

## Understanding the Use of Mathematics Interim Assessments: A Case Study

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### Abstract

The purpose of this study was to understand the use of interim assessment data to inform mathematics instruction. A qualitative case study methodology was used to analyze the use of interim assessment data in a suburban elementary school. Data sources included interviews with three teachers at varying levels of their profession and the principal; observations of teachers working with assessment data in teams or as part of a professional development setting; artifacts representing interim assessments, supporting materials, and analysis results. The study explored the type of culture that was developed around data use, the types of assessments that were used, how the data were analyzed, and teachers' use of the data as a means to inform their instruction. The results from this research will inform the work of teachers and administrators as they design systems to support students' learning.

**Keywords:** Elementary Teachers; Formative Assessment; Collaboration; Administrative Support

### Introduction

In the United States, many students in public schools in grades 3-8 (ages 8-13) take an assessment in Mathematics at the end of the year to determine their proficiency across the content area. In New York state the standardized assessment is aligned to the Common Core State Standards and is a combination of multiple choice and open response questions. It is scored by the state agency and information is provided to show the level of performance for each student. While the test has questions aligned to different content domains (Number and Operations in Base Ten, Number and Operations – Fractions, Operations and Algebraic Thinking, Geometry, and Measurement and Data), the teachers are not able to see the actual student results at the item level. Both teachers and parents receive summary reports aligned to the specific domains and students are then classified holistically as Below Proficient, Partially Proficient, Proficient, and Above Proficient.

While these summative results are informative, using interim assessment data as a framework to guide school reform efforts has become very prevalent. Interim assessments are "medium scale assessments falling between formative and summative assessment that serve to (1) evaluate students' knowledge and skills relative to a specific set of academic goals, typically within a limited time frame, and (2) are designed to inform decisions at both the classroom and beyond the classroom level, such as the school or district level" (Perie, Marion, Gong, & Wurtzel, 2007, p. 1). The results can be used for formative purposes as administrators and teachers are able to see patterns across student learning that can inform curriculum and instructional planning, evaluation of existing programs, and support predictions about end of year results (Perie et al., 2007). Interim assessments can be purchased (such as the Measures of Academic Progress by

NWEA) or developed locally by teachers and administrators to more closely align to the scope and sequence of the local curriculum. Whether purchased or developed locally, the interim assessment is typically administered 3 times a year to provide a baseline, a midyear check point, and an end of year data point.

How schools use these results is an important aspect of understanding their value. Paul Bambrick-Santoyo (2010) has written extensively on the process and use of interim assessments and has developed a framework for implementing this assessment tool. The current study reported here builds on his framework by exploring a case study where a school used interim assessment data as a vehicle for teachers to talk about math instruction and student learning across grades K-5. The use of interim assessments was a means to develop a schoolwide language around both content and pedagogical content knowledge in mathematics (Carpenter, Fennema, Peterson, & Carey, 1988) An interim assessment tool, if developed and used, can allow teachers to "to view the subject matter through the eyes of the learner, as well as interpreting the learner's comments, questions, and activities through the lens of the subject." (McDiarmid, Ball, & Anderson, 1989, p.194) While a school might adopt a new assessment system that produces information about student understanding, this study explored the key supports that are needed to make that assessment meaningful for the teachers and the students.

There are many aspects to consider when thinking about how interim assessments can be used to inform instruction. First, beyond just the assessment, one needs to explore the supports that are in place within a school or district to facilitate the analysis process and support instructional change. As with any school reform effort, having the support of the broader district and principal within the school is critical to

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facilitate the process of change. This support influences the culture that permeates the school and the level of collaboration within the school. In Paul Goren's (2010) summary of a Special Edition of the Peabody Journal of Educational Research he noted that strong leaders focused on developing a culture around the use of the interim assessments. Part of this culture requires developing shared norms and routines around the use of data (Blanc et al., 2010). The principal plays a critical role in guiding the analysis and supporting the process to help teachers think through how they can use their data (Coburn & Turner, 2011). The type of support districts and principals provide can range from the provision of technology to analyze the data (Nabors et al., 2010), to the personnel in the school to support the process (Martone, 2005), and include the use of time within the school to analyze and plan using the data (Buckley et al., 2010).

Second, an important piece of using interim assessments to support student learning is to understand to what degree instruction and learning are directly influenced. The goal of using interim assessments is that the information from the assessments provides the teachers with enough information to change their instruction to meet the needs of the students to improve student learning. However, changing instruction can take more than just an analysis of test results. Teachers bring a set of beliefs to their approach to instruction and data results are often interpreted in relation to those beliefs (Coburn & Turner, 2011). A formal protocol to guide the analysis and reflection process can help move the analysis of data from information to knowledge that influences teachers' work (Buckley et al., 2010). While protocols can be helpful to guide the analysis process, the application of the results can vary.

