



RESEARCH for *ACTION*

**A VIEW FROM THE INSIDE:  
Teachers' Perceptions of the  
MDC Initiative and their Use of the  
Formative Assessment Lessons**

October • 2011

## Special thank you to practitioners

This research would not have been possible without the participation of teachers and other educators, who shared their experiences with the Mathematics Design Collaborative (MDC) initiative with Research for Action (RFA) staff.

The following school districts and networks of schools participated in this research: Charlotte-Mecklenburg School District (NC), Hamilton County Department of Education (TN), Kenton County School District (KY), New York City Department of Education (NY), National Council of La Raza, and New Tech Network. Teachers in all sites were invited to complete the survey, while a smaller sample participated in site visits.

Fifty-six mathematics teachers, special education teachers, and other educators in three school districts and two schools within a network of schools participated in RFA's site visits, which included interviews and observations of Formative Assessment Lesson (FAL) use. They generously opened their classrooms and gave of their planning periods, lunch breaks, and after school time to share their experiences with RFA staff.

In addition, 83 teachers in four school districts and two school networks took time out of their busy end-of-the-school-year schedules to complete RFA's teacher survey.

RFA would like to thank all educators who participated in this study. We hope that you find value in this guide that was produced with you in mind.



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## Introduction

The Bill and Melinda Gates Foundation has invested in the development and dissemination of instructional tools to support teachers' incorporation of the Common Core State Standards (CCSS) into their classroom instruction. Math experts have developed formative assessment lessons (FALs) that teachers can incorporate throughout the year's curriculum.

The Foundation has asked RFA to study teachers' early adoption of the FALs, focusing particularly on their response to and use of the lessons. The lessons were piloted in urban, rural, and suburban school districts in four states and two national networks of schools during the 2010-11 school year, which is referred to as Year 1 in this booklet.

## How to read this booklet

This booklet is a synthesis of what we learned from practitioners over the course of the pilot year, 2010-11. It highlights how MDC worked in schools and includes what teachers can expect when using the FALs, points out promising practices, as well as teachers' early impressions about MDC's impact on their teaching and student learning. We hope that this information will better prepare other teachers as they seek to use the FALs. We hope, too, that it will generate questions and comments and perhaps serve as catalyst for a discussion within your own math departments.

## A word about terminology

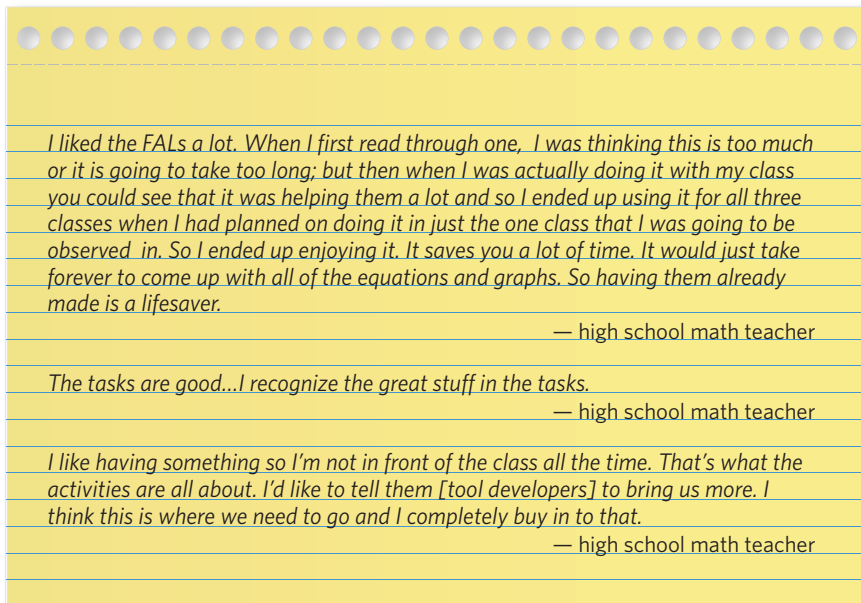
There are times in this booklet when we use the term Math Design Collaborative (MDC) and other times when we use the term formative assessment lesson (FAL).

