in assessment types." District officials also referenced the online publicly-available Standards Toolkit," where the district's data protocols are housed under the tab labeled "Monitor Student Learning and Adjust Instruction."[xix] They highlighted related materials in the district's online Student

Learning Objectives (SLO) resources as well as meeting protocols for various stages of the inquiry cycle and instructional planning.

District A has similar training offerings to District B. The district's data coaches lead one-time, half-day formal formative assessment training for teachers and leaders during the year and in the summer. At least one person from each school in the district is encouraged to attend the "train-the-trainer" session. The data coaches participate in a three-part training entitled "Classroom Assessment for Student Learning" led by the Pearson Assessment Training Institute.

Table 5: Specific District and School-Level Supports for Formative Assessment Practice*

Type of Training/Support	*District A*	*District B*	*District C*
Optional district-wide trainings (summer and during the school year)	X	X	X
Online formative assessment item banks (e.g., ANet, SchoolNet)	X		X
Online toolkit with formative assessment resources and materials			X
Data warehouse (includes student summative and interim assessment scores, attendance, grades, etc.)	X	X	
District benchmark assessments (interim) (can provide formative assessment data but less timely than daily in-class practices – optional use in all three districts)	X	X	X
School leader/principal training (including mentorship, Principal Academies)	X		X
In-school coaching (provided by district)	X	X	X
Campus/school-based training or professional development	X	X	
Collaborative planning time for PLCs/grade-level teams to review data and plan lessons (attended regularly by administrators)	X	X	X
Administrator classroom walkthroughs	X	X	

*As reported by district and school administrators in interviews.

A recent study by the Bill & Melinda Gates Foundation asked teachers about their ideal professional development experience. Teachers in the Gates study were dissatisfied with most of the current professional development they had experienced but continued to see value in such training to help them improve their instruction. Their ideal learning experiences reflect what research says about high-quality professional development: that it should be relevant to teachers' work, interactive, delivered by someone who understands the experience of teaching, sustained over time and respectful of teachers as professionals.[xx] Our study districts have set up structures (e.g., collaborative planning time, in-school coaching, administrator walkthroughs) that could and in some cases do support high-quality professional learning. The districts have also spent resources to provide teachers with materials (e.g., benchmark assessments, item banks, online toolkits) to support formative assessment. But teachers in these three districts appear to be experiencing a disconnect similar to those in the Gates report; namely that the delivery of the professional learning may not be living up to its promise. Formative assessment is a classroom-based practice and is fundamentally connected to instruction. Any professional learning intended to develop teachers' skill in formative assessment must attend to the nature of adult learning, natural resistance to change, and the quality and consistency of the content.

Finding 3c. *Teacher evaluations can provide accountability and leverage*

Teacher evaluations in all three study districts provide a mechanism for accountability for formative assessment which leaders can and do leverage to encourage teachers to improve their practice. Rubrics in each evaluation enumerate specific formative assessment practices administrators expect to see in classrooms and shape the nature and form of observations and conversations around teaching in district schools. Although District B's evaluation will not be fully implemented until next school year, District C's and A's evaluations have been in place for several years.

Each of these evaluation systems requires administrators to engage in regular, substantive coaching conversations based on student learning and observation data. In interviews, principals reported the value of these conversations with individual teachers and their regular participation in grade-level team meetings focused on data discussions and adjusting instruction. As one school administrator explained, "The biggest key for me has been being very actively engaged for years in [teachers'] planning meetings. …One of the requirements [on the teacher evaluation] is that most students demonstrate mastery of the daily objective. That's why I know I'm going to see [formative assessment] every day because for a good score on the [evaluation] rubric, teachers have to show evidence of student mastery of that daily standard. To do that, they have to give some type of assessment."

District and school administrators can do more to use the formative assessment elements of their teacher evaluations to drive discussions and improvement and identify areas for additional coaching, modeling and support for teachers struggling to implement new practices.

What barriers exist to classroom instruction that is routinely adjusted based on formative data?

4 **Significant barriers to implementing effective formative assessment practice still exist. Obstacles to implementing effective formative assessment practice reflect common structural, technical and attitudinal challenges that accompany fundamental changes to education systems and instructional practice. Districts are working to address these barriers and create conditions for successful school and classroom implementation of formative assessment despite competing priorities.**

Despite regular collaborative planning time supported by all three districts, teachers in interviews and survey respondents report limited time to plan to assess student understanding and to adjust instruction accordingly. In part, teachers' sense of limited time stems from aggressive district pacing guides that create pressure to keep moving rather than slow down and re-teach as needed. Falling behind the district pacing guides—which are aligned to summative tests—pose difficulties for teachers and students since these tests come with high-stakes accountability measures that have an impact on teacher evaluations and school performance ratings. Teachers feel pressure to ensure their students are ready for these tests. "We have great [offline] resources to use to complete formative assessments, but we do not have the technology or time to do so. With all the other testing demands, we are data rich but information poor. I know what I need to do to fill in gaps, but I do not have the time or support to do so. I have to use that time to collect "data" through formative and summative assessments instead of fix the individual learning needs of students," one teacher noted.

Teachers also cited lack of time to act on the data they collect because of frequent interruptions and inconsistent scheduling in the school day. As one teacher commented, "Planning time is never guaranteed between individualize education program (IEP) meetings (for students with disabilities),

parent meetings, grade-level team meetings and PLC meetings. We are supposed to be doing common assessments but don't have time during school hours to create them collaboratively."

Educators struggle to align formative assessment practices with existing curriculum and testing requirements. Administrators and teachers in Districts A and C voiced concerns about the lack of alignment between the district benchmark assessments (a long-cycle formative assessment tool) and the district scope and sequence. In District C, teachers and administrators also mentioned the difficulty in aligning formative assessments to the various curricula used across schools and departments. Curriculum materials in some subjects are outdated, and/or there are no supporting materials to help teachers create formative assessments aligned to the pacing guide and the materials. As one teacher explained, "The discrepancy between Expeditionary Learning, EngageNY, Math Fellows and the district's scope and sequence make aligning everything very difficult. It's not impossible but these processes take an immense amount of time to accomplish thoughtfully and thoroughly." The current transition to ANet and SchoolNet as a repository for formative assessment items in Districts A and C may help to address this issue but teachers will require training to use these tools effectively.[1]

Because formative assessment strategies are classroom-based and require teachers to change their practice, district and school leaders face attitudinal challenges in some cases. Almost one quarter (22 percent) of the open-ended comments on our survey reflect frustrations with supports, technology, misunderstandings about definitions or purpose, misunderstandings about process, lack of time, etc.

District leaders feel some outside pressure to downplay the focus on formative assessment as well, to circumvent a growing national anti-testing fervor which feeds concerns about student assessment fatigue. Administrators relate anti-testing challenges to a misconception about formative assessment as formalized testing rather than as part of effective daily instruction. As one administrator put it, "[There is] this perception that we are, every day, sitting our children at a desk with a pen and paper or in front of a computer and making them take a test, as opposed to determining the strengths and needs of our children and then figuring out how we can meet their needs as the result of the information we gather."

CONCLUSION

Our findings in this study point to ways that schools and districts can better help teachers transform classrooms into more effective climates for formative assessment practice. In summary, we found that:

1. **Teachers regularly use some types of formative assessment strategies but the implementation of their practice is uneven. Although teachers use some strategies effectively, on the whole, most teachers need more practice and support to improve their implementation, particularly in areas that invite more student participation and ownership of their learning.**

2. **Teachers across all three districts report that the support provided by districts for formative assessment is insufficient and that they most often turn to their colleagues for support to improve their formative assessment strategies. All three study districts and their schools provide general support for formative assessment practice. However, there isn't always**

[1] ANet is a bank of interim assessment items developed by the Achievement Network. SchoolNet, developed by Pearson Learning Services, is a web-based product that combines assessment, reporting and instructional management tools in a single platform.

agreement on the importance and definition of formative assessment and the support is not necessarily targeted consistently and clearly on formative assessment per se.

