IES Institute of Education Sciences

# Math Expressions

## Intervention Report | Primary Mathematics Topic Area

WHAT WORKS CLEARINGHOUSE™
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Acquiring math skills at an early age is important for students' long-term academic achievement and for success in learning more advanced mathematical content.[1] *Math Expressions* is a curriculum for students in prekindergarten through sixth grade that aims to build students' conceptual understanding of mathematics and to develop fluency in mathematical problem solving and computation. The curriculum encourages student learning of mathematics through real-world situations, visual supports such as drawings and manipulatives, multiple approaches to solving problems, and opportunities for students to explain their mathematical thinking.[2]

This What Works Clearinghouse (WWC) intervention report, part of the WWC's Primary Mathematics topic area, explores the effects of *Math Expressions* on general mathematics achievement. The WWC identified three studies of *Math Expressions*. One of these studies meets WWC standards. The evidence presented in this report is from one study of the effects of *Math Expressions* on students—including 37% White, 33% Black, 27% Hispanic or Latino, 2% Asian, and 1% American Indian or Alaska Native students—in first and second grades in urban, suburban, and rural districts.

## What Happens When Students Participate in *Math Expressions*?[3]

**The evidence indicates that implementing *Math Expressions* has no discernible effects on mathematics achievement compared with the other mathematics curricula used in study schools.**

Findings on *Math Expressions* from the one study that meets WWC standards are shown in Table 1.[4] The table reports an effectiveness rating, the improvement index, and the number of studies and students that contributed to the findings. The effectiveness rating is based on the quality of the designs used in studies, whether the findings are favorable or unfavorable for the intervention, and the number of studies that tested the intervention. See Box 1 for more information on interpreting effectiveness ratings.

In order to help readers judge the practical importance of an intervention's effect, the WWC translates findings across studies into an "improvement index" by averaging findings that meet WWC standards within the same outcome domain. The improvement index can be interpreted as the expected change in percentile rank for an average comparison group student if that student had received the intervention. For example, an improvement index of +1 means that the expected percentile rank of the average comparison group student would increase by 1 point if the student received *Math Expressions* instead of the curricula provided to the comparison group. A positive improvement index does not necessarily mean the estimated effect is statistically significant. Results for each individual outcome measure within domains are shown in Table 4.

The evidence presented in this report is based on available research. Findings and conclusions could change as new research becomes available.

**Table 1. Summary of findings on *Math Expressions* from one study that meets WWC standards**

| | | Study findings | Evidence meeting WWC standards (version 4.0) | |
|---|---|---|---|---|
| Outcome domain | Effectiveness rating | Improvement index (percentile points) | Number of studies | Number of students |
| General mathematics achievement | No discernible effects | +1 | 1 | 8,060 |

Note: For more information about outcome measures, see the study description in Table 6. The effects of *Math Expressions* are not known for other outcomes within the Primary Mathematics topic area, including number and operations; geometry and measurement; data analysis, statistics, and probability; and algebra.

## BOX 1. HOW THE WWC REVIEWS AND DESCRIBES EVIDENCE

The WWC evaluates evidence based on the quality and results of reviewed studies. The criteria the WWC uses for evaluating evidence are defined in the Procedures and Standards Handbooks and the Review Protocols. The studies summarized in this report were reviewed under WWC Standards (version 4.0) and the Primary Mathematics topic area protocol (version 4.0).

To determine the effectiveness rating, the WWC considers what methods each study used, the direction of the effects, and the number of studies that tested the intervention. The higher the effectiveness rating, the more certain the WWC is about the reported results and about what will happen if the same intervention is implemented again. The following key explains the relationship between effectiveness ratings and the statements used in this report:

| Effectiveness rating | Rating interpretation | Description of the evidence |
|---|---|---|
| Positive (or negative) effects | The intervention ***likely*** to change an outcome | Strong evidence of a positive (or negative) effect, with no overriding contrary evidence |
| Potentially positive (or negative) effects | The intervention ***may*** change an outcome | Evidence of a positive (or negative) effect with no overriding contrary evidence |
| No discernible effects | The intervention ***may result in little to no change*** in an outcome | No affirmative evidence of effects |
| Mixed effects | The intervention ***has inconsistent effects*** on an outcome | Evidence includes studies in at least two of these categories: studies with positive effects, studies with negative effects, or more studies with indeterminate effects than with positive or negative effects |

## How is *Math Expressions* Implemented?

The following section provides details of how districts and schools can implement *Math Expressions*. This information can help educators identify the requirements for implementing *Math Expressions* and determine whether implementing this intervention would be feasible in their districts or schools. Information on *Math Expressions* presented in this section comes from the study that meets WWC standards (Agodini et al., 2010) and from correspondence with the developer. Dr. Karen Fuson developed the curriculum, which was later purchased by Houghton Mifflin Harcourt.

