IES Institute of Education Sciences

The University of Chicago School Mathematics Project (UCSMP)

Intervention Report | Primary Mathematics Topic Area

WHAT WORKS CLEARINGHOUSE™
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Mathematics skills are important for academic and workplace success.[1] *University of Chicago School Mathematics Project (UCSMP)* is a core mathematics curriculum that includes materials and a routinized instructional approach with an option for teacher training. The curriculum uses an inquiry-based approach with a focus on active learning where students frequently engage in hands-on activities and small-group activities.[2]

This What Works Clearinghouse (WWC) intervention report, part of the WWC's Primary Mathematics topic area, explores the effects of *UCSMP* on general mathematics and algebra outcomes. This review focuses on studies of two *UCSMP* courses that are eligible for review under the Primary Mathematics topic area: *Pre-Transition Mathematics and Transition Mathematics*.[3] *Pre-Transition Mathematics* teaches arithmetic, algebra, geometry, probability, and statistics. *Transition Mathematics* teaches more advanced arithmetic, algebra, and geometry, and connects these areas to measurement, probability, and statistics. The WWC identified 11 studies of these two *UCSMP* courses. Three of these studies meet WWC standards. The evidence presented in this report is from studies of the effects of *UCSMP* on students—including 3% Asian, 4% Black, 61% White, and 21% Hispanic students—in grades 6 to 9 in urban, suburban, and rural school districts.

What Happens When Students Participate in *UCSMP*?[4]

The evidence indicates that implementing *UCSMP* has no discernible effects on general mathematics achievement or algebra outcomes compared with the other mathematics curricula used in study schools.

Findings on *UCSMP* from three studies that meet WWC standards are shown in Table 1. The table reports an effectiveness rating, an 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 +3 means that the expected percentile rank of the average comparison group student would increase by 3 points if the student received *UCSMP* instead of the curricula provided to the comparison group. A positive or negative 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 *UCSMP* from studies that meet 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	+3	3	637
Algebra	No discernible effects	-5	1	282

Note: For more information about outcome measures, see study descriptions in Tables 6, 8, and 10. The effects of *UCSMP* are not known for other outcomes within the Primary Mathematics topic area, including data analysis, statistics, and probability; geometry and measurement; and number and operations.

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 *UCSMP* Implemented?

The following section provides details of how districts and schools can implement *UCSMP*. This information can help educators identify the requirements for implementing *UCSMP* and determine whether implementing this intervention would be feasible in their districts or schools. Information on *UCSMP* presented in this section comes from the studies that meet WWC standards (Thompson & Senk, 2016; Thompson et al., 2005, 2012) and from correspondence with the developer.

- **Goal:** The *UCSMP* curriculum is designed to teach students mathematics concepts, applications, and skills.
- **Target population:** *UCSMP* is designed for students in grades 6 to 12.
- **Method of delivery:** *UCSMP* is a print and online curriculum that can be used to provide whole classroom, small group, and individual student instruction.
- **Frequency and duration of service:** The developer recommends *UCSMP* be used daily during math instruction for 45 to 60 minutes throughout the entire school year.

Comparison group: In the three studies that contribute to this intervention report, students in the comparison group used a variety of mathematics curricula including *Basic Mathematics* provided by Globe Fearon, *Middle School Math Course 2* and *Scott Foresman-Addison Wesley Math* provided by Scott Foresman-Addison Wesley, *Mathematics: Applications and Concepts Course 2* provided by Glencoe, *Passport to Algebra and Geometry and Mathematics: Concepts and Skills Course 2* provided by McDougal Littell, *Prentice Hall Mathematics: Course 1* provided by Prentice Hall, and *Everyday Mathematics* provided by McGraw-Hill Education.

- **Intervention components:** *UCSMP* includes a student and teacher edition of the curriculum, both of which are available in print and online. Each *UCSMP* course has 12 to 14 chapters, and each chapter includes 6 to 10 lessons. *UCSMP Transition Mathematics* is in the third edition and *UCSMP Pre-Transition Mathematics* is a first edition. Refer to Table 2 for additional details.

Table 2. Components of *UCSMP*

Key component	Description
Instructional approach	*UCSMP* lessons focus on introducing, developing, and reinforcing math concepts and skills while integrating arithmetic with statistics, geometry, and algebraic thinking. Each lesson has four parts: a warm-up activity, a math lesson in which the teacher instructs the whole class, a student assignment in which students work individually or in small groups, and a wrap-up activity. Homework is assigned daily. The lessons involve linking everyday situations and past experiences to new concepts; using multiple strategies to solve math problems; asking students to provide verbal and written explanations of their thinking; and using hands-on activities, games, and technology, including graphing calculators.
Curriculum materials	*UCSMP* includes a student textbook, available in print and online, that contains explanations, questions, and end-of-chapter summaries, self-tests, and reviews. The curriculum includes a teacher's edition, also available in print and online, that summarizes the math background for each lesson; provides an overview of each lesson, including questions to ask students; and provides guidance on how to differentiate instruction for students with different needs. Implementation guides are also available for teachers and school administrators to provide guidance and tips on the curriculum's instructional approach. The curriculum also includes the following teaching resources: additional practice and review problems, warm-up activities, and math games. Assessment resources include copies of all quizzes, chapter tests, and comprehensive exams.
Teacher training	The developer does not require teacher training and little or no training was provided to teachers in the studies reviewed in this report. However, *UCSMP* trainers can provide teacher trainings virtually or in person, depending on the needs and preferences of districts purchasing and implementing the curriculum. Available teacher training includes 1 to 2 days on the *UCSMP* philosophy, features, and recommended instructional approaches.

