What Works Clearinghouse

INSTITUTE OF EDUCATION SCIENCES

Middle School Math | April 9, 2007

Connected Mathematics Project

Program description

The *Connected Mathematics Project (CMP)* is a problem-centered mathematics curriculum designed for all students in grades 6–8. Each grade level of the curriculum is a full-year program and covers numbers, algebra, geometry/measurement, probability, and statistics. The program seeks to make connections within mathematics, between mathematics and other subject areas, and to the real world. The curriculum is divided into a sequenced set of units, each organized around different mathematical topics. The four to seven lessons in a unit each contain one to five problems that the teacher and students explore in class. Additional problem sets, called Applications, Connections, and Extensions, in each lesson help students practice, apply, connect, and extend their understanding and skills. Each lesson culminates in a Mathematical Reflections activity. According to the developers, the *CMP* addresses National Council of Teachers of Mathematics standards.

Research

Three studies of the *CMP* met the What Works Clearinghouse (WWC) evidence standards with reservations.[1] The three studies included over 26,000 students from grades 6–8 in about 100 schools located in northeastern, south central, midwestern, and western states.

Effectiveness

The *CMP* curriculum was found to have mixed effects on math achievement.

	Math achievement
Rating of effectiveness	Mixed effects
Improvement index[2]	Average: –2 percentile points Range: –12 to +11 percentile points

1. The evidence presented in this report is based on available research. Findings and conclusions may change as new research becomes available.
2. These numbers show the average and the range of improvement indices for all findings across two of the three studies. One additional study that showed a statistically significant positive effect is not included in the average and range.

Additional program information

Updating Previous Research

This report updates the previous WWC report on *CMP* that was released on the WWC website in November 2004. Since the release of the previous report, the WWC has updated its evidence standards and developed peer-reviewed procedures for addressing certain methodological flaws in original studies, such as mismatch between the unit of assignment and the unit analysis and lack of adjustment for multiple comparisons. These standards and procedures, when applicable, have been applied to studies included in the original *CMP* review. No new studies were identified for this updated report.

Developer and contact

The *CMP* was developed at Michigan State University by Glenda Lappan, James T. Fey, William F. Fitzgerald, Susan N. Friel, and Elizabeth D. Phillips. Email: cmp@math.msu.edu. Web: http://connectedmath.msu.edu. Telephone: (517) 432-2870. The curriculum is distributed by Pearson Prentice Hall. Web: http://phcatalog.pearson.com.

Scope of use

Pilot editions of *CMP* were used between 1991 and 1997 by approximately 160 teachers and 45,000 students in diverse settings across the United States. As of September 2004, it had been implemented in 2,462 school districts, covering all 50 states.

Teaching

This problem-centered curriculum is based on an inquiry model of instruction, which consists of three phases: launch, explore, and summarize. In the first phase, the teacher launches the problem with the whole class, introduces new ideas, clarifies definitions, reviews old concepts, and connects the problem to students' past experiences. In the explore phase, students work individually, in pairs or small groups, or occasionally as a whole class to solve the problem. In the summarize phase, students discuss their solutions as well as the strategies that they used to approach the problem, organize the data, and find the solution.

Intended as a three-year mathematics curriculum, *CMP* covers grades 6–8, providing eight student units for each grade level. Each student unit is organized around an important mathematical idea or cluster of related ideas and is divided into several investigations, with each investigation containing a series of problems. The implementation plan is based on a 45–60 minute class period and a 180-day school year. The *CMP* provides teacher guides specifically designed for each student unit. The teacher guides include discussions of the mathematics of the unit, instructional strategies, and assessment resources. The developer suggests that when a district uses the curriculum for the first time, it should establish a support system to all the *CMP* teachers in a building.

Cost

According to Pearson Prentice Hall, the publisher, the most recent edition of the *CMP* costs $8.47 per student and $20.97 per teacher unit. See the publisher for costs for other resources.