- **Goal:** *Math Expressions* teaches students mathematics knowledge and skills.
- **Target population:** *Math Expressions* is designed for students in prekindergarten through sixth grade.
- **Method of delivery:** *Math Expressions* is a print-based curriculum that is used in a combination of whole class, small group, and individual student settings. Classroom teachers guide students through hands-on activities in *Math Expressions* during whole-class instruction, introducing new information and encouraging students to solve problems using visual representations. Students then discuss in small groups to build understanding and practice.

**Comparison group:** In the study that contributes to this intervention report, students in the comparison group used as their core mathematics curriculum either *Investigations in Number, Data, and Space (Investigations)*; *Saxon Math (Saxon)*; or *Scott-Foresman-Addison Wesley Mathematics (SFAW)*.

- **Frequency and duration of service:** The developer recommends students use *Math Expressions* daily for 60 minutes during the entire school year.
- **Intervention components:** The key components of *Math Expressions*, which are pedagogical approaches to daily lessons, visual learning support, differentiated learning and interactive practice, and teacher training, are described in Table 2. The current version of *Math Expressions* is the 2018 edition.

**Table 2. Components of *Math Expressions***

| Key component | Description |
|---|---|
| **Pedagogical approach within the daily lesson structure** | *Math Expressions* provides instructional techniques to explore mathematical problems and solution methods. Students use problem-solving activities to develop conceptual understanding of math; for example, in the early elementary grades, students act out problems in class. In kindergarten, first grade, and second grade, students engage in daily math routines, typically first thing in the morning as they arrive at school. These routines focus on developing and supporting understanding of and fluency with place-value concepts. In all grades, the math lesson begins with a 5-minute activity called quick practice, which builds fluency with the key concepts needed for past or upcoming lessons. The teacher then leads a whole-class activity that builds on students' background knowledge and introduces more advanced concepts and solution methods. After the whole-class instruction, students discuss and practice new skills and concepts in pairs, small groups, or individually. Throughout the lesson, students are encouraged to use multiple approaches to solve problems and to explain and justify their answers. Homework is assigned daily and includes practice on content from the current lesson as well as on previously learned concepts over the course of the school year. |
| **Visual learning supports** | The curriculum uses manipulatives, drawings, and other visual tools to support student learning and to connect formal math concepts to students' background knowledge. For example, in the early grades, students use triangular shapes called "Math Mountains" to demonstrate concepts on parts and wholes and addition and subtraction. Students in all grade levels use visual supports during all parts of the daily math lesson to help them solve problems and demonstrate their work and understanding. The visual supports often serve as the starting point for student discussions, where students are encouraged to show their drawings to one another and discuss how their drawing illustrates the problem they are attempting to solve. |
| **Differentiated learning and interactive practice** | *Math Expressions* is designed to support differentiated instruction. In the print materials, each lesson includes resources for teachers to support a wide range of student needs. In addition to the print materials, *Math Expressions* includes a digital suite of resources for teachers, students, and parents to support interactive learning, differentiated instruction, and distance learning. Teachers can customize class and homework assignments for students through adaptive software that creates a personalized profile for each student and can provide extra practice, enrichment, or remediation. Students can use an interactive online textbook and engage in online games called Poggles during class. For students who need them, interactive Tier 1 and Tier 2 Response to Intervention lessons are available online. Tier 3 resources, including intervention lesson activities and progress monitoring, are also available. The studies did not provide information about whether or how study teachers implemented differentiated instruction. |
| **Teacher training** | Teachers receive several forms of informal support. Teachers receive instructional support through several curriculum materials including a lesson guide, online professional learning modules, and videos on the Houghton Mifflin Harcourt website. The lesson guide contains detailed overviews for each unit and notes for each lesson that help teachers teach the mathematics covered in the lesson.<br>Formal professional development is also available and tailored to the needs of each district. Initial and ongoing professional development for teachers is facilitated by Houghton Mifflin Harcourt specialists. The sessions are available in person, virtually, or both.<br>In the one study that met WWC standards, study teachers received 2 days of initial training in the summer before the first day of school. In addition, study teachers received follow-up training in the fall and spring of the school year. |

## What Does *Math Expressions* Cost?

This preliminary list of costs is not designed to be exhaustive; rather, it provides educators with an overview of the major resources needed to implement *Math Expressions*. The program costs described in Table 3 are based on the information available as of June 2020.