3 **Significant barriers to implementing effective formative assessment practice still exist. Obstacles to implementing effective formative assessment practice reflect common structural, technical and attitudinal challenges that accompany fundamental changes to education systems and instructional practice. Districts are working to address these barriers and create conditions for successful school and classroom implementation of formative assessment despite competing priorities.**

4 **Teachers who used formative assessment practices more frequently also reported more use of technology, especially if they had school or district support. Use of technology for formative assessment depends on teachers already understanding and using formative assessment in their classrooms.**

Formative assessment drives effective teaching practice. Data about student learning collected in the moment provides teachers with insight into students' thinking, helps teachers design learning experiences that meet students where they are and supports improved achievement. Teachers work to do this every day, in every lesson. To be successful, teachers rely on their instructional skills but they also depend on the supports provided by their schools and districts.

School leadership is a crucial element in improving teacher practice. Without aligned support for formative assessment from the classroom to the central office, districts end up with pockets of excellence—interested teachers who have taken on the challenge to implement formative assessment—but no system-wide commitment to supporting those practices. To create the conditions teachers need to improve their formative assessment practice, districts must first tackle the biggest barriers to implementation by:

- creating a common definition of formative assessment;
- providing information about the wide range of effective formative assessment strategies;
- providing time to reflect on and practice formative assessment strategies; and
- building access to technology specifically designed to support formative assessment.

Formative assessment empowers students to participate and take ownership of their own learning. As teachers clarify learning targets, develop clear criteria for success and share immediate feedback, students identify gaps in their own learning and work to fill them. However, our study revealed that teachers may need support in areas related to creating a student-centered climate, implementing peer assessment and sharing and/or developing criteria for success with students. These strategies were a common challenge for teachers, but they provide the greatest benefit for both teachers and students.

At its heart, formative assessment is an instructional practice. To increase the use of effective formative assessment, teachers must also improve their teaching – a persistent challenge to districts and support providers. Improvement requires consistent attention, supportive accountability, time for reflection and room to experiment with new ideas, techniques and tools. But most importantly, improving teaching practice requires persistence and follow-through. Teachers are eager to improve their practice and districts are poised to provide the necessary support. Great gains can be made – and have been made – when district and school leaders focus on instruction, clearly define formative assessment practice and align themselves to focus on a consistent message with consistent support over time.

APPENDIX A: FORMATIVE ASSESSMENT CYCLE ELEMENTS

1. *Learning Progression*	Teachers identify learning goals for a lesson or sequence of lessons and determine criteria for the successful accomplishment of these goals. This purposeful sequencing of expectations is a "learning progression." Teachers share goals and success criteria with students. Success criteria guide learning while students engage in learning tasks.
2. *Elicit Evidence of Learning*	Teachers use a variety of strategies during the course of instruction to elicit evidence of how student learning is progressing toward instructional goals. These strategies can be planned or can be implemented spontaneously during the lesson. Strategies for eliciting evidence include such activities as questioning, observations of student work, monitoring instructional tasks (e.g., representations, explanations, performance, problem-solving), mid-lesson checks (e.g., thumbs up/down, ABCD cards, whiteboards, traffic lights), exit cards, notes to the teacher and/or quizzes.
3. *Interpret the Evidence*	Teachers examine the evidence against the success criteria to determine the status of student learning. With this information, teachers assess what the students understand, what their misconceptions are, what knowledge they do or do not have, and what skills they are or are not acquiring. Students also use this information to understand their progress toward learning goals.
4. *Identify the Gap*	Teachers identify the gaps between students' current learning status and the goals of current instruction. By self-monitoring, students use the success criteria to identify gaps in their own learning.
5. *Feedback*	Teachers provide descriptive feedback to the students about the status of their learning in relation to the success criteria and give cues to the students about what they can do to progress and close the gaps. Students get feedback about their own learning by self-monitoring and give feedback to each other.
6. *Plan Learning/ Instructional Modifications*	To address learning gaps identified by formative assessment, teachers modify subsequent instruction to meet students' learning needs. They select learning experiences that place an appropriate demand on students and lead to closing the gap between where students are and where they need to be. By self-monitoring, students also adjust their learning strategies so that they can move forward.
7. *Scaffold New Learning*	Instructional supports help students move easily from one idea to the next and rapidly close learning gaps. Teachers (or peers) scaffold new learning by focusing lessons on smaller segments of skills and knowledge. By scaffolding new learning, teachers are able to better determine exactly where students need help, where they succeed and which supports are most effective.
8. *Close the Gap*	Teachers and students close the gaps identified through formative assessment and set new goals and criteria for success. The assessment cycle is a continuous process in the classroom.

APPENDIX B: METHODOLOGY

From March through December 2015, Education First researchers collected data in each district using a variety of qualitative and quantitative methods: interviewing district and school administrators; administering district-wide surveys of teachers on their formative assessment practices; conducting observations of teachers to see firsthand their formative assessment practice (observations included pre- and post-observation interviews); and collecting relevant artifacts and materials.

District and School Selection

The research team worked with the Michael & Susan Dell Foundation to identify five urban districts to invite to participate in this study. Of the initial five districts invited, three (Austin Independent School District, Denver Public Schools and Metro Nashville Public Schools) agreed to participate in the study. District participation required assignment of a liaison to work with the research team and willingness to support the intensive data collection in the district through interviews, observations and district surveys. Upon confirmation of participation and approval of the research plan, district leaders identified schools and teachers that demonstrated quality formative assessment practice. The research team used these recommendations to invite principals and teachers to participate in the study.

Sample Size

As noted in Table 1 below, a total of 28 teachers participated in the classroom observations and pre-and post-observation interviews. While distribution of teachers from the three geographic regions was not equal, it was similar. The most participating teachers were from Austin (*n*=11, 39.3 percent), closely followed by Nashville (*n*=10, 35.7 percent), and Denver (*n*=7, 25.0 percent).

A total of 1,098 participants completed the survey. However, there were a large number of participants who did not report their geographic location (*n*=305, 27.8 percent). Nashville had the most survey participants (*n*=366, 33.4 percent), followed by Denver (*n*=278, 25.3 percent), and Austin (*n*=149, 13.6 percent).

We interviewed the principal in each school where we conducted observations and district administrators responsible for overseeing and/or supporting teachers' formative assessment practice. A total of 12 district administrators and 14 principals participated in interviews.

Table 1: District Participation in the Michael & Susan Dell Foundation Formative Assessment Study

District	*# of Schools Visited*	*# of District & Principal Interviews*	*# of Teacher Observations & Interviews*	*# of Survey Respondents*
AISD	4	9	11	149
DPS	3	7	7	278
MNPS	7	10	10	366
Total	**14**	**26**	**28**	**1098***

*305 respondents did not report their geographic information

Data Collection and Procedures

Classroom observations: Researchers collected classroom observation data using a Formative Assessment Classroom Observation Protocol (FACOP) comprised of five domains focused on best practice in formative assessment:

- Domain A – Learning Intentions and Criteria for Success
- Domain B – Engineering Effective Classroom Discussions (Questioning)
- Domain C – Engineering Effective Classroom Discussions (Collaboration)
- Domain D – Learning Tasks (Implemented)
- Domain E – Feedback on Instruction

Each domain was made up of 4-5 specific components that were assessed and rated on a 1-4 point scale (1=Beginning, 2=Developing, 3=Effective, 4=Exemplary). For the complete FACOP instrument see Appendix C.

During the summer of 2015, the research team used videos of classroom instruction to norm on the observation protocol and calibrate ratings within the team. Calibration training continued over three weeks before site visits began in September 2015.