Research

Twenty-two studies reviewed by the WWC investigated the effects of *CMP*. Three studies (Ridgway, Zawojewski, Hoover, & Lambdin, 2002; Riordan & Noyce, 2001;[3] Schneider, 2000) were quasi-experimental designs that met WWC evidence standards with reservations. The remaining 19 studies did not meet WWC evidence screens.

Ridgway, Zawojewski, Hoover, & Lambdin (2002) included students in grades 6–8 from 18 schools located in the midwestern,

3. Riorden & Noyce (2001) also examined effects of the program *Everyday Mathematics*®. For further details of this analysis see the *Everyday Mathematics*® Intervention report.

Research *(continued)*

western, and eastern regions of the country. Students using the *CMP* curriculum were compared to students who did not use the curriculum.[4]

Riordan & Noyce (2001) included eighth-grade students from 50 schools in Massachusetts. Students using the *CMP* curriculum were compared to students who did not use the *CMP* program, but used different published textbook programs, which, in the aggregate, represented the instructional norm in Massachusetts.

Schneider (2000) included three cohorts of middle school students from 48 schools in Texas. Students using the *CMP* curriculum were compared to students who did not use the curriculum.

Effectiveness

Findings

The WWC review of interventions for middle school math addresses student outcomes in one domain: math achievement.

The Ridgway, Zawojewski, Hoover, & Lambdin (2002) study examined students' scores on the Iowa Test of Basic Skills (ITBS) and reported a statistically significant negative effect, favoring the comparison group; however, the WWC analysis did not confirm the statistical significance of this outcome. The study also examined total scores on the Balanced Assessment Test and reported statistically significant positive effects; however, this was not confirmed by the WWC. The average effect size for math achievement across study findings was not large enough to be considered substantively important. So, in this study, *CMP* had an indeterminate effect on math achievement, according to WWC criteria.

The Riordan & Noyce (2001) study examined total scores on the Massachusetts Comprehensive Assessment System (MCAS) and reported a statistically significant positive effect.

The Schneider (2000) study examined passing rates and students' scores on the Texas Learning Index using the Texas Assessment of Academic Skills (TAAS) and found no statistically significant effects. In addition, the average effect size across all outcomes for this study was neither statistically significant nor substantively important (that is, at least 0.25). So, in this study, *CMP* had an indeterminate effect on math achievement, according to WWC criteria.

Rating of effectiveness

The WWC rates the effects of an intervention in a given outcome domain as: positive, potentially positive, mixed, no discernible effects, potentially negative, or negative. The rating of effectiveness takes into account four factors: the quality of the research design, the statistical significance of the findings (as calculated by the WWC[5]), the size of the difference between participants in the intervention and the comparison conditions, and the consistency in findings across studies (see the WWC Intervention Rating Scheme).

The WWC found the *Connected Mathematics Project* to have mixed effects for math achievement

Improvement index

The WWC computes an improvement index for each individual finding. In addition, within each outcome domain, the WWC computes an average improvement index for each study and an average improvement index across studies (see Technical Details of WWC-Conducted Computations). The improvement index represents the difference between the percentile rank of the average student in the intervention condition versus

4. The WWC reviewed findings for students in grade 6 only as baseline data (that is, math achievement before exposure to the program took place) was not taken into account in this study.
5. The level of statistical significance was reported by the study authors, or where necessary, calculated by the WWC to correct for clustering within classrooms or schools and for multiple comparisons. For an explanation, see the WWC Tutorial on Mismatch. See Technical Details of WWC-Conducted Computations for the formulas the WWC used to calculate the statistical significance. In the case of *CMP,* corrections for clustering and multiple comparisons were needed.

The WWC found the *Connected Mathematics Project* to have mixed effects for math achievement *(continued)*

the percentile rank of the average student in the comparison condition. Unlike the rating of effectiveness, the improvement index is entirely based on the size of the effect, regardless of the statistical significance of the effect, the study design, or the analysis. The improvement index can take on values between –50 and +50, with positive numbers denoting favorable results. The average improvement index for math achievement is –2 percentile points across the three studies, with a range of –12 to +11 percentile points across findings in two of the three studies. One additional study that showed a statistically significant positive effect is not included in the average and range because a student-level improvement index could not be computed.