**Table 3. Cost ingredients for *Math Expressions***

| Cost ingredients | Description | Source of funding |
|---|---|---|
| **Personnel** | Classroom teachers implement *Math Expressions* with their students. Before implementing *Math Expressions*, teachers may participate in professional learning activities, including both virtual and in-person training. The cost of professional development varies depending on the format of delivery, number of teachers receiving training, and the level of support chosen by districts. | School districts or schools purchase *Math Expressions* and pay for teacher training. Districts that adopt *Math Expressions* on a large scale may receive some training sessions for teachers, district, or school staff at no charge from Houghton Mifflin Harcourt. |
| **Facilities** | The intervention is typically implemented in the students' regular classrooms during regular math instruction time. Training is typically provided at the district or school in a classroom or other available room. | School districts or schools provide the classroom facilities. |
| **Equipment and materials** | *Math Expressions* includes several teacher and student components. The typical cost per teacher for teacher materials, including print and a single-year digital license, is $646, or $1,311 for the print materials and a 6-year license. The typical cost per student for student materials, including print and a 1-year digital license, is $48, or $150 for 6 years of consumable print materials and a 6-year digital license. For a class of 20 students, the cost can range from about $1,600 for 1 year to $4,300 for 6 years based on these costs. The teacher and student components can be purchased separately. | School districts or schools usually purchase *Math Expressions* materials. |

**For More Information:**

About *Math Expressions*

9400 Southpark Center Loop
Orlando, FL 32819
Attn: Houghton Mifflin Harcourt
Email: k12inquiries@hmhco.com Web: https://www.hmhco.com/forms/contact-us-math-expressions. Phone: (800) 225-5425

About the cost of the intervention

Web: https://www.hmhco.com/search/shop?term=math+expressions

## Research Summary

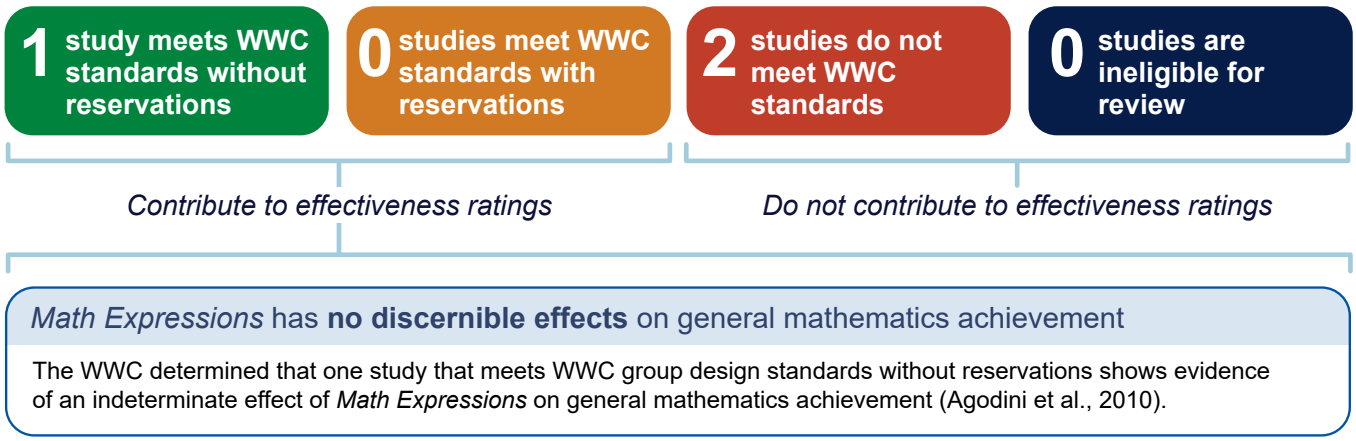
The WWC identified three studies that investigated the effectiveness of *Math Expressions* (Figure 1):

- One study meets WWC group design standards without reservations
- Two studies do not meet WWC group design standards
- No studies are ineligible for review

The WWC reviews findings on the intervention's effects on eligible outcome domains from studies that meet standards, either with or without reservations. Based on this review, the WWC generates an effectiveness rating, which summarizes how the intervention impacts, or changes, a particular outcome domain. The WWC reports additional supplemental findings, such as those the study authors reported separately for each comparison curriculum contrast, on the WWC website (https://whatworks.ed.gov). These supplemental findings and findings from studies that do not meet WWC standards do not contribute to the effectiveness ratings.