What Does *UCSMP* Cost?

The cost of *UCSMP* varies by course and number of students; each course can be purchased separately. This preliminary list of costs is not designed to be exhaustive; rather, it provides educators an overview of the major resources needed to implement *UCSMP*. The program costs described in Table 3 are based on the information available as of June 2020.

Table 3. Cost ingredients for *UCSMP*

Cost ingredients	Description	Source of funding
Personnel	Certified teachers implement the curriculum in their daily classes. The developer does not publish training costs, and the cost of teacher training varies based on school district preferences and needs.	School districts or schools usually pay for teacher training costs.
Facilities	The intervention is typically implemented in students' regular classes. When the intervention is implemented using the online edition, schools need to provide computers in the regular classes or in a computer lab.	School districts or schools usually provide the classroom or computer lab facilities.
Equipment and materials	In a typical classroom, the materials include one physical or digital text and one scientific or graphing calculator for each student, one teacher's manual, and one set of teaching and assessment resources. With the purchase of at least 25 student editions, the publisher provides a teacher's edition, teaching resources, and assessment resources at no cost. The student edition costs $69 to $72 per student; therefore, the typical cost for a class of 25 students is $1,800. The teacher materials can be purchased separately: the teacher's edition costs $99 to $129 per course, the teaching resources cost $89 per class, and the assessment resources cost $89 to $99 per class.	School districts or schools usually purchase *UCSMP* materials, provide calculators to students, and make copies of student work-sheets, if needed. Students or parents need to purchase calculators if the school does not provide them.

For More Information:

About *UCSMP*

1427 East 60th Street
Chicago, IL 60637
Attn: *UCSMP* at the University of Chicago
Email: ucsmp@uchicago.edu Web: http://ucsmp.uchicago.edu/about/overview/ Phone: (773) 702-1130

About the cost of the intervention

Web: http://ucsmp.uchicago.edu/secondary/ordering/

Research Summary

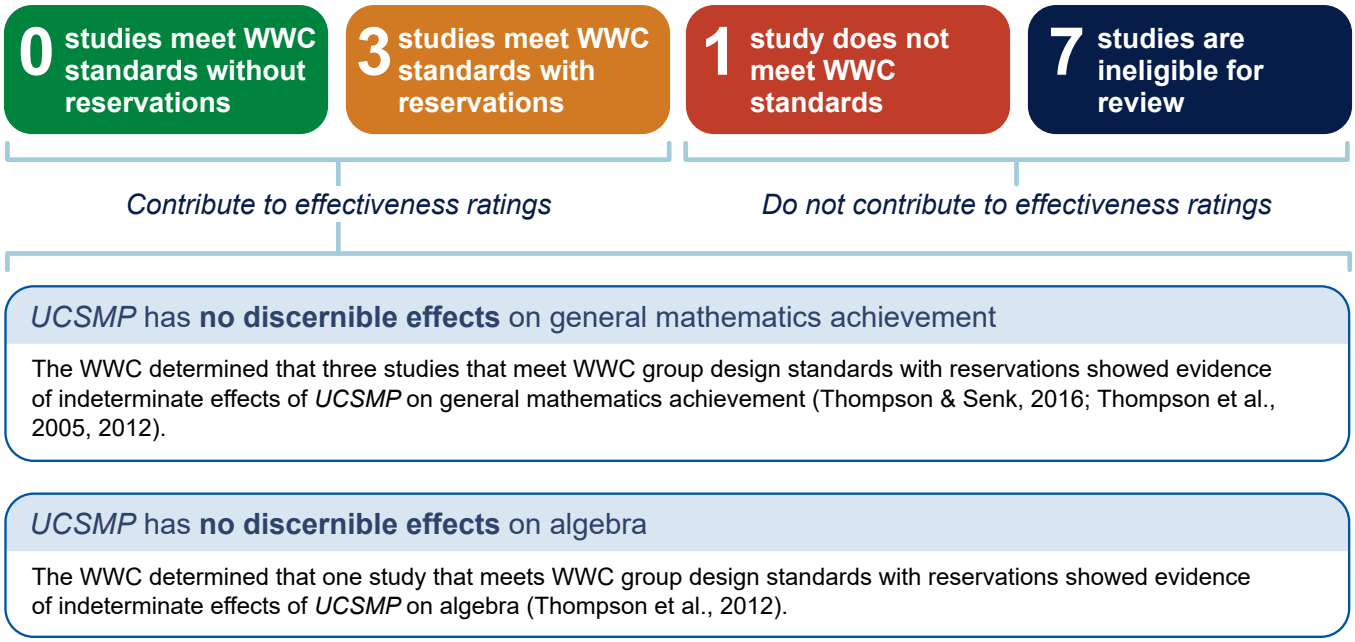
The WWC identified 11 studies that investigated the effectiveness of *UCSMP* (Figure 1):

- 3 studies meet WWC group design standards with reservations
- 1 study does not meet WWC group design standards
- 7 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 female and male students, on the WWC website (https://whatworks.ed.gov). These supplemental findings and findings from studies that either do not meet WWC standards or are ineligible for review do not contribute to the effectiveness ratings.