Summary

The WWC reviewed 22 studies on the *Connected Mathematics Project.* Three of these studies met WWC evidence standards with reservations; the remaining studies did not meet WWC evidence screens. Based on these three studies, the WWC found the program to have mixed effects on math achievement. The evidence presented in this report may change as new research emerges.

References

Met WWC evidence standards with reservations

Ridgway, J. E., Zawojewski, J. S., Hoover, M. N., & Lambdin, D. V. (2002). Student attainment in the Connected Mathematics curriculum. In S. L. Senk & D. R. Thompson (Eds.), *Standards-based school mathematics curricula: What are they? What do students learn?* (pp. 193–224). Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Additional source:

Hoover, M., Zawojewski, J. S., & Ridgway, J. E. (1997, April). *Effects of the Connected Mathematics Project on student attainment.* Paper presented at the meeting of the American Educational Research Association, Chicago, IL.

Riordan, J. E., & Noyce, P. E. (2001). The impact of two standards-based mathematics curricula on student achievement in Massachusetts. *Journal for Research in Mathematics Education, 32*(4), 368–398.

Schneider, C. L. (2000). Connected Mathematics and the Texas Assessment of Academic Skills. *Dissertation Abstracts International, 62*(02), 503A. (UMI No. 3004373)

Did not meet WWC evidence screens

Adams, L. M., Tung, K. K., Warfield, V. M., Knaub, K., Yong, D., & Mudavanhu, B. (2002). *Middle school mathematics comparisons for Singapore Mathematics, Connected Mathematics Program, and Mathematics in Context (including comparisons with the NCTM Principles and Standards 2000).* Retrieved from the University of Washington Department of Applied Mathematics Web site: http://www.amath.washington.edu/~adams/full.ps[6]

Bay, J. M., Beem, J. K., Reys, R. E., Papick, I., & Barnes, D. E. (1999). Student reactions to standards-based mathematics curricula: The interplay between curriculum, teachers, and students. *School Science and Mathematics, 99*(4), 182–188.[7]

Ben-Chaim, D., Fey, J. T., Fitzgerald, W. M., Benedetto, C., & Miller, J. (1997). *Development of proportional reasoning in a problem-based middle school curriculum.* College Park: University of Maryland, Department of Mathematics. (ERIC Document Reproduction Service No. ED412091)[8]

Ben-Chaim, D., Fey, J. T., Fitzgerald, W. M., Benedetto, C., & Miller, J. (1997, April). *A study of proportional reasoning among seventh and eighth grade students.* Paper presented

6. Outcome measures are not relevant to this review.
7. Does not use a strong causal design: this is a qualitative study.
8. Lack of evidence for baseline equivalence: the study, which used a quasi-experimental design, did not establish that the comparison group was equivalent to the intervention group at baseline.

References *(continued)*

at the meeting of the American Educational Research Association, Chicago, IL.[8]

Ben-Chaim, D., Fey, J. T., Fitzgerald, W. M., Benedetto, C., & Miller, J. (1998). Proportional reasoning among 7th grade students with different curricular experiences. *Educational Studies in Mathematics, 36*(3), 247–273.[8]

Cain, J. S. (2002). An evaluation of the Connected Mathematics Project. *Journal of Educational Research, 32*(4), 224–233.[8]

Clarkson, L. M. C. (2001). The effects of the Connected Mathematics Project on middle school mathematics achievement. *Dissertation Abstracts International, 61*(12), 4709A. (UMI No. 9997642)[9]

Griffith, L., Evans, A., & Trowell, J. (2000). *Arkansas grade 8 benchmark exam: How do Connected Mathematics schools compare to state data?* Little Rock: Arkansas State Department of Education.[8]

Krebs, A. S. (1999). Students' algebraic understanding: A study of middle grades students' ability to symbolically generalize functions. *Dissertation Abstracts International, 60*(06), 1949A. (UMI No. 9936570)[7]

