

**Assessing the Impact of Standards-based Middle School Mathematics Curricula
on Student Achievement and the Classroom Learning Environment**

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ABSTRACT

Assessing the Impact of Standards-based Middle School Mathematics Curricula on Student Achievement and the Classroom Learning Environment (R305T010735)

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Abstract:

This three-year research project called the Middle School Mathematics Study (MS)² investigated the use of mathematics curriculum materials (textbooks) in the middle grades and their impact on student learning. More specifically it investigated the impact of three NSF funded standards-based curricula (*Connected Mathematics*, *Mathematics in Context*, and *MathThematics*) and publisher generated mathematics curricula on a diverse group of middle grade students. This was a quasi-experimental design involving middle schools matched on demographic characteristics, including size of community and percent of students eligible for free and reduced lunch. Middle schools in 6 states participated, representing urban, suburban, small city and rural communities. This research focused on how teachers use district-adopted curriculum materials (textbooks) and other curricular resources. It also monitored the mathematics learning of middle grade students using these different mathematics curricula over a two-year period.

This study documented that the middle grade mathematics teachers used their textbooks differently. None of the middle school teachers covered all of the mathematics content in their textbooks. Independent of the mathematics curriculum being used, teachers spent a disproportionate amount of time on some strands (Number and Operation, where more time was spent) than others (Data and Probability, where less time was spent). Most teachers using an NSF-funded curriculum taught content intended for students in a different (lower) grade, and both sets of teachers supplemented with skill-building and “practice” worksheets. The location of topics within a textbook did not necessarily determine or explain what mathematics was taught or omitted. An examination of the extent of textbook use found in this study is reported in an article “From the Written to Enacted Curricula: The Intermediary Role of Middle School Mathematics in Shaping Students’ Opportunity to Learn” in *School Science and Mathematics* (See Appendix for a copy of this manuscript).

The study also examined the fidelity of implementation of the curricula. Several lenses were used to assess the fidelity of implementation, including an observational framework that was built on characteristics of standards-based teaching of mathematics. It was found that teachers using the NSF supported mathematics curricula were most likely to use standards-based teaching, while few teachers using publisher generated mathematics textbooks used standards-based teaching. More specifically, 4%, 17% and 79% of the teachers using publisher generated

mathematics textbooks were classified as high, medium and low levels of standards-based practices, compared to 17%, 35% and 48% of the teachers using NSF supported mathematics curricula.

This study also examined the impact of these mathematics curricula as reflected on two different assessments. On the CTB/McGraw-Hill *Terra Nova Survey test* there was no significant difference (<0.01) between students who experienced the NSF supported curricula and the publisher generated textbooks. On the CTB/McGraw-Hill *Balanced Assessment in Mathematics* (BAM) some differences were noticed. A hierarchical linear modeling (HLM) analysis was used on the *Balanced Assessment in Mathematics* and revealed a significant difference (<0.01). More specifically it was found that students using the NSF mathematics curricula that were taught by teachers using standards-based instruction were the highest performing students. (A report entitled “The impact of middle school mathematics curricula on student achievement and the classroom learning environment”, is nearly completed and will be submitted to the *Journal for Research in Mathematics Education*.)

Several examinations of the strategies used and performance of the middle school students on individual BAM items have been done. For example, an article “Spatial visualization: What happens when you turn it?” was published in November 2005 of *Mathematics Teaching in the Middle School*, and another manuscript entitled “Assessment: All around perimeter” has been submitted for publication consideration (See Appendix for a copy of the published article).

Project Description

Research Issues and questions being addressed. It has been assumed that the mathematics curriculum materials adopted by a school district are used by teachers and in the spirit intended by its developers. Tyson-Bernstein and Woodward (1991) describe the role of textbooks as ubiquitous in American schools, and identify them as a prominent, if not dominant, part of determining what children have an opportunity to learn. In a similar manner, Robitaille and Travers (1992) argue, “Teachers decide what to teach, how to teach it, and what sorts of exercises to assign to their students largely on the basis of what is contained in the textbook authorized for their course.” For most teachers the textbook serves as the scope and sequence determining what content is taught and its order (Weiss, Pasley, Banilower, & Heck, 2003; Chávez, 2003). However, research has also reported that many teachers “pick and choose” units to use and replace units of their text with other materials (Seeley, 2003; Seymour & Davidson, 2003).