- **MDC** refers to the broader Gates Foundation initiative designed to better prepare math teachers to use formative assessment strategies and the lessons to prepare students for postsecondary college and career successes.
- The **FALs** are the specific math lessons or tools that have been developed by the Shell Centre, a central component of the MDC initiative.

## What can you expect in using the FALs?

### Last year, teachers said:

**They were enthusiastic about the FALs.** An overwhelming majority of teachers found value in the FALs and appreciated having high quality, rigorous lessons to use with their students. During the first pilot year, teachers' most urgent request was that the tool developers create more FALs.



**They benefited from their participation in the MDC initiative in general, but some teachers also had concerns.** When asked if participation in the MDC initiative had been worth the time and effort involved, 74% of teachers said yes:

**I agree:** *As a result of this initiative, I have started using formative assessment. So I have increased the formative assessment that I do. I always thought that there was something like this, but I could not find it. This was fabulous. I cannot tell you how excited and lucky I feel when I think about my being in this initiative!*

But 26% of teachers had reservations:

**I agree, but:** *At times I would tell you no, especially at some of those workshops where all we did was scoring, the answer would be no. The very first PD was phenomenal and we came out energized. We were active participants and the students; we were problem solvers... It was also very powerful for teachers to see that there is more than one way to answer the problems.*

**Their beliefs about teaching math aligned with the goals of the MDC initiative.**

- 89% reported that taking on the role of “teacher as facilitator” enabled them to strengthen their students’ mathematical learning.
- 94% reported that peer-to-peer problem solving is an effective method of learning mathematics.
- 88% reported that all students can engage in mathematical reasoning. This aligns with the CCSS of mathematical practice.

**They were committed to using the FALs in the 2011-12 school year.**

- Most teachers (87%) looked forward to receiving and teaching more FALs next year.
- 89% planned to make improvements on how they use the FALs next school year.

**They reassessed their expectations of student learning.** Seventy-four (74%) percent of teachers indicated that using FALs had caused them to reevaluate their beliefs about what students can accomplish, and increased expectations for students’ mathematical work.

**They benefited from a range of supports from a variety of sources.** Support included formal professional development, in-class support from district leaders, encouragement and structural support from school leaders, and peer discussions and collaboration. Teachers said that all sources of support offered were instrumental in developing their understanding of the FALs and how best to use them.

**% of teachers who reported that the following key players provided them with suggestions about how to use the FALs:**

MDC PD consultant	89%
Teacher colleagues	61%
District leader	49%
Instructional coach/department chair	44%
Principal	17%

## Using the FALs

The findings below represent a range of experiences of teachers who piloted the FALs during the 2010-11 school year. During the first year, there was a limited number of FALs available for pilot testing. Additionally, the lessons were often introduced during PD sessions, so teachers had little opportunity to work with FALs on their own. Most teachers (72%) have used 1-5 FALs, and another 22% have used 6-10.