Research team members observed each selected teacher for at least one full class period, lasting from 45-90 minutes in length.[2] All observations included an audio recording of the lesson. Research team members scripted field notes during the observation and used these and other collected documents (e.g., lesson plans, handouts) to complete the FACOP instrument at the end of each observation. In most instances, two research team members observed in each classroom.

Survey: Formative Assessment Educator Survey (FAES) data were collected using Survey Monkey between June and October 2015, in collaboration with the three sites. To comply with Austin ISD's current moratorium on district-wide teacher surveys, we received permission to survey two groups of teachers attending summer programs run by the district: the Curriculum Writers Cadre which met in June and teachers participating in AISD's new teacher orientation (including teachers new to teaching and teachers new to the district) who we surveyed in August. In Nashville and Denver, we distributed the survey to all teachers district-wide in September and October.

The survey consisted of 86 closed-ended items, four open-ended items, and a demographic section. Survey content was divided into four main sections:

1) Importance of Formative Assessment (18 closed items)
2) Use of Formative Assessment (Parts A-E) (46 closed items, 2 open-ended items)
3) Technology (10 closed items, 1 open-ended item)
4) Support for Formative Assessment (12 closed items, 1 open-ended item)

For a copy of the FAES survey see Appendix D.

Interviews: We conducted pre- and post-observation interviews with teachers to delve deeper into their thinking about the actual lessons we observed. The pre-interview protocol consisted of 13 questions collecting information tied to the learning goals for the lesson, sequencing of the lesson with regard to prior and future planning, focus on planned strategies (including technology use), and previous professional training in formative assessment. The post-interview protocol included 11 more reflective questions, asking educators to share their thoughts on various aspects of the enacted formative assessment from the lesson, plans for future instruction, challenges to formative assessment and resources for implementing formative assessment. Where possible, the pre-observation interviews were

[2] Full classroom period length differed based on district, school and grade level.

conducted on-site prior to the observation on the day of the lesson, and the post-observation interviews were conducted no later than the day following the observation.
We also spoke to district administrators and principals in the schools where we conducted the observations to gather context and information about levels of understanding and support for teacher formative assessment practice. The administrator interview protocol included 13 items about administrator perceptions of formative assessment, opinions and beliefs regarding formative assessment, implementation of formative assessment in their school/district, professional trainings and supports for formative assessment and challenges to implementation.

All interviews were recorded and transcribed. For a copy of the interview protocols, see Appendix E.

Analysis

Classroom Observations: We analyzed both individuals and geographical groups of teachers descriptively. We produced average individual teacher overall scores to identify teachers who had exhibited best practices in formative assessment. We analyzed geographical groups of teachers by district to see mean scores on each domain of the rubric and overall. We compared these average scores to pre-established score ranges (see Table 2).

Table 2: FACOP Score Value with Corresponding Average Score Range

Score Value	*Score Range*
Beginning	1.00 – 1.75
Developing	1.76 – 2.75
Effective	2.76 – 3.75
Exemplary	3.76 – 4.00

Surveys: We analyzed survey responses for two different purposes. First, we compared group differences among geographic region (Nashville, Denver, and Austin) on every item and computed sub-scale scores. We used One-Way Analysis of Variances (ANOVAs) as the inferential test to compare groups.

We also investigated relationships between subscales using multiple Pearson Correlations to see if teachers who reported implementing more formative assessment practices in their classroom were also using more technology. We computed effect sizes (r^2) to provide a practical interpretation of results in addition to a statistical interpretation.

Interviews: For district administrator, principal and teacher interviews, audio recordings were transcribed and coded based on our research questions. We then analyzed the codes and developed summary memos that were reviewed by the full research team.

APPENDIX C: CLASSROOM OBSERVATION RUBRIC

This document combines the classroom observation protocols for the five domains of formative assessment:

- **Domain A: Learning Intentions and Criteria for Success**
- **Domain B: Engineering Effective Classroom Discussions – Questioning**
- **Domain C: Engineering Effective Classroom Discussions – Collaboration**
- **Domain D: Learning Tasks (Implemented)**
- **Domain E: Feedback on Instruction**

Domain A: Learning Intentions and Criteria for Success

Domain Component	Beginning 1	Developing 2	Effective 3	Exemplary 4
Connection to Future Learning	Lesson is presented in isolation with no connections made to previous or future learning. OR Superficial procedural connections are made.	Lesson is presented with only isolated references made to previous or future learning.	Lesson is clearly presented in terms of previous or future learning.	Lesson is presented as part of a coherent sequence of learning with meaningful connections made to previous or future learning in a way that students understand the connection.
Learning Goal Quality	The teacher does not present a learning goal.	The learning goal for the lesson is on the board but is not explained to and/or presented to students.	The learning goal is presented and discussed with the students but is not connected to state and/or local academic standards.	The learning goal focuses on what students should know by the end of the lesson. The content of the learning goal is appropriate for students and is connected to state and/or local academic standards.
Learning Goal Implementation	There is no reference or tie to the learning goal within the lesson.	There is indirect connection to the learning goal at the end of the lesson, but not in a way that would	The learning goal is referenced within the lesson multiple times in a manner that would deepen	The learning goal is integrated within the lesson and is emphasized at the end of the lesson in a way

Domain Component	Beginning 1	Developing 2	Effective 3	Exemplary 4
		deepen student understanding.	student understanding somewhat.	that ties the lesson together in a meaningful way that builds student conceptual understanding.
Presentation of Criteria	The teacher does not provide criteria for success or the criteria are not appropriate for the learning goals or developmental level of students.	The teacher presents criteria for success that may be connected to and/or appropriate for learning goals and developmental level of students. The teacher does not provide students with a way to internalize the criteria/use the criteria effectively (e.g., develop the criteria themselves, provide flexibility in options for deliverables) resulting in no students engaging with the criteria in meaningful ways.	The teacher presents criteria for success that are appropriate for the learning goals and developmental level of students. The teacher provides students with opportunities to internalize the criteria/use the criteria effectively (e.g., develop the criteria themselves, provide flexibility in options for deliverables) but most students do not demonstrate understanding or engage with the process.	The teacher presents criteria for success that are appropriate for the learning goals and developmental level of students. The teacher provides students with opportunities to internalize the criteria/use the criteria effectively. Nearly all students demonstrate understanding and are engaged with the process.

Domain B: Engineering Effective Classroom Discussions – Questioning

Domain Component	Beginning 1	Developing 2	Effective 3	Exemplary 4
Use of Questioning	The teacher asks 0-1 questions designed to assess student progress.	The teacher asks some questions at appropriate points to assess student progress.	*The teacher infuses questions throughout the lesson designed to determine student progress.	The teacher infuses questions throughout the lesson designed to determine student progress and makes necessary adjustments in lesson as needed.
Wait Time	The teacher provides inadequate wait time for students to process and respond to teacher questions, may often answer the question for students OR does not provide opportunities for all students to engage with the question.	The teacher inconsistently provides adequate wait time for all students to engage with and respond to teacher posed question.	The teacher provides appropriate wait time to allow all students to engage with and respond to posed questions but does not provide follow-up questioning when appropriate.	The teacher provides appropriate wait time and allows all students to engage with and respond to the posed question. Teacher provides follow-up questioning when appropriate.
Eliciting Evidence of Learning	The teacher rarely uses effective questioning strategies to gather evidence of student learning.	The teacher uses effective questioning strategies infrequently OR that provide evidence from only a few students or the same students in the class repeatedly.	The teacher uses effective questioning strategies that provide evidence from most of the students of their learning within the class period.	The teacher uses effective questioning strategies throughout the lesson that provide evidence from all students of their learning in systematic ways (e.g. exit tickets).
Determining Progress	The evidence collected cannot be used to make meaningful determinations about the class's progress on	The teacher missed multiple critical opportunities to make determinations of student progress.	The teacher sometimes uses student responses to make inferences about student progress.	The teacher often uses student responses to make inferences about student progress.

Domain Component	Beginning 1	Developing 2	Effective 3	Exemplary 4
	intended learning outcomes.			