Third, it is important to understand the quality of the interim assessment items and the usefulness of the information that can be obtained from those assessments. All of the preceding points assume that the interim assessments are providing useful information for teachers, principals, and districts. However, the quality of the assessments does not always allow for rich analysis and instructional planning. Often interim assessments might require only easily scoreable multiple choice items (Shepard, 2010). While these items might align to the standards the cognitive complexity required is not always as rich as more open response items. Shepard (2010) recommends the use of open response items to more thoroughly explore students' thinking. To add this in to the analysis some teachers might require an explanation step following a multiple choice item as a way for students to show their thinking (Perie et al., 2007). Thinking about ways the interim assessments can be used to illustrate students' understanding is a critical step to being able to then make instructional decisions.

Interim assessments can serve as a way for teachers to document and analyze student learning. If schools have the technology and professional supports they can successfully turn the data into useful information and make instructional decisions. However, this effective use is predicated on interim assessments that are well constructed and provide meaningful information to the teachers.

Lesson study (Lewis, Perry & Hurd, 2004) is a valuable approach to exploring a particular aspect of teaching a content topic. The teachers research why that topic might be challenging, develop a focused lesson to think about how to teach the concept, teach the lesson as the other teachers watch, then meet together to analyze student work and discuss next steps. This in-depth approach to professional development supports the teachers' development

of both the content and the pedagogical content knowledge. This current study builds on this idea but applies it to a whole school model. Rather than looking at the work of teaching in the moment, groups of teachers worked together to analyze the products of teaching across a grade in terms of a common interim assessment tool.

This current study explored the type of culture that was developed around data use, how the data were analyzed by teachers, and teachers' use of the data as a means to inform their instruction. The use of interim assessments was specific to this school district and occurred at all five elementary schools within the district. This case study focused on the lead school, Falcon, where the principal was instrumental in developing the idea for the district. The research questions explored through this study were:

What impact did a formal process of interim assessments have in a suburban elementary district?

- a. How did the interim assessment process influence
  - i. the work of the teachers?
  - ii. the work of the principal?
- b. How did the interim assessment process influence the culture in the school?

### Methodology

This study used a case study approach to explore how interim assessment data were used to inform instruction. The school is located in the Northeast of the United States in a suburban location. As of 2015-2016, the school had 413 students with about 3 classes per grade and an average class size of 21 across grades Kindergarten through Fifth (ages 5-13). Eighty-seven percent of the students were white, no students were English Language Learners, 11% were eligible for free lunch, and 14% were students with disabilities. There are 20 full time teachers at the school and one full time principal. For the third, fourth, and fifth grade statewide Math assessments the school had 77%, 73%, and 58% scoring proficient or above, respectively. The school has a six hour day where the time is typically divided each day between English Language Arts with a two hour block, science or social studies for 60 minutes, a special (library, music, etc.) for 45 minutes, and mathematics for 60 minutes. The teachers can determine when in their day math will take place but it must be taught each day for each grade level. The teachers all used the Common Core State Standards to guide their instruction and have a common set of curriculum materials, Envisions, that they use as a teaching resource but there is not a required pacing guide that is used across the school. Teachers also have access to shared Ipads, a range of different concrete manipulatives, and the ability to pull from other resources as needed.

Teachers administer unit assessments typically bi-weekly from the Envision curriculum but these assessment results are administered at different times because a pacing guide is not followed and they are viewed only at the individual classroom level. The interim assessments discussed in this study represent the first time the school is working with a shared assessment that is administered to each grade at the same time where the results can be discussed across teachers. The interim assessments used here were developed the summer before by teachers and administrators hired by the district. The items aligned to content and format representative of those found on the state assessment but there was not an in-depth test development process in place. The goal for these assess-

ments was to create a culture around the use of a shared assessment where the teachers could view the items and the student work to better understand students' thinking and inform their own instruction.

### Participants

The participants in this study included the principal and three elementary teachers. The principal, Donna, has been the administrator at Falcon since it opened. Prior to becoming the principal Donna was a teacher, assistant principal, and ELA supervisor for 18 years all within the same school district as Falcon. The principal was very committed to thinking about how interim assessments could be used to inform instruction. During the summer before the study took place the principal attended a workshop by Paul Bambrick-Santoyo on Data Driven Instruction. She used information from this session to work with the district to implement the interim assessments. Donna participated in the data collection and then served as a participant-researcher to help inform the analysis process. While whole school teacher meetings were observed for an overarching understanding of the process, there were three main teacher participants for this case study. Gina was a teacher in the study and also served as a participant-researcher. Gina had been teaching at Falcon for 4 years, teaching fourth and fifth grades, and has taught for over 25 years total. She was currently teaching a fifth grade class. Dina, the second teacher participant, taught second grade at Falcon for the past 4 years and has been in the field of teaching for 29 years teaching K-3. Karen, the third teacher participant, taught Kindergarten at Falcon and has been there for the past 4 years and has been in the field of teaching for 7 years.