### What to expect

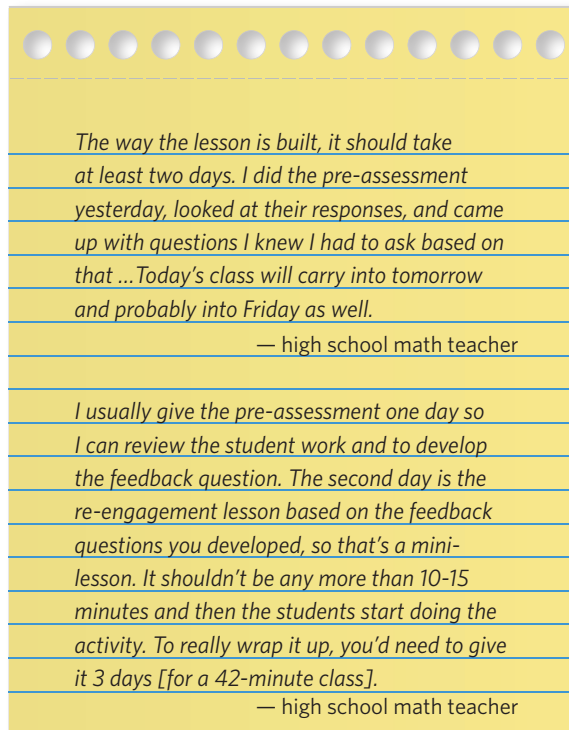
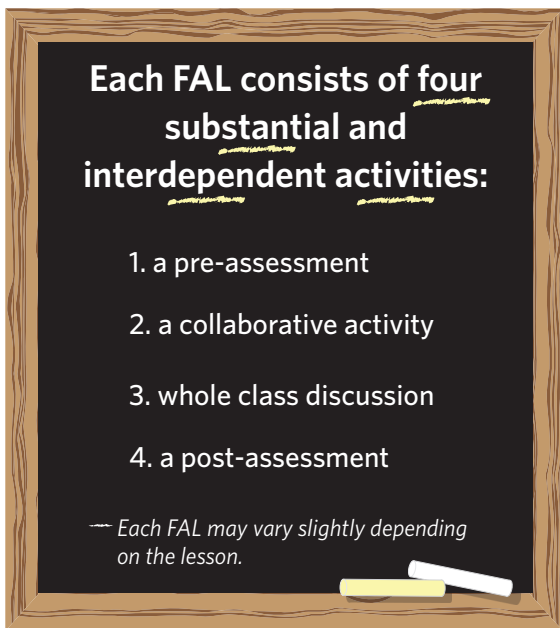
**Most teachers (88%) said that the Teacher Guide included with the FAL was “easy to use.”** Each lesson included detailed information about how to use it with students. It provided instructions, information about time needed to complete each section of the FAL, information about how to assess student responses on the pre-assessment, common student issues or misunderstandings, suggestions for how the teacher can respond, and a suggested outline for the entire lesson. It also outlined how the lesson is connected to the CCSS and included the mathematical goals for the lesson.

**FALs can be used for a variety of instructional purposes.**

#### **% of teachers who reported that the FALs can be used to:**

Reinforce previously taught content	<b>98.8%</b>
Prepare students for a summative assessment	<b>82.9%</b>
Extend learning for advanced students	<b>93.3%</b>
Deepen students' mathematical knowledge	<b>96.3%</b>

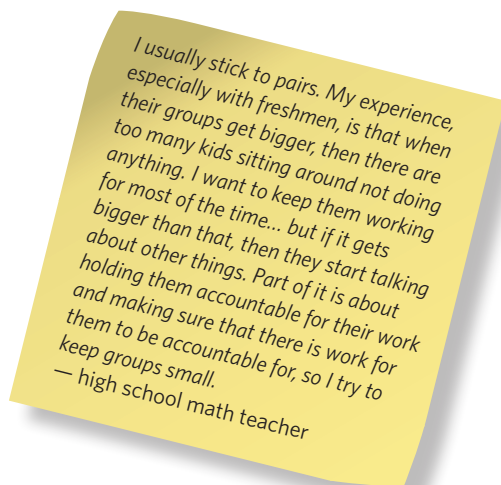
FALs usually require two to three class periods to complete, depending upon the length of class periods. The average duration of teachers' math classes was 65 minutes. Each FAL consists of four general and interdependent activities, which may vary slightly depending on the lesson.



**Group size:** Teachers preferred to group students in pairs (57%) or clusters of three (33%) for the collaborative portion of the FAL.

Fewer teachers reported grouping students in larger clusters. In interviews, most teachers said they kept groups small.

**Group composition:** Teachers purposefully grouped students. Seventy-eight percent (78%) of teachers made strategic decisions about grouping students. They did not always use the same strategy; rather, they varied their grouping structures throughout the school year.