The one study of *Math Expressions* that meets WWC group design standards reported findings on general mathematics achievement. No other studies or findings meet WWC group design standards within any outcome domain included in the Primary Mathematics topic area.[5] Citations for the three studies reviewed for this report are listed in the References section, which begins on page 9.

**Figure 1. Effectiveness ratings for *Math Expressions***



## Main Findings

Table 4 shows the findings from the one *Math Expressions* study that meets WWC standards. The table includes WWC calculations of the performance of the intervention group relative to the comparison group in terms of the mean difference and effect size. The effect size is a standardized measure of the effect of an intervention on outcomes, representing the average change expected for all individuals who are given the intervention (measured in standard deviations of the outcome measure). For the mean difference and effect size values, a positive number favors the intervention group and a negative number favors the comparison group. A positive or negative improvement index does not necessarily mean the estimated effect is statistically significant.

Based on findings from the one study that meets WWC standards and includes 8,060 students, the effectiveness rating for general mathematics achievement is *no discernible effects*.

**Table 4. Findings by outcome domain from one study of *Math Expressions* that meets WWC standards**

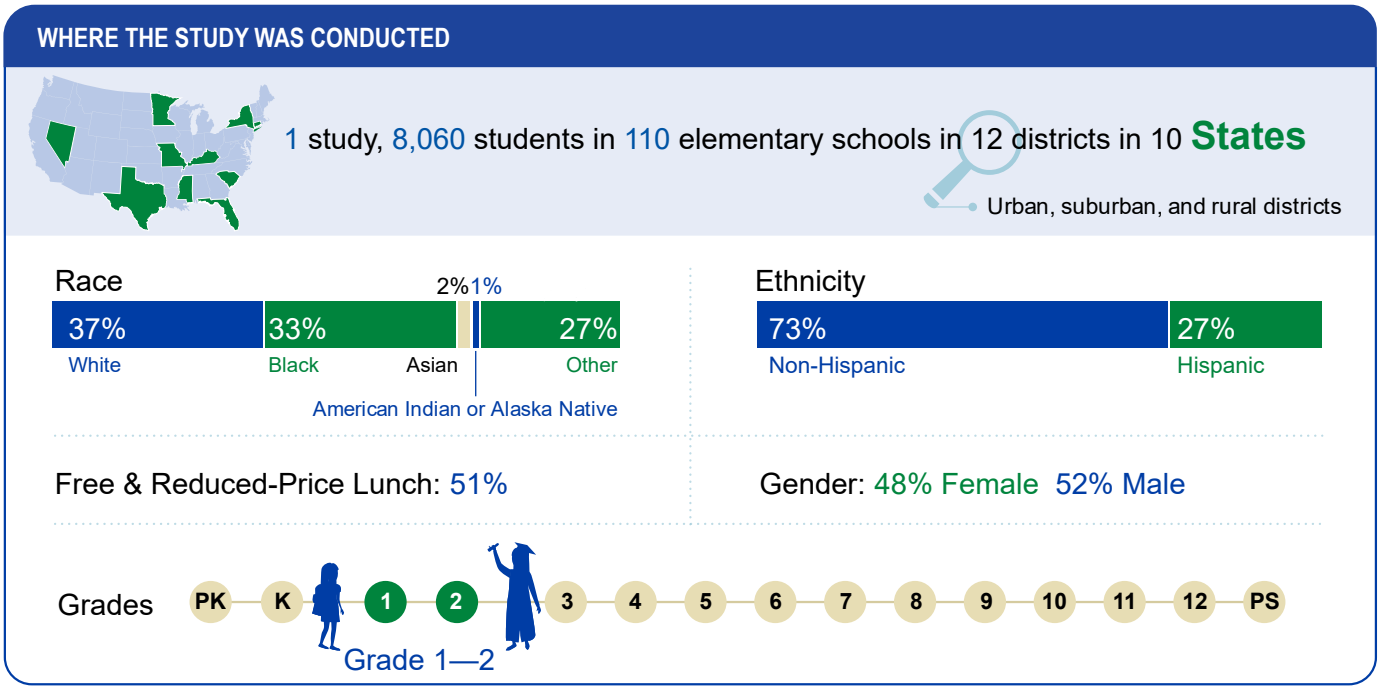
| | | | Mean (standard deviation) | | WWC calculations | | | |
|---|---|---|---|---|---|---|---|---|
| **Measure (study)** | **Study sample** | **Sample size** | **Intervention group** | **Comparison group** | **Mean difference** | **Effect size** | **Improvement index** | ***p*-value** |
| **Early Childhood Longitudinal Study-Kindergarten Class of 1998–99 (ECLS-K) Math Assessment** | Students in grade 1 (vs. *Investigations*) | 54 schools, 2,339 students | 45.35 (8.52) | 44.51 (8.04) | 0.84 | 0.10 | +4 | 0.43 |
| **ECLS-K Math Assessment** | Students in grade 1 (vs. *Saxon* ) | 52 schools, 2,320 students | 45.45 (8.52) | 45.23 (7.32) | 0.22 | 0.03 | +1 | 0.83 |
| **ECLS-K Math Assessment** | Students in grade 1 (vs. *SFAW*) | 55 schools, 2,481 students | 45.30 (8.52) | 44.43 (8.15) | 0.87 | 0.10 | +4 | 0.41 |
| **ECLS-K Math Assessment** | Students in grade 2 (vs. *Investigations*) | 35 schools, 1,638 students | 70.17 (16.70) | 69.85 (15.75) | 0.32 | 0.02 | +1 | 0.90 |
| **ECLS-K Math Assessment** | Students in grade 2 (vs. *Saxon*) | 35 schools, 1,731 students | 70.82 (16.70) | 72.53 (16.16) | -1.71 | -0.10 | -4 | 0.51 |
| **ECLS-K Math Assessment** | Students in grade 2 (vs. *SFAW*) | 35 schools, 1,633 students | 71.27 (16.70) | 70.31 (15.74) | 0.96 | 0.06 | +2 | 0.71 |
| **Outcome average for general mathematics achievement (Agodini et al., 2010)[a]** | | | | | | **0.03** | **+1** | **Not statistically significant** |