### Data Collection

There were three methods of data collection used in this study. Each participant was interviewed. Two of the three teacher participants were also observed in the classrooms for one period of math instruction. The participants were also observed during eight 90 minute bi-monthly faculty meetings. Artifacts were also collected during each faculty meeting as needed.

#### Interviews

Each participant was interviewed for at least 45 minutes and replied to open-ended questions about different issues and successes around the use of interim assessment data. Each interview was tape recorded and transcribed. Gina was also recorded as she informally discussed the process of using the interim assessments with the researcher. There were four informal discussions with Gina that were recorded and transcribed. The average length of these informal discussions was about 20 minutes. The informal discussions provided a more in depth view of how the interim assessment data was being analyzed and used in a specific classroom.

#### Observations

There were two types of observations focused on the work of the teachers and school-wide faculty meetings. First, observations of the teacher participants occurred in their classrooms. Two of the three teacher participants, Dina and Karen, were observed. Each observation took place after the interview and focused on one period of mathematics instruction. During these observations the researcher functioned as a "fly on the wall" and did not interact with the students or the lesson. The focus of the observations was to note verbatim comments about the

lesson and record references to the collection or use of data during the lesson. Second, eight faculty meetings were observed from October through May. Each meeting lasted about one hour. The focus of the observation was to note verbatim comments regarding how interim data was discussed and questions/ideas that were shared.

#### Artifacts

Artifacts were collected at the faculty meetings. These artifacts included sample assessments, sample analysis, and supporting materials discussed at the faculty meetings.

### Data Analysis

The focus of the analysis began with the interviews. Each interview was coded independently by each of the three researchers. The coded transcripts were then reviewed multiple times and compared across researchers. The codes were collapsed to create a code book of consistent terms. The codes were then organized around common themes and categories of analysis. The analysis was shared among all of the researchers. This study benefited from the involvement of two of the participants as researchers. The participant-researchers, Donna and Gina, reviewed the summary coding and organization of themes and categories to confirm that the data were well represented.

The observations and artifacts were then analyzed to illustrate how they supported or refuted the interview analysis. Verbatim comments from the observations were coded using the code book generated from the interview analysis. The artifacts served as illustrative examples of what was discussed in the interviews and observations. The observations and artifacts served to triangulate the themes and categories developed from the interview analysis.

### Results

Using interim assessment data to inform instruction is a complex process that takes place at many levels of the instructional setting and was a shift in practice for this high performing suburban elementary school. This study found five main themes as the school embarked on its first year in this process. First, it was important to understand how the new interim assessments were created and administered. Second, the interim assessment data analysis must be supported in multiple ways. Third, the data analysis process then influenced the work of the teachers inside each classroom. Fourth, there were a number of supports that were required to foster the use of interim assessment data to inform instruction. And fifth, it was important to understand the broader context and the role of the principal in this new endeavor.

#### *Creation and Administration of Interim Assessments*

When designing a new assessment system there are many steps in the process. When Falcon decided to implement the use of an interim mathematics assessment across grades Kindergarten to Fifth they needed to determine how to create and administer the assessments.

#### *Creation of interim assessments*

In an age of performance comparisons and common standards, this school saw the need to explore student understanding in a more systematic way. At the end of each academic year the principals receive summative

assessment results based on the annual mathematics assessment taken by students in grades 3-5 (ages 8-10). These results show the percentage of students performing at four levels of performance and allow administrators to make comparisons across schools, districts, and the overall state. The principal noted that comparisons of state standardized results to other similarly demographic schools showed them that their students were not performing as well. The principal shared this information with her staff and framed the discussion as "How can we do better? What can we do better? What can we do better tomorrow than we did today and let's focus on that." Part of the shift in her focus then centered on the use of interim assessments. After attending a workshop led by Paul Bambrick-Santoyo, author of *Driven by Data*, Donna saw the benefit of implementing a common set of assessments across all grade levels tied to the Common Core. Dina, the second grade teacher, understood the principal's vision for the process and stated,

*[The administration] wanted an assessment tool that could be used across the district so you might be able to see how your kids are working and how they're reaching their goals as compared to other schools. What's interesting is we're able to sort of compare and look at the data, not one better than the other, but see where children had problems with other classrooms in the building.*

The new assessments were viewed as a common benchmark across classes and a means to facilitate deeper discussion about student learning.