Krebs, A. S. (2003). Middle grades students' algebraic understanding in a reform curriculum. *School Science and Mathematics, 103*(5), 233–245.[7]

Lapan, R. T., Reys, B. J., Barnes, D. E., & Reys, R. E. (1998, April). *Standards-based middle grade mathematics curricula: Impact on student achievement.* Paper presented at the meeting of the American Educational Research Association, San Diego, CA.[8]

Lapan, R., Reys, B., Reys, R., & Holliday, G. (2001). *Assessing the performance of middle grade students using standards-based mathematics instructional materials.* (Available from the University of Missouri, 121 Townsend Hall, Columbia, MO 65211)[9]

Lubienski, S. T. (2000). A clash of social class cultures? Students' experiences in a discussion-intensive seventh-grade mathematics classroom. *Elementary School Journal, 100*(4), 377–403.[7]

Lubienski, S. T. (2000). Problem solving as a means toward mathematics for all: An exploratory look through a class lens. *Journal for Research in Mathematics Education, 31*(4), 455–482.[7]

O'Neal, S. W., & Robinson-Singer, C. (2003). *The Arkansas statewide systemic initiative pilot of the Connected Mathematics Project: An evaluation report.* Albuquerque, NM: Accountability & Development Associates, Inc.[8]

Reys, R., Reys, B., Lapan, R., Holliday, G., & Wasman, D. (2003). Assessing the impact of standards-based middle grades mathematics curriculum materials on student achievement. *Journal for Research in Mathematics Education, 34*(1), 74–95.[9]

Additional source:

Reys, R., Reys, B., Lapan, R., Holliday, G., & Wasman, D. (2004). Assessing the impact of standards-based middle grades mathematics curriculum materials on student achievement: Corrections. *Journal for Research in Mathematics Education, 35*(2), 152.

Rickard, A. (1995). Teaching with problem-oriented curricula: A case study of middle-school mathematics instruction. *The Journal of Experimental Education, 64*(1), 5.[7]

Wasman, D. G. (2000). An investigation of algebraic reasoning of seventh- and eighth-grade students who have studied from the Connected Mathematics Project curriculum. *Dissertation Abstracts International, 61*(09), 3498A. (UMI No. 9988711)[8]

Winking, D. (1998). *The Minneapolis Connected Mathematics Project: Year two evaluation.* Retrieved from the Minneapolis Public Schools, Teacher and Instructional Services Web site: http://tis.mpls.k12.mn.us/sites/5df1b159-7ce3-4aa3-8e71-8e60a7b98e6c/uploads/connected_mathematics_2.pdf[8]

9. Confound: there was only one unit of assignment in each study condition, so the analysis could not separate the effects of the intervention from the effects of the unit of assignment.

Additional sources:

Winking, D. (2000). *Minneapolis data: Excerpts from the year two evaluation report.* (Available from the Connected Mathematics Project, Michigan State University, A715 Wells Hall, East Lansing, MI 48824)

Winking, D. (2000). *Minneapolis data: Excerpts from the year one evaluation report.* (Available from the Connected Mathematics Project, Michigan State University, A715 Wells Hall, East Lansing, MI 48824)[8]

Zawojewski, J. S., Robinson, M., & Hoover, M. (1999). Reflections on developing formal mathematics and the Connected Mathematics Project. *Mathematics Teaching in the Middle School, 4*(5), 324–330.[7]

For more information about specific studies and WWC calculations, please see the [WWC *Connected Mathematics Project* Technical Appendices].

