What Works Clearinghouse

Odyssey Math

Program Description[1]

Odyssey Math, published by CompassLearning®, is a web-based K–8 mathematics curriculum and assessment tool designed to allow for instructional differentiation and data-driven decision making.[2] The online program includes electronic curriculum and materials for individual or small group work, assessments aligned with state curriculum standards, and a data management system that allows teachers to develop individualized instructional and assessment tools, as well as track individual and classroom student performance. *Odyssey Math* can be used as a standalone curriculum or as a supplement to other mathematics curriculum. The primary school version of the *Odyssey Math* curriculum focuses on fundamental math skills like numeracy for the earlier grades, while in later grades, the curriculum equips students for skills necessary in middle and high school mathematics. The interactive activities used for both age groups allow for the application of ideas, tools, and manipulatives, and build upon previous knowledge.

Research[3]

No studies of *Odyssey Math* meet What Works Clearinghouse (WWC) evidence standards and one study meets WWC evidence standards with reservations. The study included 207 fifth-grade students from one school district in Pennsylvania where *Odyssey Math* was used as a supplemental curriculum to Houghton Mifflin.[4]

Based on this study, the WWC considers the extent of evidence for *Odyssey Math* to be small for math achievement.

Effectiveness

Odyssey Math was found to have potentially positive effects on math achievement.

	Math achievement
Rating of effectiveness	Potentially positive
Improvement index[5]	+17 percentile points

1. The descriptive information for this program was obtained from publicly-available sources: the program's website (http://www.compasslearning.com, downloaded October 2008) and Brandt et al. (2006). 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. This review refers to studies of *Odyssey Math* in kindergarten through fifth grade. Studies of *Odyssey Math* conducted in sixth through eighth grade were out of the scope of the Elementary School Math protocol.
3. The studies in this report were reviewed using WWC Evidence Standards, Version 1.0 (see the WWC Standards).
4. The evidence presented in this report is based on available research. Findings and conclusions may change as new research becomes available.
5. This number shows the student-level improvement index based on the findings in the one study that meets WWC evidence standards with reservations. That one study examined the effectiveness of *Odyssey Math* when it is used as a supplemental program.

Additional program information

Developer and contact

Odyssey Math was developed and is distributed by CompassLearning, Inc. Address: 203 Colorado Street, Austin, TX 78701. Email: info@compasslearning.com. Web: http://www.compasslearning.com. Telephone: (800) 232-9556.

Scope of use

CompassLearning was founded in 1969 and develops education software. The web-based *Odyssey Math* product was launched in 2003 as a follow-up product to the original server-based *Odyssey* product (now termed *Odyssey Classic*) that was delivered under the Josten's brand and then by CompassLearning. *Odyssey Classic* is no longer sold or supported by CompassLearning.[6] According to the developers, more than 11 million students in 20,000 schools nationwide use *Odyssey Math* and other *Odyssey* programs.

Teaching

Odyssey Math offers a full mathematics curriculum for grades K–8 that combines both online and offline tools and activities. *Odyssey Math* can be used as a standalone curriculum or as a supplement to other mathematics curricula to provide an alternative instructional model, differentiated instruction, or gain feedback on particular concepts students are struggling with. Specifically, the management tool allows teachers to customize instruction for individual students and/or for classroom lesson plans. The program's reporting system automatically prescribes individualized learning paths with activities that are tailored for each student based on his or her test scores. Teachers can also generate reports detailing student achievement and areas that need further review. *Odyssey Math's* assessment tool provides a means to build and customize assessments based on key focus areas, individual learning styles, or local, state, and national standards. Teachers can use the bank of test items, or they can build their own items and item banks for any grade level and any subject.

Cost

Odyssey Math pricing depends on the implementation.

Research

Fourteen studies reviewed by the WWC investigated the effects of *Odyssey Math*. One study (DiLeo, 2007) is a randomized controlled trial that meets WWC evidence standards with reservations. The remaining 13 studies do not meet either WWC eligibility screens or evidence standards.