#### *Administration of interim assessments*

Part of the shared focus was using the assessments as a way to predict student performance prior to administration. Donna used time at the bi-monthly staff meeting to have teachers review the assessment and predict items students will "Ace, do Okay, or Bomb". After each teacher rated the items individually they shared their findings as a grade level group. The teachers talked through their different ratings and why, points of confusion, and student issues. For example, one teacher noted, "I have a lot more Os and Bs than my colleagues." and then the teachers discussed their differences. Additionally, a group of teachers discussed the difficulty students would face with the item measuring their ability to know greatest to least. Another teacher in the group shared how she has been integrating that skill into their morning meetings. The teachers were also asked to make predictions based on specific students to note who might ace it and circle the ones who might have trouble. One teacher noted she had more circles for boys and wondered if "they come to me like that" or if it is "within my power" to address that label. Sharing their student level predications helped to generate a discussion around levels within a classroom. The discussions illustrated the ways the prediction process helped the teachers to be familiar with the content, see how the Common Core standards were operationalized in the items, and to discuss different approaches across classrooms.

Another major change for the school was the idea of a set schedule for the implementation of the assessments. In the past teachers gave their own assessments on their own schedules and reflected on their results in their own classrooms. The use of interim assessments opened up the assessment process across classrooms and grades. Every seven-ten weeks a math interim assessment was administered in each classroom. The results were then input within 24-48 hours into a spreadsheet. The spreadsheet was uniform across all classrooms and showed results by student by item with color coding to flag different levels of performance. The teachers then analyzed their results

and used the last week of the cycle to remediate or enrich groups of students as needed based on their performance on aspects of the assessment. The principal stated,

*We are calling it remediation, re-teaching, and enrichment week. We built that in to really force them into really think about how you make sure you're not going forward until they get [it].*

Having all teachers in the school operating on this same schedule allowed for a common set of expectations about the process and possible next steps. Using this as a foundation the teachers could then share ideas about what they learned and make instructional decisions together working from a common assessment.

#### *Analysis of Interim Assessments*

The analysis of the interim assessment can be thought of as three interrelated components. First, the data needed to be input into a usable format to support the analysis. Second, analysis occurred at the question, class, and across class/grade level. And third, the types of errors noted in the analysis helped to inform instructional decisions.

#### *Data inputting*

Prior to analyzing the data from the interim assessments the results needed to be input into the common spreadsheets. It was a quick turnaround to get the results ready for analysis. Donna used time at a staff meeting to share the excel spreadsheet structure, discuss the steps for inputting the data, offer support from the main office if it was needed, and share sample analyses. At one point when office assistance was offered Donna noted it was in place of food for the meeting. A teacher called out, "We like this better than food!" and others cheered along. The teachers were unsure about the layout and process of data inputting and appreciated the support.

The use of spreadsheets and recordkeeping helped to form a foundation for the analysis as teachers could then see student results more clearly. Karen stated the impact this type of data collection had on her own approach beyond just the interim assessments. She noted,

*I've never used any spreadsheet type [approach] in kindergarten. I've been a kindergarten teacher for ten years and I always just stuffed things in a folder. So I like [this approach] because before putting 20 tests in front of you and trying to figure out a way for it... to guide your instruction took a while. So having it all in one spot [with] everything lined up for you was certainly helpful with the data piece.*

The principal also discussed how viewing data in this way was a shift for her teachers. She stated,

*I think when they get their spreadsheets back [it will be different] because it will be the first time that they have a very clear set of data that is directly related to their students and their teaching. All the other data so far is based on the whole year. So now it is based on a smaller amount of time and what they did in their room.*

Helping teachers to view data in a different way helped them to then think about ways to adjust their instruction based on the results they are seeing.

#### *Levels of analysis*

When looking at the spreadsheet of assessment results there were three levels of possible analysis: question specific discussions, class-wide findings, and discussions across classes about common issues. Each teacher men-

tioned looking at the findings at the question level to see areas of confusion. For example, Gina saw errors because “students didn’t line up the decimals correctly” while Dina noted that she followed up on questions students got wrong that she thought they should have known. Dina stated,

*If they’d get it wrong and I know they know how to do it, I’d pull them aside [and give them a] photocopied version of it. “Can you solve that for me?” And I didn’t them they were wrong. Or I’d just give them the numbers and see they could do it. And then I’d pull it out... so they can pinpoint it.*

Both Dina and Gina noted how they revisited specific questions to help students see targeted issues. During a staff meeting teachers also noted points about specific questions such as “The reading will be difficult, relates to following directions, also careless mistakes...The sign will be an issue.” As teachers thought about the interim assessment they often focused on specific items and issues students faced relative to that item.

