

# What Works Clearinghouse



Middle School Math

March 2010

## PLATO® Achieve Now

### Program Description<sup>1</sup>

PLATO® Achieve Now is a software-based curriculum for the elementary and middle school grades. Instructional content is delivered via the PlayStation Portable (PSP®) system, allowing students to access learning materials in various settings. Software-based assessments are used to customize individual

instruction, allowing students to learn at their own pace with content appropriate for their skill level. PLATO® Achieve Now is aligned with the National Council of Teachers of Mathematics guidelines.

### Research<sup>2</sup>

One study of PLATO® Achieve Now meets What Works Clearinghouse (WWC) evidence standards and no studies meet WWC evidence standards with reservations. The one study included 1,037 sixth-grade students in 13 schools in three districts across the United States.<sup>3</sup>

Based on this one study, the WWC considers the extent of evidence for PLATO® Achieve Now to be small for math achievement.

### Effectiveness

PLATO® Achieve Now was found to have no discernible effects on math achievement.

Math Achievement	
Rating of effectiveness	No discernible effects
Improvement index <sup>4</sup>	Average: -1 percentile point

1. The descriptive information for this program was obtained from publicly available sources: the program's website (<http://www.plato.com/Products/PLATO-Achieve-Now-on-PSP/PLATO-Achieve-Now-on-PSP-Mathematics.aspx>, downloaded June 2009) and Campuzano et. al. (2009). The WWC requests developers to review the program description sections for accuracy from their perspective. Further verification of the accuracy of the descriptive information for this program is beyond the scope of this review.
2. The studies in this report were reviewed using WWC Evidence Standards, Version 1.0 (see the WWC Standards).
3. The evidence presented in this report is based on available research. Findings and conclusions may change as new research becomes available.
4. These numbers show the average and range of student-level improvement indices for all findings across the study.

## Absence of conflict of interest

The studies Campuzano, Dynarski, Agodini, and Rall (2009) and Dynarski et. al. (2007), cited in the references section below, were prepared, in whole or in part, by staff of Mathematica Policy Research (MPR). Because the deputy principal investigator for the WWC review of Middle School Math is also a MPR

staff member, the study was rated by staff members from other organizations, who also prepared the intervention report. The report was then reviewed by the principal investigator, a WWC Quality Assurance reviewer, and an external peer reviewer.

## Additional program information

### Developer and contact

*PLATO® Achieve Now* was developed and distributed by PLATO Learning, Inc. The product is no longer for sale.

### Scope of use

No scope of use statistics are available.

### Teaching

The instructional content of *PLATO® Achieve Now* is delivered via the PlayStation Portable (PSP®) system. The program is designed to deliver instructional content to students in various contexts, including during the school day, in after-school programs, and at home.

*PLATO® Achieve Now* focuses on pre-algebraic concepts and includes content pertaining to rational numbers in related organizational patterns, proportion and percent, integers, probability, statistics, problem solving, geometry, measurement, and the foundational concepts of algebra I. *PLATO® Achieve Now* is designed for the elementary and middle school grades.

Students use the product for independent practice and reinforcement of math skills. The curriculum utilizes an individualized, competency-based mastery model to guide student progression through the materials. The instructional aspects of the program include interactive games, as well as school and home learning activities. Software-based assessments are used to customize instruction to individual students. Based on the assessments, students work at their own pace on activities identified by the teacher, with content appropriate for their skill level. Recommended usage is 30 minutes per day, four days a week, for at least 10 weeks.

Teachers receive training through web-based meetings and online self-tutorials. Ongoing support during the school year is also provided. *PLATO® Achieve Now* is aligned with the National Council of Teachers of Mathematics guidelines.

### Cost

This product is no longer for sale.

## Research

Thirteen studies reviewed by the WWC investigated the effects of *PLATO® Achieve Now*. One study (Campuzano, Dynarski, Agodini, & Rall, 2009) is a randomized controlled trial that meets WWC evidence standards. The remaining 12 studies do not meet either WWC evidence standards or eligibility screens.