## Promising practices

**There was no one best composition of students for the collaborative activity.** Teachers employed a variety of strategies to group their students based on their knowledge of students' mathematical skill level and personalities. A minority of teachers reported that they let their students choose their own groups.

### Teachers' decision about grouping

#### Student abilities

Teachers paid attention to students' mathematical abilities, frequently grouping stronger students with weaker students, which allowed teachers to differentiate instruction.

### Teachers' quotes

*I put a lot of thought into it. I don't want a group of clueless students sitting there.*

— high school math teacher

*I try to group a weaker student with a stronger student so they can build on each other's strengths.*

— high school math teacher

*I just found that pairing stronger with weaker students works better for my kids.*

— high school math teacher

#### Seating charts

Some teachers had strategic seating charts in place and when it came time to pair/group up, these teachers could say, 'Turn to the person behind you...'

*The students think they decide the pairs. They are already strategically seated. ...If I notice I have 3 over here who are nailing it, I'll just play with the numbers and say, 'Today, I want you to do a little something different, let's choose someone that we haven't worked with, how about this row get with this row.' I know their strengths and weaknesses, and I know who can work well together and who can't.*

— high school math teacher

#### Student personalities

Teachers were also mindful of students' personalities when grouping students.

*I don't want to put someone together with another student who will cause conflict, so I look at personality and math background and group them together.*

— high school math teacher

#### Unique student needs

Teachers were also attentive to the unique needs of their ELL students.

*I make sure certain students aren't working together. When I use the FAL collaborative activity, if students are in different language pairs, I might add a 3rd or 4th student to help translate.*

— high school math teacher



## What to watch for

**The arrangement of student desks is an important consideration when students are working collaboratively.** In observations of classrooms, some students sat directly across from one another, which resulted in at least one student reading and working with the FAL manipulatives (charts, graphs, text, etc.) upside down. This seating arrangement made it difficult for students to work collaboratively and fully engage with the lesson. When students put their desks side-by-side, it was easier for a pair or 3 students to scan across the desktops of their peers.

**Some teachers felt a tension between covering curriculum and using FALs.** Forty-two percent (42%) of teachers surveyed said that using FALs takes too much time away from covering required curriculum topics. Teachers felt pressure to cover content and prepare students for the state assessments, and were concerned that using a FAL that takes 2-3 days would put them behind schedule. Once the FALs are aligned to curriculum pacing guides, teachers may feel less tension between using the lessons and covering content.

**Nearly one-third of teachers (32%) reported that they did not complete all four parts of the FAL.** Teachers cited pressure to cover new material as a reason for not completing it. Pressure may have stemmed from a lack of alignment with curriculum pacing during the pilot year; a need to cover required content by the end of the year; or another challenge. Future research will focus on teachers' perceptions of their ability to complete an entire FAL and whether they believe it is a feasible goal.

**Teachers (51%) expressed concerns about the upfront preparation required before using the FALs.** Some lessons required multiple sets of laminated cards, transparencies and markers. Additionally, teachers had to sort and package the materials for collaborative group use. Each small group needed their own envelope of manipulatives and other materials. This added an extra layer of prep work for the teacher.

# MDC's influence on teacher practice

## What to expect

Teachers reported that their participation in the MDC initiative led to their adoption of formative assessment instructional practices, even when they were not using the FALs. Teachers said that they shifted their pedagogical style from providing direct instruction to facilitating discussions, scaffolding learning through inquiry, and allowing students to make and learn from their mistakes.