*Analyzing the test results across the class was also common. Gina shared how she reviewed the test with her students to generate a class-wide discussion. She stated, We looked at their results and we went over every single problem. They had their test in front of them and the ones that they got incorrect and we talked about them and we really dug deep... [asking] why you think you got that incorrect. It was so eye opening for me because the kids were able to have such rich and rigorous discussion about themselves as mathematicians. That was eye opening to me, whereas, I don’t think that I truly never did that with unit tests. I just handed them back... and we moved on. This [analysis] allowed us to really look at what each problem was asking them to do and asking what did you think they were asking you.*

Using the tests as a means to open up discussion across the class and see common issues and next steps helped the teachers to think about instruction.

A next step was also to think more systematically about ways to share findings across classes and grades. Gina noted,

*I’m finding that we really have come to a lot of realizations as to how to look at data and notice specific things. But I would like to be more educated on the data analysis process. And I think that’s where a lot of teachers are. For example, if we are all looking at our interim assessments and we notice that, as a team, the students tanked on number 3 and we are noticing that they all answered B and D. So then how do... we really dig deep into the questioning... So, it’s just those specific pieces of data analysis that I think that the teachers need to be a little more educated on. What types of things are we looking for?*

Donna explored this approach in staff meetings when teachers brought their results and shared some findings. Donna asked the teachers, “What do you all do to tease out the why? What are some types of assessment that tease out what the problem is?” Donna encouraged her teachers to think about the results as one step in the process and to then think about ways to build on those findings and further probe students’ understanding. A next step in this process might be building on this common foundation of an interim assessment to have common analysis about findings and next steps.

#### *Types of errors*

There were four types of errors focused on during the analysis process. These included: careless errors, wording issues, conceptual misunderstanding, and environmental issues. Careless errors were a common but important aspect of the analysis to understand. Karen noted how the

use of a stimulating picture such as a Lightning McQueen car could distract the students away from focusing on the content of the item. Dina added on to this type of error noting, “Some of my high kids would miss on the problem solving because they would just miscalculate something, or they rush because they’re very clever in math. It doesn’t mean they got it wrong because they don’t know how to do it. It was wrong because they rushed.” Understanding this type of error can help teachers to think about ways to address it proactively in their instruction.

The wording of the item could also cause confusion for students. Being able to look at the actual test items in the interim assessment allowed the teachers to explore how items were worded and think about how that related to their normal instructional approach. In Dina’s interview she noted how sometimes it is not the numbers that cause the issue but how the item is worded. She stated, “And I’ve always said look at the way they ask the question. I asked Donna that one. She said there are examples on the website [and] it’s the wording they used in the word problems, not so much the numbers. It’s all about the way they say it.” Throughout the observation of Karen her focus on the vocabulary behind the math concepts was prevalent. As she taught a lesson on measurement she continued to emphasize different measurement terms and applications. Karen helped the students to understand different terms associated with measurement then went on to show those words in context through a story. The lesson continued with students exploring measurement as they measured similar objects with three different objects. Throughout the lesson she focused on helping the students to make connections between the terms and the concepts. It was clear from this observation that Karen took a proactive approach in thinking about the wording and language behind the math concepts.

An important aspect of the analysis process was also looking for deeper conceptual misunderstandings about a topic. One area of confusion discussed across the grade levels was around place value and a deeper understanding of subtraction with regrouping. Donna shared a problem she asked a number of classes involving regrouping and whether the numbers above the typical cross-outs done in a regrouping problem were equivalent to the original number. She found that 76% of the students she asked did not see the numbers as equivalent. Sharing this conceptual misunderstanding led to a staff wide discussion about terms, ways to teach place value, and methods to explore subtraction. In the observation of Dina she demonstrated a lesson where the students explored regrouping and subtraction. During the lesson Dina had the students model breaking apart numbers. She focused on what the process meant in actions, words, and numbers using multiple representations. She also had the students verbally connect drawings to ideas and explain the process to others. The lesson and focus developed out of the shared faculty discussion around conceptual confusion observed through the assessment process. Moving beyond assessment issues focused on carelessness or wording to explore the conceptual problems students have was a crucial benefit of a shared interim assessment process.

#### *Interim Assessments Influence the Work of Teachers in the Classroom*

The goal of using interim assessments was that it helped teachers think about their instruction differently. The regular feedback in a common form was meant to support teachers as they developed instruction to address issues they were seeing in the assessment. Through the analysis teachers focused on modifying their instruction to help

students develop a deeper understanding of the concepts, instill differentiation in their lessons to address different needs, and include students more in the instructional process.