Domain C: Engineering Effective Classroom Discussions – Collaboration

Domain Component	Beginning 1	Developing 2	Effective 3	Exemplary 4
Climate	The classroom climate is teacher-centered.	Most aspects of the classroom climate are controlled by the teacher. However, students are allowed to work in pairs OR are engaged in classroom and small group discourse about the lesson.	The classroom climate is collaborative in nature and students work in groups with other students for most of the class period and engage in discussion regarding the topic of the lesson and their own ideas.	A collaborative classroom environment is present where students work in collaborative teams with other students to guide their own learning and are engaged in discourse regarding the lesson and their own ideas throughout the lesson.
Student Collaboration	Student-to-student collaboration is not evident within the lesson.	Limited student-to-student collaboration is evident.	Student collaboration is very good, organized in groups and students work cooperatively while completing their own individual work and/or a group task. Most students are engaged in the work.	Student collaboration is highly effective, organized in groups and students work cooperatively while completing a group task and are fully engaged in the lesson.
Student Viewpoints	Multiple viewpoints or approaches are not sought or valued.	Multiple viewpoints or approaches are rarely sought or valued.	Multiple viewpoints or approaches are occasionally sought or valued.	Multiple viewpoints or approaches are frequently and

Domain Component	Beginning 1	Developing 2	Effective 3	Exemplary 4
				consistently sought or valued.
High Expectations	The teacher does not promote an attitude of "we all can learn".	The teacher is not convincing in promoting an attitude of "we all can learn".	The teacher conveys an attitude of "we all can learn".	The teacher both conveys an attitude of "we all can learn" and provides appropriate support and encouragement to students.

Domain D: Learning Tasks (Implemented)

Domain Component	Beginning 1	Developing 2	Effective 3	Exemplary 4
Connection to Learning Goals	The teacher uses tasks or activities that are not connected to the learning goals.	The teacher uses tasks or activities that are loosely connected to learning goals and are not likely to provide evidence of student progress toward the goals during the lesson.	The teacher uses tasks or activities that are connected to learning goals that will provide some evidence of student progress toward the goals.	The teacher uses well-crafted tasks that are aligned tightly with learning goals that will provide strong evidence of student progress toward the goals.
Clarity of Task	All students are unclear about the assigned task and classroom time is spent going over the explanations of the task more than once.	Many students are unclear about the task and the directions may be repeated or the teacher may be unaware of lack of student clarity.	A few students are unclear about the task and the directions may be repeated for clarity and/or provided in written form.	All students are clear about the task and are able to begin work efficiently.
Adjusting Instruction within the Lesson	The evidence collected cannot be used to make meaningful inferences about the class's progress on intended learning outcomes or to adapt instruction.	The teacher misses multiple critical opportunities to make inferences about progress and/or to adapt instruction accordingly.	The teacher sometimes uses student responses and work to make inferences about progress and/or to adapt instruction accordingly.	The teacher frequently uses student responses and work to make inferences about progress and adapts instruction accordingly.

Domain Component	Beginning 1	Developing 2	Effective 3	Exemplary 4
Use of Evidence to Inform Future Instruction	There is little or no attempt by the teacher to collect evidence of student learning in the lesson that is connected to learning goals or criteria for success. OR The collection of evidence is so minimal or inconsistent that there is no way to gain insight into student learning. The teacher has no basis for modifying instructional plans.	There is some evidence of student learning that the teacher collects but it is weakly connected to learning goals or criteria for success. The teacher does not analyze the evidence to identify patterns of understanding/misunderstanding or make inferences about student strengths and weaknesses. The information is not used to shape instructional decisions.	The teacher uses multiple ways of gathering evidence throughout the lesson that are connected to learning goals or criteria for success. There is some evidence that the teacher is analyzing the evidence to identify patterns of understanding/misunderstanding or make inferences about student strengths and weaknesses. The information, identified patterns, and inferences are not used to shape instructional decisions.	The teacher skillfully uses multiple ways of gathering evidence throughout the lesson that are connected to learning goals or criteria for success. There is strong evidence that the teacher is analyzing the evidence to identify patterns of understanding/misunderstanding or make inferences about student strengths and weaknesses. The information, identified patterns, and inferences are used to shape instructional decisions.

Domain E: Feedback on Instruction

Domain Component	Beginning 1	Developing 2	Effective 3	Exemplary 4
Assessing Progress During Lesson	The teacher does not review student work during the lesson or does not make reference to when the work will be reviewed.	The teacher reviews some student work during the lesson but does not provide substantial feedback to students.	The teacher reviews some student work during the lesson and provides real time, substantial feedback to students.	The teacher reviews all student work during the lesson and provides real time, substantial feedback to students.

Domain Component	Beginning 1	Developing 2	Effective 3	Exemplary 4
Individualized Feedback	The teacher provides no descriptive feedback. OR Feedback seems disconnected to intended learning goals. There is little opportunity for students to internalize feedback, and no opportunity to use feedback in a meaningful way.	The teacher provides descriptive feedback (written or oral) on a specific piece of work without a score or a grade that supports learning goals and/or reflects criteria for success. There is no opportunity for students to internalize feedback, and no opportunity to use feedback in a meaningful way.	The teacher provides descriptive feedback (written or oral) on a specific piece of work without a score or a grade that supports learning goals and/or reflects criteria for success. There are opportunities for students to internalize feedback. However, there are no opportunities to use feedback in a meaningful way.	The teacher provides descriptive feedback (written or oral) on a specific piece of work without a score or a grade that supports learning goals and/or reflects criteria for success. There are opportunities for students to internalize feedback, and opportunities to use feedback in a meaningful way.
Self-Assessment	Students are not provided with any opportunities to engage in self-assessment of their work or thinking. OR Students are asked to grade their own work for a summative grade.	The teacher asks students to assess their own learning, but the task does not appear to be meaningful for most students. OR The self-assessment task lacks structure and does not support students.	The teacher asks students to assess their own learning. The task is meaningful to most students and is structured to support some students to complete an honest self-assessment.	The teacher asks students to assess their own learning. The task is meaningful and is structured to support students.
Peer Assessment	Students are not provided with any opportunities to engage in the assessment of their peers' work.	The teacher asks students to asses a peers' work and provide feedback to improve the quality of the work (this is not grading of a worksheet). However, the peer-assessment task does not appear to be meaningful to most students, the	The teacher asks students to asses a peers' work and provide feedback to improve the quality of the work (this is not grading of a worksheet). The peer-assessment task appears to be meaningful to most students and is	The teacher asks students to asses a peers' work and provide feedback to improve the quality of the work (this is not grading of a worksheet). The peer-assessment task appears to be meaningful to all students and is

Domain Component	Beginning 1	Developing 2	Effective 3	Exemplary 4
		task lacks structure and does not have an impact on the quality of student work.	structured in a way that supports some students in completion of the task. The peer-assessment has a limited impact on the quality of student work.	structured in a way that supports some students in completion of the task. The peer-assessment has a clear impact on the quality of student work.
Feedback Loops	The teacher asks very few questions during the lesson designed to encourage classroom discourse. OR The teacher asks questions of students but focuses on recall rather than deeper/meaningful exploration of ideas.	The teacher asks questions at a few points in the lesson designed to encourage classroom discourse, but only occasionally builds on student responses or encourages students to build on others responses. Teacher provides minimal feedback on student ideas.	The teacher asks questions designed to encourage classroom discourse at multiple points during the lesson. The teacher and others frequently build on other students' responses, clarifying student comments, pushing for more elaborate answers, or engaging more students in thinking about the problem. Feedback loops sustain the conversation, rarely end with the teacher indicating correct or incorrect responses, and allow for more deeper and meaningful exploration of some ideas.	The teacher asks questions designed to encourage classroom discourse throughout during the lesson. The teacher and others consistently build on other students' responses, clarifying student comments, pushing for more elaborate answers, or engaging more students in thinking about the problem. Extended feedback loops sustain the conversation, rarely end with the teacher indicating correct or incorrect responses, and allow for more deeper and meaningful exploration of some ideas.