Appendix

Appendix A1.1 Study characteristics: Ridgway, Zawojewski, Hoover, & Lambdin, 2002 (quasi-experimental design)

Characteristic	Description
Study citation	Ridgway, J. E., Zawojewski, J. S., Hoover, M. N., & Lambdin, D. V. (2002). Student attainment in the Connected Mathematics curriculum. In S. L. Senk & D. R. Thompson (Eds.), *Standards-based school mathematics curricula: What are they? What do students learn?* Mahwah, N.J.: Lawrence Erlbaum Associates, Inc.
Participants	The 1994/95 sample included over 340 sixth graders and 630 seventh graders from 9 *CMP* schools (2 classrooms per grade from each school), and 160 sixth graders and 250 seventh graders from 9 comparison schools (1 classroom per grade from each school).[1] The 1995/96 sample included over 780 eighth-graders from an unspecified number of *CMP* schools and 300 eighth graders from an unspecified number of comparison schools. Some students were included in both the 1994/95 sample and the 1995/96 sample. Demographic characteristics of the participants are not reported. The WWC review only included findings from the sixth grade, because baseline data were available only for the sixth-grade students and not for the other grade levels.
Setting	Participating classrooms were from schools located in the midwestern, western, and eastern regions of the country.
Intervention	Teachers in the intervention group were using the *CMP* as the core curriculum throughout the school year. The study authors did not report how the program was actually implemented in those classrooms. All the sixth-grade students in the study were new to the program, and about three-fourths of the seventh- and eighth-grade students in the study had used the program in the previous year.
Comparison	Teachers in the comparison group did not implement the *CMP,* nor were they involved in any reform efforts. Data were not available about the mathematics textbook series used by those teachers.
Primary outcomes and measurement	Math achievement was assessed using the Iowa Test of Basic Skills (ITBS) Survey Battery and Balanced Assessment (BA) Test (see Appendix A2 for more detailed descriptions of the outcome measure).
Teacher training	All *CMP* teachers attended the summer *CMP* institutes at Michigan State University.

1. The WWC requested and received from one of the study authors information about the number of schools that participated in the study.

Appendix A1.2 Study characteristics: Riordan & Noyce, 2001 (quasi-experimental design)

Characteristic	Description
Study citation	Riordan, J. E., & Noyce, P. E. (2001). The impact of two standards-based mathematics curricula on student achievement in Massachusetts. *Journal for Research in Mathematics Education, 32*(4), 368–398.
Participants	This study looked at 20 *CMP* schools with 1,879 eighth-graders and 30 matched comparison schools with 4,978 eighth-graders. Overall, 10% of the student participants were eligible for free or reduced-price lunches, and 87% were white. All students were regular education students.[1]
Setting	This study included relatively advantaged middle schools with predominantly white students and a low percentage of students receiving free or reduced-price lunches in Massachusetts.
Intervention	Schools in the intervention group had implemented at least 11 student units in grades 6–8 by 1998/99, but none of the schools implemented all eight units that the *CMP* has available for each grade. Further, it is not clear how the program was actually implemented in those schools. The 20 schools in the intervention group had implemented the program for two to three years.
Comparison	The 30 comparison schools did not implement the *CMP,* but used 15 different textbook programs, which, in the aggregate, represented the instructional norm in Massachusetts. The most commonly used programs were those published by Heath, Addison-Wesley, Prentice Hall, and Houghton-Mifflin.
Primary outcomes and measurement	Math achievement was measured using the Massachusetts Comprehensive Assessment System (see Appendix A2 for more detailed descriptions of the outcome measure).
Teacher training	No information about teacher training was provided.

1. This study also included an additional separate examination of a single intervention school that has been using the program for four years and its four comparison schools. Because the results of students in the single intervention schools were confounded with the school site, this analysis was not included in the WWC review.

Appendix A1.3 Study characteristics: Schneider, 2000 (quasi-experimental design)