#### *Deeper understanding of concepts*

With the implementation of the Common Core and interim assessments aligned to the Common Core, teachers across the school were moving away from an algorithmic approach to mathematics and focused more on helping students to see connections between topics and ideas. During a staff development meeting Donna discussed the instructional shifts required in the Common Core. She shared a handout reviewing the shifts and emphasized the need to go deeper instructionally. Dina built on the earlier example shared about the subtraction regrouping problem. She stated,

*Well, when we are going to teach it for the first time now, we're paying much more attention to what it actually means, instead of just the crossing off and the borrowing. We're worried more about the vocabulary and what it actually means because of the 5th grade assessment, when they had all that trouble... One of the kids said to me "but if you're borrowing a hundred, why is it a ten over here? Why is it a fifteen?" And I never really could explain it that well... Because you don't really think about it, you're not taught what it truly means over and over again. So I think because of the weaknesses in the fourth and fifth grade, we're able to better teach down in second grade to give them at least the words and what it should be meaning. And then it will be a little bit more solid.*

Dina noted that her own education focused more on the procedural approach and now she needed to embed more explanation and support for the ideas she was teaching to give the students a stronger foundation for later years.

A common finding was a shift from getting an answer correct to then asking students to explain their thinking. Karen noted how this shift has played out in her own instruction and stated,

*I think because the common core and the interim assessment, I think more is expected of kindergarten than ever before. I think we all in the past have touched upon these things, but we have never really dug as deep as we have now. It has been fun for us... I'm trying to do, which I've never done before, doing more in their journals for math, which before I always kept it as strictly language arts. So doing more of that and even using that as my exit tickets too.*

Another teacher, during a staff meeting observation, shared a question about the mathematical discussions her students were having. The teacher said to Donna, "I couldn't get over it. Thinking, this is incredible. Should we be taking the time to have these discussions or focus on the right answer?" The teachers saw how their instruction was changing as a result of the focus brought through the Common Core and aligned interim assessments.

#### *Differentiation*

A benefit of the interim analysis process was a concrete understanding of what topics students knew versus which ones could use more support. Armed with a detailed spreadsheet and items aligned to topics, teachers could then approach their seventh week with remediation and enrichment goals. Gina summarized how she used the interim analysis stating,

*It was definitely a shift in everything that I had ever done. But I also think it was so worth it, because now that I'm moving on, it is really changing who I am and it is really changing my instruction. It is really forcing me to differentiate in a man-*

*ner I have never differentiated before. I am really targeting specific areas with kids, where I have done that before, but it was... more general. This data is really helping me target more specifically.*

Using the interim data in combination with other formative assessments throughout the class allowed Gina to target her instruction on the topics and students as needed. Having time set aside for reteaching and enrichment was a new aspect of the curriculum for these teachers. While Gina demonstrated how she used this time in her own classroom to meet the needs of the students, other teachers noted the need for more support to understand how to best use this time. In one faculty meeting the teachers also talked about the reteaching time and questions they had about that week. It was explained that it was time that was built into the calendar and once the teachers saw the results they could think about how best to use that time. One of the teachers replied she "liked that part" and she wondered if they could use that time to team teach. It was interesting to see teachers thinking about ways to use this time. Donna emphasized that the reteaching was not about doing the same thing again. She discussed how you could regroup the students among the teachers. Some students could work with an aide. Donna emphasized that this was a time to learn about the process, try things, and then reflect on how it worked. One teacher also suggested the role of stations and how they could be used. Donna emphasized that the goal was to look at what the kids were doing and not understanding and then to alter instruction to meet those needs. This discussion illustrated how the structure was there to act on the results of the interim assessment analysis but more support in terms of reteaching and enrichment might be helpful.

#### *Inclusion of students as active in the process*

Involving students more in the results of the interim assessments allowed them to be partners in how the learning unfolded. Focusing on how students can play an active role in their learning is a critical feature of the Common Core and served as a lens through which the data were interpreted. Involving students was at times as basic as the questions asked of students. During the observation of Karen, at the Kindergarten level, she continually probed students to explain their thinking and take ownership of their learning. During the observation students were modeling numbers with popsicle sticks. One student was making 19 and Karen asked him to "show me another way other than using ones, how many tens, how many ones?" She then had the student count them and then show another way and explain why it was different. She continually had the students check their work and explain it. It wasn't enough to be right but the students also had to know why they were right.

Thinking about the different topics as units of study also helped students focus on areas to address. Gina shared an example of how she combined the assessment results with in-class exit/entrance tickets to help students drive their learning. She stated,

*I gave them an exit ticket and I listed on it the topics that were on the test. I had them list in order 123 what was their weakest, their second weakest, and third weakest. And then what were you strongest in? I took the exit tickets that evening as well as the [interim assessment] data and I grouped the kids...put them into 3 groups so that next day the children were grouped according to the data on the interim assessment and according to where they saw themselves. And what was interesting to me was the kids were right on target [and] they knew exactly.*

Using the assessments as a springboard to generate dis-

cussions with students helped to guide instructional next steps.