APPENDIX D: SURVEY QUESTIONS

Instructions

The purpose of this survey is to learn more about teacher classroom practice within your district. **Please reflect on what you have done in your classroom this school year as you respond to each item.**

Section 1 - Formative Assessment Importance

For each of the statements below indicate your level of agreement as:

(1) Strongly Disagree, (2) Disagree, (3) Agree, (4) Strongly Agree

- It is important to design coherent sequences of learning rather than individual lessons.
- It is important for students to understand the learning goal or goals for each lesson.
- It is important for students to understand the criteria that will be used to determine their success in the lesson.
- It is important to have flexibility in student options for deliverables to demonstrate their learning.
- It is important to infuse questioning throughout the lesson to determine student progress.
- It is important to make adjustments to instruction within the lesson based upon student responses to questions.
- It is important for students to work on a task or problem in small groups.
- It is important for students to be responsible for and guide their own learning.
- It is important for students to be engaged in discourse/discussion regarding the lesson.
- It is important for students who are working in groups to have multiple viewpoints or approaches to solving the problem.
- It is important for tasks and activities within daily lessons to be directly tied to learning goals.
- It is important for tasks and activities within daily lessons to provide evidence of student progress toward learning goals.
- It is important that student responses and work provide evidence for adapting instruction within the lesson each day.
- It is important to use technology (e.g. student responders, iPads) to assess student learning within the lesson.
- It is important to provide real time feedback on student work to all students.
- It is important for students to have opportunities to internalize feedback and apply it in a meaningful way.
- It is important to use evidence generated through student self-assessments and peer assessments to inform future teaching and learning.
- It is important to generate feedback loops during classroom discourse where one question leads into elaboration and further questioning to build the discussion.

Section 2 - Use of Formative Assessment

For each of the items below indicate your frequency of use as:

(1) Not at All (2) once a semester or quarter, (3) Monthly, (4) Weekly, (5) Daily

Part A

- I connect each lesson to the previous lesson or learning that has taken place.
- I connect each lesson to future learning that will take place.
- I design coherent sequences of learning rather than individual lessons.

- I explain to students the connections between new, prior, and future learning.
- I have a learning goal(s) for the lesson.
- I present the learning goal(s) for the lesson to students verbally.
- I present the learning goal(s) for the lesson to students in writing (i.e. on the board).
- I discuss with students what they should know by the end of the lesson.
- The learning goal(s) for the lesson is connected to state/local academic standards.
- I reference the learning goal(s) multiple times within the lesson.
- I share with students the criteria that will be used to determine their success in the lesson.
- I have students participate in developing the criteria for success.
- I have flexibility in student options for deliverables to demonstrate their learning.
- I have students demonstrate understanding of the criteria for success.

Part B

- I ask questions within the lesson to assess whole group progress.
- I ask questions within the lesson to assess individual student progress.
- I make adjustments to instruction within the lesson based upon student responses.
- I ensure the pace of the lesson provides adequate wait time for students to respond to questions.
- I use follow-up questions when engaging students in discourse.
- I use exit tickets to assess student learning.
- I use student responses to questions for adapting future instruction.

Part C

- I have students work in small groups with 2-3 other students.
- I have students to work with a partner.
- I allow students to guide their own learning.
- I enable students to be engaged in discourse/discussion regarding the lesson in small groups.
- I facilitate students in discourse/discussion regarding the lesson as a whole class.
- I include both individual and group assignments when group work is used.
- I enable students to learn from each other when they engage in group work.
- I expect students to find the right answer to a teacher provided problem.
- I allow students to have multiple viewpoints or approaches to solving the problem.
- I have high expectations for all students to succeed.

Part D

- The tasks and activities within the lesson are directly tied to learning goals.
- The tasks and activities within the lesson provide evidence of student progress toward learning goals.
- The majority of students is clear about the task and begins work efficiently.
- All students understand the directions for the lesson.
- Student responses and work provide evidence for adapting instruction within the lesson.
- Student responses and work are analyzed to identify patterns of understanding/misunderstanding within the lesson.

Part E

- I review all student work during the lesson.
- I review some student work during the lesson.
- I provide real time feedback on student work to all students.

- Students have opportunities to internalize feedback and apply it in a meaningful way.
- I use student self-assessment.
- I use student peer-assessment.
- I use evidence generated through student self-assessments to inform future teaching and learning.
- I use evidence generated through student peer-assessments to inform future teaching and learning.
- I generate feedback loops during classroom discourse where one question leads into elaboration and further questioning to build the discussion.

Section 3 - Technology

For each of the items below indicate your frequency of use for Formative ASSESSMENT purposes as:

(1) Not at all (2) Once a semester or quarter, (3) Monthly, (4) Weekly (5) Daily

- Personal computing (e.g., iPad, Laptop)
- Projection boards (e.g., SMART Board, Promethean)
- Google Forms
- Online polling (e.g., Poll Everywhere, PollDaddy)
- Digital discourse and dialogue (e.g., Padlet, Lino)
- Digital Quizzes and Learning Games (e.g., Kahoot, Quizlet, ZipGrade)
- Voice recording (e.g., Vocaroo, QuickVoice app)
- Video lessons and recording (e.g., Zaption, EdPuzzle)
- Chat tools (e.g., Backchannel Chat, Chatzy)

Other (please describe):

Section 4 - Challenges to Using Formative Assessment

For each of the items below please indicate your level of agreement:

(1) Strongly disagree (2) Disagree, (3) Agree(4) Strongly Agree

- I understand what formative assessment is and how to use it
- My class sizes allow me to individualize instruction for all students
- My class periods provide enough time to use formative assessment
- I have enough time to plan formative assessments
- I have administrator support to incorporate formative assessment into my teaching practice.
- The curriculum I use includes support for formative assessment
- My district or school provides me with materials/tools to support formative assessment
- My district or school provides me with technology to support formative assessment
- My district or school provides me with adequate training on formative assessment practices
- District pacing guides allow time to incorporate formative assessments and changes to my practice if needed

Other (Please describe any other challenges or barriers to formative assessment that you experience):

Section 5 - Administrator Support

For each of the statements below indicate your level of agreement as:

(1) Strongly Disagree, (2) Disagree, (3) Agree, (4) Strongly Agree

- I am encouraged to use formative assessment within my instruction daily.
- I have time to use formative assessment within my instruction daily.
  I have received professional development focused on formative assessment use.
- I have the necessary materials that enable me to use formative assessment within my instruction daily.
- My administrator supports and encourages the use of formative assessment.
- District administration supports and encourages the use of formative assessment

Section 6 - Open-Ended Elaboration

1. What resources or supports have enabled you to implement formative assessment in your classroom?
2. How has student learning been enhanced through your use of formative assessment?
3. How have you adjusted your instruction in response to evidence gathered through formative assessment?

