

Middle School Algebra I: Effective Instructional Strategies

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E&R Report No.08.22

SUMMARY

November 2009



Why a Middle School Algebra Study

In 2007-08, 28 WCPSS middle schools offered Algebra I and 97% of these students scored

proficient on the Algebra I EOC at the end of the course. The 29% of Algebra I students who took algebra before high school were among the strongest students in the district, yet only 79% scored at Level IV. The percentage of middle schools that made expected growth with their Algebra I students was 79%, with 68% making high growth. Despite high proficiency rates, there is ample room for improvement in student performance of middle school Algebra I students.

Project Goals

- Collect WCPSS specific data that will help teachers, schools, and district leadership understand current middle school Algebra I practices.
- Identify and share best teaching strategies.
- Contribute to a series of studies that identify targets for overall school improvement.

Methods & Analysis

Thirty-six middle school teachers who had taught Algebra I in 2003-04, 2004-05, and 2005-06 and were still teaching in 2006-07 were ranked on teacher effectiveness from highest to lowest using student residual averages. Residuals are the difference between a student's EOC scale score and the expected scale score of similar WCPSS students. The full report on this study includes a detailed explanation of residuals. The teachers with the eight highest residual averages (top teachers) and the teachers with the eight lowest averages (bottom teachers) became the focus of this study. Results of teacher surveys, observations, student scores, and focus-group interviews of these 16 teachers were compared.

Results/Student Scores

The results indicated that there was a qualitative difference between the performances of students in top versus bottom teacher classes. The difference in the average 7th grade mathematics scale scores of those two groups was negligible, but the difference in Algebra I EOC scale scores at the end of the course was not. The average scale score mean of top teachers was 3.9 scale points higher than the mean for bottom teachers.

Results/Attitude Toward Students

All middle school Algebra I teachers had a positive attitude overall toward their students and their teaching assignment; yet top middle school teachers were significantly more positive than bottom middle school teachers. Top teachers focused on the positive qualities of each student, expecting all students to rise to their high expectations, and were not distracted by lack of prerequisites or study skills.

Results/Instructional Practice

Top teachers:

- used open-ended questions and explorations. There appeared to be no fear of what students might offer as answers. It was acceptable for students to be “smarter” and “quicker” in math than the teacher.
- were confident in the role of facilitator and also shared in the class as a participant in learning.
- developed topics using organized, repetitive, and clear concept development by using probing questions and sustained feedback.
- used a variety of instructional methods.
- used less lecture and more whole group discussion and small groups than did bottom teachers. Overall there was more student ownership of learning in top teacher classes.
- used structured classroom management that provided students with clear definitions of their roles.
- adjusted their instruction appropriately by using frequent formative assessment.
- assumed knowledge of basic algebraic skills and taught an enrichment-filled course at an invigorated pace. Students were exposed to both curriculum and beyond-curriculum topics.
- expected precise mathematical vocabulary. The top teachers and all their students modeled appropriate meaningful vocabulary.

Teachers' Possible Next Steps

- BELIEVE that **all** students will work and succeed at a very high level, and communicate that belief to all students.
- Study and use appropriate Algebra I vocabulary.
- Focus on concept development and avoid isolated memory tricks.
- Listen and give meaningful feedback positively.
- Use whole group discussions and small groups.
- Promote open classroom discourse.
- Study residual rosters.
- Study to increase depth of content knowledge.
- Reflect on growth data as well as performance data and instructional practice.

School-based Leadership's Possible Next Steps

- Support a school culture where all students can be successful (high expectations for all students).
- Promote open discourse between school leadership and staff.
- Share results data with teachers including growth data, effectiveness rosters and indices.
- Use purposeful teacher course assignment

Full report: http://www.wcpss.net/evaluation-research/reports/2009/0831ms_alg1.pdf



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