*I try to use formative assessment, even on those days when I'm not using a Shell [FAL] lesson. Of course, it's not as detailed and wonderful as [Shell] lessons are, but even on a quiz or a test, I will try and evaluate the task like they show us - make comments and give it back, or hold some of them as examples, put them on the overhead and say, 'Hey, this is a good answer,' and they can discuss it.*  
— high school math teacher

*It's a stretch in that while the kids are answering, I have to think of what is my next question going to be? Before MDC -- two, three years ago -- I would tell them the answer, 'This is right or wrong.' But the FAL suggests asking, 'Why did you come up with that? Justify your answer.' And so you ask them more questions to make them explain more of what they are doing, and it just makes all the difference in the world.*  
— high school math teacher

*I'm more inclined to let children make mistakes than I used to be. I talked about the disequilibrium...it's at that moment that you struggle with something. It is really hard for me to let students struggle...but that's where the learning takes place.*  
— high school math teacher

**FALs enhanced teachers' instructional repertoire.** Eighty-nine percent (89%) of teachers said that FALs have helped them find new and effective ways to include formative assessments in their classes. Sixty-three percent (63%) said the FALs had become an important component of their instructional repertoire.

**FALs gave teachers insight into students' mathematical strengths and weaknesses, which allowed them to modify instruction and better meet their students' needs.** Teachers said they learned about students' misconceptions and discussed these with students through mini-conferencing and whole-class discussions. A full 93% of teachers noted that they know how to respond to the mathematical mistakes their students make on the FALs.

*I definitely am getting [formative information]. That is what's awesome. With this last one, I told my student to draw quadratics on their white boards and some were drawing it wrong. Some smart kids were drawing it wrong. So right away, that showed me how they understood quadratics.*

— high school math teacher

*The structure of the FALs lends to formative assessment. When you start with the pre-lesson activity, finding out where you need to begin... The guidance on questioning is particularly helpful because the errors that they talk about and the kinds of mistakes that kids will make is spot on. ...So the questioning part helps me to develop the questions that I want to use in class... The tools are there for me to see what's happening in the beginning, where we are starting from and to adjust and ask appropriate questions to get the kids moving where they need to be, based on the mistakes they are making.*

— high school math teacher

## FALs and student engagement

### What to expect

Using FALs enhanced teachers' ability to engage students with a range of mathematical abilities and needs.

#### % of teachers who reported that the FALs help engage:

Students with different mathematical abilities	89%
ELL students, though interview data suggest many sites did not have a significant ELL population.	67%
Special education students	67%
Students who tend to be disengaged	78%
Students who tend to be disruptive	71%

**The relationship between using the FALs and increasing student engagement is still developing.** As noted earlier, survey results indicate that teachers believe the FALs have enhanced their ability to engage students. Other teachers were less certain about whether the FALs engaged all students, especially those who tended to struggle in math. As teachers continue to use FALs in alignment with their pacing guides, the relationship between FALs and student engagement should become clearer.

Everybody can mostly start, that's what I love about them. They all have a starting point and 100% of them could get the gist of what is going on, but **I noticed the struggling students get so frustrated so early on. They don't want to plug away at it, they just want to get it done.**  
— high school math teacher

The kids enjoyed the task too and it was my more active class, so **even with my more active class they really got into using the white boards and justifying their answers and being excited about trying to figure things out.**  
— high school math teacher

**Students are beginning to engage in mathematical discussions.** Some teachers reported that using the FALs increased student engagement and improved the quality of math discussions. These teachers said that the lessons were highly engaging and “elicited rich student responses.” Teachers were impressed with their students’ ability to participate in the lesson and discuss math content with their peers.

*The FALs just brings up stuff for discussion. They had one on functions that brings up a lot of stuff...if you do them it is amazing the stuff that is brought out of it.*

— high school math teacher

*The students are so radiant once they have the opportunity to express themselves. They blossom once they see that they can contribute something to the ideas, and then you have the most interesting discussions if you just let the students struggle with one idea. Everybody participates and then you have one student who has a very good argument and it's very exciting to see that happening.*

— high school math teacher

## What did teachers say about the FALs and student learning?

### What to expect

**FALs’ impact on student learning is still emerging.** Most teachers (83%) believed that students’ math reasoning skills have increased as a result of using the FALs. However, interview data suggest that teachers do not have a strong sense of the direct academic impact of using the FALs. Some teachers offered examples of how the FALs have positively impacted their students’ learning.