Note: Some statistics may not sum as expected due to rounding. *Investigations = Investigations in Number, Data, and Space; Saxon = Saxon Math; SFAW = Scott-Foresman-Addison Wesley Mathematics.*

[a] Agodini et al. (2010) includes four groups—the *Math Expressions* intervention group and three comparison curricula groups: *Investigations, Saxon,* and *SFAW*. The *p*-values presented here were calculated by the WWC because the only *p*-values reported in the study were from analyses that do not meet WWC group design standards. This study is characterized as having indeterminate effects on general mathematics achievement because the mean effect is neither statistically significant nor substantively important. For more information, please refer to the WWC Procedures Handbook, version 4.0, page 22.

## In What Context Was *Math Expressions* Studied?

The following section provides information on the setting of the one study of *Math Expressions* that meets WWC standards, and a description of the participants in the research. This information can help educators understand the context in which the study of *Math Expressions* was conducted, and determine whether the program might be suitable for their setting.




## Details of Each Study that Meets WWC Standards

This section presents details for the study of *Math Expressions* that meets WWC standards. These details include the full study reference, findings description, findings summary, and description of study characteristics. A summary of domain findings for the study is presented below, followed by a description of the study characteristics. These study-level details include contextual information about the study setting, methods, sample, intervention group, comparison group, outcomes, and implementation details. For additional information, readers should refer to the original study.

### Research details for Agodini et al. (2010)

Agodini, R., Harris, B., Thomas, M., Murphy, R., & Gallagher, L. (2010). *Achievement effects of four early elementary school math curricula: Findings for first and second graders* (NCEE 2011-4001). National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education. https://eric.ed.gov/?&id=ED512551

Findings from Agodini et al. (2010) show no discernable effects of *Math Expressions* in the general mathematics achievement domain (Table 5). The findings and research details summarized for this study come from eight related citations, including the primary study listed above. See the References section, which begins on page 9, for a list of all related publications.