The three studies of *UCSMP* that meet WWC group design standards reported findings on general mathematics achievement and algebra. No other findings in the studies meet WWC group design standards within any outcome domain included in the Primary Mathematics topic area.[5] Citations for the four studies reviewed for this report are listed in the References section, which begins on page 12. Citations for the seven studies that are ineligible for review and the reasons the WWC determined they were ineligible are also listed in the References section.

Figure 1. Effectiveness ratings for *UCSMP*



Main Findings

Table 4 shows the findings from the three studies of *UCSMP* that meet 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 three studies that meet WWC standards, the effectiveness ratings for general mathematics achievement and algebra are *no discernible effects*. The findings in the general mathematics domain are based on 637 students and the findings in the algebra domain are based on 282 students.

Table 4. Findings by outcome domain from studies of *UCSMP* that meet 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
UCSMP Mathematics Test One (Thompson & Senk, 2016)[a]	Students in grades 6–8	264	20.88 (7.12)	20.49 (6.92)	0.39	0.06	+2	.82
UCSMP Problem Solving and Understanding Test (Thompson & Senk, 2016)[a]	Students in grades 6–8	264	15.79 (7.35)	12.27 (9.17)	3.52	0.42	+16	.09
Outcome average for general mathematics achievement (Thompson & Senk, 2016)[a]						**0.24**	**+9**	**Not statistically significant**
High school subject test: General mathematics (Thompson et al., 2005)[b]	Students in grades 7–9	91	56.61 (23.90)	58.50 (20.60)	-1.89	-0.08	-3	.82
Outcome average for general mathematics achievement (Thompson et al., 2005)[b]						**-0.08**	**-3**	**Not statistically significant**
UCSMP Algebra and Geometry Readiness Test: Part One (Thompson et al., 2012)[c]	Students in grade 7	282	24.70 (7.30)	23.30 (6.70)	1.40	0.20	+8	.10
UCSMP Algebra and Geometry Readiness Test: Part Two (Thompson et al., 2012)[c]	Students in grade 7	282	11.20 (4.90)	11.60 (4.40)	-0.40	-0.09	-3	.47
Outcome average for general mathematics achievement (Thompson et al., 2012)[c]						**0.06**	**+2**	**Not statistically significant**
Outcome average for general mathematics achievement across all studies						**0.07**	**+3**	**Not statistically significant**
Iowa Algebra Aptitude Test (Thompson et al., 2012)[c]	Students in grade 7	282	40.40 (10.90)	41.70 (9.80)	-1.30	-0.13	-5	.30
Outcome average for algebra (Thompson et al., 2012)[c]						**-0.13**	**-5**	**Not statistically significant**

Notes: Some statistics may not sum as expected due to rounding.

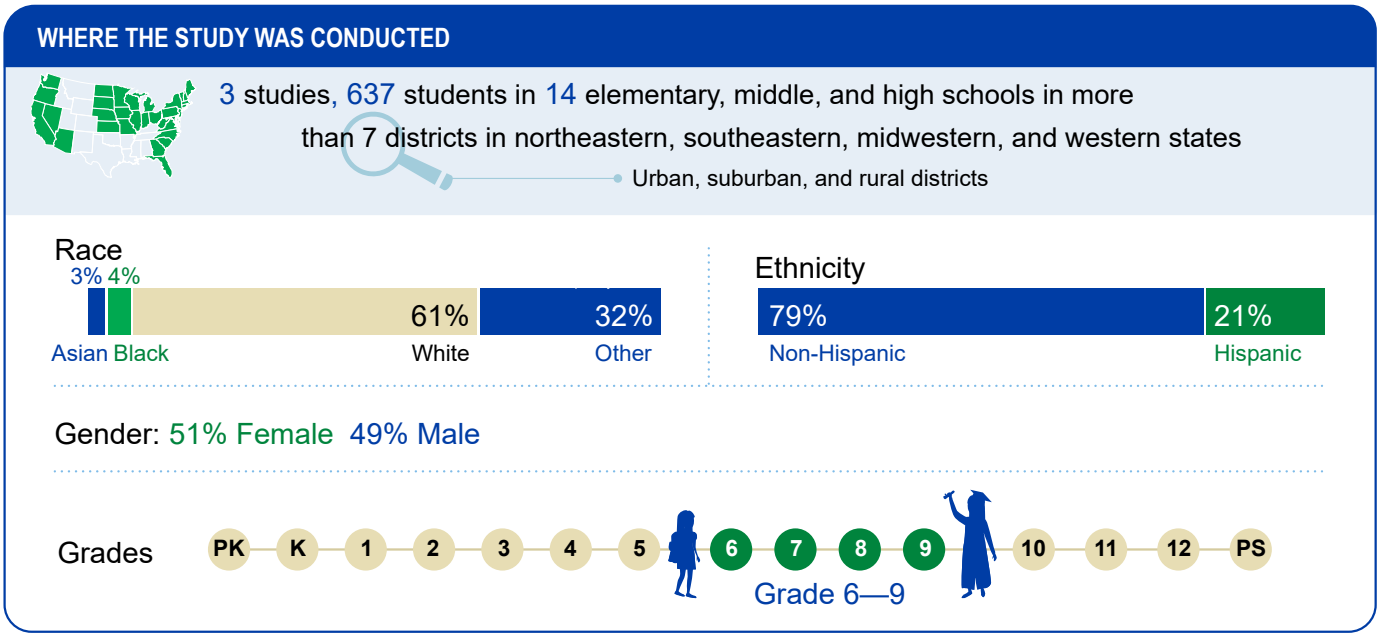
[a] Thompson and Senk (2016) required corrections for clustering and multiple comparisons; the *p*-values presented here were calculated by the WWC and account for clustered assignment of students to conditions by class. The Mathematics Test One and the Problem Solving and Understanding Test were both developed by *UCSMP* staff and assessed student knowledge of arithmetic, number properties, measurement, and algebra. This study is characterized as having an indeterminate effect on general mathematics achievement because the mean effect reported is not statistically significant.