Section 7 - Demographic Questions

- District – drop down item with choices
- School – Fill in the blank
- Grade Level – choices: K-1-2-3-4-5-6-7-8-9-10-11-12 and have this so they can choose more than one
- Subject Area(s) – choices are: mathematics, science, social studies/history, English/language arts, music, art, foreign language, technology, or other (fill in the blank)
- Licensure/Certification – fill in the blank
- # of years teaching – choices: 0-1, 2-5, 6-10, 11-15, 16-20, 21-25, 26-30, 31+
- # of years at this school - choices: 0-1, 2-5, 6-10, 11-15, 16-20, 21-25, 26-30, 31+
- Gender – choices: male, female
- Ethnicity – choices: Caucasian (white), African-American, Hispanic/Latino, Asian, other (fill in the blank)
- My students:
    - approximate % of students in my class that are ELL – choices
    - don't know, 0-10%, 11-25%, 26%-50%, 51%-75%, 76%-100%
    - approximate % of students in my class that are African American
    - don't know, 0-10%, 11-25%, 26%-50%, 51%-75%, 76%-100%
    - approximate % of students in my class that are Hispanic/Latino(a)
    - don't know, 0-10%, 11-25%, 26%-50%, 51%-75%, 76%-100%
    - approximate % of students in my class that are White/Caucasian
    - don't know, 0-10%, 11-25%, 26%-50%, 51%-75%, 76%-100%
    - approximate % of students in my class that are Asian
    - don't know, 0-10%, 11-25%, 26%-50%, 51%-75%, 76%-100%
    - approximate % of students in my class that are from other backgrounds
    - don't know, 0-10%, 11-25%, 26%-50%, 51%-75%, 76%-100%
    - approximate % of students that receive free/reduced lunch
    - don't know, 0-10%, 11-25%, 26%-50%, 51%-75%, 76%-100%

APPENDIX E: INTERVIEW PROTOCOLS

Pre-Observation Teacher Interview Protocol

Thank you very much for agreeing to participate in our formative assessment study. The Michael & Susan Dell Foundation and Education First are collaborating on this formative assessment study to understand how educators from four urban districts assess student performance and adjust and shape day-to-day, lesson-to-lesson instructional decisions based on formative assessment data.

Data collected in this study will be used by the foundation to inform its future investments in data-driven education and may be shared with the public in various publication formats.

We are talking with you today before and after the lesson we'll be observing to get some context for your lesson and understand a little about how you use formative assessments. What we learn from you today will give us important context and background for the classroom observation.

The study districts will be identified in our report but individual participants will not be identified by name, although we will distinguish between teachers, school administrators and district administrators. Only the Education First research team will have access to interview and observation data linked to individual names. These will not be shared.

We will be recording this interview so that we can add this information to our overall data analysis.

Do you have any questions about the project before we begin?

Design/Plan for Instruction Focus

1. Tell me about your teaching background and current position. (i.e., # years teaching, # of years teaching at this school, certification/licensure, master's degree yes/no and focus)

2. What are the learning goals for today's lesson?

3. Did you develop this lesson on your own or did this lesson come from existing curricular materials? Have you taught this lesson before? If so, are there features of the lesson that you use regularly in other lessons as well? Which ones?

4. How does this lesson connect to prior learning or lessons?

5. How does this lesson connect to planned future learning or lessons?

6. What are the primary activities that students will be engaged in during the lesson?

7. What are some strategies you plan to use to support student learning today?

8. How do you use technology to support data-informed instruction (formative assessment specifically)? Do you plan to use technology in the lesson today?

9. How do you plan to assess student learning within the lesson today? What do you expect to learn about student learning and progress toward meeting the learning goals through the identified assessment(s)?

10. How will information about student learning gathered today be used to inform future instruction?

11. What do you think are some potential misconceptions or areas that students might struggle with in the lesson today?

12. Have you had any coursework or training that has specifically focused on the use of formative assessment?

13. (If applicable) How effective do you believe the coursework or training was for you?

Post-Observation Teacher Interview Protocol

Implementation of Lesson Focus

1. Were you able to accomplish your learning goals for this lesson? Explain.

2. How would you describe the classroom climate today? (i.e. teacher-centered vs. collaborative or student-centered)

3. How and where within the lesson were able to determine student progress toward learning goals? How did the use of technology enable you to do this (if applicable)?

4. How did you modify or adjust instruction within the lesson as a response to assessing student learning? Were the modifications planned or did you do this on the spot?

5. In what ways did you or others provide students feedback within the lesson? [If they don't discuss ask if the feedback was given to whole group, small group, or individual or a combination.]

6. How do you anticipate using what you discovered today about student learning to inform/adapt future plans for instruction with this class?

7. How do you define formative assessment? Can you give me examples from your lesson today that demonstrate your use of formative assessment?

8. Provide teacher with the graphic "sample process map". Explain that this is one of several examples of the process teachers follow when implementing formative assessment. Ask the teacher to think of an example either in the observed lesson or in a recent lesson that she could use to share her steps and how they relate to the sample process map for formative assessment. "Walk me through the process you followed with a student or students either in this lesson or another recent lesson".

9. What do you believe is the role of formative assessment in teaching and learning?

10. What obstacles have you encountered when considering or implementing formative assessment in your classroom?

    Prompt for: What challenges have you faced (if any) in acting on the formative data you collect and responding to students' needs?

11. What type of resources, such as curriculum and other materials, do you have to support your use of formative assessment?

Administrator Interview Protocol

Thank you very much for agreeing to participate in our formative assessment study. The Michael & Susan Dell Foundation and Education First are collaborating on this formative assessment study to understand how educators from four urban districts assess student performance and adjust and shape day-to-day, lesson-to-lesson instructional decisions based on formative assessment data.

Data collected in this study will be used by the Michael & Susan Dell Foundation to inform its future investments in data-driven education and may be shared with the public in various publication formats.

We are talking with you today to get a sense of how your district [or school] supports teachers in their formative assessment practice. What we learn from you today will give us important context and background for our fall site visits [or classroom observations].

The study districts will be identified in our report but individual participants will not be identified by name, although we will distinguish between teachers, school administrators and district administrators. Only the Education First research team will have access to interview and observation data linked to individual names. These will not be shared.

We will be recording this call so that we can add this information to our overall data analysis next fall.

Do you have any questions about the project before we begin?

1. Tell me about your current position and your background in education. (i.e., # years as administrator, # years as teacher and subject/grade level, licensure, advanced degree and focus, # of years in current position and with district).

2. How do you define formative assessment?

After the administrator answers this question share with them the definition of formative assessment for purposes of this study so that they can use this to frame their answers to the next questions about formative assessment in this interview.[3]

From the Michael & Susan Dell Foundation, formative assessment is: the extent to that evidence about student achievement is elicited, interpreted, and used by teachers, learners, or their peers, to make decisions about the next steps in instruction that are likely to be better, or better founded, than the decisions they would have taken in the absence of the evidence that was elicited." The key strategies in formative assessment practice as identified by the Michael & Susan Dell Foundation are:

- *Clarifying and sharing learning intentions and criteria for success*
- *Engineering effective classroom discussions, questions, and learning tasks*
- *Providing feedback that moves learners forward*
- *Activating students as the owners of their own learning*
- *Activating students as instructional resources for one another*

For example, district common assessments are considered long-term formative assessment practices. Short-term formative assessments include daily activities within the teachers' classroom to elicit evidence of student learning and adapt instruction accordingly. We are interested in hearing about your use of both short-term and long-term formative assessments in this interview.

3. What are the main differences between formative and summative assessment in K-12 teaching and learning?

4. Would you describe a recent example of effective formative assessment that you have witnessed in your school/district with one of your teachers for me? Why was it effective? How common are examples like this one in your school/district?

5. How do teachers use technology for formative assessment?

6. Are teachers in your school/district required to submit any form of lesson plans regularly? Do these include a focus on planned specific formative assessment strategies?

7. Are there criteria within your annual teacher evaluation process that emphasize the use of formative assessment? Describe. [Ask for a copy if they will provide.]

8. Are there any formal school or district level policies in place that promote the use of formative assessment? Describe. Can you describe any resources or instructional tools that the school or district has provided to teachers to support the use of formative assessment?

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[3]Definition from: Dylan Wiliam: "Formative Assessment and Contingency in the Regulation of Learning Processes"; Paper presented in a Symposium entitled Toward a Theory of Classroom Assessment as the Regulation of Learning at the annual meeting of the American Educational Research Association, Philadelphia, PA April 2014. As accessed online January 19, 2015; Siobhan Leahy, Christine Lyon, Marnie Thompson and Dylan Wiliam: "Classroom Assessment: Minute by Minute, Day by Day"; Educational Leadership November 2005 Volume 63 Number 3 pages 19-24. As accessed online January 19, 2015.

