

# COGNITIVE DEVELOPMENT NEWS

brought to you by the Cognition Learning And Development Lab at the University of Notre Dame

FALL 2009



Photo by:  
Sara J. Dye

## What's new in the CLAD lab? Moving forward on several research projects

In addition to getting married (congratulations!), senior Emily Fyfe (formerly Conrad) received a grant from Notre Dame's Undergraduate Research Opportunity Program (UROP) to work in the lab for two months this summer. Her research focuses on learning and transfer in the domain of mathematics. Read more about Emily's study on page 2.

Graduate student Lori Petersen continues her research with preschool children at the ECDC. Lori seeks to

discover which types of objects are best to use with children when they are learning to count.

Emily and Lori, along with CLAD lab manager, April Dunwiddie, Prof. Nicole McNeil, and our teacher collaborators, spent much of the summer developing arithmetic practice workbooks. Over 200 second grade children will be using the workbooks in their classrooms this fall. Look for updates about the arithmetic practice workbooks in future newsletters.

## Featured CLAD lab study

Some educators prefer to teach math concepts using concrete objects (e.g., blocks, plastic animals). Although this method may help some children understand math, many children fail to transfer the knowledge gained with concrete objects to problems presented with abstract math symbols (e.g., 5, +, =).

Other educators prefer to focus on the procedures for operating on abstract math symbols. Although this method may help some children understand math, many children fail to learn the meaning behind the abstract math symbols.

Senior Emily Fyfe recently performed an experiment to investigate which method is most effective for promoting deep, transferrable knowledge of math concepts. In her study, 7- and 8-year old children were taught a challenging math concept using one of several methods. Some of these methods

involved concrete objects; some involved abstract symbols; and some involved both. After receiving instruction, children were tested on their understanding of the math concept.

Emily found that children learned best when they were taught with a “concreteness fading” method. In this method, educators first teach the target concept in the context of concrete objects. Then, they teach the concept in the context of black-and-white pictures of the concrete objects. Finally, they teach the concept in the context of abstract math symbols. Educators slowly “fade” away from the concrete to the abstract representations, and they point out the links between the concrete and abstract representations along the way.

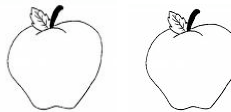
Emily will present these results in October at the biennial conference of the Cognitive Development Society.

Example of  
concreteness  
fading  
method

Step 1

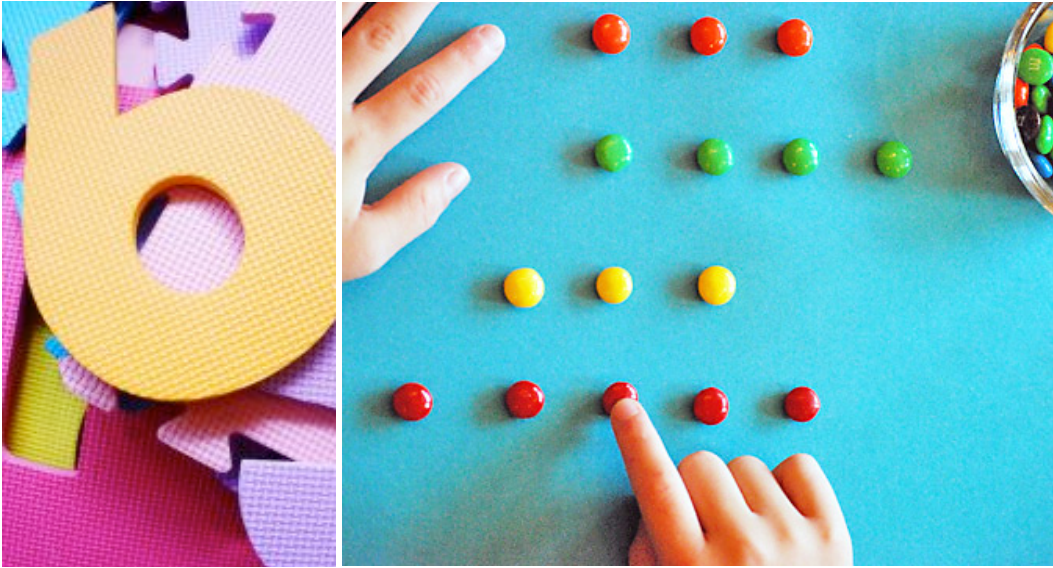


Step 2



Step 3

2



## Key findings from leaders in the field

Some children enter kindergarten already behind their peers academically. Unfortunately, this gap widens as children progress through school. Although many parents and educators are aware of the disparity in early academic skills, it is not easy to decide how to intervene. Which skills are most important for children to work on before they enter school?

Recently, a team of 12 researchers analyzed six large-scale longitudinal studies to investigate which early skills predict later school achievement.

Researchers examined a variety of early academic, attention, and socio-emotional skills prior to school entry. They tested how strongly these early skills predict later academic achievement (standardized tests scores and teacher ratings of students' academic achievement) in second grade.

Results revealed that early math, pre-reading, and attention skills are the strongest predictors of later academic achievement. Moreover, early math skills (e.g. counting, number recognition, and adding) were found to be the most powerful predictors of later academic achievement in both math and reading.

These findings suggest that it may be beneficial for parents and early educators to foster children's early math skills even prior to the start of kindergarten.

Surprisingly, early socio-emotional skills and behavioral problems did not predict later school achievement. Perhaps this finding can ease the anxiety that some parents have regarding their child's behavior and social skills at school entry.

# CLAD team updates

**Noelle Crooks**, *recent graduate*, presented a poster at the Annual Conference of the Cognitive Science Society this summer. She started graduate school at the University of Wisconsin-Madison this fall.

**Claire Keultjes**, *graduate student*, presented a talk at the Annual Conference of the Cognitive Science Society this summer.

**Lori Petersen**, *graduate student*, will continue her work with children at the ECDC (Notre Dame and St. Mary's) this fall. She hopes to fulfill the requirements for her Masters degree this fall.

**Emily Fyfe**, *senior*, will travel to San Antonio, TX next month to present a poster at the biennial conference of the Cognitive Development Society.

**Jenny Heil**, *senior*, is back after studying abroad in Greece. She is working on her honors thesis, which focuses on the costs and benefits of teaching children math through games vs. formal instruction.

**Prof. Nicole McNeil**, *director*, was one of the invited speakers at the U.S. Dept. of Education Institute of Education Sciences (IES) annual conference this summer in Washington D. C.

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