Academic Achievement Outcomes: Montessori and Non-Montessori Public Elementary Students

Jan Davis Mallett & Jennifer Schroeder, Ph.D.

Texas A&M University-Commerce

Abstract

Within the realm of elementary public schools, several pedagogical models of early childhood education are practiced in the United States (Lillard, 2007). The constructivist approach to early childhood education is illustrative of best practices based on current theory. One model of constructivist early childhood education is the Montessori Method founded in the early twentieth century by Maria Montessori, an Italian physician (Montessori, 1912/1964). Though the Montessori Method is aligned with research-based best practices espoused by constructivism, there are relatively few public Montessori schools currently in the United States. A direct comparison is needed between the academic outcomes of public elementary school programs which implement the Montessori Method and those which implement a more traditional approach to early childhood education. The focus of this study is the academic achievement outcomes of Montessori public school students as compared to similar non-Montessori students.

Background Studies

The Montessori Method

•Dr. Maria Montessori was an Italian physician who developed a theory and pedagogical materials for the education of young children. (Montessori, 1912/1964).

•Five factors differentiate Montessori from traditional elementary education:
*learning presented in meaningful context,
*multi-aged grouping,
*specialized materials,
*purposeful movement in a prepared environment, and
*nurturing the child's intrinsic motivation (Lillard, 2007).

Traditional Education

•In a meta-analysis of science, technology, engineering, and mathematics instruction among elementary through college-aged students, Becker and Park (2011) found that an integrated curriculum produced significant results.

•With fifth grade students in science class, constructivist teaching practices produced deeper and greater conceptual understanding (Wu & Tsai, 2005).

•A mathematic learning material that first grade students manipulate enhanced conceptual understanding and led to better addition and subtraction performance than a control group(Tournaki, Bae, & Kerekes, 2008).

Participants

The study included the de-identified academic achievement and demographic data of 1,035 public elementary school students from an urban school district in the southwestern United States.

Materials

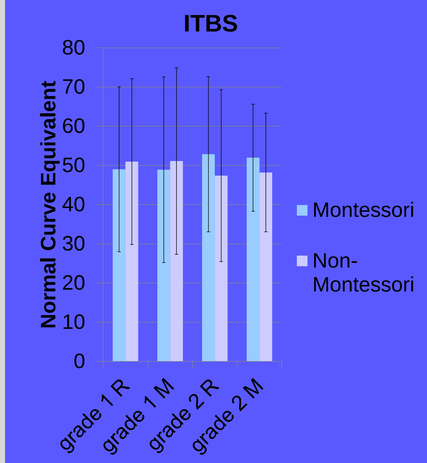
Iowa Test of Basic Skills (Hoover, et al., 2003). The ITBS is a nationally-normed achievement test administered in the spring of each year. For this study, the grade 1 Total Language and Total Math and grade 2 Total Reading and Total Math Normal Curve Equivalents were used.

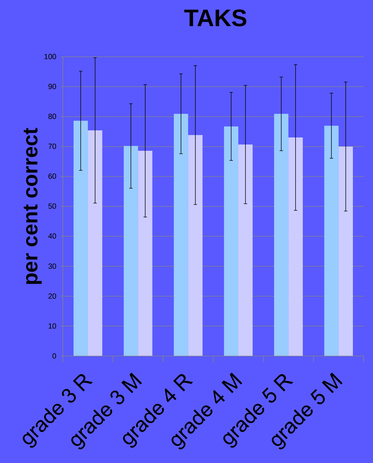
Texas Assessment of Knowledge and Skills (TEA, 2011). The TAKS is a state-developed achievement test administered according to state and district mandated secure protocol. For this study, the percent correct of the grades 3, 4, and 5 Reading and Math tests were used.

Procedure

The statistical analysis of this project involved several steps. Multiple regressions were conducted to remove the effects of gender, ethnicity, and socio-economic status as determined by free, reduced, or full price lunch assignment from the dependent variables. At the first and second grade levels, the dependent variables were Total Reading and Total Math Normal Curve Equivalent (NCE) scores on the ITBS. At the third, fourth, and fifth grade levels, Reading and Math percent correct on the TAKS reading and math subtests were the dependent variables. A residual score was saved and, for easier comparison, was converted back to an NCE-like score for ITBS tests and a percent-like score for TAKS tests. The new scores were then used in a one-way ANOVA using a .05 significance level. The independent variable for each analysis was school type, Montessori or non-Montessori, and the dependent variable was the residual test score. Separate analyses were conducted by grade and subject..

Results





ANOVA Results

		F	*p*	η2
Grade 1 ITBS	Total Reading	.397	.529	.002
F(1,182)	Total Math	.397	.529	.002
Grade 2 ITBS	Total Reading	3.035	.083	.017
F(1,177)	Total Math	3.035	.083	.017
Grade 3 TAKS	Reading	1.130	.289	.006
F(1,183)	Math	.371	.543	.002
Grade 4 TAKS	Reading	7.182	.008	.034
F(1,204)	Math	7.182	.008	.034
Grade 5 TAKS	Reading	7.977	.005	.040
F(1,192)	Math	7.977	.005	.040

Discussion

• In grades 1and 2, the academic achievement of Montessori and non-Montessori students was not significantly different.

•In grade 3, the TAKS Reading and Math scores of Montessori and non-Montessori students were not significantly different.

•A slight practical significance was observed favoring Montessori education in grades 2 and 3.

•In grades 4 and 5, Montessori students had significantly better TAKS Reading and Math scores than their non-Montessori counterparts.

•The practical significance of the grades 4 and 5 TAKS scores was very small.

•It must be noted that the Montessori effect might be cumulative, as the Montessori students in this study remained in the program from 1st grade. In other words, the 4 and 5 graders tested had been Montessori students for several years.

•Limitations of the study include the use of two different measures of achievement. The ITBS is only administered for grades 1 and 2 in the district with public Montessori schools, and TAKS scores are the available metric in grades 3, 4, and 5.

•As there is no Total Reading score for grade 1, the Language Total was used instead.

•Implications of this study include the observation that the gap between the academic achievement of Montessori and traditional students widens in favor of Montessori students as the number of years in Montessori education grows.

•In particular, the results of this study suggest that consistent, comprehensive tracking of the academic achievements of Montessori students across the span of their school years is needed.

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Contact Information

Jan Mallett at jdavismallett@leo.tamuc.edu or by phone at 903-468-3286
Dr. Jennifer Schroeder at Jennifer_Schroeder@tamuc.edu or by phone at 903-468-3286

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