Early Numeracy Intervention
Evaluating the Efficacy of a First Grade Math Tutoring Program in a Montessori Context
Emma Drangstveit & Noelle Wozniak | Psychology  Natasha Hanke | Education  Oriana Vile | Communication Sciences and Disorders
Mary Beth Tusing, Faculty Mentor

INTRODUCTION
Students who struggle with early numeracy skills are at risk for later challenges when learning math. Research shows early numeracy skills (e.g., number identification, understanding quantity, counting, and number sequencing) are strong predictors of future math success (Bryant et al., 2008).

Early Numeracy Intervention (ENI; Bryant et al., 2011) is a supplemental math program that targets early numeracy skills. It was developed from Jordan and colleagues’ (2003, 2006) research on early numeracy growth in kindergarten and first grade. After 19 weeks of intervention, Bryant and colleagues (2011) showed that students at-risk for math delays improved number sequencing skills and place value knowledge, as well as overall math achievement.

Although limited research exists on the effectiveness of ENI in alternative school settings, it is described as easily adjusted to different educational settings. This study evaluates ENI’s effectiveness as a supplemental math intervention program in a Montessori setting.

METHODOLOGY
PARTICIPANTS AND SETTING
Intervention took place at a Montessori elementary. Montessori education offers hands-on learning at one’s own pace. Participants were two 1st graders from different cross-age classrooms of 1st-3rd graders. They were identified by school screenings and teacher nomination as at-risk in math.

ENI was delivered to a group of 5 students in a cafeteria. Another group met in the cafeteria at the same time. ENI was the students’ last activity of the day.

DEPENDENT VARIABLES
Place Value (PV): Assesses ability to write numbers represented in base-10 blocks and select the correct grouping of base-10 blocks to represent a number. The task is timed.

RESULTS
NOVA
NID: There was a minimal change in level from baseline to Intervention A and a neutral trend in both. An upward trend in the baseline confounds interpretation. Upon return to baseline, level of performance increased rather than decreased, but did show a negative trend. There was a higher level and positive trend in performance in Intervention B.

PV: There was a clear change in level and trend from baseline to Intervention A and again in the reversal to baseline. Performance in Intervention B was more variable, but showed a change in level and trend relative to baseline. In both intervention conditions a positive moderate trend was evident.

DISCUSSION / IMPLICATIONS
Results offer beginning support for the use of ENI as a supplemental math intervention program in a Montessori setting.

The intervention was able to be delivered with fidelity in the Montessori setting, as fidelity checks showed 100% accuracy.

Clear effects of the intervention on place value, or base-10, skills were evident for both participants. Applications with base-10 was one instructional target of ENI, particularly during Intervention B.

Participants also showed positive gains in Number Identification skills over the course of the intervention. This is noteworthy, because the intervention did not directly practice reading numbers.

LIMITATIONS
weekly progress monitoring with Number Identification did not occur during the first intervention condition due to school vacation days. Therefore, a causal relationship between ENI participation and NID gains cannot be determined. Outside factors may explain participant growth.

The dependent variables for this study did not address all skills targeted by ENI. Future research is needed to explore additional early numeracy outcomes when ENI is used in a Montessori setting.

Interobserver Agreement:
100% for all assessments.

Trained researchers evaluated interobserver agreement and procedural integrity for assessments and intervention delivery.

EXPERIMENTAL DESIGN
A single case ABAB design (Kendr, 2005) examined the effects of participation in ENI on early numeracy skills for both students.

REFERENCES


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