### Meets evidence standards

Campuzano, Dynarski, Agodini, and Rall (2009) investigated the effect of *PLATO® Achieve Now* on math achievement in 13 schools in three districts that randomly assigned teachers and

their classes to the *PLATO® Achieve Now* intervention group (regular classroom instruction supplemented with the *PLATO® Achieve Now* intervention) or to the control condition during the 2004–2005 or 2005–2006 school year. The study included 1,037 sixth-grade regular education students (547 *PLATO® Achieve Now* and 490 control) taught by 39 teachers (21 *PLATO® Achieve Now* and 18 control). Of these 39 teachers, 19 were in the study for 2004–2005 only, 18 teachers were in the study for 2004–2005 and 2005–2006, and 2 teachers were in the study for 2005–2006 only. Student test scores in classrooms with

## **Research (continued)**

teachers supplementing instruction with *PLATO® Achieve Now* were compared with student test scores in classrooms with teachers in the control condition, who taught math as they would normally, which could include technology products already available to those teachers.

### **Extent of evidence**

The WWC categorizes the extent of evidence in each domain as small or medium to large (see the WWC Procedures and

## **Effectiveness**

### **Findings**

The WWC review of interventions for Middle School Math addresses student outcomes in the math achievement domain. The findings below present the authors' estimates and WWC-calculated estimates of the size and the statistical significance of the effects of *PLATO® Achieve Now* on students.<sup>6</sup>

### **Math Achievement**

Campuzano, Dynarski, Agodini, and Rall (2009) reported negative but not statistically significant effects of *PLATO® Achieve Now* on math achievement based on the Stanford Achievement Test–Tenth Edition (SAT–10), the Iowa Test of Basic Skills (ITBS), and the New Mexico Standards Based Assessment (NMSBA).<sup>7</sup> The authors reported all effects in normal curve equivalent (NCE) units. The WWC confirmed that these negative effects were neither statistically significant nor large enough to be considered

## **The WWC found *PLATO® Achieve Now* to have no discernible 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

5. The extent of evidence categorization was developed to tell readers how much evidence was used to determine the intervention rating, focusing on the number and size of studies. Additional factors associated with a related concept—external validity, such as the students' demographics and the types of settings in which studies took place—are not taken into account for the categorization. Information about how the extent of evidence rating was determined for *PLATO® Achieve Now* is in Appendix A5.
6. The level of statistical significance was reported by the study authors or, when 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. For the formulas the WWC used to calculate the statistical significance, see WWC Procedures and Standards Handbook, Appendix C for clustering and WWC Procedures and Standards Handbook, Appendix D for multiple comparisons. In the case of Campuzano, Dynarski, Agodini, and Rall (2009), no corrections for clustering or multiple comparisons were needed.
7. All three exams were not used in each district; rather, districts used at least one of the three exams as the pretest and/or posttest measure.

Standards Handbook, Appendix G). The extent of evidence takes into account the number of studies and the total sample size across the studies that meet WWC evidence standards with or without reservations.<sup>5</sup>

The WWC considers the extent of evidence for *PLATO® Achieve Now* to be small for math achievement.

substantively important by WWC criteria (an effect size of at least 0.25).

In sum, in the math achievement domain, the WWC reviewed findings from one study which showed indeterminate effects.

### **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, the size of the difference between participants in the intervention and the comparison conditions, and the consistency in findings across studies (see the WWC Procedures and Standards Handbook, Appendix E).

average improvement index across studies (see WWC Procedures and Standards Handbook, Appendix F). The improvement index represents the difference between the percentile rank of the average student in the intervention condition and the

**The WWC found PLATO® Achieve Now to have no discernible effects for math achievement (continued)**

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 for the intervention group.

The average improvement index for math achievement is -1 percentile point based on the sole finding from one study.

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**References**

**Meets WWC evidence standards**

Campuzano, L., Dynarski, M., Agodini, R., & Rall, K. (2009). *Effectiveness of reading and mathematics software products: Findings from two student cohorts* (NCEE 2009-4041). Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education.

**Additional source:**

Dynarski, M., Agodini, R., Heavside, S., Novak, T., Carey, N., Campuzano, L., Means, B., Murphy, R., Penuel, W., Javitz, H., Emery, D., & Sussex, W. (2007). *Effectiveness of reading and mathematics software products: Findings from the first student cohort*. Washington, DC: U.S. Department of Education, Institute of Education Sciences.

**Studies that fall outside the Middle School Math review protocol or do not meet WWC evidence standards**

PLATO Learning. (n.d.). *Evaluation study: Camden City School District*. Retrieved April 23, 2008, from <http://www.plato.com/media/Evaluation%20Studies/C/Camden%20City%20School%20District.pdf>. The study is ineligible for review because it does not use a comparison group.