**FALs could help students become better prepared for the postsecondary arena.** Most teachers (83%) surveyed agreed that the FALs will prepare their students for postsecondary success.

*I think I have seen some evidence. In the distance-time FAL, we went a week later over test preparation and we did data multiple choice questions and the students were just banging them out. I saw them go from bigger scale of the lesson to the application of the knowledge on the standardized test. I saw transfer of prior knowledge to the assessment on the DC CAS prep – they are expected to think thoroughly and these lessons provide the time to absorb the material and remember it later.*

— high school math teacher

*They talk about it and solve the task and when you are asked questions about the task, like ‘explain something,’ or ‘what did you learn? Where did you get this idea from?’ It makes a lot of difference than just giving a worksheet or exercise. The understanding when they [the students] can explain it, and when they apply it...it demonstrated a type of understanding that is deep and they can retain [the content].*

— high school math teacher

**FALs could enhance students' ability to perform on standardized assessments.** Almost three-quarters (74%) of teachers agreed that FALs helped to prepare students for current assessments. Some teachers reported that problem-solving skills and math knowledge developed by using FALs could be transferrable and help students on summative assessments.

Other teachers were hesitant or unsure about the FALs' impact on student learning; some reserved judgment because they had used too few FALs. Many teachers also said that once they used more FALs they would be better able to judge the mathematical benefit for students.

I haven't seen any evidence yet, but I'm not going to say that it won't increase. This was our first year working through it. I haven't seen it yet.  
— high school math teacher

I don't think we've used them enough to say that. I've used two this year.  
— high school math teacher

**Teachers with more experience using the FALs were more likely to report that FALs deepen students' knowledge and their ability to retain it compared to other instructional methods.**

For example, one teacher stated during her presentation about the FALs:

*[Prior to MDC, I sometimes thought to myself] 'Hey, I thought I taught that already.' I don't have that feeling anymore [once I started using the FALs]. Yes, it takes more time, but I don't have to reteach things. By Christmas, about 80% of my students had mastered all the skills. Three skills that were limited mastery were the three skills that I crammed in. My class averages were much higher. My average is 80% and I don't have advanced kids.*  
— high school math teacher

## What to watch for

**Using the FALs in instructionally-meaningful ways will allow teachers to fully assess their impact on student learning.** In the upcoming year, teachers will have the opportunity to use FALs in alignment with curricular units. Future research will focus on how FALs inform and influence instructional practice and contribute to student achievement in mathematics.

## Questions for Teachers to Consider

As you continue to make strides towards incorporating the FALs into your curriculum, we pose a few questions for you to consider. You can use these questions and the report as a starting point for early discussion or continued dialogue about the MDC initiative and how it is working for you and your colleagues.

1. How can your colleagues best support your use of formative assessment and FALs? How can you support your colleagues?
2. How many FALs do you plan to use this school year (semester/trimester)? Why?
3. How purposeful should teachers be when grouping students for the collaborative portion of the FAL?
4. What are the roles and responsibilities of your students when they are working with their peers during the collaborative portion of the FAL? How might you communicate their roles/responsibilities and your expectations to them?
5. Is formative assessment, including the use of FALs, an important component of your instructional repertoire? Why or why not?

6. How are you using the formative information about students' mathematical strengths, weakness, and misunderstandings to guide your instruction?

7. How are your students engaged when you are using a FAL?

8. Have you noticed any evidence of student learning as a result of the FALs? Did your students retain the content of that particular lesson?

9. What challenges have you experienced during your participation in the MDC initiative? What solutions have you found?

10. What are the three most important things your district and school leaders can do to better support your use of the FALs?

11. What have you learned as a result of participating in the MDC initiative that you would like to share with a teacher who is new to the initiative?



If you and your colleagues have additional comments about your involvement in the MDC initiative that you would like to share with us, FAL tool developers, or professional development providers, please send them to:

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For 20 years, Research for Action has provided rigorous research and analysis designed to raise important questions about the quality of education available to disadvantaged students, and the effects of educational reform on students, schools, and communities.





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