Teachers tend to teach as they have been taught; therefore, transitions to different curricula based on different instructional philosophies are difficult (Ball, 1987; Boaler, 2002). Yet research has documented the importance of mathematics curricula being implemented (taught) in a manner consistent with the program philosophy (Ball & Cohen, 1996; Porter, 2002; Remillard, 2005). One important dimension of the (MS)² study examined the curricular materials actually used by teachers and the extent and nature of implementation. This aspect of the study provided information regarding the degree to which the actual learning environment matched the recommendations of the program developers in all the teachers and their classrooms that were studied, i.e., the fidelity of implementation. This information is vital to making meaningful interpretations from the results related to the impact on student achievement (National Research Council, 2004).

A second dimension of the study focused on the impact of mathematics curricula on student learning. While the need exists for research studies to document the impact of standards-based mathematics curricula materials on student learning over an extended period of time, some of the challenges encountered in this study provide reasons why such longitudinal school-based studies are rare. These challenges are elaborated later in the limitations section.

The Middle School Mathematics Study (MS)² provided empirical data to address these two issues. More specifically the (MS)² addressed the following two major research questions:

- What is the extent and nature of use of district-adopted mathematics curriculum materials by middle school teachers?
- How do middle grade students using different mathematics curriculum materials perform on a variety of measures of mathematics achievement?

Significance of study for research, policy and practice. (MS)² has examined how mathematics textbooks are used in middle school classrooms and how the type of textbooks influenced the teaching and learning of mathematics. This research also monitored the mathematics learning of middle grade students over a two-year period. The findings provide information essential to

policy makers and may prove useful in guiding future programmatic changes by middle school teachers, mathematics supervisors, administrators and school boards. Monitoring student progress and the impact of these curricula on the mathematics performance of eighth graders is consistent with recommendations offered in *Before It's Too Late* (Glenn Commission Report, 2000), *No Child Left Behind* (2002) and *Rising Above the Gathering Storm* (Committee on prospering in the global economy of the 21st Century, 2005).

Design of Study

Sample selection criteria, sample size, methods and data analysis. Only schools in their second or third year of implementation of a district-adopted mathematics curriculum series (textbook) and with a grade 6-8 organizational structure were considered for this study. This decision was made to facilitate the monitoring of students (sixth and seventh graders) for two years as they moved to seventh and eighth grade. Cadre 1 consisted of the first year students (6th and 7th graders), and Cadre 2 consisted of the same students during the second year (7th and 8th graders). Selecting 6-8 middle school buildings eliminated the possibility of feeder schools (either elementary to middle or middle to junior high) and also facilitated collegial contact and communication among all middle school mathematics teachers as well as the research staff.

Different sized communities were represented in the study. In an effort to reflect a range of student bodies, a decision was made to insure that rural, small community, suburban and urban schools were included. These regions were operationally defined as follows: rural—a population less than 5000; small city—population of 5000 to 10000 and not near or part of a larger population area; suburban—population of 5000 to 100000 near or part of a larger populated area; and urban—population over 100000.

After establishing these criteria, each of the NSF middle school mathematics curriculum developers was contacted and asked to nominate at least 6 schools that represented the previously described criteria. Project staff then contacted these schools to confirm they were in their second or third year of implementation and also had grades 6-8 in the same building. In districts with more than one middle school, only one middle school was selected for participation.

Once these schools were identified, research staff visited each school and talked with administrators and teachers about the study. During this meeting the expectations and responsibilities of the schools and the research project were discussed. Once the schools using NSF supported mathematics curricula were identified, a search was made to locate companion schools with similar demographics (i.e. size, prior student achievement, and percent of students eligible for free and reduced lunch, FRL) and using mathematics curricula other than the NSF funded mathematics curricula. Visits were made to each of these schools to discuss the nature of the research study and answer questions about their participation. This resulted in a quasi-experimental design.

It should be noted that getting schools to participate in this research study was not easy. Many schools viewed an external research study as an intrusion or an additional

commitment and for various reasons chose not to participate. In fact, less than one-third of the schools initially contacted agreed to participate. This issue of school based research is discussed in more detail in the section on limitations and in a forthcoming article in the *Journal for Research in Mathematics Education* entitled “Pressures to Improve Student Performance: A context that both urges and impedes school-based research” (See Appendix for a copy of this manuscript).

