

Can Doing Something Easy Help Students Learn Something Hard?

***Identifying Instructional Practices That
Help Students Succeed in Mathematics***

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Maryland**

- **Large urban/suburban school system bordering Washington, DC**
- **Highly diverse student demographics**
- **System goal: All students complete Algebra 1 during middle school**
- **Grade 7 is “last chance” to acquire needed mathematics skills to reach this goal**

Context for instruction

- **Are teachers using recommended instructional practices?**
- **Are instructional practices used by teachers significantly related to student outcomes, as measured by statewide assessments? (Grade 7 standardized mathematics test scores after controlling for students' initial abilities, demographics, and service receipt measures)**
- **Are there differences in student performance due to teachers' recent experience teaching the course?**

Guiding questions

- **Formative study – evidence of use of recommended instructional practices**
- **Summative study – advanced statistical analyses**
- **Close collaboration with mathematics office – confirm desired practices, course content, and course scope**

Project design

Observed Teachers

- **Teaching Math 7 for Grade 7 at least two out of the last three school years (recent experience with this course)**

Non-Observed Teachers

- **do not meet experience criteria**
- **taught this course to at least 10 students**

Students

- **All students taking Math 7 for Grade 7 course**
- **Completed entire course (2 full semesters)**

Populations

- **Lesson components**
- **Classroom structures that support learning**
- **Critical thinking and questioning**
- **Discourse and group work**
- **Differentiation, variety, learning styles**
- **Formative assessment**
- **Interactive technology**

Instructional practices

- **45 eligible teachers, 32 schools**
- **Two observations each class (same teacher, same class section) – 90 observations – 50-minute observation**
- **At beginning and end of same instructional unit**
- **Structured observation protocol**
- **Pre-observation log**

Formative study

Quasi-experimental design -- controlled for confounding variables

- **Exploratory factor analysis**
- **Reliability analysis**
- **Multiple regression procedures**

Summative study

Positive and significant associations with mathematics test scores:

- ***Classroom structures.*** Students appear to know what to do when they come into the room (e.g., find seat, pick up work at front table) or when they form groups.
- ***Classroom structures.*** Students can drop off completed work and get copies of homework or make-up work without teacher's help.

Findings

Positive and significant associations with mathematics test scores:

- ***Discourse and group work.*** Teacher has students discuss in groups or pairs (turn to a partner or think pair share)
- ***Other.*** Use of exit card or summarizer

Findings

Positive and significant associations with mathematics test scores:

- ***Critical thinking.*** Teacher asks students questions that focus on problem-solving strategies and reasoning; Teacher models thinking process for developing strategies and discovering relationships; Teacher reinforces students' use of the language of mathematics.
- ***Formative assessment.*** Asking student to clarify thinking or justify response aloud.

Findings

Also:

- **No differences** in mathematics performance between students of observed teachers (taught this course at least two out of last three years) and students of non-observed teachers

Findings

- **Enhance** use of instructional practices identified by study to have positive and significant associations with mathematics test scores
- **Collaborate** with mathematics staff to further improve reliability and validity of measures of practice in observation instrument
- **Replicate** study using different student populations and settings to see if findings are stable

Recommendations

Journal of Academic Perspectives

<http://www.journalofacademicperspectives.com/back-issues/vol-2013/no-2/>

MCPS Website

http://montgomeryschoolsmd.org/departments/sharedaccountability/reports/2012/FINAL%20REPORT%20Math%207_5_14.pdf

Additional information

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