

NATIONAL CENTER for MONTESSORI in the PUBLIC SECTOR

Does It Work? Recent Research on Montessori Outcomes

Montessori parents know first-hand how this approach to education supports and nurtures children's development in all areas: physical, intellectual, language, and social-emotional. Scientific research confirms that Montessori children have an advantage not only academically, but also in social and emotional development.

Executive Functions: Children in Montessori classrooms showed strengths in executive function skills, including self-regulation, working memory, planning, and inhibitory control, especially with high fidelity implementation. Executive function strengths were associated with academic achievement.

Diamond, A., & Lee, K. (2011). Interventions shown to aid executive function development in children 4 to 12 years old. *Science*, 333(6045), 959-964.

To be successful takes creativity, flexibility, self-control, and discipline. Central to all those are executive functions, including mentally playing with ideas, giving a considered rather than a compulsive response, and staying focused. This review compares research results from various activities and curricula that have been shown to improve children's executive function, including computerized training, aerobic exercise, martial arts and mindfulness practices, and classroom curricula including Montessori education. In a comparison of curricula and curricula add-ons, the Montessori approach is shown to meet more criteria for the development of executive function for a more extended age group.

Ervin, B., Wash, P. D., & Mecca, M. E. (2010). A 3-year study of self-regulation in Montessori and non-Montessori classrooms. *Montessori Life*, 22(2), 22-31.

Researchers compared 256 Montessori and non-Montessori students in kindergarten, first- and second-grades from three public school districts in South Carolina. They found that Montessori children have comparatively higher levels of self-regulation and more consistent growth in self-regulation skills over the 3-year period of the study. Further, researchers found an association between students' levels of self-regulation and their academic success.

Lillard, A. S. (2012). Preschool children's development in classic Montessori, supplemented Montessori, and conventional programs. *Journal of School Psychology*, 50, 379-401. doi:10.1016/j.jsp.2012.01.001

Angeline Lillard examines the impact of Montessori implementation fidelity. Her study found that children in classroom with high fidelity implementation showed significantly greater school- year gains on outcome measures of executive function, reading, math, vocabulary, and social problem-solving, than children in low fidelity or conventional classrooms. Lillard concludes by suggesting that mixed results on outcomes for Montessori students from previous research may be explained by Montessori implementation fidelity.

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Researchers compared Montessori students with students in other school programs, and found that 5-year-old children who completed the three-year cycle in the Montessori preschool program scored higher on both academic and behavioral tests than the control group. The study also found that 12-year-old

Montessori students wrote more sophisticated and creative stories and showed a more highly developed sense of community and social skills than students in other programs.

Lillard, A. S., & Heise, M. J. (2016). An intervention study: Removing supplemented materials from Montessori classrooms associated with better child outcomes. *Journal of Montessori Research*, 2(1), 16-26.

This study provides further evidence for the efficacy of fully implemented Montessori. The authors examined three Montessori classrooms that contained supplemental, non-Montessori materials like commercial puzzles and games. These supplemental materials were removed from two of the three classrooms. Children in the classrooms from which the supplemental materials were removed grew significantly more in early literacy skills and executive function than their peers in the classroom with the supplemental materials.

Social Development: Children in Montessori classrooms showed better social problem solving ability, a stronger sense of community and social justice, and more positive perceptions of classmates, and used positive social problem-solving strategies.

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Rathunde, K., & Csikszentmihalyi, M. (2005a). Middle school students' motivation and quality of experience: A comparison of Montessori and traditional school environments. *American Journal of Education*, 111(3), 341-371.

This study compared middle school motivation and experience for approximately 290 sixth- and eighth-grade students in five Montessori and six traditional schools. Montessori students reported significantly more flow, higher affect, potency, and intrinsic motivation while doing schoolwork than their traditional school peers. Traditional students reported higher levels of drudgery (i.e., doing work with high levels of importance, but low levels of intrinsic motivation). These findings suggest a relationship between Montessori environments and students' comparatively higher levels of intrinsic motivation.

General Academic Achievement: Children in Montessori classrooms have shown higher levels of self-regulation, which was associated with academic success. Montessori students have also shown higher levels of intrinsic motivation and time on academic tasks.

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Rathunde, K., & Csikszentmihalyi, M. (2005b). The social context of middle school: Teachers, friends, and activities in Montessori and traditional school environments. *The Elementary School Journal*, 106(1), 59-79.

In the aforementioned study, researchers also compared the social contexts of five Montessori and six traditional middle schools, and reported those results in the present article. Montessori students reported more favorable impressions of their schools and teachers than their traditionally-schooled peers. Further, Montessori students reported spending more time on academic tasks and in active learning pursuits, and they had more positive perceptions of classmates than their traditionally-schooled peers.

Language: Children in Montessori classrooms have shown strengths in phonological decoding, letter-word identification, reading assessments, sentence structure, and writing creativity.

East Dallas Community Schools. (2010). *Summer newsletter 2010*.