*Supports Required to Facilitate Teachers' Instructional Change*

As teachers worked with the interim assessment data and thought about ways to adapt their instruction based on their analysis, it was important to think about how to support that instructional change. Understanding ways teachers shared ideas, built a common language of instruction, and viewed changes in self were all important aspects to fostering a change in instructional practice.

Teachers appreciated opportunities to share their ideas about math instruction. The twice a month staff meetings focused on sharing math ideas and teachers saw that as a time to report out and ask questions. Karen discussed the value of these meetings and stated, "I'm not sure if [the meetings] can continue, but even to have a time for us at those meetings to bounce ideas off or even to hear what the grade above or below you is doing. So more time to collaborate would be helpful in the direction we are going." During one staff meeting observation the teachers shared ideas regarding how to address students' difficulty with the interchangeable nature of adding numbers. The group of teachers shared strategies for addressing this question such as using unifix cubes, creating a worksheet with spaces, and integrating it with calendar math and different ways to make the numbers. As Karen noted, the teachers saw this time together as a way to share instructional ideas. Dina built on that idea and suggested other ways outside of the staff meetings to share ideas. She noted, "I think I'd benefit more from going into a classroom and talk about grade 2. All the teachers get together for an hour, pull out all three interim assessments and talk about the questions face to face. I think there's some value in the face to face and the sort of back and forth discussion." Thinking about structured time for collaboration was an important part of building on the analysis process and allowing teachers to change their practice.

An additional benefit of a common interim assessment was a common tool to talk to. This commonality was evident as it served as the foundation for an increase in "math talk" as teachers shared ideas about their instruction and student learning. The principal noted, "I think the most helpful and the biggest change is that people are talking about instruction and asking each other how did you do this? It was much more isolated before. I hear that math talk now and [teachers] helping each other on how they do different things. I think that's the biggest piece." Dina also noted a change in the type of discussions and the shared sense of common purpose as teachers worked with their students. She stated,

*Now there's more discussion about what we should teach and what should follow it. So we're sort of on the same track and we share discussions. [For example,] 'Well I think teaching this right after that is confusing. Why don't we put something in between?' So I think it does focus the discussion a little better so it could help the kids.*

While this level of discussion was prevalent within grades it also occurred across grades in the staff meetings. For example, building on the earlier discussion of place value, one teacher shared problems her students were having around mental math and breaking apart numbers to see them in different ways. Teachers connected this concern to the issue of place value. The staff then shared strategies to help her think about her instruction in different ways. The common interim assessment allowed teachers to share their results and talk through instructional next steps as they served as a resource for each other.

As teachers shared their practice more openly it caused them to change their view of themselves as a teacher. Their instruction, questions, and accomplishments were now things that could be shared more widely. Dina noted her thinking as she looked at her assessment results, "Looking at yourself as a teacher it's easy to see why people get down on themselves about how they teach if the children aren't doing well. You wonder how did they miss that? Is it just the test? So you do question yourself on some things. But that's good. You should always question yourself." But then seeing how these questions could be shared within grade levels and across grades helped to provide answers and other perspectives. The teachers saw how their struggles connected and saw how different approaches might help. Gina summarized the change she saw in the staff and stated,

*It is interesting. I think with that is so poignant... building that professional learning community. I think that is so strong and this is just baby steps to starting to develop that professional learning community. I think that it has allowed us to start to discuss things and share things. I think that there is a lot of work that needs to be done to develop that, because that trust issue and that judgment piece is huge. So I think that developing that sense of confidence in [us] and to say you are not being judged on this. This is to help us as educators and to help us drive our instruction. So I think that piece really needs to be fostered because that's hard.*

Providing opportunities to allow teachers to be a resource for each other and see how their instruction can change to meet the needs of their students was a critical benefit of using a common interim assessment.

While the interim assessments could be used to measure teacher effectiveness, the culture Donna created viewed them as a tool to help improve student learning. Rather than being an end result she focused on the formative use of the information. Donna stated, "The whole point, I have been saying this a lot, the whole part of interim assessment is not how well the students do on the assessments, but it is what we do after the assessments to help [students] or how we change our instruction." Gina further supported this view of the use of the assessments and stated, "It's really creating such a culture of learning in our class that is different than it's ever been before." Creating the "culture of learning" is what helped the teachers to share openly about the process and their learning.