[b] For Thompson et al. (2005) the *p*-values presented here were calculated by the WWC, because the *p*-values reported in the study did not account for the clustered assignment of students to conditions by class. The WWC performed a difference-in-differences adjustment to calculate the effect size. The correlation of 0.741 between the pre- and posttest was provided in response to an author query. This study is characterized as having an indeterminate effect on general mathematics achievement because the estimated effect is not statistically significant.

[c] For Thompson et al., (2012) the *p*-values presented here were calculated by the WWC, because the *p*-values reported in the study did not account for the clustered assignment of students to conditions by class. The Algebra/Geometry Readiness Test: Part One and the Algebra/Geometry Readiness Test: Part Two were both developed by *UCSMP* staff. This study is characterized as having an indeterminate effect on general mathematics achievement and algebra because the estimated effects are not statistically significant. For more information, please refer to the WWC Procedures Handbook, version 4.0, page 22.

In What Context Was *UCSMP* Studied?

The following section provides information on the setting of the three studies of *UCSMP* that meet WWC standards, and a description of the participants in the research. This information can help educators understand the context in which the studies of *UCSMP* were 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 studies of *UCSMP* that meet WWC standards. These details include the full study reference, findings description, findings summary, and description of study characteristics. A summary of domain findings for each 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 studies.

Research details for Thompson & Senk (2016)

Thompson, D. R., & Senk, S. L. (2016). *An evaluation of the University of Chicago School Mathematics Project: Pre-Transition Mathematics.* University of Chicago School Mathematics Project. https://s3.amazonaws.com/ucsmp/research_reports/ptm_evaluation_report.pdf

Findings from Thompson and Senk (2016) show evidence of an indeterminate effect of *UCSMP* in general mathematics achievement (Table 5).

Table 5. Summary of findings from Thompson & Senk (2016)

		Meets WWC Group Design Standards With Reservations		
		Study findings		
Outcome domain	Sample size	Average effect size	Improvement index	Statistically significant
General mathematics achievement	264 students	0.24	+9	No

Table 6. Description of study characteristics for Thompson & Senk (2016)