9. Has your school/district provided any formal training for teachers on formative assessment? If so, please describe the training and the duration of support.

10. What do you believe are some of the challenges for your teachers in implementing formative assessment in their classrooms?

11. Are there any challenges external to the school that make the use of formative assessment challenging?

12. What types of support do you believe teachers need in order to effectively implement formative assessment within their classrooms?

13. Are there any other thoughts you would like to share with us in respect to formative assessment use within your school or district?

APPENDIX F: SURVEY RESULTS

Importance of Formative Assessment – Scale 1 (strongly disagree), 2 (disagree), 3 (agree), 4 (strongly agree)

Item	District A	District B	District C	Overall	Group Difference
It is important to design coherent sequences of learning rather than individual lessons.	3.46	3.38	3.51	3.43	No
It is important for students to understand the learning goal(s) for each lesson.	3.54	3.49	3.40	3.45	Yes (*p*=.021)
It is important for students to understand the criteria that will be used to determine their success in the lesson.	3.49	3.43	3.41	3.42	No
It is important to provide students with multiple options to demonstrate their learning.	3.54	3.50	3.53	3.50	No
It is important to include questioning throughout the lesson to determine student progress.	3.69	3.59	3.57	3.59	Yes (*p*=.025)
It is important to make adjustments to instruction within the lesson based upon student responses to questions.	3.73	3.59	3.66	3.64	Yes (*p*=.024)
It is important for students to work on a task or problem in small groups.	3.21	3.25	3.21	3.19	No
It is important for students to be responsible for and guide their own learning.	3.28	3.33	3.30	3.27	No
It is important for students to be engaged in discourse/discussion regarding the lesson.	3.55	3.51	3.53	3.50	No
It is important for teachers to encourage students who are working in groups to consider multiple viewpoints or approaches to solving the problem.	3.53	3.45	3.56	3.50	No
It is important for tasks and activities within daily lessons to be directly tied to learning goals.	3.59	3.46	3.42	3.47	Yes (*p*=.004)
It is important for tasks and activities within daily lessons to provide evidence of student progress toward learning goals.	3.51	3.36	3.28	3.37	Yes (*p*=.000)

It is important for tasks and activities within daily lessons to provide information to help teachers adapt instruction.	3.57	3.42	3.47	3.45	Yes (*p*=.028)
It is important to use technology (e.g., student responders, iPads) to assess student learning within the lesson.	2.91	2.99	2.69	2.82	Yes (*p*=.000)
It is important to provide real time feedback on student work to all students.	3.43	3.35	3.37	3.36	No
It is important for students to have opportunities to internalize feedback and apply it in a meaningful way.	3.47	3.49	3.48	3.44	No
It is important to use evidence generated through student self-assessments and peer assessments to inform future teaching and learning.	3.26	3.34	3.18	3.22	No
It is important to generate feedback loops during classroom discourse where one question leads into elaboration and further questioning to build the discussion.	3.33	3.32	3.32	3.30	No
Subsection Average	3.45	3.40	3.38	3.39	No

Use of Formative Assessment: Part A - Scale 0 (not at all), 1 (once a semester), 2 (monthly), 3 (weekly), 4 (daily)

Item	District A	District B	District C	Overall	Group Difference
I connect each lesson to the previous lesson or learning that has taken place.	3.68	3.68	3.68	3.68	No
I connect each lesson to future learning that will take place.	3.35	3.37	3.33	3.36	No
I design coherent sequences of learning rather than individual lessons.	3.43	3.43	3.41	3.41	No
I explain to students the connections between new, prior and future learning.	3.55	3.63	3.46	3.52	Yes (*p*=.034)
I have a learning goal(s) for the lesson.	3.83	3.79	3.80	3.80	No
I present the learning goal(s) for the lesson to students verbally.	3.72	3.69	3.69	3.70	No
I present the learning goal(s) for the lesson to students in writing (e.g., on the board).	3.63	3.28	3.49	3.50	Yes (*p*=.000)

I discuss with students what they should know by the end of the lesson.	3.57	3.47	3.47	3.52	No
The learning goal(s) for the lesson is connected to state/local academic standards.	3.84	3.79	3.72	3.77	Yes (*p*=.032)
I reference the learning goal(s) multiple times within the lesson.	3.46	3.45	3.28	3.40	Yes (*p*=.036)
I share with students the criteria that will be used to determine their success in the lesson.	3.34	3.45	3.17	3.31	Yes (*p*=.003)
I have students participate in developing the criteria for success.	1.84	2.53	1.84	2.00	Yes (*p*=.000)
I provide students with multiple options to demonstrate their learning.	3.21	3.33	3.11	3.19	No
I have students demonstrate understanding of the criteria for success.	3.21	3.37	3.13	3.22	No
Subsection Average	3.40	3.45	3.33	3.38	Yes (*p*=.026)

Use of Formative Assessment: Part B - Scale 0 (not at all), 1 (once a semester), 2 (monthly), 3 (weekly), 4 (daily)

Item	District A	District B	District C	Overall	Group Difference
I ask questions within the lesson to assess whole group progress.	3.90	3.93	3.84	3.88	No
I ask questions within the lesson to assess individual student progress.	3.87	3.87	3.81	3.83	No
I make adjustments to instruction within the lesson based upon student responses.	3.79	3.80	3.69	3.75	No
I ensure the pace of the lesson provides adequate wait time for students to respond to questions.	3.89	3.89	3.84	3.86	No
I use follow-up questions when engaging students in discourse.	3.87	3.84	3.77	3.82	Yes (*p*=.027)

I use exit tickets to assess student learning.	2.74	2.64	2.94	2.78	Yes (*p*=.042)
I use student responses to questions to help me adapt future instruction.	3.65	3.66	3.58	3.62	No
Subsection Average	3.67	3.66	3.64	3.65	No

Use of Formative Assessment: Part C - Scale 0 (not at all), 1 (once a semester), 2 (monthly), 3 (weekly), 4 (daily)

Item	District A	District B	District C	Overall	Group Difference
I have students work in small groups with 2-3 other students.	3.31	3.48	3.45	3.37	Yes (*p*=.012)
I have students to work with a partner.	3.40	3.57	3.54	3.47	Yes (*p*=.012)
I allow students to guide their own learning.	2.97	3.20	2.84	2.97	Yes (*p*=.005)
I enable students to engage in discourse/discussion regarding the lesson in small groups.	3.26	3.49	3.45	3.36	Yes (*p*=.002)
I facilitate students in discourse/discussion regarding the lesson as a whole class.	3.58	3.67	3.56	3.57	No
I include both individual and group assignments when group work is used.	3.06	3.40	3.10	3.13	Yes (*p*=.005)
I enable students to learn from each other when they engage in group work.	3.42	3.69	3.51	3.49	Yes (*p*=.001)
I expect students to find the right answer to a teacher provided problem.	3.40	3.30	3.09	3.26	Yes (*p*=.001)
I encourage students to consider multiple viewpoints or approaches to solving problems.	3.60	3.68	3.56	3.59	No
I have high expectations for all students to succeed.	3.96	3.91	3.90	3.92	No

Subsection Average	3.39	3.54	3.40	3.41	Yes (p=.009)

Use of Formative Assessment: Part D - Scale 0 (not at all), 1 (once a semester), 2 (monthly), 3 (weekly), 4 (daily)

Item	District A	District B	District C	Overall	Group Difference
The tasks and activities within the lesson are directly tied to learning goal(s).	3.90	3.89	3.79	3.85	Yes (p=.011)
The tasks and activities within the lesson provide evidence of student progress toward learning goal(s).	3.77	3.78	3.67	3.74	No
More than fifty percent of students are clear about the task and begin work efficiently.	3.78	3.78	3.74	3.77	No
All students understand the directions for the lesson.	3.64	3.71	3.56	3.63	No
Student responses provide me with evidence for adapting instruction within the lesson.	3.79	3.78	3.66	3.74	Yes (p=.012)
I analyze student responses and work to identify patterns of understanding/misunderstanding within the lesson.	3.73	3.74	3.52	3.66	Yes (p=.000)
Subsection Average	3.77	3.78	3.66	3.73	Yes (p=.002)