Through the use of articles, modeling, and discussion Donna proactively addressed the resistance. Donna shared examples from the Marshall Memo to illustrate how she culled articles from there to share with her staff. Using this research helped teachers to see how the process they were involved in was situated within a larger context. Additionally, throughout the year Donna took opportunities to get back into the classroom for short periods so she could apply what she was saying. For example, she worked with a second grade teacher to teach a math unit. Together she shared the issues she saw and the ways they were working with the students. It was important for Donna to "practice what she preached" as she initiated the interim assessment requirement. Donna noted that "It should be known that people going into this... weren't thrilled. The majority of people were not happy we were doing it. Now I think in a few months we are starting to convince some people that it is good." Donna was realistic about the difficulty of change but helped to create a context where her teachers saw the need, value, and purpose of the interim assessment process.

## Discussion

The use of common interim assessments is becoming more prevalent as schools search for ways to assess student progress prior to annual state standardized test and the findings of this case study align well to the literature regarding aspects of interim assessments that should be considered (Herman, 2017). While this was a small scale case study done over the course of one year, this study illustrated how one school implemented a new system to foster a deeper look at mathematics instruction and learning. The principal worked to create a culture where teachers saw the process as one of learning together with a focus on instructional improvement rather than as a summative evaluation of effectiveness. Exploring how these tests were developed, implemented, analyzed, and acted upon served as a means to understand how common interim assessments can provide a springboard to

help teachers share their practice, serve as a resource for each other, and adjust their instruction to meet their students' needs. The implications of this study demonstrate the importance of focusing in each of these areas when utilizing interim assessments.

When common interim assessments are developed within a district they can serve as a valuable tool to help connect teachers to the assessment process. The assessments operationalize the standards on which they are based and can help to measure progress through the curriculum through the year. As Bambrick-Santoyo (2010) stated, "Standards are meaningless until you define how you will assess them" (p. 7). Involving teachers in that development process can allow them to better see that connection. However, test development is a skill and districts and teachers could benefit from more support as they think about item development, value of distractors in multiple choice items, and the role of rubrics in measuring open response items. Integrating district wide training in test development would help to further link the assessment process to instruction and help teachers to see the connection between the components (Martone, 2007).

The previewing step, a critical piece of the implementation of the interim assessments, is another way to help teachers to see the connection between the assessment and their instruction. Bambrick-Santoyo (2010) uses a road trip analogy where the car is all checked and running well. However, without the map you might end up in a different location regardless of how well the car is running. The interim assessments provide an understanding of where the students need to go and an opportunity to assess issues on their journey. But thoughtful use of the previewing and analysis process is critical to make sure the map is used well. If the previewing is used as an opportunity to blindly "teach to the test" the students will only receive limited exposure to the content. But if the teachers use the preview as an opportunity to better understand ways the standards are measured and to see rigor in action they can recalibrate their approach and provide a range of experiences for their students. The analysis needs to also move beyond a procedural reteaching of missed items to a deeper understanding of the concepts and misconceptions highlighted by incorrect items. Valuing the formative use of an interim assessment (Heritage, 2010; Chappius & Chappius, 2007/08) is a key component to the effectiveness of the process.

The analysis step also requires time. Time is in critical shortage in schools but without focused attention to the results of the interim assessments they become another assessment "hoop" students are forced to jump through without providing meaningful results. Providing teachers with structured time to review assessments, connect to

instructional questions, share student work, and discuss next steps is critical to really changing instruction and student learning. A lesson study approach would work well to more formally share the connection between instruction, student learning, and assessment (Lewis, Perry, & Hurd, 2004). Grounding these collaborative lesson study experiences in findings from the interim assessment analysis could illustrate the connection for the teachers between instruction and assessment. Additionally, probing student work to further explore their understanding can help teachers to discuss instructional next steps (Deuel, Holmlund, Slavik, & Kennedy, 2009; Cushman, 1996). These structured protocols lend themselves to greater accountability as the expectations are clear and can be directly linked to interim assessment results.

One piece of the effective use of interim assessment data is the student role in the process. While this aspect of assessment was noted in the results of this study, a more in depth focus on the student as an active learner is crucial. The goal of the assessment process is for students to understand where they are, where they are headed, and what they need to do to get there (Chappius & Chappius, 2007/08). Stiggins et al. (2006) shared a poignant example of a student, Emily, who started the year as a struggling writer. Throughout the year the teacher implemented new standards and a new writing program. As she worked with Emily the teacher actively involved Emily in the process of learning so Emily took ownership of the knowledge. Emily talked about how she "learned to assess her own writing and to fix it when it didn't "work well," and how she and her classmates have learned to talk with her teacher and each other about what it means to write well" (p.6). In this example Emily took the knowledge she learned through an active use of assessment results to inform her learning. It is this process that has started at Falcon but needs to continue to develop to fully include students in their learning and to move beyond the procedural item level analysis to a deeper conceptual exploration of the topics and connection between topics.

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