WWC evidence rating	**Meets WWC Group Design Standards with Reservations.** This study is a cluster quasi-experimental design (QED) that established baseline equivalence of the individuals in the intervention and comparison groups.
Setting	The study took place in seven schools within four districts in rural, suburban, and urban areas in the northeastern and midwestern United States. The districts and states were not named.
Methods	The study team matched *UCSMP* classes to comparison classes in the same school or, in a few cases, in the same district. The schools were recruited through advertisements published on the *UCSMP* website, in *UCSMP* publications, and on other publications and listservs, such as the National Council of Teachers of Mathematics publications. In order to be included in the study, schools were required to provide similar students for the *UCSMP* and comparison classes and to nominate teachers for the study and require teachers to attend two 1-day meetings at the University of Chicago. Schools were also required to collect data for the study, which included administering the assessments described below and allowing teachers to participate in interviews. The study included nine *UCSMP* classes with 121 students and nine comparison classes with 143 students. The study sample was restricted to students within these class pairs who did not switch classes or curricula during the school year and who had both pre- and posttest data.
Study sample	The study sample included 264 students in grades 6 to 8. Across the study sample, 51% of the students were male, 73% were White, 4% were Black, 2% were Asian, and the race of 21% of students was not specified. Thirty percent of students were Hispanic. The study does not provide information on student race for the analytic samples included in this review nor any other background characteristics for the students in the schools.
Intervention condition	The intervention group used *UCSMP's Pre-Transition Mathematics course* (field trial edition). The intervention was implemented during students' regular math classes. The majority of *UCSMP* classes used the curriculum daily; some classes used it four times per week. Math instructional time in the intervention classes ranged from 225 to 400 minutes per week. Students were loaned graphing calculators that they used two to three times per week, on average.
Comparison condition	Students in the comparison classes used *Everyday Mathematics* provided by McGraw-Hill Education, *Basic Mathematics* provided by Globe Fearon, *Prentice Hall Mathematics: Course 1* provided by Prentice Hall, *Mathematics: Applications and Concepts Course 2* provided by Glencoe, and *Scott Foresman-Addison Wesley Math* provided by Scott Foresman-Addison Wesley. Most comparison classes had math instruction five times per week; some classes offered math four times per week. Comparison classes spent 225 to 400 minutes per week on math instruction. Students were loaned graphing calculators that they used two to three times per week, on average.
Outcomes and measurement	The study presented results for two outcome measures that are eligible for review under the Primary Mathematics topic area: the *UCSMP*-created Mathematics Test One and the *UCSMP*-created Problem Solving and Understanding Test. Both outcomes were measured in spring after the intervention had been used for 1 school year. The *UCSMP* Mathematics Test One is a multiple-choice test; it is the same assessment as the pretest, which the study referred to as the Entering Mathematics Test. The test measures student knowledge of arithmetic, measurement, and algebraic concepts and has a reliability of 0.78 to 0.86. The *UCSMP* Problem Solving and Understanding Test uses open-ended questions to measure student approaches to solutions and types of student errors. The assessment is scored using a rubric for each question and has a reliability of 0.85. The study reported supplemental findings for subgroups of students in grade 6 on the TerraNova Math Assessment and for a subscore on the *UCSMP* Mathematics Test One. Summaries of these findings are available on the WWC website (https://whatworks.ed.gov). The supplemental findings do not factor into the intervention's rating of effectiveness. Several subgroup findings did not meet WWC group design standards because the study does not establish equivalence of the analytic intervention and comparison groups at baseline for these samples. In addition, the study included findings based on subtests that the researchers created by pulling specific items from the TerraNova Math Assessment and the *UCSMP* Mathematics Test One that reflected the content covered by teachers in the study. These findings do not meet WWC standards because the questions upon which the subtest scores were based varied across classes and conditions. Lastly, the study presented results for a set of *UCSMP* schools that were part of a case study and did not have comparison classes—these case study findings are ineligible for review because they are not based on an eligible design.

Additional implementation details

UCSMP teachers did not receive any formal training or professional development to implement the curriculum. Teachers met with the curriculum developers in person in Chicago twice—once in the fall and once in the spring. The focus of these meetings was to provide feedback to the developers on the curriculum materials, and teachers could raise issues and get feedback from developers or other teachers who might have helped their curriculum implementation.

Instead of formal training, during this study, the University of Chicago provided teachers written guidance and sections from the second-edition textbook at three different points in time. *UCSMP* provided teachers chapters 1–4 at the beginning of the school year, and chapters 5–12 throughout the year, based on teachers' progress through the curriculum. In addition, for the purposes of supporting implementation during the study, teachers received lesson notes and answers to frequently asked questions throughout the school year.

UCSMP worked with Texas Instruments and Casio to obtain enough calculators—either TI-84 Plus or Casio 9750—for each student and loaned the calculators to study schools for in-class use. Two of the five schools also lent calculators to students for use at home.

Research details for Thompson et al. (2005)

Thompson, D. R., Senk, S. L., Witonsky, D., Usiskin, Z., & Kealey, G. (2005). *An evaluation of the second edition of UCSMP Transition Mathematics*. University of Chicago School Mathematics Project. http://s3.amazonaws.com/ucsmp/research_reports/tm_second_edition_evaluation_report.pdf

Findings from Thompson et al. (2005) show evidence of an indeterminate effect of *UCSMP* in general mathematics achievement (Table 7).

Table 7. Summary of findings from Thompson et al. (2005)

		Meets WWC Group Design Standards With Reservations		
		Study findings		
Outcome domain	Sample size	Average effect size	Improvement index	Statistically significant
General mathematics achievement	91 students	-0.08	-3	No

Table 8. Description of study characteristics for Thompson et al. (2005)