**Table 5. Summary of findings from Agodini et al. (2010)**

| | | Meets WWC Group Design Standards Without Reservations | | |
|---|---|---|---|---|
| | | Study findings | | |
| Outcome domain | Sample size | Average effect size | Improvement index | Statistically significant |
| General mathematics achievement | 8,060 students | 0.03 | +1 | No |

**Table 6. Description of study characteristics for Agodini et al. (2010)**

| | |
|---|---|
| **WWC evidence rating** | **Meets WWC Group Design Standards Without Reservations.** This is a cluster randomized controlled trial with low cluster-level attrition and low individual-level nonresponse. For more information on how the WWC assigns study ratings, please see the WWC Procedures and Standards Handbooks (version 4.0) and WWC Standards Briefs, available on the WWC website. |
| **Setting** | One hundred ten elementary schools in 12 districts participated in the study. The districts were located across the following 10 states: Connecticut, Florida, Kentucky, Minnesota, Mississippi, Missouri, New York, Nevada, South Carolina, and Texas. These districts are located in urban, suburban, and rural areas, and each district had at least four Title I schools (a study eligibility requirement). In total, 76% of participating schools were eligible for Title I support. |
| **Methods** | The study authors randomly assigned schools within school districts to one of four math curricula: (1) *Math Expressions*, (2) *Investigations in Number, Data, and Space (Investigations)*, (3) *Saxon Math (Saxon)*, or (4) *Scott Foresman Addison-Wesley Mathematics (SFAW)*. The design included two cohorts of schools. Cohort 1, from the 2006–07 school year, included 39 schools located in four districts in four states, and during that year, curriculum implementation occurred in all first-grade classrooms. Cohort 2, from the 2007–08 school year, added six states and included 71 schools located in eight districts; in that year, curriculum implementation occurred in all first- and second-grade classrooms, except in one school where curriculum implementation occurred in second-grade classrooms only. For both cohorts, schools were randomly assigned in the summer, and students were placed in classrooms by way of school personnel using their usual placement procedures immediately before the start of the school year. The study team collected student rosters at the beginning of the fall semester and used the rosters to randomly sample 11 students (on average) to be tested within each study classroom.<br><br>The study analyzed students separately by grade. In the fall after random assignment of schools occurred, the numbers of first-grade students from Cohorts 1 and 2 who were selected to be tested for the study included (1) 1,444 students in 27 schools assigned to *Math Expressions*, (2) 1,349 students in 28 schools assigned to *Investigations*, (3) 1,338 students in 26 schools assigned to *Saxon*, and (4) 1,489 students in 29 schools assigned to *SFAW*. In the fall after random assignment of schools occurred, the numbers of second-grade students from Cohort 2 included (1) 995 students in 17 schools assigned to *Math Expressions*, (2) 1,018 students in 18 schools assigned to *Investigations*, (3) 1,057 students in 18 schools assigned to *Saxon*, and (4) 990 students in 18 schools assigned to *SFAW*.<br><br>The sample loss after random assignment (attrition) was within the acceptable threshold for the review: at the school level, the overall attrition rate was between 0% and 3.7%, and the differential attrition rate was between 0 and 7.1 percentage points, depending on the grade level. Overall nonresponse at the student level was between 15.4% and 18.6%, and differential nonresponse was between 0.4 and 2.8 percentage points. |
| **Study sample** | The study sample included first- and second-grade students. Thirty-seven percent of students in participating schools were non-Hispanic White, 33% were non-Hispanic Black, 27% were Hispanic, 2% were Asian, and 1% were American Indian or Alaska Native. Just over half of the sample (52%) was male, and about half of the students were eligible for free or reduced-price lunch (51%). |
| **Intervention condition** | Students in the intervention group used *Math Expressions* (published by Houghton Mifflin Harcourt) as their core math curriculum. Cohort 1 used the 2005 copyright edition, and Cohort 2 used the 2008 copyright edition. Each day began with a set of routines led by students involving the calendar, money, a number chart, counting, and time. In general, the math lesson occurred later in the day and typically began with a quick fluency activity. Afterward, the teacher provided whole-class instruction and encouraged students to discuss and demonstrate the mathematical ideas taught. Visual learning supports were used to help students link their knowledge to formal mathematical concepts. Finally, students practiced the new mathematics skill or concept in pairs, small groups, or individually by completing worksheets. Math homework was assigned daily to students. Teachers in the intervention group reported using *Math Expressions* as their core math curriculum and provided, on average, 5.0 to 5.5 hours of math instruction per week. Most teachers (84% in first grade and 80% in second grade) reported completing at least 80% of *Math Expressions* lessons. |

