

**EMERGENT READERS IN EARLY MONTESSORI CLASSROOMS:
THE RELATIONSHIP BETWEEN THREE-DIMENSIONAL PRINT AND FLAT PRINT**

Ginger Kelley McKenzie, Ed.D; Victoria Zascavage, Ph.D.; Carol Smith Woods, M.Ed.; & Max Buot, PhD.
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The purpose of this project was to determine if children who are emergent readers with similar Montessori preschool experiences could read simple three letter phonetic words faster and more accurately using three-dimensional print as compared to flat print.

Methods

Participants (N=116) were Montessori kindergarten and first graders in a mid-western city. Children were presented with two sets of cards, which contained common three letter phonetic words that were identical in font style, color, and size. Set A were printed in three-dimensional print and Set B was printed in a traditional flat print. Children were timed as they read each set of cards. Participants were tested twice with a one week span between Trial 1 and Trial 2. In order to reduce the effect of practice, we alternated the order of presentation of the print type. The independent variables were gender, age, grade in school. The dependent variables were the total number of words pronounced correctly and total time. Based on a repeated measures ANOVA statistical analysis conducted using the pilot data (n=116), male emergent readers who were in the 25th percentile of words pronounced correctly with traditional flat print, performed significantly better (i.e., read more words) with three-dimensional print. In particular, this specific group improved their total number of words pronounced correctly by at least two words. However, there was no evidence of an association between three-dimensional print and improved reading speed in the pilot data.

Implication to Montessori Practices

This study drew inspiration from Maria Montessori and her use of a progression from sensory sandpaper letters to the concrete of the moveable alphabet to the abstract of traditional print in the early reading curriculum (Montessori, 1967). Our preliminary findings indicate that male emergent readers may benefit from the use of three -dimensional print to increase their ability to read phonetic words.

Visual-spatial skills are a key component in Montessori early childhood classrooms (e.g. sensorial materials, sandpaper letters, moveable alphabet). Research on the relationship between developmental dyslexia and strengths in visual-spatial skills has resulted in contradictory findings. However, von Karolyi ,Winner, Gray and Sherman (2003), determined that individuals with dyslexia demonstrated superior global (or holistic) visual-spatial abilities, as opposed to local (or part-by-part) ability. Our study begins an exploration that for some students, the abrupt progression from the use of manipulative (sandpaper letter, moveable alphabet) to traditional flat print may create unnecessary reading difficulty attributed to visual spatial delays; a difficulty that could be addressed by a median step- the use of three -dimensional print.

Limitations and Next Steps

The findings of this study are limited by a small population sample and regional demographic variables. With an expanded population which we identify more students at risk for reading difficulty we can develop and test an assessment tool based upon the relationship of word recognition and the presentation of three dimensional verses flat print. This instrument will then become an instructional resource capable of identifying students who might benefit from the use of three-dimensional print.

References

Montessori, M. (1967). *The Discovery of the Child*. New York: Ballantine.
Von Karolyi, C., Winner, E., Gray, W.,& Sherman, G. (2003). Dyslexia linked to talent: Global visual-spatial ability. *Brain and Language*, 85, 427-431.

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Research Question

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Findings

The independent variables were gender, age, grade in school. The dependent variables were the total number of words pronounced correctly and total time. Based on a repeated measures ANOVA statistical analysis conducted using the pilot data (n=116), male emergent readers who were in the 25th percentile of words pronounced correctly with traditional flat print, performed significantly better (i.e., read more words) with three-dimensional print. In particular, this specific group improved their total number of words pronounced correctly by at least two words. However, there was no evidence of an association between three-dimensional print and improved reading speed in the pilot data.

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