PLATO Learning. (n.d.). *Evaluation study: Carver Middle School: Chicago Public School District*. Retrieved April 23, 2008, from <http://www.plato.com/media/Evaluation%20Studies/C/Carver%20Middle%20School.pdf>. The study is ineligible for review because it does not use a comparison group.

**Summary**

The WWC reviewed 13 studies on PLATO® Achieve Now. One of these studies meets WWC evidence standards; the remaining 12 studies do not meet either WWC evidence standards or eligibility screens. Based on the one study, the WWC found no discernible effects for the math achievement domain. The conclusions presented in this report may change as new research emerges.

PLATO Learning. (n.d.). *Evaluation study: De Anza Junior High School*. Retrieved April 23, 2008, from <http://www.plato.com/media/Evaluation%20Studies/D/De%20Anza%20Junior%20High%20School.pdf>. The study is ineligible for review because it does not use a comparison group.

PLATO Learning. (n.d.). *Evaluation study: Electronic classroom of tomorrow*. Retrieved April 23, 2008, from <http://www.plato.com/media/Evaluation%20Studies/E/Electronic%20Classroom%20of%20Tomorrow.pdf>. The study is ineligible for review because it does not use a comparison group.

PLATO Learning. (n.d.). *Evaluation study: Frederick Douglass Academy*. Retrieved April 23, 2008, from <http://www.plato.com/media/Evaluation%20Studies/F/Fredrick%20Douglass%20Academy.pdf>. The study is ineligible for review because it does not use a comparison group.

PLATO Learning. (n.d.). *Evaluation study: Joshua Middle School*. Retrieved April 23, 2008, from <http://www.plato.com/media/Evaluation%20Studies/J/Joshua%20Middle%20School.pdf>. The study is ineligible for review because it does not use a comparison group.

PLATO Learning. (n.d.). *Evaluation study: Paterson Public Schools*. Retrieved April 29, 2008, from <http://www.plato.com/media/Evaluation%20Studies/P/Paterson%20Public%20Schools.pdf>. The study is ineligible for review because it does not use a comparison group.

PLATO Learning. (n.d.). *Evaluation study: Rod Paige Middle School*. Retrieved April 23, 2008, from

## References (continued)

- http://www.plato.com/media/Evaluation%20Studies/R/Rod%20Paige%20Middle%20School.pdf. The study is ineligible for review because it does not use a comparison group.
- PLATO Learning. (n.d.). *Evaluation study: Saluda Middle School*. Retrieved April 23, 2008, from http://www.plato.com/media/Evaluation%20Studies/S/Saluda%20Middle%20School.pdf. The study is ineligible for review because it does not use a comparison group.
- PLATO Learning. (n.d.). *Evaluation study: Schrum Memorial Middle School*. Retrieved April 23, 2008, from http://www.plato.com/media/Evaluation%20Studies/S/Schrum%20Memorial%20Middle%20School.pdf. The study is ineligible for review because it does not use a comparison group.
- Memorial%20Middle%20School.pdf. The study is ineligible for review because it does not use a comparison group.
- PLATO Learning. (n.d.). *Evaluation study: Wilson Junior High School*. Retrieved April 23, 2008, from http://www.plato.com/media/Evaluation%20Studies/W/Wilson%20Junior%20High%20School.pdf. The study is ineligible for review because it does not use a comparison group.
- Poore, J. H., & Hamblen, J. W. (1983). Improvement of basic mathematical skills with PLATO: An experiment. *Association for Educational Data Systems Journal*, 24, 224–259. The study is ineligible for review because it does not use a comparison group.