Sample size. This research involved 11 middle schools in 6 different states. During the first year of the study, data were collected from over 60 different middle school teachers and over 4000 sixth and seventh grade students. The students and their teachers were monitored the second year as they moved to seventh and eighth grades.

Only students who had completed two years with these curricula were considered in the final data analysis. Also only students for which complete data were available (i.e., complete test data, including prior achievement) were considered in the data analysis.

Methods. In order to describe *how teachers use district-adopted curriculum materials* (textbooks), the following data were collected:

- *Initial Teacher Survey*—documented teacher background (e.g., degrees, teaching experiences, amount of professional development, beliefs about teaching and learning mathematics, practices related to textbooks).
- *Textbook-Use diaries*—described teachers’ use of their textbook and other curricular materials in planning and enacting mathematics instruction (completed by teachers over three 10-day periods each year).
- *Classroom observations*—research team made 3 classroom observations per year and used a standard-based list of protocols to capture the nature of teaching/learning. (All visits were scheduled in advance to insure that the observation did not conflict with a test or other school activity).
- *Teacher Interview*—focused on teachers’ decisions about what and how to teach mathematics and the extent to which their textbook influenced their decisions.
- *Table of Contents Implementation Records (ToC)*—used by teachers to record the amount of the textbook ‘covered’ during the school year. (These data were only collected during the second year of the study.)

In order to *monitor the mathematics learning of middle grade students* in mathematics the following data were collected:

- *Prior Achievement*
- *Balanced Assessment in Mathematics*, Form B
- *Terra Nova Survey*

Prior achievement data were obtained from the schools for each student. This included performance measures in mathematics and reading. Some schools provided scores on the Iowa Test of Basic Skills (ITBS), and others provided results from their state mathematics assessments.

Data Analysis

Initial Teacher Surveys and Teacher Interview. The survey data were tallied and used to profile the participating teachers. Individual interviews with teachers helped to verify information from the *Initial Teacher Survey*, and to provide additional perspectives regarding the teachers' beliefs about and use of their mathematics textbooks.

Textbook-Use Diaries. The diaries, completed by teachers on a daily basis for three 10-day periods throughout the school year, documented the frequency of use of textbooks by the teacher and students during the mathematics lesson and as a source of homework assignments. For each of these uses, frequencies were calculated as a percent of the total instructional days documented in the diary.

Classroom Observations. All teachers were observed at least three times during the year. Observers recorded if the textbook was utilized during the lesson by the teacher and/or by students. Observers also rendered judgments regarding the degree to which the textbook influenced the content and/or presentation of the mathematics lesson. In particular, influences were rated as *Not at all* (NA), *Very little* (VL), *Somewhat* (S), and *A great deal* (GD). In cases where the majority of the observed lesson addressed topics and utilized material from the textbook, observers noted that the textbook had "a great deal" of influence. On the other hand, if the lesson did not relate to any particular textbook material and the textbook was not used (by teacher or students) during the lesson, then the observer recorded that the lesson was "not at all" influenced by the textbook.

Table of Contents Implementation Records (ToC). The lessons taught were tallied as well as the mathematical content strands in which these lessons fell. Table-of-Contents Implementation Records yielded data that produced the percent of lessons taught and their distribution across content strands.

Student Data. Data were gathered on all students in classes taught by the participating teachers in sixth, seventh and eighth grades. Our design provided for data collection on all students in these grades, including students who were in remedial or accelerated classes. Acceleration became increasingly noticeable in grades seven and eight as students were routed into different classes, including several levels of algebra. Only students assigned to special education mathematics classes were excluded from the data collection.

Prior achievement data were gathered on all students who were sixth and seventh graders in 2002-03. These data took different forms ranging from standardized achievement tests, such as the *Iowa Test of Basic Skills* to statewide assessment results. In order to obtain a common prior achievement metric, all of these measures were converted to a Normal Curve Equivalent (NCE) score. This NCE was used on all analysis involving prior achievement.

The student data (prior achievement and the results from the *Terra Nova* and *BAM*) underwent multiple analyses. More specifically, prior achievement was used as a co-variant. An ANOVA was used in both the *Terra Nova* and *BAM*. In addition, HLM was used to provide a clearer picture of the student data. An examination of interactions between the curriculum variables and

student characteristics, such as FRL, gender and ethnicity, was also made on student performance.