Characteristic	Description
Study citation	Schneider, C. L. (2000). Connected Mathematics and the Texas Assessment of Academic Skills. *Dissertation Abstracts International, 61*(12), 4709A. (UMI No. 9997642).
Participants	The study included 3 cohorts from 23 *CMP* schools and 25 matched comparison schools overall. Cohort 1 was from 23 intervention and 19 comparison schools. Cohort 2 was from 22 intervention and 19 comparison schools. Cohort 3 was from 18 intervention and 18 comparison schools. For TAAS TLI scores, data was collected from 16 schools per condition (*CMP,* comparison) and per cohort (that is, cohort 1, cohort 2, cohort 3), because six schools were omitted from the analysis due to missing data or because the intervention was discontinued. Not all cohorts participated in every analysis because different grade levels were followed through for each cohort.
Setting	The participating schools were located in rural, suburban, and urban and both low and high socioeconomic areas of Texas. Those schools varied in the racial composition, socioeconomic status, special education status, and English language learner status of the student populations that they served. Many of the schools had predominantly minority student populations.
Intervention	Schools in the intervention group were using the *CMP* for grades 6–8. There were substantial variations in the extent to which the curriculum was used at each grade and each year across these schools. The three cohorts in the intervention group received the *CMP* for three years, two years, and one year, respectively, between 1996/97 and 1998/99.
Comparison	The 25 comparison schools did not implement the *CMP,* and it is unclear what mathematics curricula they were using.
Primary outcomes and measurement	Students' mathematic achievement was measured using the Texas Assessment of Academic Skills (TAAS) passing rate and Texas Learning Index (TLI) (see Appendix A2 for more detailed descriptions of the outcome measures).
Teacher training	Teachers who taught grade 6, 7, or 8 at the 23 *CMP* schools participated in a six-day summer professional development conducted by the Texas Statewide Systemic Initiative in 1996, 1997, and 1998.

Appendix A2 Outcome measures in the math achievement domain

Outcome measure	Description
Iowa Test of Basic Skills (ITBS)	The ITBS is a norm-referenced state standardized test. The mathematics sections measure the following math abilities: problem solving, data interpretation, math concepts, estimation, and computation (as cited in Ridgway, Zawojewski, Hoover, & Lambdin, 2002). The Ridgway et al. (2002) study used the ITBS Survey Battery Form K (levels 12,13, and 14).
Balanced Assessment (BA) Test	The BA test was designed to assess students' math achievement in a variety of curricular areas through constructed-response items that require a range of responses from short answer to extended response. It was developed through the collaboration between the *CMP* developer and the Balanced Assessment Project (as cited in Ridgway et al., 2002).
Massachusetts Comprehensive Assessment System (MCAS)	The MCAS is a criterion-referenced state standardized test that includes both multiple-choice and open-response questions (as cited in Riordan & Noyce, 2001).
Texas Assessment of Academic Skills (TAAS)—passing rates	The TAAS is a criterion-referenced state standardized test that measures problem-solving and critical-thinking skills. The passing rate is the percentage of students that reached a proficient level (as cited in Schneider, 2000).
Texas Assessment of Academic Skills (TAAS)—Texas Learning Index (TLI)	The TAAS is a criterion-referenced state standardized test that measures problem-solving and critical-thinking skills. TLI is a TAAS-based statistic designed for comparing student progress between administrations and between grades (as cited in Schneider, 2000).

Appendix A3 Summary of study findings included in the rating for the math achievement domain[1]

			Authors' findings from the study		WWC calculations			
			Mean outcome (standard deviation[2])					
Outcome measure	Study sample	Sample size (schools/students)	*CMP* group[3]	Comparison group	Mean difference[4] (*CMP* – comparison)	Effect size[5]	Statistical significance[6] (at $\alpha = 0.05$)	Improvement index[7]
Ridgway, Zawojewski, Hoover, & Lambdin, 2002 (quasi-experimental design)[8]								
ITBS	Grade 6	18/500	8.10 (2.30)	8.60 (2.70)	–0.50	–0.20	ns	–8
Balanced Assessment Test	Grade 6	18/500	21.50 (12.60)	18.10 (11.90)	3.40	0.27	ns	+11
Average[9] for math achievement (Ridgway, Zawojewski, Hoover, & Lambdin, 2002)						0.04	ns	+1
Riordan & Noyce, 2001 (quasi-experimental design)[8]								
MCAS	Grade 8	50/6,857	238.20 (9.08)	233.85 (10.57)	4.35	na[10]	Statistically significant	na[10]
Average[9] for math achievement (Riordan & Noyce, 2001)						na[10]	Statistically significant	na[10]
Schneider, 2000 (quasi-experimental design)[8]								
TAAS TLI score	Grade 6–8 (Cohort 1)	32/5,701	73.20 (6.37)	72.90 (5.46)	0.30	0.05	ns	+2
TAAS TLI score	Grades 6–7 (Cohort 2)	32/6,461	72.30 (6.59)	74.20 (5.29)	–1.90	–0.32	ns	–12
TAAS TLI score	Grade 6 (Cohort 3)	32/7,339	73.60 (5.41)	74.50 (6.37)	–0.90	–0.15	ns	–6
Average[9] for math achievement (Schneider, 2000)						–0.14	ns	–6
Domain average[9] for academic achievement across all studies						–0.05	na	–2