WWC evidence rating	**Meets WWC Group Design Standards With Reservations.** This study is a cluster QED that established baseline equivalence of the individuals in the intervention and comparison groups.
Setting	The study took place in three schools in three states in the southeastern, midwestern, and western United States. Two schools were in urban settings, and one was in a rural setting. No other information on the school settings was reported.
Methods	The study team matched *UCSMP* classes to comparison classes in the same school using students' pretest math scores. The schools were recruited through advertisements published in the National Council of Teachers of Mathematics and *UCSMP* publications. Schools were eligible if they included at least four sections of pre-algebra and committed to keep the classes intact for an entire school year. For each school, district or school staff nominated at least two teachers for the study. In some schools, teachers were randomly assigned to use *UCSMP* or the regular curriculum; in other schools, teachers were purposefully selected to use *UCSMP*. At one school, the same teacher taught both the *UCSMP* and the regular curricula. Within 10 schools, the researchers formed 16 pairs of classes by matching them using pretest scores and class size. Four of these pairs compared *UCSMP*'s second edition with comparison classes that did not use *UCSMP*, and 12 pairs compared the first and second editions of *UCSMP*. This review is based on the four pairs that compared *UCSMP*'s second edition with comparison classes that did not use *UCSMP*. This included four *UCSMP* classes with 41 students and four comparison classes with 50 students. The results based on the 12 pairs of classes that compared the two editions of *UCSMP* are not eligible for review because both groups used *UCSMP*.
Study sample	The study sample included students in grades 7 to 9 across three schools. Eligible students in grade 7 were in the 50th to 90th percentile based on national percentile rankings of general mathematics. Eligible students in grade 8 were in the 30th to 70th percentile, and eligible students in grade 9 were in the 15th to 50th percentile. Among students in the study sample, 47% were female. Across all students at one study school, approximately 40% to 50% of the students were from low-income households and 45% of the students were non-White. The study does not provide information on socioeconomic status or race for students in the second or third schools, nor does it provide any other student characteristics.
Intervention condition	The intervention group used the *UCSMP Transition Mathematics* (second edition, field trial edition) in pre-algebra classes for 45 minutes per day, on average, for the entire school year. Teachers spent an average of 12 to 20 days on each chapter, and the median number of chapters covered was 11 of the 13 chapters. Teachers reported using small groups and project work as part of their instructional approach. Students at two of the study schools had access to graphing or non-graphing calculators. At the third study school, the authors indicated 67% of students reported using calculators at least twice a week. Approximately 65% of students reported spending 16 to 45 minutes per day on homework, and most students reported needing some help with their homework.
Comparison condition	The comparison group engaged in their business-as-usual instruction and used non-*UCSMP* curricula. The curricula covered computational and applied arithmetic concepts. Two schools included instruction on algebraic applications and one school included basic geometry. Students worked individually and in groups and worked on projects as part of the regular curriculum. Students had access to graphing or non-graphing calculators. Teachers implemented math instruction for 45 minutes per day on average for the full school year.
Outcomes and measurement	Study authors reported findings on one outcome measure that is eligible for review under the Primary Mathematics topic area. This outcome measure, the High School Subject Test: General Mathematics, falls in the general mathematics achievement domain. The assessment is a 40-item multiple choice test developed by Scott Foresman-Addison Wesley. The study also reported findings on three other outcome measures: Problem-Solving and Understanding Test, Geometry Readiness Test, and Algebra Readiness Test. All three assessments were developed by *UCSMP* researchers, and analyses based on these assessments do not meet WWC group design standards because the analytic intervention and comparison classes did not satisfy the WWC's baseline equivalence requirement. In addition, the study included findings based on subtests that the researchers created by pulling specific items from the four outcome measures that reflected the content covered by teachers in the study. These findings do not meet WWC standards because the questions upon which the subtest scores were based varied across classes and conditions. Lastly, the authors presented analysis for all four outcome measures that compared classes using the *UCSMP* first edition to the *UCSMP* second edition—these analyses were ineligible for review because the *UCSMP* classes were not compared with a comparison group.

Additional implementation details

UCSMP teachers did not receive any formal training or professional development to implement the curriculum. Teachers met with the curriculum developers in person in Chicago twice—once in the fall and once in the spring. The focus of these meetings was to provide feedback to the developers on the curriculum materials, and teachers could raise issues and get feedback from developers or other teachers who might have helped their curriculum implementation.

Instead of formal training, the University of Chicago provided teachers written guidance and sections from the second-edition textbook at three different points in time. *UCSMP* provided teachers chapters 1–4 at the beginning of the school year, chapters 5–8 in November, and chapters 9–13 in early winter. In addition, for the purposes of supporting implementation during the study, teachers received lesson notes and answers to frequently asked questions throughout the school year. This process of sharing written guidance and notes was done to incorporate ongoing refinements to the *UCSMP* curriculum over the course of the study in preparation for the release of the commercial version of *UCSMP Transition Mathematics* (second edition). Small modifications to the curriculum included adding in-class activities pertaining to upcoming lessons and reordering the sequence of certain lessons.

Research details for Thompson et al. (2012)

Thompson, D. R., Senk, S. L., & Yu, Y. (2012). *An evaluation of the third edition of the University of Chicago School Mathematics Project Transition Mathematics*. The University of Chicago School Mathematics Project.

http://ucsmp.uchicago.edu/resources/Transition_Mathematics_Third_Edition_Technical_Report.pdf

Findings from Thompson et al. (2012) show evidence of indeterminate effects of *UCSMP* in general mathematics achievement and algebra (Table 9).