Findings

An examination of the *Initial Teacher Survey* data collected in the fall 2002 showed no significant differences between the general characteristics of these teachers (e.g., degrees held, teaching experience and amount of professional development) and the national profile of middle grade teachers reported by Horizon (Weiss, et al., 2001). Thus it is reasonable to conclude the teachers participating in the (MS)² were typical of middle school mathematics teachers in the United States, and the findings are likely to be representative of many middle school mathematics teachers across the country.

Teachers Use of Mathematics Textbooks

About half the teachers reported their textbook was a strong determinant of what mathematics is taught and the order in which it is presented. One teacher commented, “My math book is my bible”. The other half of the teachers reported that their state or curriculum framework and mandated assessments are strong influences on what mathematics is presented. Similar patterns were observed regardless of the type of textbook used.

- An examination of the NSF funded and publisher generated mathematics textbooks revealed a significant difference in the attention these books gave to major content strands. Publisher generated textbooks devoted significantly more time ($p < 0.01$) to the Number and Operation strand and significantly less time to Geometry & Measurement, as well as Data Analysis & Probability strands.
- Teachers using NSF funded or publisher generated textbooks did not differ significantly in the percent of the textbooks that students experienced. Both groups of teachers taught approximately 60-70% of the textbook lessons.
- An examination of a subset of teachers using the same publisher generated mathematics textbook revealed no common pattern among these teachers for lessons taught or omitted. Teachers tended to purposely choose lessons to teach or omit regardless of their location in the textbook.
- Teachers from both groups were most likely to teach lessons related to Number and Operation and typically taught 80% of lessons from this strand.
- Teachers from both groups were least likely to teach lessons related to Data Analysis & Probability, typically omitting 30-40% of lessons from this strand.

An Index of Emphasis representing the ratio of the percentage of lessons in a strand and the percentage of lessons in the strand that were taught was created (see article entitled “From the Written to Enacted Curricula: The Intermediary Role of Middle School Mathematics in Shaping Students’ Opportunity to Learn” in *School Science and Mathematics* in Appendix). An index of

1.0 would suggest that the percent of lessons taught from a strand is similar to the overall emphasis given to that particular strand in the mathematics textbooks. We found:

- Both sets of teachers placed significantly greater emphasis on Number and Operation with an index of 1.25 or greater.
- Teachers of NSF and publisher generated textbooks had an index of 0.70 for Data Analysis & Probability.
- Teachers using NSF funded curricula had an index of 1.13 for algebra, compared to 1.00 to teachers using publisher generated textbooks.
- The Index of Emphasis together with the emphasis given to the various strands suggests that users of NSF funded textbooks placed a significantly larger emphasis on Algebra that would be expected from the composition of Algebra lessons in their textbooks.

Student Performance

An ANOVA was used with student achievement on the *Balanced Assessment in Mathematics* and *TerraNova Survey* as the dependent variables with prior achievement as a co-variant. Hierarchical Linear Modeling (HLM) was also used to examine variation of student achievement by mathematics curricula as “nested” within teachers and schools. Below is a summary of the findings where a 0.01 level of significance was used throughout.

For Students using NSF funded mathematics curricula:

- Grade 6-7 Cohort:
Higher “fidelity of implementation” of NSF-funded curricula was associated with higher student achievement on both the *Balanced Assessment in Mathematics* and *Terra Nova Survey* than low levels of implementation fidelity.
- Grade 7-8 Cohort:
Higher “fidelity of implementation” of NSF-funded curricula was associated with higher student achievement on the *Balanced Assessment in Mathematics* only; no significant differences were detected on *Terra Nova Survey* scores.

For Students using publisher-generated curricula:

- Grade 6-7 Cohort:
Higher “fidelity of implementation” of publisher-generated curricula was associated with higher student achievement on both the *Balanced Assessment in Mathematics* and *Terra Nova Survey* than low levels of implementation fidelity.
- Grade 7-8 Cohort:
A significant relationship between “fidelity of implementation” and student achievement on the *Balanced Assessment in Mathematics* and *Terra Nova Survey* was not detected for students experiencing a publisher-generated curriculum.

