**Building a Sustainable Foundation for a Successful Turnaround in Mathematics**

**or**

**Behind the Curtain at Hazelwood East Middle School**

Steve Leinwand, American Institutes for Research

September, 2012

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As Julie noted in May, 2012:

“**I’m just excited to be looking forward to teaching next year.”**

Let’s start with the punch line: not extraordinary, but certainly impressive, improvement in student achievement, particularly in grade 6 and trend lines in the right direction as shown in Table 1.

**Table 1. Missouri Assessment Program**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Grade** | **Year** | **Percent Proficient** | **Percent Advanced** | **Percent Proficient and Above** |
| 6 | 2012 | 33.9 | 7.9 | 41.8 |
| 2011 | 26.7 | 4.8 | 31.5 |
| 2010 | 26.5 | 0.7 | 27.2 |
|  |  |  |  |  |
| 7 | 2012 | 25.5 | 6.3 | 31.8 |
| 2011 | 31.8 | 3.3 | 35.1 |
| 2010 | 26.1 | 0.6 | 26.7 |
|  |  |  |  |  |
| 8 | 2012 | 22.7 | 14.7 | 37.4 |
| 2011 | 22.4 | 5.3 | 27.7 |
| 2010 | 26.9 | 7.6 | 34.5 |

When I first arrived at Hazelwood (Missouri) East Middle School in April, 2011, I found a fairly typical underperforming school serving a population of minority students. People meant well and there were obvious pockets of excellence, but overall, the mathematics teachers were demoralized, scores were dismal and there were few structures in place to support the changes that were so clearly necessary. This summary describes the steps and the actions taken between April, 2011 and June, 2012 that contributed to the growth in student achievement and created a foundation for sustainable improvement.

**Step 1: Create an effective infrastructure – you can’t do it without time, people, support and tools**

* Anything less than 90 minutes per day allocated to mathematics is unlikely to provide enough time to catch up and move ahead. *Hazelwood has a 90 minute block for math each day and one half-day professional development session was devoted to effective lesson planning and “chucking” for 90-minute blocks*.
* Class size of more than 20 students is unlikely to provide enough personal attention. *Hazelwood has enough teachers so that each teacher teaches three 90 minute periods each day with about 15 students in any class*.
* Coaching, supporting, facilitating, organizing are critical functions that enable teachers to focus on teaching and improving their capacity and effectiveness. *Hazelwood has a full time Math Coach who co-teaches, co-plans, debriefs after observations, and facilitates interaction, coordination and improvement. In addition, the school has a full time Math Interventionist who supports both students and teachers and has become an “assistant math coach.”*
* Effective teachers need technological tools to enhance instruction, facilitate transitions, and maximize the display and demonstration of content. *Every math classroom in Hazelwood has a web-connected computer and an interactive white board and will soon be equipped with document cameras.*

**Step 2: Approach the implementation systemically – you can’t do it by tweaking at the margins and you can’t do it unless you attend to each of the major program components**

* You need a coherent and aligned **curriculum** that includes a set of grade level content expectations, appropriate print and electronic instructional materials, with a pacing guide that links the content standards, the materials and the calendar. *Hazelwood has created customized pacing guides for the uniform implementation of the Connected Math Project (CMP2) that identify which units, which lessons within each unit, and within what time frame constitute the curricular expectations. Rather than race through the materials and try to cover everything, these pacing guides are designed to provide sufficient time to complete approximately 80% of each grade’s content – recognizing that doing 80% well is much more appropriate than doing a mediocre job trying to “cover” 100%.*
* You need high levels of **instructional** **effectiveness**, guided by a common vision of effective teaching of mathematics and supported by deliberate planning, reflection and attention to the details of effective practice. *Hazelwood has adopted a vision of effective teaching and learning that identifies high leverage instructional practices, conducted a book study of Accessible Math: 10 Instructional Shifts to Raise Student Achievement, and focused on these practices as part of the instructional coaching. More specifically, teachers are making consistent use of warm-ups or do-nows to begin most classes; teachers are beginning to chunk 90 minute lessons into appropriate and varied pieces to maintain student engagement; teachers have posted “Why?”, “How do you know?”, “Can you explain that?”, “How can you picture that?” posters in each classroom and are beginning to use and refer to these posters to strengthen classroom discourse; teachers are beginning to make consistent use of exit slips as part of daily formative assessment; and teachers are making increasingly effective use of interactive white boards to conduct instruction Most encouraging is the fact that teachers, who in the past might have relied primarily on repetitive drill activities and worksheets designed to practice algorithms, have begun to rely far more consistently on problem-solving activities, group work, and discussion of conjectures about data that have been collected as part of building deeper conceptual understanding of important mathematics. More specifically, the focus on instruction centered on the following nine research-based high-leverage practices:*
  1. *Effective teachers of mathematics respond to most student answers with “why?”, “how do you know that?”, or “can you explain your thinking?”*
  2. *Effective teachers of mathematics conduct daily cumulative review of critical and prerequisite skills and concepts at the beginning of every lesson.*
  3. *Effective teachers of mathematics elicit, value, and celebrate alternative approaches to solving mathematics problems so that students are taught that mathematics is a sense-making process for understanding why and not memorizing the right procedure to get the one right answer.*
  4. *Effective teachers of mathematics provide multiple representations – for example, models, diagrams, number lines, tables and graphs, as well as symbols – of all mathematical work to support the visualization of skills and concepts.*
  5. *Effective teachers of mathematics create language-rich classrooms that emphasize terminology, vocabulary, explanations and solutions.*
  6. *Effective teachers of mathematics take every opportunity to develop number sense by asking for, and justifying, estimates, mental calculations and equivalent forms of numbers.*
  7. *Effective teachers of mathematics embed the mathematical content they are teaching in contexts to connect the mathematics to the real world.*
  8. *Effective teachers of mathematics devote the last five minutes of every lesson to some form of formative assessments, for example, an exit slip, to assess the degree to which the lesson’s objective was accomplished.*
  9. *Effective teachers of mathematics demonstrate through the coherence of their instruction that their lessons – the tasks, the activities, the questions and the assessments – were carefully planned.*
* You need a set of common, aligned benchmark and summative **assessments** that allow for monitoring of student, teacher and school accomplishment at the unit and grade level. *Hazelwood adopted six-week on-line Acuity benchmark assessments to monitor progress and teachers have begun to use PLC time to analyze the results and make both curricular and instructional adjustments. Each benchmark assessment was initially assembled by the Math Instructional Coach, reviewed by me, and then reviewed, revised as needed, and accepted by the grade level team of teachers.*
* You need a system of **accountability** based on data, support and professional expectations. *Hazelwood has been very forthright in making test results public and using instructional checklists and walkthroughs to hold teachers accountable for both instruction and outcomes.* *Teachers are gradually adopting, reviewing the data from, and beginning to make use of the data from the Acuity Benchmark Assessments.*