ns = not statistically significant
na = not applicable

1. This appendix reports findings considered for the effectiveness rating and the average improvement indices. Additional findings are presented in Appendix A4.
2. The standard deviation across all students in each group shows how dispersed the participants' outcomes are: a smaller standard deviation on a given measure would indicate that participants had more similar outcomes. Means and standard deviations for the Riordan & Noyce (2001) and Schneider (2000) studies were received from the study authors.
3. In the Ridgeway et al. (2002) study, the *CMP* group mean equals the comparison group mean plus the mean difference. The computation of the mean difference took into account the pretest difference between the study groups.
4. Positive differences and effect sizes favor the intervention group; negative differences and effect sizes favor the comparison group.
5. For an explanation of the effect size calculation, see Technical Details of WWC-Conducted Computations.
6. Statistical significance is the probability that the difference between groups is a result of chance rather than a real difference between the groups.

(continued)

7. The improvement index represents the difference between the percentile rank of the average student in the intervention condition and the percentile rank of the average student in the comparison condition. The improvement index can take on values between –50 and +50, with positive numbers denoting favorable results.
8. The level of statistical significance was reported by the study authors, or where necessary, calculated by the WWC to correct for clustering within classrooms or schools and for multiple comparisons. For an explanation about the clustering correction, see the WWC Tutorial on Mismatch. See Technical Details of WWC-Conducted Computations for the formulas the WWC used to calculate statistical significance. In the case of Ridgway, Zawojewski, Hoover, & Lambdin (2002) corrections for clustering and multiple comparisons were needed, so the significance levels may differ from those reported in the original study. In the case of Schneider (2000), corrections for clustering and multiple comparisons were not needed. Riordan & Noyce (2001) examined student outcomes for low socioeconomic status (SES) students and for male and female students separately, and reported statistically significant positive effects favoring the *CMP* group for low-SES and female students. The results of these analyses were not included for rating purposes because of overlap with results for the entire sample. In addition, standard deviations were not available for this subset of findings.
9. The WWC-computed average effect sizes for each study and for the domain across studies are simple averages rounded to two decimal places. The average improvement indices are calculated from the average effect size.
10. Student-level standard deviations were not available for this study. School-level standard deviations were 9.08 for the intervention group and 10.57 for the comparison group. Because the student-level effect size and improvement index could not be computed, the magnitude of the effect size was not considered for rating purposes. However, the statistical significance for this study is comparable to other studies and is included in the intervention rating. For further details, please see Technical Details of WWC-Conducted Computations.

Appendix A4 Summary of additional findings for the math achievement domain[1]

Outcome measure	Study sample	Sample size (schools/ students)	Authors' findings from the study: Mean outcome (standard deviation[2]): *CMP* group	Authors' findings from the study: Mean outcome (standard deviation[2]): Comparison group	WWC calculations: Mean difference[3] (*CMP* – comparison)	WWC calculations: Effect size[4]	WWC calculations: Statistical significance[5] (at $\alpha = 0.05$)	WWC calculations: Improvement index[6]
Schneider, 2000 (quasi-experimental design)[7]								
TAAS pass rates	Grade 8 (Cohort 1)	48/1,440	80 percent of students (na)	86 percent of students (na)	0.65	–0.26	ns	–10
TAAS pass rates	Grade 7 (Cohort 2)	42/1,260	76 percent of students (na)	83 percent of students (na)	0.65	–0.26	ns	–10
TAAS pass rates	Grade 6 (Cohort 3)	42/1,260	78 percent of students (na)	82 percent of students (na)	0.78	–0.15	ns	–6