| | |
|---|---|
| **Comparison condition** | The comparison group included students using three curricula: *Investigations*, *Saxon*, and *SFAW*.<br>1. *Investigations* (published by Pearson) is a mathematics curriculum for students in kindergarten through fifth grade organized into units that last 2 to 5 weeks. Within each unit, the curriculum is built around two or more investigations, each providing different contexts for students to explore mathematical problems through hands-on activities, written activities, and class discussions. Classroom activities vary depending on the length and type of investigation. Teachers begin by introducing the investigation to the class through large-group, hands-on activities, and over the following days students work in smaller groups to explore the concept through in-depth problems or by playing mathematical games. At the end of the investigation, the teacher and students discuss the work completed during the investigation. Schools used the first and second editions of the textbook. Teachers provided, on average, 2.7 to 3.1 hours of math instruction per week in each grade. Additionally, most teachers (72% in first grade and 80% in second grade) reported completing at least 80% of the lessons from *Investigations*.<br>2. *Saxon* (published by Houghton Mifflin Harcourt) is a curriculum for students in kindergarten through fourth grade that includes scripted lesson plans for teachers. It includes explicit instruction, practice, mathematical conversations, and hands-on activities. The curriculum includes five daily activities: morning routines, fact practice, an explicit lesson, guided class practice, and homework. Morning routines are extensive and designed to reinforce the previously learned skills and lay the foundation for building new skills. In the lesson, teachers conduct a whole-class activity to introduce a new concept, using manipulatives, worksheets, or overhead transparency masters. At the end of each lesson, the teacher asks a few students to summarize for the whole class what they learned that day. Teachers provided, on average, 6.1 to 6.9 hours of math instruction per week in each grade. In addition, most teachers (87% in first and second grades) reported completing at least 80% of the lessons from *Saxon*.<br>3. *SFAW* (published by Pearson) is a curriculum for students in prekindergarten through sixth grade that uses a consistent daily structure. Each lesson includes six activities: a spiral review (a brief review of previously learned material), investigating the concept (hands-on exploration of a new concept), a warm-up (a brief activity to activate prior knowledge and connect it to the new lesson), teach (direct instruction of the new concept), independent practice (students practice using worksheets or manipulatives), and assessment (a concluding activity to check for understanding of the new concept). Teachers provided, on average, 5.3 to 5.5 hours of math instruction per week in each grade. Additionally, most teachers (92% in first grade and 88% in second grade) reported completing at least 80% of the lessons from *SFAW*. |
| **Outcomes and measurement** | Study authors reported findings on one outcome measure that is eligible for review under the Primary Mathematics topic area, the ECLS-K Math Assessment, a standardized test developed by the Educational Testing Service for the Early Child Longitudinal Study, Kindergarten Class of 1998-99 (ECLS-K). The assessment is in the general mathematics achievement domain. The test includes questions in the following five content areas: (1) Number Sense, Properties, and Operations; (2) Measurement; (3) Geometry and Spatial Sense; (4) Data Analysis, Statistics, and Probability; and (5) Patterns, Algebra, and Functions. The test was administered to students in the fall (within 4 weeks of the first day of classes) and spring (1 to 6 weeks before the end of the school year).<br>The study also reported findings for 2-year impacts at the end of second grade, after the students received 2 years of exposure to the intervention. The WWC considers the 2-year impact findings as supplemental findings because they are based on smaller samples than the main findings presented in this report. Summaries of the supplemental findings are available on the WWC website (https://whatworks.ed.gov). The supplemental findings do not factor into the intervention's rating of effectiveness. |
| **Additional implementation details** | After completing random assignment, the study team connected school staff to publishers of their assigned curriculum. Research funds were used to support teacher training. The study team did not specify implementation criteria that schools needed to meet or maintain to be included in the study after participation began.<br>Teachers assigned to *Math Expressions* received 2 days of initial training in the summer before the school year began. Two follow-up trainings took place during the school year, once in the fall and again in the spring. Follow-up sessions typically consisted of classroom observations followed by short feedback sessions with teachers.<br>Teachers assigned to *Investigations* received 1 day of initial training in the summer before the school year began. Trainers offered group training sessions before the start of each unit (about every 4 to 6 weeks). The follow-up sessions were typically 3 to 4 hours long and held after school.<br>Teachers assigned to *Saxon* received 1 day of initial training in the summer before the school year began. One follow-up training session was tailored to meet each district's needs and took place during the school year.<br>Teachers assigned to *SFAW* received 1 day of initial training in the summer before the school year began. Follow-up training was offered about every 4 to 6 weeks throughout the school year. The follow-up trainings were typically 3 to 4 hours long and took place after school. |