DiLeo (2007) analyzed data from a randomized controlled trial (RCT) conducted in a single school district in Pennsylvania. Teachers and students were assigned to classrooms by principals, with efforts made to balance classrooms by student ability. Teachers were then randomly assigned to use either *Odyssey Language Arts* or *Odyssey Math* in their classroom. The group using *Odyssey Language Arts* served as the control group to the *Odyssey Math* treatment group. Teachers were asked to use *Odyssey Math* at least 90 minutes per week (the developer-recommended amount) as a supplement to their core mathematics curriculum (Houghton Mifflin). The study focused primarily on the relationship between *Odyssey* usage (in the treatment group) and student achievement, but the author also examined outcome differences of the treatment and control groups. The original randomly assigned sample included 13 classrooms (7 treatment and 6 control) in five schools. A single magnet school with two comparison classrooms was dropped from the analysis because the school's demographic composition was significantly different from the other schools in the sample. Therefore, the final analysis

6. This review focuses only on studies of the newer, web-based *Odyssey Math* product launched in 2003.

Research *(continued)*

sample included 11 classrooms (7 treatment and 4 control) in 4 schools with a total of 207 fifth-grade students.[7] Despite the severe differential attrition of treatment and control classrooms, post-attrition treatment and control groups had only small differences on baseline test scores that were not statistically significant, but that did require the author control for the baseline pretest (according to the Elementary Math protocol).[8] Because of the differential attrition, the WWC rated this RCT as meeting evidence standards with reservations.

Extent of evidence

The WWC categorizes the extent of evidence in each domain as small or medium to large (see the WWC Procedures and 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.[9]

The WWC considers the extent of evidence for *Odyssey Math* to be small for math achievement.

Effectiveness

Findings

The WWC review of interventions for Elementary School Math addresses student outcomes in math achievement. The findings below present the author's estimates and WWC-calculated estimates of the size and the statistical significance of the effects of *Odyssey Math* on students.[10]

DiLeo (2007) reported a statistically significant positive effect on mathematics achievement as measured by the Pennsylvania System of School Assessment (PSSA) between the students randomly assigned to use *Odyssey Math* (the "treatment" group) and *Odyssey Reading* (the "control" group). In WWC calculations, this effect was not statistically significant. However, the WWC determined the effects were large enough to be considered substantively important (that is, an effect size of at least 0.25). Therefore, based on this one study, *Odyssey Math* appears to have potentially positive effects on mathematics achievement.

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).

7. An additional school with 73 students was included in the author's analysis but is not included in this report because teachers in that school were not randomly assigned to use either the Language Arts or Math software (as described below) and could have used both, and therefore were classified as a separate group by the author. The author provided the WWC with sample sizes and standard deviations, details about the random assignment process, and information about attrition not presented in the published 2007 study, which was a dissertation.
8. The author presented third-grade Pennsylvania System of School Assessment (PSSA) scores to establish baseline equivalence. Fourth-grade students did not take the PSSA in 2005, so third grade was the most recent year available.
9. 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 *Odyssey Math* is in Appendix A5.
10. 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 DiLeo (2007), a correction for clustering was needed, so the significance levels may differ from those reported in the original study.

The WWC found *Odyssey Math* to have potentially positive 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 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 versus the percentile rank of the average student in the comparison condition. Unlike the rating of effectiveness, the improvement index is based entirely on the size of the effect, regardless of the statistical significance of the effect, the study design, or the analyses. The improvement index can take on values between –50 and +50, with positive numbers denoting results favorable to the intervention group.

Based on the one study of *Odyssey Math* that meets evidence standards with reservations, the improvement index for math achievement is +17 percentile points.

Summary

The WWC reviewed 14 studies of *Odyssey Math*. One of these studies meets WWC evidence standards with reservations. The remaining 13 studies do not meet either WWC evidence standards or eligibility screens. Based on the one study, the WWC found potentially positive effects in math achievement. The conclusions presented in this report may change as new research emerges.

References

Meets WWC evidence standards with reservations

DiLeo, J. (2007). *A study of a specific language arts and mathematics software program: Is there a correlation between usage levels and achievement?* Unpublished doctoral dissertation, Indiana University of Pennsylvania, Indiana, PA.

Studies that fall outside the Elementary School Math protocol or do not meet WWC evidence standards

Brandt, W. C., & Hutchison, C. (2005). *Romulus community schools 2002–2005: Summary research and evaluation report*. San Diego, CA: CompassLearning, Inc. The study is ineligible for review because it does not use a comparison group.

Additional source:

Brandt, W. C., Hutchison, C., & Learning Point Associates. (2006). *Romulus community schools comprehensive school reform evaluation*. Naperville, IL: Learning Point Associates.

Clariana, R. (2005). *CompassLearning classrooms of the future: An interim report of one-to-one wireless laptop use in upper elementary mathematics: Let them solo*. Austin, TX: CompassLearning, Inc. The study is ineligible for review because it does not use a sample within the age or grade range specified in the protocol.