# Appendix

## Appendix A1 Study characteristics: Campuzano, Dynarski, Agodini, & Rall, 2009 (randomized controlled trial)

Characteristic	Description
<b>Study citation</b>	Campuzano, L., Dynarski, M., Agodini, R., & Rall, K. (2009). <i>Effectiveness of reading and mathematics software products: Findings from two student cohorts (NCEE 2009-4041)</i> . Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education. <i>Additional source:</i> Dynarski, M., Agodini, R., Heaviside, S., Novak, T., Carey, N., Campuzano, L., Means, B., Murphy, R., Penuel, W., Javitz, H., Emery, D., & Sussex, W. (2007). <i>Effectiveness of reading and mathematics software products: Findings from the first student cohort</i> . Washington, DC: U.S. Department of Education, Institute of Education Sciences.
<b>Participants</b>	The study sample included 1,037 sixth-grade students (547 <i>PLATO® Achieve Now</i> ; 490 control) taught by 39 teachers (21 <i>PLATO® Achieve Now</i> ; 18 control) in 13 schools across three districts in multiple states across the country during the 2004–05 and 2005–06 school years. Of the study sample, approximately 53% were female (52% <i>PLATO® Achieve Now</i> and 55% control), 74% received free or reduced-price lunch (not reported by intervention status), 42% were Hispanic (not reported by intervention status), and 40% were African-American (not reported by intervention status). Approximately 80% of the teachers in the study were female (81% <i>PLATO® Achieve Now</i> ; 78% control) with an average of 11 years of teaching experience (9 years <i>PLATO® Achieve Now</i> ; 13 years control) and 33% of whom obtained a master's degree (24% <i>PLATO® Achieve Now</i> ; 44% control).
<b>Setting</b>	The study took place in 13 schools in three districts in multiple states across the country.
<b>Intervention</b>	Students were taught using <i>PLATO® Achieve Now</i> during the 2004–05 and/or 2005–06 school years. <i>PLATO® Achieve Now</i> supplemented standard mathematics instruction for the treatment group. According to the study authors, <i>PLATO® Achieve Now</i> students used the product for independent practice and reinforcement of math skills. Students worked at their own pace on activities identified by the teacher. According to the authors, the recommended usage is 30 minutes per day, four days per week, for at least 10 weeks.
<b>Comparison</b>	Comparison students were taught in traditional classes, with the teachers utilizing any technology products already available to them.
<b>Primary outcomes and measurement</b>	The primary outcome measures in Year 2 of the study were the Stanford Achievement Test–Tenth Edition (SAT–10), the Iowa Test of Basic Skills (ITBS), and the New Mexico Standards Based Assessment (NMSBA). Districts in this study used at least one of these three exams as the outcome measure to obtain pretest and/or posttest scores. The study authors converted the scale scores from these tests to normal curve equivalent (NCE) scores with a range of 1 to 99 and an average of 50 to standardize the measures across tests and cohorts. For a more detailed description of these outcome measures, see Appendix A2.
<b>Staff/teacher training</b>	Vendor training sessions generally took place in host districts, and sometimes host schools, during the summer or early fall of 2004. The initial training lasted about 6 hours and varied by product from 4 hours to about 8 hours. Vendors delivered ongoing support in several modes. Product representatives visited teachers; vendors also provided support through email, telephone help desks, and additional training at schools.

## **Appendix A2      Outcome measures for the math achievement domain**

<b>Outcome measure</b>	<b>Description</b>
<b>Stanford Achievement Test–Tenth Edition (SAT–10)</b>	The SAT–10 is a commercially available standardized test that measures number sense and operations, patterns, relationships, algebra, geometry, measurement, data, statistics, and probability. The study authors converted the scale scores from the SAT–10 math test to normal curve equivalent scores to standardize the measures across tests and cohorts (as cited in Campuzano, Dynarski, Agodini, & Rall, 2009).
<b>Iowa Test of Basic Skills (ITBS)</b>	The ITBS is a group-administered, norm-referenced battery of achievement tests for students in kindergarten through eighth-grade. The tests are ordered by levels ranging from 5 to 14, which correspond to the targeted age of the students. The sixth-grade level of the math test measures number properties and operations, algebra, geometry, measurement, probability and statistics, and estimation. The study authors converted the scale scores from the ITBS math test to normal curve equivalent scores to standardize the measures across tests and cohorts (as cited in Campuzano, Dynarski, Agodini, & Rall, 2009).
<b>New Mexico Standards Based Assessment (NMSBA)</b>	The NMSBA is a criterion-referenced test. The math section measures number and operations, algebra, geometry, measurement, data analysis, and probability. Items were aligned to the New Mexico K–12 content standards, benchmarks, and performance standards. The study authors converted the scale scores from the NMSBA math test to normal curve equivalent scores to standardize the measures across tests and cohorts (as cited in Campuzano, Dynarski, Agodini, & Rall, 2009).