Use of Formative Assessment: Part E - Scale 0 (not at all), 1 (once a semester), 2 (monthly), 3 (weekly), 4 (daily)

Item	District A	District B	District C	Overall	Group Difference
I review all student work during the lesson.	3.26	3.38	3.07	3.21	Yes (p=.001)
I review some student work during the lesson.	3.69	3.72	3.66	3.69	No
I provide real time feedback on student work to all students.	3.50	3.53	3.35	3.46	Yes (p=.007)

I provide students with opportunities to internalize feedback and apply it in a meaningful way.	3.38	3.55	3.25	3.36	Yes (*p*=.000)
I use student self-assessment.	2.72	3.15	2.54	2.74	Yes (*p*=.000)
I use student peer-assessment.	2.10	2.72	2.09	2.21	Yes (*p*=.000)
I use evidence generated through student self-assessments to inform future teaching and learning.	2.64	3.07	2.48	2.65	Yes (*p*=.000)
I use evidence generated through student peer-assessments to inform future teaching and learning.	2.23	2.74	2.05	2.25	Yes (*p*=.000)
I generate feedback loops during classroom discourse where one question leads into elaboration and further questioning to build the discussion.	3.11	3.33	3.00	3.08	Yes (*p*=.006)
Subsection Average	2.96	3.24	2.83	2.96	Yes (*p*=.000)

Technology – Scale 0 (not at all), 1 (once a semester), 2 (monthly), 3 (weekly), 4 (daily)

Item	District A	District B	District C	Overall	Group Difference
Personal computing (e.g., iPad, Laptop)	2.40	2.26	2.13	2.27	No
Projection boards (e.g., SMART Board, Promethean)	1.80	1.38	1.82	1.74	Yes (*p*=.033)
Google Forms	0.56	0.99	0.97	0.78	Yes (*p*=.000)
Online polling (e.g., Poll Everywhere, PollDaddy)	0.42	0.76	0.28	0.44	Yes (*p*=.000)
Digital discourse and dialogue (e.g., Padlet, Lino)	0.42	0.52	0.28	0.40	Yes (*p*=.033)
Digital quizzes and learning games (e.g., Kahoot, Quizlet, ZipGrade)	1.31	1.49	0.61	1.10	Yes (*p*=.000)

Item banks and/or online formative assessment (e.g., Mastery Connect)	1.14	0.90	0.59	0.91	Yes (*p*=.000)
Voice recording (e.g., Vocaroo, QuickVoice app)	0.45	0.63	0.27	0.42	Yes (*p*=.001)
Video lessons and recording (e.g., Zaption, EdPuzzle)	0.86	1.07	0.50	0.78	Yes (*p*=.000)
Chat tools (e.g., Backchannel Chat, Chatzy)	0.25	0.35	0.12	0.23	Yes (*p*=.005)
Subsection Average	0.96	1.03	0.76	0.91	Yes (*p*=.000)

Support for Formative Assessment - Scale 1 (strongly disagree), 2 (disagree), 3 (agree), 4 (strongly agree)

Item	District A	District B	District C	Overall	Group Difference
I understand what formative assessment is and how to use it.	3.60	3.59	3.49	3.56	No
I have enough time to plan formative assessments.	2.65	2.82	2.40	2.59	Yes (*p*=.000)
The curriculum I use includes support for formative assessment.	3.12	3.29	2.75	3.02	Yes (*p*=.000)
The curriculum I use supports formative assessment and individualized instruction at a range of grade levels.	3.03	3.20	2.62	2.91	Yes (*p*=.000)
My approach to instruction provides me with ample opportunities to interact with all of my students and act on formative assessment data.	3.12	3.30	3.16	3.17	Yes (*p*=.035)
My class periods provide enough time to gather and act on formative assessment data.	2.72	2.91	2.61	2.72	Yes (*p*=.004)
I have administrator support to incorporate formative assessment into my teaching practice.	3.33	3.26	3.08	3.23	Yes (*p*=.000)
My district or school provides me with materials/tools to support formative assessment.	2.90	3.07	2.64	2.84	Yes (*p*=.000)

My district or school provides me with technology to support formative assessment.	2.69	2.71	2.54	2.64	No
My district or school provides me with adequate training on formative assessment practices.	2.88	2.95	2.55	2.77	Yes (*p*=.000)
My district's pacing guides allow time to incorporate formative assessments and changes to my practice if needed.	2.62	2.95	2.32	2.57	Yes (*p*=.000)
I know how to use data to diagnose underlying learning gaps and identify lessons and instructional strategies appropriate to help students catch up.	3.22	3.37	3.11	3.21	Yes (*p*=.001)
Subsection Average	2.99	3.12	2.77	2.93	Yes (*p*=.000)

APPENDIX G: FORMATIVE ASSESSMENT OBSERVATION RESULTS BY ITEM ACROSS LOCATION

Table 1. Scale Value with Corresponding Average Score Range

Scale Value	Score Range
Beginning	1—1.99
Developing	2.0—2.99
Effective	3.0—3.5
Exemplary	3.5—4.00

Tables 2 – 7 present average findings by group and overall for individual items and domains.

Table 2.

Domain A: Learning Intentions and Criteria for Success				
Item	**District A**	**District B**	**District C**	**Overall**
Connection to Future Learning	2.67	3.05	3.21	2.98
Learning Goal Quality	2.80	2.65	3.29	2.88
Learning Goal Implementation	2.67	2.85	3.29	2.92
Presentation of Criteria	1.73	2.85	1.86	2.22
Total Domain A	2.47	2.85	2.91	2.75

Table 3.

Domain B: Engineering Effective Classroom Discussions—Questioning				
Item	**District A**	**District B**	**District C**	**Overall**
Use of Questioning	3.13	3.20	3.29	3.20
Wait Time	3.13	3.10	3.64	3.27
Eliciting Evidence of Learning	3.13	3.05	3.21	3.12
Determining Progress	3.20	3.60	3.43	3.43
Total Domain B	3.15	3.24	3.39	3.26

Table 4.

Domain C: Engineering Effective Classroom Discussions—Collaboration				
Item	**District A**	**District B**	**District C**	**Overall**
Climate	2.47	2.35	2.79	2.51
Student Collaboration	2.53	2.40	2.93	2.59
Student Viewpoints	3.13	3.40	3.93	3.47
High Expectations	3.60	3.55	3.50	3.55
Total Domain C	2.93	2.93	3.29	3.03

Table 5.

Domain D: Learning Tasks				
Item	**District A**	**District B**	**District C**	**Overall**
Connection to Learning Goals	2.93	3.10	3.29	3.10
Clarity of Task	2.87	3.20	3.21	3.10
Adjust Instruction within the Lesson	3.00	3.15	3.36	3.16
Use of Evidence to Inform Future Inst.	2.60	3.20	2.64	2.86
Total Domain D	2.85	3.16	3.13	3.06

Table 6.

Domain E: Feedback on Instruction				
Item	**District A**	**District B**	**District C**	**Overall**
Assessing Progress During Lesson	2.60	3.10	2.57	2.80
Individualized Feedback	2.73	2.55	2.57	2.61
Self-Assessment	1.80	1.25	1.86	1.59
Peer Assessment	1.07	1.25	1.21	1.18
Feedback Loops	2.07	2.35	2.93	2.43
Total Domain E	2.05	2.10	2.23	2.12

Table 7.

Across Domains				
Item	**District A**	**District B**	**District C**	
Overall FA Score by Site	2.66	2.82	2.95	

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