ns = not statistically significant
na = not applicable

1. This appendix presents additional findings for the TAAS measure. Findings on TLI scores generated from the same measure were used for rating purposes and are presented in Appendix A3.
2. The standard deviation across all students in each group shows how dispersed the participants' outcomes are: a smaller standard deviation on a given measure would indicate that participants had more similar outcomes.
3. Positive differences and effect sizes favor the intervention group; negative differences and effect sizes favor the comparison group.
4. Effect sizes for the binary outcome measure of TAAS pass rates in Schneider (2000) were calculated using the odds ratio formula and converted to standardized mean difference. For an explanation of the effect size calculation, see Technical Details of WWC-Conducted Computations.
5. Statistical significance is the probability that the difference between groups is a result of chance rather than a real difference between the groups.
6. The improvement index represents the difference between the percentile rank of the average student in the intervention condition and the percentile rank of the average student in the comparison condition. The improvement index can take on values between –50 and +50, with positive numbers denoting favorable results.
7. The level of statistical significance was reported by the study authors, or where necessary, calculated by the WWC to correct for clustering within classrooms or schools (corrections for multiple comparisons were not done for findings not included in the overall intervention rating). For an explanation about the clustering correction, see the WWC Tutorial on Mismatch. See Technical Details of WWC-Conducted Computations for the formulas the WWC used to calculate statistical significance. In the case of Schneider (2000), no correction for clustering was needed.

Appendix A5 *Connected Mathematics Project* rating for the math achievement domain

The WWC rates the effects of an intervention for a given outcome domain as: positive, potentially positive, mixed, no discernible effects, potentially negative, or negative.[1]

For the outcome domain of math achievement, the WWC rated *CMP* as having mixed effects. It did not meet the criteria for positive effects or potentially positive effects because only one study showed a statistically significant positive effect and two studies showed indeterminate effects. The remaining ratings (no discernible effects, potentially negative effects, or negative effects) were not considered as *CMP* was assigned the highest applicable rating.

Rating received

Mixed effects: Evidence of inconsistent effects as demonstrated through either of the following criteria.

- Criterion 1: At least one study showing a statistically significant or substantively important *positive* effect, and at least one study showing a statistically significant or substantively important *negative* effect, but no more such studies than the number showing a statistically significant or substantively important *positive* effect.

  Not met. No studies showed a statistically significant or substantively important negative effect.

- Criterion 2: At least one study showing a statistically significant or substantively important effect, and more studies showing an *indeterminate* effect than showing a statistically significant or substantively important effect.

  Met. One of the three studies meeting standards with reservations showed a statistically significant positive effect; the remaining two studies showed an indeterminate effect.

Other ratings considered

Positive effects: Strong evidence of a positive effect with no overriding contrary evidence.

- Criterion 1: Two or more studies showing statistically significant *positive* effects, at least one of which met WWC evidence standards for a strong design.

  Not met. No studies met WWC evidence standards for a strong design.

- Criterion 2: No studies showing statistically significant or substantively important *negative* effects.

  Met. No studies showed statistically significant or substantively important negative effects.

Potentially positive effects: Evidence of a positive effect with no overriding contrary evidence.

- Criterion 1: At least one study showing a statistically significant or substantively important *positive* effect.

  Met. One study that met standards with reservations showed a statistically significant positive effect.

- Criterion 2: No studies showing a statistically significant or substantively important *negative* effect and fewer or the same number of studies showing *indeterminate* effects than showing statistically significant or substantively important *positive* effects.

  Not met. No studies showed statistically significant or substantively important negative effects. Two of the three studies showed indeterminate effects, and only one study showed a statistically significant positive effect.

1. For rating purposes, the WWC considers the statistical significance of individual outcomes and the domain level effects. The WWC also considers the size of the domain level effects for ratings of potentially positive or potentially negative effects. See the WWC Intervention Rating Scheme for a complete description.