**Step 3: Build a sustainable professional culture – you can’t do it without a professional culture of dignity, transparency, collaboration and support**

* You need to create effective and productive Professional Learning Communities (PLCs). *Hazelwood began to take advantage of the fact that at each grade all three teachers had a common planning block and that one of these 90 minute blocks each week could be dedicated to a formal collaborative PLC jointly coordinated by the teachers and the Math Instructional Coach.*
* You need to reduce professional isolation by building expectations for collegial observations, co-teaching and use of video to share and analyze lessons. *Hazelwood hopes to adopt some of these strategies in the coming year.*
* You need an administrative team that understands what effective mathematic instruction looks like and can engage teachers in discussions about their practice, student results and how to make improvements. *The Hazelwood administrators participated in some of the mathematics department professional development and one of the assistant principals worked closely with the Math Coach to provide meaningful support to teachers.*

**Step 4: Build on prior accomplishments and plan for even greater improvement**

As part of a May, 2012 work session to discuss and capture the 2011-12 experiences with teaching CMP2 so that the 2012-13 school year can begin with revised pacing guides and updated Acuity benchmark assessments, the Math Department also used the day to identify structural and professional development needs for next year. These plans (see Table 2) represent a key piece of the turnaround and improvement process as they address the ongoing nature of this work and reflect an annual process of reflecting on accomplishments and identifying needs.

**Table 2. Plans and Changes for 2012-13**

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| --- |
| 1. There appears to be a consensus that among the **structural needs and changes** that must be  addressed next year are:   * Ensuring a strong **new teacher orientation** that includes providing all three new mathematics teachers with a copy of Teach Like a Champion, a copy of Accessible Math, an updated pacing guide for his or her grade level and a complete set of Teacher’s Guides for that grade level’s CMP2 units no later than July 15. * Establishing a more formal set of **co-teaching arrangements** whereby new teachers have the opportunity to co-teach (joining two classes) for the first unit of the year. * Formalizing a schedule of **observations** among the math teachers with the understanding that no observation can be less than 45 minutes in duration and must be followed up with 48 hours with a debriefing session to discuss strengths, weaknesses and questions that arise from the observation. * Systematically strengthening the organization, the topic selection of the three grade level **PLCs** with the understanding the Math Instructional Coach is a co-equal member of each of the PLCs.  1. There also appears to be a consensus that among the professional development needs that should be addressed in August prior to the beginning of the school year are:  * Grade level sessions that focus on the **first unit of each grade**, including reviewing the pacing guide for that unit, sharing teaching ideas and materials for that unit, and reviewing/revising the common end of unit assessment, so that grade level teams begin to gel as a collegial unit and so that new teachers are provide with a meaningful orientation. * Collaborative **model lesson planning** where each grade level team first selects or is assigned an investigation (for example, one from Bits and Pieces III in grade 6, one from Stretching and Shirking in grade 7 and one from Growing, Growing, Growing in grade 8), then develops a strong lesson plan, presents the lesson to the entire department and engages in critical discussion of how the lesson can be improved. * Considering conducting “This is what you need to know about the incoming 7th graders” discussions presented by the 6th grade team to the 7th grade team and “This is what you need to know about the incoming 8th graders” discussions presented by the 7th grade team to the 8th grade team, with a focus on strengths, weaknesses, interests, etc.  1. Finally, there also appears to be a consensus that among the department-wide professional development needs that should be addressed in September and/or October are:  * Assessment – issues of formative assessment and exit slips, improvements to and review of common unit tests, consistent scoring of unit tests, use of benchmark assessment data, and review of 2012 MAP data. * Instructional Routines – issues around the Do Now, Notebooks, Homework wall, word wall, chunking lessons, and the Launch, Explore, Summarize routines. * Available Resources – collaborative time sharing and exploring such on-line resources as IXL, BuckleDown, Virtual Nerd, LearnZillion, Illuminations, etc. * Technology – effective use of Promethean boards and graphing calculators |

Let me end with a special note of thanks to the following teachers who welcomed me into their classes and community during the 2011-12 school year, who worked incredibly hard to make a difference in the lives of their students, and who are returning to continue this journey during the 2012-13 school year:

Danean Beard, grade 6

Kendra Scarbrough, grade 6

Julie Whitacre, grade 7

Kelly Holzmeyer, grade 7

Heidi Cunningham, grade 8

Amy Toti, grade 8

Amy Rathert, Math Coach