Clariana, R. (2007). Odyssey *school effectiveness report: Pemberton township school district*. Austin, TX: CompassLearning, Inc. The study is ineligible for review because it does not use a comparison group.

CompassLearning, Inc. (2005). Odyssey *school effectiveness report: Maple Leaf intermediate school*. Austin, TX: Author. The study does not meet WWC evidence standards because the intervention and comparison groups are not shown to be equivalent at baseline.

CompassLearning, Inc. (2006). *CompassLearning* Odyssey *school effectiveness report: Lillie Burney elementary school*. Austin, TX: Author. The study is ineligible for review because it does not use a comparison group.

CompassLearning, Inc. (2006). Odyssey *school effectiveness report: Boone county school district*. Austin, TX: Author. The study does not meet WWC evidence standards because the measures of effect cannot be attributed solely to the intervention—there was only one unit of analysis in one or both conditions.

CompassLearning, Inc. (2007). *Impact of CompassLearning* Odyssey Reading/Language Arts & Mathematics *on NWEA*

References *(continued)*

RIT scores and Lexile range: Akron elementary school. Austin, TX: Author. The study is ineligible for review because it does not use a comparison group.

CompassLearning, Inc. (2007). Odyssey *school effectiveness report: Washoe county school district*. Austin, TX: Author. The study does not meet WWC evidence standards because the intervention and comparison groups are not shown to be equivalent at baseline.

CompassLearning, Inc. (2007). *Summer school pilot program for third-grade intervention: Tulsa independent school district*. Austin, TX: Author. The study is ineligible for review because it does not use a comparison group.

CompassLearning, Inc. (2008). *Careful planning & commitment yield outstanding results for Carroll county school*. Austin, TX: Author. The study is ineligible for review because it is not a primary analysis of the effectiveness of an intervention.

Milhollin, C. C. (2005). *Integration of an integrated learning system—does it make a difference? An observational research study*. Unpublished doctoral dissertation, Valdosta State University, Valdosta, GA. The study is ineligible for review because it does not use a comparison group.

Webb, D. R. (2008). *The effects of the Toyota production system on student academic performance.* Unpublished doctoral dissertation, Duquesne University, Pittsburgh, PA. The study is ineligible for review because it does not examine the effectiveness of an intervention.

Wright, W. (2006). Catching up in math? The case of newly-arrived Cambodian students in a Texas intermediate school. *Texas Association for Bilingual Education Journal, 9*(1), 1–22. The study is ineligible for review because it does not use a comparison group.

Appendix

Appendix A1 Study Characteristics: DiLeo, 2007

Characteristic	Description
Study citation	DiLeo, J. (2007). *A study of a specific language arts and mathematics software program: Is there a correlation between usage levels and achievement?* Unpublished doctoral dissertation, Indiana University of Pennsylvania, Indiana, PA.
Participants[1]	In five out of ten schools within a single school district, fifth-grade teachers were randomly assigned to use CompassLearning's *Odyssey Language Arts* or *Odyssey Math* in their classrooms. Random assignment of the thirteen study teachers occurred after students were assigned to classrooms by their principals. The students in the *Odyssey Language Arts* classrooms served as the control group to the students using *Odyssey Math* (the intervention of interest for this WWC review). Two classrooms of students from one school were removed from the analysis sample because the school was a magnet school that had different demographic composition from the other schools. The final analysis sample, after excluding children with missing data, included 4 schools with 7 treatment classrooms (125 students) and 4 comparison classrooms (82 students). The author presented third-grade Pennsylvania System of School Assessment (PSSA) scores to establish baseline equivalence. Fourth-grade students did not take the PSSA in 2005, so third grade was the most recent year available. Post-attrition treatment and control groups had small differences on baseline test scores that were not statistically significant, but that did require the author control the baseline pretest (according to the Elementary Math protocol). Because the differential attrition rates between the treatment and comparison groups at the classroom level were greater than 5%, but the author provided the appropriate demonstration of equivalence and a control for the pretest, the WWC rated this study as meeting evidence standards with reservations. Approximately 7 percent of the students in the analysis sample were non-white, 63 percent of the students qualified for free or reduced-price lunch, and 14 percent of the students had an Individualized Education Program (IEP). An additional school was also presented in the author's analysis but is not included in this report because teachers in that school were not randomly assigned to use either the Language Arts or Math software and could have used both.
Setting	The study was conducted in one school district in central Pennsylvania.
Intervention	The intervention condition consisted of using *Odyssey Math* during the 2005–06 school year in addition to the usual mathematics curriculum, Houghton Mifflin. Teachers were asked to use the software a minimum of 90 minutes per week (the developer-recommended minimum), but usage levels varied across classrooms, at least in part because of access to technology. In two of the schools, students could only access the software during their weekly assigned time in the computer labs. In the other two schools, students had greater access to the software, as it was available during their weekly computer labs, in their classrooms via wireless laptops, and even at home. Students in the *Odyssey Math* condition could use the *Odyssey* software for any subject except *Language Arts*. Some of the students (from two of the schools) had access to the *Odyssey* software in the 4th grade—the year before the study began.
Comparison	The students in the control condition used only the district's Houghton Mifflin curriculum for mathematics. These students used the *Odyssey* software for Language Arts and possibly for other subjects (other than Mathematics). Some of the students (from two of the schools) had access to the *Odyssey* software in the 4th grade—the year before the study began.
Primary outcomes and measurement	Math achievement was measured using the Pennsylvania System of School Assessment (PSSA), which is the standardized assessment used for state accountability. For a more detailed description of this outcome measure, see Appendix A2.
Staff/teacher training	It is not clear how much training the teachers in this study received. However, the district had substantial funds to purchase professional development from CompassLearning for teachers in two of the schools during the 2004–05 school year through an Enhancing Education Through Technology (EETT) grant from the Pennsylvania Department of Education. During the 2005–06 school year, teachers who used *Odyssey* during the previous (2004–05) school year trained teachers using it for the first time in 2005–06.