Table 9. Summary of findings from Thompson et al. (2012)

		Meets WWC Group Design Standards With Reservations		
		Study findings		
Outcome domain	Sample size	Average effect size	Improvement index	Statistically significant
General mathematics achievement	282 students	0.06	+2	No
Algebra	282 students	-0.13	-5	No

Table 10. Description of study characteristics for Thompson et al. (2012)

WWC evidence rating	**Meets WWC Group Design Standards With Reservations.** This study is a cluster QED that established baseline equivalence of the individuals in the intervention and comparison groups.
Setting	This study took place in 16 classes at four schools across multiple states. The study does not provide any information about the states in which the schools are located.
Methods	The study team matched eight *UCSMP* classes in four schools to eight comparison classes in the same schools. The schools were recruited through advertisements published on the *UCSMP* website and in *UCSMP* publications. To be included in the study, schools were required to provide similar students for the *UCSMP* and comparison classes, to nominate teachers for the study and require teachers to attend two 1-day meetings at the University of Chicago, and to collect data for the study, which included administering the assessments described below and allowing teachers to participate in interviews. The classes were matched based on scores from two pretests: the TerraNova and the *UCSMP*-developed Middle School Mathematics Test. In addition, the authors ensured that the class sizes were roughly similar. Prior to the class matching procedures, students were randomly assigned to classes, but classes were not randomly assigned to use *UCSMP* or the comparison curricula.
Study sample	The study included grade 7 students from eight *UCSMP* classes (142 students) and eight comparison classes (140 students) across four schools. Across students in the four schools, approximately 66% were White, 6% were Black, 5% were Asian, and the race of 23% of students was not specified. Twelve percent of students were Hispanic. Approximately 55% of the students were female. The study does not provide any other student background characteristics for the students in the schools or for the analytic sample.
Intervention condition	The intervention group used *UCSMP's Transition Math* course (third edition, field trial edition). Teachers implemented the intervention for the full school year during 50- to 55-minute daily lessons at three schools and 43-minute daily lessons in one school.
Comparison condition	The comparison group used several curricula that varied across schools, including teacher-created curriculum materials, *Middle School Math Course 2* provided by Scott Foresman-Addison Wesley, and *Passport to Algebra and Geometry and Mathematics: Concepts and Skills Course 2* provided by McDougal Littell. Three schools had math for 50 to 55 minutes daily and one school had math for 43 minutes daily.
Outcomes and measurement	Study authors reported findings on three outcome measures that are eligible for review under the Primary Mathematics topic area. Two of the outcome measures are in the general mathematics achievement domain because they spanned multiple math subjects: the *UCSMP*-created Algebra/Geometry Readiness Test: Part One and the *UCSMP*-created Algebra/Geometry Readiness Test: Part Two. The third outcome measure, in the algebra domain, is the Iowa Algebra Aptitude test, which is a standardized measure. The study authors measured the outcomes in spring 2006. The *UCSMP* Algebra/Geometry Readiness Test: Part One is a 40-item multiple-choice test developed by the study team with a reliability of 0.86. Twenty-four of the 40 items were the same as in the pretest. The *UCSMP* Algebra/Geometry Readiness Test: Part Two is a 12-item open-ended response test with a reliability of 0.77. The study reported supplemental findings for four subtests of the Iowa Algebra Aptitude test. Summaries of these findings are available on the WWC website (https://whatworks.ed.gov). The supplemental findings do not factor into the intervention's rating of effectiveness. Subgroup findings for suburban students did not meet WWC group design standards because the study did not demonstrate equivalence of the analytic intervention and comparison groups at baseline. In addition, the study included findings based on subtests the researchers created by pulling specific items from the three outcome measures that reflected the content covered by teachers in the study. These findings do not meet WWC standards because the questions upon which the subtest scores were based varied across classes and conditions.
Additional implementation details	*UCSMP* teachers did not receive any formal training or professional development to implement the curriculum. Teachers met with the curriculum developers in person in Chicago twice—once in the fall and once in the spring. The focus of these meetings was to provide feedback to the developers on the curriculum materials, and teachers could raise issues and get feedback from developers or other teachers who might have helped their curriculum implementation. Instead of formal training, during the study, the University of Chicago provided teachers written guidance and sections from the second-edition textbook at three different points in time. Teachers received chapters 1–4 at the beginning of the school year, and chapters 5–12 were provided to teachers throughout the year. In addition, for the purposes of supporting implementation during the study, teachers received lesson notes and answers to frequently asked questions throughout the school year. This process of sharing written guidance and notes was done to incorporate ongoing refinements to the *UCSMP* curriculum over the course of the study in preparation for the release of the commercial version of *UCSMP Transition Mathematics* (third edition). Small modifications to the curriculum included adding Guided Examples to the lesson text and Quiz Yourself sections in each lesson, and reordering chapters on decimals, fractions, and variables. *UCSMP* researchers worked with Texas Instruments and Casio to obtain enough calculators—either TI-84 Plus or Casio 9750—for each student and loaned calculators to the schools to distribute for in-class use. Some schools also lent calculators to students for use at home.

References

Studies that meet WWC group design standards

None.