## Appendix A3 Summary of study findings included in the rating for the math achievement domain<sup>1</sup>

Outcome measure	Study sample	Sample size (teachers/students)	Authors' findings from the study		WWC calculations			
			PLATO® Achieve Now group <sup>3</sup>	Mean outcome (standard deviation) <sup>2</sup>	Comparison group <sup>4</sup>	Mean difference <sup>5</sup> (PLATO® Achieve Now-comparison)	Effect size <sup>6</sup>	Statistical significance <sup>7</sup> (at $\alpha = 0.05$ )
<b>Campuzano, Dynarski, Agodini, &amp; Rall, 2009 (randomized controlled trial)<sup>9</sup></b>								
Math NCE <sup>10</sup>	Grade 6	39/1,037	50.09 (18.44)	50.67 (19.38)	-0.58	-0.03	ns	-1
<b>Domain average for math achievement<sup>11</sup></b>								
<b>-0.03</b>								

ns = not statistically significant

na = not applicable

NCE = normal curve equivalent

1. This appendix reports findings considered for the effectiveness rating and the average improvement indices for the math achievement domain.
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. The intervention group value is the control group mean plus the program coefficient from the hierarchical linear model (HLM) analysis.
4. The control group mean is the unadjusted control group mean.
5. Positive differences and effect sizes favor the intervention group; negative differences and effect sizes favor the comparison group.
6. For an explanation of the effect size calculation, see WWC Procedures and Standards Handbook, Appendix B.
7. Statistical significance is the probability that the difference between groups is a result of chance rather than a real difference between the groups.
8. The improvement index represents the difference between the percentile rank of the average student in the intervention condition and that 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 for the intervention group.
9. The level of statistical significance was reported by the study authors or, when 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. For the formulas the WWC used to calculate the statistical significance, see WWC Procedures and Standards Handbook, Appendix C for clustering and WWC Procedures and Standards Handbook, Appendix D for multiple comparisons. In the case of Campuzano, Dynarski, Agodini, & Rall (2009), no corrections for clustering or multiple comparisons were needed.
10. The study authors converted the scale scores from the SAT-10, ITBS, and NMSBA tests to normal curve equivalent units to standardize measures across tests and cohorts. NCE scores have a mean of 50, a standard deviation of 21.06, and a range of 1 to 99. A single overall NCE value is reported by the authors to reflect the average annual treatment effect across all districts.
11. This row provides the study average, which in this instance, is also the domain average. The WWC-computed domain average effect size is a simple average rounded to two decimal places. The domain improvement index is calculated from the average effect size.

## **Appendix A4 PLATO® Achieve Now rating for the math achievement domain**

The WWC rates an intervention's effects in a given outcome domain as positive, potentially positive, mixed, no discernible effects, potentially negative, or negative.<sup>1</sup>

For the outcome domain of math achievement, the WWC rated *PLATO® Achieve Now* as having no discernible effects.

### **Rating received**

**No discernible effects:** No affirmative evidence of effects.

- Criterion 1: None of the studies shows a statistically significant or substantively important effect, either *positive* or *negative*.

**Met.** The one study did not show a statistically significant or substantively important effect either positive or negative.

### **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 showed statistically significant positive effects. One study met WWC evidence standards for a strong design.

### **AND**

- 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.

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

### **AND**

- 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.

**Met.** No studies showed a statistically significant or substantively important negative effect, no studies showed indeterminate effects, and no studies showed statistically significant or substantively important positive effects.

**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 study showed a statistically significant or substantively important effect, either positive or negative.

### **OR**

- For rating purposes, the WWC considers the statistical significance of individual outcomes and the domain-level effect. The WWC also considers the size of the domain-level effect for ratings of potentially positive or potentially negative effects. For a complete description, see the WWC Procedures and Standards Handbook, Appendix E.

(continued)

## **Appendix A4 PLATO® Achieve Now rating for the math achievement domain (continued)**

- 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.

**Not met.** No study showed a statistically significant or substantively important effect, either positive or negative.

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

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

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

**AND**

- Criterion 2: No studies showing a statistically significant or substantively important *positive* effect, or more studies showing statistically significant or substantively important *negative* effects than showing statistically significant or substantively important *positive* effects.

**Met.** No studies showed a statistically significant or substantively important positive effect.

**Negative effects:** Strong evidence of a negative effect with no overriding contrary evidence.

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

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

**AND**

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

**Met.** No studies showed a statistically significant or substantively important positive effect.

## Appendix A5 Extent of evidence by domain

Outcome domain	Number of studies	Schools	Sample size	Extent of evidence <sup>1</sup>
			Students	
Math achievement	1	13	1,037	Small

1. A rating of “medium to large” requires at least two studies and two schools across studies in one domain and a total sample size across studies of at least 350 students or 14 classrooms. Otherwise, the rating is “small.” For more details on the extent of evidence categorization, see the WWC Procedures and Standards Handbook, Appendix G.