Effects of a Standards-Based Learning Environment (SBLE)

- Using the BAM standardized test as the dependent variable, the main effect of a SBLE was found to be statistically significant in Cohort 2 but not in Cohort 1.
- Using the Terra Nova standardized test as the dependent variable, the main effect of a SBLE with prior achievement as a covariate was not statistically significant in either cohort.
- Students using NSF mathematics curriculum and experiencing a high “fidelity of implementation together with a SBLE had significantly higher performance than students in all other groups.

These results suggest that when significant differences did occur they were associated with the two factors, namely the “fidelity of implementation” and the degree of Standards-Based Learning Environment students were experiencing. This finding supports the importance of students experiencing the mathematics (regardless of the curriculum) in a Standards-Based Learning Environment. Although differences in performance among gender and ethnic groups were examined, none of the analyses revealed significant differences.

Discussion

Results of this study underscore the complexities associated with curriculum evaluation research and caution against over-simplistic interpretations of student achievement data in relation to mathematics curriculum. Specifically, the discordant use of district-adopted textbooks by middle grades mathematics teachers reflects the autonomy of U. S. teachers who function within the tenet of “local control.” Decisions regarding the selection of mathematics content to teach and emphasize resulted in striking differences in students’ opportunity to learn, even within a single school building.

These disparities in teachers’ textbook use necessitated the documentation of “fidelity of implementation” if links were to be established between student outcomes and mathematics curriculum. Our fidelity indices included measures of *how often* teachers used curricular materials and the *extent of coverage* of textbooks. However, methodological challenges are associated with these two constructs as questions, such as: What precisely does it mean to “use” the textbook? What precisely does it mean to “cover” a lesson? In this study we observed markedly different enactments of the same lesson in which textbooks were “used” and lessons “covered.” Regrettably, our measures of implementation fidelity were not sensitive enough to capture these nuances, and perhaps this might explain why fidelity was not singularly a significant predictor of student achievement.

Curriculum type (NSF-funded vs. publisher-developed) was ultimately not a significant predictor of student achievement. It is probable that the uneven implementation of NSF-funded curricula diminished the relationship, reducing the *p*-value to a level of non-significance. This assertion is supported by results indicating the stronger implementation of NSF-funded curricula was associated with highest overall performance, both on the

criterion-reference test (*Balanced Assessment in Mathematics*) and norm-referenced test (*Terra Nova Survey*). Thus, when teachers of an NSF-funded curriculum enacted the curriculum in a manner consistent with authors' intent, the results were superior student achievement.

Given that Standards-Based Learning Environment was a significant predictor of student achievement, one might reasonably conclude that, in essence, *teaching* matters more to student learning than *curriculum* per se. While it is true that such a learning environment was an effective predictor of student achievement on the Balanced Assessment only, it should be noted that such a learning environment was much more prevalent among teachers utilizing NSF-funded curricula. That is, a standards-based learning environment—successful in predicting higher student achievement—was much more likely to be attained by teachers who had access to NSF-funded curricula. Thus, the learning environment was important but more readily created by teachers who made use of NSF-funded curricular materials.

Limitations

This section was not called for in the Instructions for Grant Performance Report (ED524B), but we feel it should be included in this final report. The research team carried out all phases of this research study with the greatest care. We met regularly throughout the 4 years (the 3 years of the initial grant and the one year extension) to plan, discuss issues and formulate plans. Every precaution was taken to make this longitudinal research effort as flawless, rigorous and as theoretically strong as possible. Despite these efforts, a number of events (many beyond the control of the research team) need to be recognized as limitations and considered as cautionary notes to the findings and conclusions drawn.

The sample was limited to selected schools using NSF supported mathematics curriculum and companion schools. The NSF schools were selected from a list provided by the NSF mathematics curriculum developers that were known users of their program and the non-NSF schools were selected to match the demographic characteristics of the NSF schools as closely as possible. The participating schools reflected rural, small city and suburban schools. The one urban school in the sample was later dropped from the study (details provided in next paragraph). Also, at the request of the our program officer at the United States Department of Education, one additional school was added to insure that one specific mathematics curriculum (Saxon) was represented in this study. These conditions impact the representativeness and generalizability of the findings.

One urban school was dropped from the study. This decision was made because of problems associated with the data gathering. Initially it was difficult to obtain prior achievement scores of the 6th and 7th graders. This school also experienced a high mobility of its students, and as a result, over one-half of the students were absent on one of the two end-of-year testing days. At the beginning of the second year one of the teachers who had over one-half of the students in the 7th grade indicated that she had too many demands on her time and therefore decided not to participate in the study. This

teacher withdrawal together with continued high absenteeism among the 7th and 8th graders resulted in data from this school being dropped from the analysis.