Studies that meet WWC group design standards with reservations

Thompson, D. R., & Senk, S. L. (2016). *An evaluation of the University of Chicago School Mathematics Project: Pre-Transition Mathematics.* University of Chicago School Mathematics Project. https://s3.amazonaws.com/ucsmp/research_reports/ptm_evaluation_report.pdf

Thompson, D. R., Senk, S. L., Witonsky, D., Usiskin, Z., & Kealey, G. (2005). *An evaluation of the second edition of UCSMP Transition Mathematics.* University of Chicago School Mathematics Project. http://s3.amazonaws.com/ucsmp/research_reports/tm_second_edition_evaluation_report.pdf

Thompson, D. R., Senk, S. L., & Yu, Y. (2012). *An evaluation of the third edition of the University of Chicago School Mathematics Project Transition Mathematics.* The University of Chicago School Mathematics Project. http://ucsmp.uchicago.edu/resources/Transition_Mathematics_Third_Edition_Technical_Report.pdf

Study that does not meet WWC group design standards

Mac Iver, D. J., Ruby, A., Balfanz, R., & Byrnes, V. (2003). Removed from the list: A comparative longitudinal case study of a reconstitution-eligible school. *Journal of Curriculum & Supervision*, *18*(3), 33–64. https://eric.ed.gov/?id=EJ664402 The study does not meet WWC group design standards because the measures of effectiveness cannot be attributed solely to the intervention.

Additional source:

Balfanz, R., Mac Iver, D. J., & Byrnes, V. (2006). The implementation and impact of evidence-based mathematics reforms in high-poverty middle schools: A multi-site, multi-year study. *Journal of Research in Mathematics Education, 37*(1), 33–64. https://eric.ed.gov/?id=EJ765472

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

Davis, J. D. & Shih, J. C. (2007). Secondary options and post-secondary expectations: Standards-based mathematics programs and student achievement on college mathematics placement exams. *School Science and Mathematics, 107*(8), 336–346. https://eric.ed.gov/?id=EJ790441 The study is ineligible for review because it does not include sample members with characteristics specified in the Primary Math review protocol (Version 4.0).

Dogbey, J. (2016). Using variables in school mathematics: Do school mathematics curricula provide support for teachers? *International Journal of Science & Mathematics Education, 14*(6), 1175–1196. https://eric.ed.gov/?id=EJ1109113 The study is ineligible for review because it does not use a study design eligible for review under the WWC's group design standards, regression discontinuity design standards, or pilot single-case design standards, as described in the WWC Standards Handbook (Version 4.0).

Senk, S. L., & Thompson, D. R. (2006). Strategies used by second-year algebra students to solve problems. *Journal for Research in Mathematics Education, 37*(2), 116–128. https://eric.ed.gov/?id=EJ765476 The study is ineligible for review because it does not include sample members with characteristics specified in the Primary Math review protocol (Version 4.0).

Additional sources:

Thompson, D. R., & Senk, S. L. (2001). The effects of curriculum on achievement in second-year algebra: The example of the University of Chicago School Mathematics Project. *Journal for Research in Mathematics Education, 32*(1), 58–85. https://www.jstor.org/stable/749621?seq=1

Thompson, D. R., Senk, S. L., Witonsky, D., Usiskin, Z., & Kaeley, G. (2001). *An evaluation of the second edition of UCSMP advanced algebra*. University of Chicago School Mathematics Project. http://s3.amazonaws.com/ucsmp/research_reports/adv_alg_second_edition_evaluation_report.pdf The study is ineligible for review because it does not include sample members with characteristics specified in the Primary Math review protocol (Version 4.0).

Thompson, D. R., Senk, S. L., Witonsky, D., Usiskin, Z., & Kaeley, G. (2006). *An evaluation of the second edition of UCSMP algebra*. University of Chicago School Mathematics Project. http://s3.amazonaws.com/ucsmp/research_reports/tm_second_edition_evaluation_report.pdf The study is ineligible for review because it does not include sample members with characteristics specified in the Primary Math review protocol (Version 4.0).

Thompson, D. R., Witonsky, D., Senk, S. L., Usiskin, Z., & Kaeley, G. (2003). *An evaluation of the second education of UCSMP geometry*. University of Chicago School Mathematics Project. http://s3.amazonaws.com/ucsmp/research_reports/geo_second_edition_evaluation_report.pdf The study is ineligible for review because it does not include sample members with characteristics specified in the Primary Math review protocol (Version 4.0).

Yu, Y. (2015). *The influence of types of homework on opportunity to learn and students' mathematics achievement: Examples from the University of Chicago School Mathematics Project*. ProQuest Dissertations and Theses. https://scholarcommons.usf.edu/etd/5808/ The study is ineligible for review because it does not use a study design eligible for review under the WWC's group design standards, regression discontinuity design standards, or pilot single-case design standards, as described in the WWC Standards Handbook (Version 4.0).

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 Thompson et al. (2005) and Thompson & Senk (2016). The What Works Clearinghouse (WWC) requests 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] *UCSMP's* curriculum includes seven courses, two of which are eligible for review under the Primary Mathematics topic area: *Pre-Transition Mathematics* and *Transition Mathematics*. The other five courses—*Algebra; Geometry; Advanced Algebra; Functions, Statistics, and Trigonometry;* and *Precalculus and Discrete Mathematics*—fall under the WWC's Secondary Mathematics topic area and are included in a separate WWC review.

[4] 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).

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

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