## References

### Study that meets WWC group design standards


Agodini, R., Harris, B., Thomas, M., Murphy, R., & Gallagher, L. (2010). *Achievement effects of four early elementary school math curricula: Findings for first and second graders* (NCEE 2011-4001). National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education. https://eric.ed.gov/?&id=ED512551


***Additional sources:***


Agodini, R., & Harris, B. (2010). An experimental evaluation of four elementary school math curricula. *Journal of Research on Educational Effectiveness, 3*(3), 199-253. https://eric.ed.gov/?id=EJ888771

Agodini, R., & Harris, B. (2016). How teacher and classroom characteristics moderate the effects of four elementary math curricula. *Elementary School Journal, 117*(2), 216-236. https://eric.ed.gov/?id=EJ1122205

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Agodini, R., Harris, B., Seftor, N., Remillard, J., & Thomas, M. (2013). *After two years, three elementary math curricula outperform a fourth* (NCEE 2013-4019). National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education. https://eric.ed.gov/?&id=ED544185

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Remillard, J. T., Harris, B., & Agodini, R. (2014). The influence of curriculum material design on opportunities for student learning. *ZDM: The International Journal on Mathematics Education, 46*(5), 735-749. https://www.researchgate.net/publication/271660767_The_influence_of_curriculum_material_design_on_opportunities_for_student_learning


### Studies that meet WWC group design standards with reservations

None.

### Studies that do not meet WWC group design standards


Honeycutt, R. A. (2013). *An evaluation of an elementary mathematics program at a medium-sized suburban school district in North Carolina*. ProQuest Dissertations and Theses. https://eric.ed.gov/?id=ED561826. The study does not meet WWC standards because it uses a quasi-experimental design in which the analytic intervention and comparison groups do not satisfy the baseline equivalence requirement.

Houghton Mifflin Harcourt. (2013). *Success across Wisconsin: Case studies from selected Wisconsin school districts using Houghton Mifflin Math Expressions*. http://hmhco-v1.prod.webpr.hmhco.com/-/media/sites/home/educators/education-topics/hmh-efficacy/houghton_mifflin_harcourt_math_expressions_wi_case_studies_2013.pdf?la=en. The study does not meet WWC standards because the measures of effectiveness cannot be attributed solely to the intervention.


### Studies that are ineligible for review using the Primary Mathematics review protocol

None.

## Endnotes

[1] National Council of Teachers of Mathematics. (2007). *Curriculum research brief: Selecting the right curriculum*. https://www.nctm.org/Research-and-Advocacy/Research-Brief-and-Clips/Selecting-the-Right-Curriculum/; Stein, M. K., Remillard, J. T., & Smith, M. S. (2007). How curriculum influences student learning. In F. Lester Jr. (Ed.), *Second handbook of research on mathematics teaching and learning* (2nd ed., Vol. 1, pp. 319–369). Information Age Publishing.

[2] The descriptive information for this intervention comes from Agodini et al. (2010). The What Works Clearinghouse (WWC) requests that developers review the intervention description sections for accuracy from their perspective. The WWC provided the developer with the intervention description in June 2020 and the WWC incorporated feedback from the developer. Further verification of the accuracy of the descriptive information for this intervention is beyond the scope of this review.

[3] The literature search reflects documents publicly available by May 2020. Reviews of the studies in this report used the standards from the WWC Procedures and Standards Handbook (version 4.0) and the Primary Mathematics review protocol (version 4.0).

[4] This intervention report includes findings from a study conducted by staff from Mathematica. Because Mathematica is one of the contractors that administers the WWC, staff members from a different organization reviewed the study. In addition to staff at Mathematica, an external quality assurance reviewer and an external peer reviewer reviewed this intervention report.

[5] The effects of *Math Expressions* are not known for other outcome domains within the Primary Mathematics topic area, including number and operations; geometry and measurement; data analysis, statistics, and probability; and algebra.

## Recommended Citation

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