One school changed their mathematics program after the first year. No mention of the possibility of changing mathematics curriculum arose during the first year of the study, yet during the summer between Year 1 and 2 the teachers of one school chose to return to a former mathematics textbook that had been used. This decision was not unanimous among the teachers, but all of the teachers did agree to abide by this decision. Consequently, this school originally identified as a user of NSF mathematics program, used the program for one year and then switched to a publisher-generated mathematics program. The data collected from this school were analyzed as an NSF school for Cohort 1 and a non-NSF school for Cohort 2.

Direct comparisons of students participating in different mathematics programs was not possible. Three different NSF mathematics programs were represented in this study. Companion schools were selected because of their demographic characteristics. These companion schools used more than 20 different non-NSF supported mathematics textbooks. These programs differed greatly in the type and variety of mathematics textbooks used. As a result of the diversity of textbooks used, it was not appropriate to pit one textbook against another.

No common prior achievement measures across all schools were available. Schools were unwilling to commit additional testing days to collect prior achievement levels. Therefore this study relied on available prior student performance data from each school. Six schools had ITBS scores, two had Stat 9, and the remaining schools provided results on their state assessments. In an effort to get a common metric for prior achievement, a transformation was done to produce NCE. This transformation to a common metric was necessary but results on the same standardized test would have been ideal for a prior achievement measure.

Each teacher was observed three times during each year of the study in a single class. While teachers may have taught several classes of the same type, the researchers did not observe every class. Lack of resources prevented more observations during the year as well as observing the teacher in every mathematics class being taught. More observations during the year and multiple observations of the same teacher would have strengthened the profile on the classroom learning environment. This made it impossible to generalize the results from the observational data to all of the teacher's classes. Consequently, this reduced the number of classes and thereby sacrificed some statistical power in the later analysis.

Only students on which complete data were available were considered in the analysis. This insured that prior achievement, end-of-year assessment measures and demographic background of the students (e.g., gender, ethnic background, and eligibility for free-and-reduced lunch) were available for each student. This requirement for a complete data profile decreased the number of students in the analysis. However, these criteria were uniformly applied across all schools.

Presentations and Publications

Instruments developed for this study have been requested from many other researchers across the country. In all cases, we have shared our instruments as well as our experience in using them in the hope that the knowledge we have gained can further research in this area. Several instruments developed for the (MS)² are also posted on the Center for the Study of Mathematics Curriculum website at www.mathcurriculumcenter.org.

In addition to sharing our research instruments with other researchers, we have made a number of presentations to other researchers, mathematics teachers, mathematics supervisors and classroom teachers. More specifically, we have prepared and are continuing to prepare presentations/manuscripts reporting results from our study.

Presentations (Completed)

Reys, R.

A Look at the Middle School Mathematics Study
Gateways Meeting of Mathematics Curricula Developers
Boston, MA September 2002

Reys, R., Reys, B. & Tarr, J.

Studying the Impact of Standards-Based Middle-School Mathematics Curricula
National Council of Teachers of Mathematics Research Pre-session
San Antonio, TX April 2003

Tarr, J. & Chávez, Ó.

Assessing the Impact of Standards-Based Middle School Mathematics Curricula on Student Achievement and the Classroom Learning Environment
Show-Me Researchers' Workshop
Columbia, MO May 2003

Reys, R.

The Middle School Mathematics Study—A Research Study in Progress
Leadership Meeting of the Center for the Study of Mathematics Curriculum
Chicago, IL November 2003

Reys, R.

A Research Study Addressing Mathematics Curriculum
Annual Meeting of the NSF Centers for Learning and Teaching
Washington, DC February 2004

Reys, R., Tarr, J., & Chávez, Ó.

Do Textbooks Matter? Findings from a Study of NSF and Non-NSF Mathematics Curriculum Materials.
National Council of Supervisors of Mathematics Annual Meeting
Philadelphia, PA April 2004

Chávez, Ó, Reys, R., Reys, B., & Tarr, J.

Impact of Standards-based Middle School Mathematics Curricula: Three Studies
Research Pre-session of the National Council of Teachers of Mathematics
Philadelphia, PA April 2004.