1. Sample sizes and information about attrition and random assignment were provided to the WWC by the study author.

Appendix A2 Outcome measures for the math achievement domain

Outcome measure	Description
Pennsylvania System of School Assessment (PSSA)[1]	According to the Pennsylvania State Department of Education, the annual PSSA is a standards-based criterion-referenced assessment. The PSSA assesses students' abilities relative to specific standards within each subject and for each grade level. There are specific cut-off scores to determine a student's proficiency level. Students receive designations of below basic, basic, proficient, or advanced, depending on how they score in each tested subject. In addition to achievement categories, a continuous measure of student achievement also is presented in the study. The continuous score is presented in this intervention report.

1. A description of the Pennsylvania System of School Assessment was obtained at the Pennsylvania State Department of Education's website (http://www.pde.state.pa.us/a_and_t/site/default.asp) in December 2008.

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

Outcome measure	Study sample	Sample size (classrooms/ students)	Authors' findings from the study: Mean outcome (standard deviation)[2] — *Odyssey Math* group	Authors' findings from the study: Mean outcome (standard deviation)[2] — Comparison group	WWC calculations: Mean difference[3] *(Odyssey Math–* comparison*)*	WWC calculations: Effect size[4]	WWC calculations: Statistical significance[5] (at $\alpha = 0.05$)	WWC calculations: Improvement index[6]
DiLeo, 2007 [7]								
Pennsylvania System of School Assessment	Grade 5	11/207	1583 (239)	1480 (215)	103	0.45	ns	+17
Domain average for math achievement (DiLeo, 2007)[8]						**0.45**	**ns**	**+17**

ns = not statistically significant

1. This appendix reports the 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. Positive differences and effect sizes favor the intervention group; negative differences and effect sizes favor the comparison group. The author provided the WWC with standard deviations and means adjusted for pretest differences. Pretest adjusted means are presented for the *Odyssey Math* and comparison groups.
4. For an explanation of the effect size calculation, see WWC Procedures and Standards Handbook, Appendix B.
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 that of the average student in the comparison condition. The improvement index can take on values between –50 and +50, with positive numbers denoting results favorable to the intervention group.
7. 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 DiLeo (2007), a correction for clustering was needed, so the significance levels may differ from those reported in the original study.
8. 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 *Odyssey Math* rating for the math achievement domain

The WWC rates an intervention's effects 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 *Odyssey Math* as potentially positive. It could not achieve a rating of positive because there was only one study. The remaining ratings (mixed, no discernible effects, potentially negative, or negative) were not considered, as *Odyssey Math* was assigned the highest applicable rating.

Rating received

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. *Odyssey Math* had one study that showed a 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. *Odyssey Math* had no studies showing negative effects.

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. *Odyssey Math* had no studies with a strong design.

AND

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

  Met. *Odyssey Math* had no studies showing negative effects.

1. 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.

Appendix A5 Extent of evidence

Outcome domain	Number of studies	Sample size		Extent of evidence[1]
		Schools	Students	
Math achievement	1	4	207	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.