East Dallas Community Schools operates two inner-city Montessori schools that serve an ethnically and culturally diverse group of primarily low-income families. In over 30 years of using the Montessori approach to education, EDCS has proved that all children, regardless of race or income, can succeed in school when you start young and involve parents. In a neighborhood in which the high school dropout rate is over 50%, children who attend EDCS have graduated from high school at a rate of 94%, with 88% of those graduates attending college. A ten-year study of standardized test scores found that third grade students' average scores were in the top 36% nationwide in reading and math. Even though many of these children start school without speaking any English, 100% of the children test as fluent in English by the end of the third grade

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Mallett, J. D., & Schroeder, J. L. (2015). Academic achievement outcomes: A comparison of Montessori and non-Montessori public elementary school students. *Journal of Elementary Education*, 25(1), 39-53.

This study compared reading and math achievement of over 1,000 students in grades one through five in public Montessori and non-Montessori schools in Texas. No statistically significant differences in reading or math achievement were found in grades one through three, but Montessori students in grades four and five performed significantly better in both subjects than their peers in traditional schools.

Moody, M. J., & Riga, G. (2011). Montessori: Education for life. In L. Howell, C. W. Lewis, & N. Carter (Eds.), *Yes we can!: Improving urban schools through innovative education reform* (pp. 127-143). Charlotte, NC: Information Age Publishing.

These authors examined school-level outcomes on state reading and math assessments for public Montessori schools in Chicago and South Carolina. In South Carolina, during all five years of the study, a greater percentage of Montessori students in grades three through eight passed reading and math assessments than their traditional school peers. In Chicago, where a new Montessori program was being rolled out, reading and math test scores at these schools markedly improved over the years of Montessori implementation.

Rodriguez, L., Irby, B. J., Brown, G., Lara-Alecio, R., & Galloway, M. (2005). An analysis of reading achievement related to pre-kindergarten Montessori and transitional bilingual education. In V. Gonzalez & J. Tinajero (Eds.), *Review of research and practice* (Vol 3., pp. 45-65). Mahwah, NJ: Laurence Earlbaum Associates.

These authors examined the reading skills of low-income Latino students from a bilingual Montessori preK program compared to similar students from a traditional bilingual preK program. Students who had participated in the Montessori preschool scored significantly higher on both Spanish and English reading tests. This suggests that the Montessori preK fostered superior language skills in both languages than the traditional preK, even though both were bilingual.

Mathematics: Children in Montessori classrooms have shown higher scores in applied problem solving, understanding of math concepts, and standardized test scores.

Dohrmann, K. R., Nishida, T. K., Gartner, A., Lipsky, D. K., & Grimm, K. (2007). High school outcomes for students in a public Montessori program. *Journal of Research in Childhood Education*, 22(2), 205–217. doi:10.1080/02568540709594622

This longitudinal study of Milwaukee high school graduates showed that students who had attended Montessori preschool and elementary programs significantly outperformed a peer control group on math/science scores. “In essence,” the study found, “attending a Montessori program from the approximate ages of three to 11 predicts significantly higher mathematics and science standardized test scores in high school.

Donabella, M. A., & Rule, A. C. (2008). Four seventh grade students who qualify for academic intervention services in mathematics learning multi-digit multiplication with the Montessori checkerboard. *TEACHING Exceptional Children Plus*, 4(3). Retrieved from ERIC: <http://files.eric.ed.gov/fulltext/EJ967477.pdf>

This article describes the positive impact of Montessori manipulative materials on four seventh grade students who qualified for academic intervention services because of previous low state test scores in mathematics. The article presents a brief introduction to the Montessori approach to learning, an overview of Montessori mathematics, and an explanation of the Checkerboard for Multiplication with related multiplication manipulatives. Pretest/posttest results of the four students indicated that all increased their understanding of multiplication. The results of an attitude survey showed students improved in enjoyment, perceived knowledge, and confidence in solving multiplication problems.

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Reed, M. K. (2008). Comparison of the place value understanding of Montessori elementary students. *Investigations in Mathematics Learning*, 1(1), 1-26.

Reed randomly selected first- through third-grade students in one Montessori and one Catholic school for this study. After collecting data from ninety-three students, she found that Montessori students performed significantly better on conceptual place value math tasks, and were as adept at solving procedural math problems as their non-Montessori peers. By third grade, there was not a significant difference with regards to ability to solve the math tasks, but Montessori students demonstrated more flexible, conceptual thinking in their approach to solving these problems.

Science: In one study, children in a public Montessori program for ages 3 to 11 achieved significantly higher science standardized test scores in high school.

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School Readiness: While the Montessori approach recognizes that learning begins at birth, well before conventional schooling starts, children in Montessori preschool and kindergarten classrooms have shown strengths in traditional “school readiness” measures such as phonological decoding, letter-word identification, and math skills.

Ansari, A. & Winsler, A. (2014). Montessori public school pre-K programs and the school readiness of low-income Black and Latino children. *Journal of Educational Psychology, 106*(4), 1066–1079.

This study used data from the Miami School Readiness Project to examine the school readiness gains of 7,045 low-income Latino and 6,700 low-income Black children. Researchers compared students from two types of Title I pre-K public school programs: those in programs using the Montessori curriculum and those in more conventional programs using the High/Scope curriculum with a literacy supplement. “Latino children in Montessori programs began the year at most risk in pre-academic and behavioral skills, yet exhibited the greatest gains across these domains and ended the year scoring above national averages.”

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