Chávez, Ó, Reys, R., Reys, B., & Tarr, J.

Middle School Mathematics Study of textbooks, teachers and students.

- National Council of Teachers of Mathematics Annual Meeting
Philadelphia, PA April 2004
- Tarr, J. & Stenglein, S.
What's the Evidence? Research on Curriculum Materials
Seventh Annual Show-Me Conference
Nashville, TN May 2004
- Reys, R.
Challenges of School Based Research
Show-Me Researcher's Conference
Columbia, MO May 2004
- Tarr, J.
Assessing the Impact of Standards-Based Middle School Mathematics Curricula on Student Achievement and the Classroom Learning Environment
Show-Me Researchers' Workshop
Columbia, MO May, 2004
- Tarr, J., Davis, J., Wilcox, S., Lubienski, S., & Malloy, C.
Curriculum Materials and Student learning
Center for the Study of Mathematics Curriculum National Research Meeting
Phoenix, AZ February, 2005
- Tarr, J., & Chávez, Ó.
The Impact of Curricular Materials on Student Achievement and the Classroom Learning Environment
College of Education Research Day
Columbia, MO March 2005
- Tarr, J., Reys, R., Chávez, Ó., & Chen, J.
Mathematics Curriculum: What do we know from research? What do we need to know?
National Council of Teachers of Mathematics Annual Meeting
Anaheim, CA April 2005
- Tarr, J., Chávez, Ó., Appova, A., Regis, T. P.
Discordant Implementation of Mathematics Curricula by Middle School Teachers
Twenty-Seventh Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education
Roanoke, VA. October 2005
- Regis, T., Tarr, J., & Appova, A. (2005).
Do Textbooks Matter? Textbooks + Teachers + Student Achievement
Missouri Council of Teachers of Mathematics.
Columbia, MO December, 2005
- Tarr, J., Reys, R., Reys, B., Chávez, Ó., Townsend, B., & Chen, J.
Middle School Mathematics Study of Textbooks, Teachers and Students
National Council of Teachers of Mathematics Research Presession
Anaheim, CA April 2005
- Reys, R., Tarr, J. E., & Chávez, Ó.
The Impact of Curricular Materials on Student Achievement and the Classroom Learning Environment
National Council of Supervisors of Mathematics Annual Meeting
Anaheim, CA April 2005

Shih, J., Tarr, J., Chávez, Ó., Reys, R. & Reys, B.
*Using Hierarchical Linear Modeling to Analyze Mathematics Achievement Data:
An Illustrative Example*

Research Council on Mathematics Learning
Las Vegas, NV March 2006

Reys, R. & Reys, B.

Mathematics Textbooks: The good, the bad, the ugly
Kansas and Missouri Superintendents Forum
Kaufman Foundation
Kansas City, MO March 2006

Presentations (Accepted)

Tarr, J., Reys, R., Chávez, Ó., & Shih, J.

A Longitudinal Study of Mathematics Curriculum and Student Achievement
Research Pre-session of the National Council of Teachers of Mathematics
St. Louis, MO April 2006

Tarr, J., Reys, B., Chávez, Ó., Regis, T., & Appova, A.

Fidelity of Implementation: Linking Student Achievement and Mathematics Curriculum
National Council of Supervisors of Mathematics Annual Meeting
St. Louis, MO April 2006

Tarr, J., Reys, R., & Chávez, Ó., & Shih, J.

The Relationship Between Students' Achievement and Mathematics Curricula
National Council of Teachers of Mathematics
St. Louis, MO April 2006

Shih, J., Reys, R., Reys, B., Tarr, J., & Chávez, Ó.

Design, data, and analysis issues in evaluating mathematics curricula
American Educational Research Association Annual Meeting
San Francisco, CA April 2006

Publication—status of manuscripts

- Chávez, Ó., Reys, R. & Jones, D. (2005). Spatial visualization: What happens when you turn it? *Mathematics Teaching in the Middle School*, 11(4), 190-196, November.
- Tarr, J., Chávez, Ó., Reys, R. & Reys, B. From the written to enacted curricula: The intermediary role of middle school mathematics in shaping students' opportunity to learn, *School Science and Mathematics*, (In press, scheduled for April 2006).
- Chval, K., Chávez, Ó., Tarr, J. Reys, B., Reys, R., (2006). Pressures to improve student performance: A context that both urges and impedes school-based research, *Journal for Research in Mathematics Education*, (In press, scheduled for May 2006).
- Chávez, Ó., Chval, K., Tarr, J., & Reys, B. (proposed chapter accepted). Measuring the influence of the district-adopted textbook. In J. Remillard, G. Lloyd, & B. Herbel-Eisenmann (Eds.). *Teacher's use of mathematics curriculum materials: Research perspectives on relationships between teachers and curriculum*.
- Appova, A. & Reys, R. Assessment: All around perimeter, *Mathematics Teaching in the Middle School*, (Under review)
- Tarr, J., Shih, J. Chávez, Ó., Reys, R., Reys, B., & Osterlind, S. The impact of middle school mathematics curricula on student achievement and the classroom learning environment. *Journal for Research in Mathematics Education*, (Under review).

References

- Ball, D. L. (1987). Unlearning to teach mathematics. *For the Learning of Mathematics*, 8(1), 40-48.
- Ball, D. L., & Cohen, D. K. (1996). Reform by the book: What is—or might be—the role of curriculum materials in teacher learning and instructional reform? *Educational Researcher*, 25(9), 6-8,14.
- Boaler, J. (2002). *Experiencing school mathematics: Traditional and reform approaches to teaching and their impact on student learning*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Chávez, O. (2003). *From the Textbook to the Enacted Curriculum: Textbook Use in the Middle School Mathematics Classroom*. University of Missouri-Columbia: Unpublished doctoral dissertation.
- Committee on prospering in the global economy of the 21st Century. (2005). *Rising Above The Gathering Storm: Energizing and Employing America for a Brighter Economic Future*. Washington, DC: National Academy of Sciences.
- Glenn Commission Report. (2000). *Before it's too late: A report to the nation from the National Commission on Mathematics and Science Teaching for the 21st Century*. Washington, DC: United States Department of Education.
- National Research Council. (2004). *On evaluating curricular effectiveness: Judging the quality of the K-12 mathematics evaluations*. Washington, DC: The National Academies Press.
- No Child Left Behind Act of 2001, 20 U.S.C. § 6301 *et seq.* (2002).
- Porter, A. (2002). Measuring the content of instruction: Uses in research and practice, *Educational Researcher*, 31(7), 3-14.
- Robitaille, D. F. & Travers, K. J. (1992). International studies of achievement in mathematics. In D. A. Grouws (Ed.), *Handbook of Research in Mathematics Teaching and Learning* (pp. 687–709). New York: Macmillan.
- Seeley, C. (2003). Mathematics textbook adoption in the United States. In George Stanic and Jeremy Kilpatrick (Eds.), *A History of Mathematics Education* (Vol. 2, pp. 957-988). Reston, VA: National Council of Teachers of Mathematics.

- Seymour, D. & Davidson, P. (2003). A history of nontextbook materials. In George Stanic and Jeremy Kilpatrick (Eds.), *A History of Mathematics Education* (Vol. 2, pp. 989-1035). Reston, VA: National Council of Teachers of Mathematics.
- Tyson-Bernstein, H. & Woodward, A. (1991). Nineteenth century policies for twenty-first century practice: The textbook reform dilemma. In *Textbooks in American Society* (pp. 91–104). Albany, NY: State University of New York Press.
- Weiss, I. R., Banilower, E., McMahon, K., & Smith, P. S. (2001). *Report of the 2000 National survey of science and mathematics education*, Chapel Hill, NC: Horizon Research.
- Weiss, I., Pasley, J., Smith, P., Banilower, E. & Heck, H. (2003). *Looking inside the classroom: A study of K-12 mathematics and science education in the United States*. Chapel Hill, NC: Horizon Research.

Appendix

- Chávez, Ó., Reys, R. & Jones, D. (2005). Spatial visualization: What happens when you turn it, *Mathematics Teaching in the Middle School*, 11, (4), 190-196. November.
- Chval, K. B., Reys, R., Reys, B. J., Tarr, J. E. & Chávez, Ó. (2006). Pressures to improve student performance : A context that both urges and impedes school-based research, *Journal for Research in Mathematics Education*, May 2006.
- Tarr, J. E., Chávez, Ó., Reys, R. E., & Reys, B. J. (2006). From the written to enacted curricula: Intermediary role of middle school mathematics in shaping students' opportunity to learn, *School Science and Mathematics*, April 2006.