



Developing Early Interest and Skill in STEM: Hands-On Activities and Parent-Child Conversations

David H. Uttal, Ph.D., Northwestern University

Catherine A. Haden, Ph.D., Loyola University Chicago



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THE PROBLEM

The U.S. needs more children prepared and motivated for future STEM education and career opportunities. Our research examines ways to address the STEM pipeline problem by learning how young children develop early interest and skill in STEM through hands-on activities and conversations with their parents.

WHY THIS MATTERS

- U.S. children have many *informal* learning experiences, visiting museums, zoos, and aquaria, even before school age.
- Informal learning experiences are critically important for early STEM learning.

CURRENT RESEARCH

- The research takes place at the Chicago Children's Museum in an exhibit designed for STEM learning. Families build skyscrapers in a hands-on activity that may promote understanding of engineering and general principles of science, technology, and math.
- Thus far, we have observed more than 150 children ages 4 – 8 building skyscrapers with their families.
- Some families viewed a demonstration of a simple engineering principle before engaging in the hands-on building activity, while others did not.
- We examine how and when parents' conversations and children's hands-on activities lead to STEM learning.



Demonstration

WHAT HAVE WE LEARNED?

Compared with families who did not view the demonstration:

- Parents who viewed the demonstration talked more with their children about engineering and the scientific method while engaged in hands-on activities in the museum.
- When asked to fix a wobbly building, children who viewed the demonstration showed more understanding of engineering principles.
- Later, at home, children who viewed the demonstration showed greater recall and use of what they learned in the museum.

IMPLICATIONS

Findings from this study specify conditions that promote conversations and support children's STEM learning and interest across informal learning contexts.





Dr. David H. Uttal is a Professor of Psychology and of Education at Northwestern University in Evanston, IL. He received his Ph.D. from the University of Michigan and completed a Postdoctoral Fellowship at the University of Illinois. His research focuses on cognitive development and education, particularly the development of children's early mathematical and spatial abilities. He is especially interested in the role of spatial thinking in STEM education and develops interventions to improve spatial understanding. To learn more about his work, please visit <http://groups.psych.northwestern.edu/uttal/>.

Dr. Catherine A. Haden is a Professor of Psychology at Loyola University Chicago, IL. She received her Ph.D. from Emory University, and completed a Postdoctoral Fellowship at the Center for Developmental Science at the University of North Carolina at Chapel Hill. Her research interests are in the area of children's cognitive development, focusing primarily on memory and learning. She is interested in social factors – such as interactions with parents and other educators – that influence children's developing memory and narrative skills, and children's learning about STEM. To learn more about her work, please visit <http://www.luc.edu/childrensmemory/>.

In their current work, funded by the National Science Foundation, Co-PIs Uttal and Haden have formed a partnership with the **Chicago Children's Museum** to study how parent-child conversational interactions during hands-on activities impact children's STEM learning. Serving a diverse audience of more than 657,000 visitors each year, Chicago Children's Museum's mission is to improve children's lives by creating a community where play and learning connect. To advance this mission, the museum is committed to supporting empirical research about how children learn in informal settings, including the critical role of families in that learning. Thanks to funding from the National Science Foundation, the museum features an integrated research platform that has led to studies about children's museum-based learning by faculty at Northwestern University, the University of Chicago, Northeastern Illinois University and Loyola University. Working together with university partners enables Chicago Children's Museum to better serve children and their families in Chicago while contributing to a knowledge base that can inform and improve best practice in many informal learning environments.



Society for Research in Child Development

The Society for Research in Child Development (SRCD) is a membership organization of approximately 6000 multidisciplinary and international developmental scientists from over 50 countries. Established in 1933 by the National Research Council of the National Academy of Sciences, SRCD aims to advance research on human development; facilitate multidisciplinary, multicultural and international scholarship; nurture junior developmental scientists; and support the effective translation and dissemination of developmental science to improve human health and welfare. SRCD sponsors a biennial meeting on child development, runs a fellowship program that places developmental scientists in congressional and executive branch offices, publishes three journals—including *Child Development*, *Child Development Perspectives*, and *Monographs of the Society for Research in Child Development*—and also publishes the quarterly *Social Policy Report* and *Social Policy Report Brief*. Although explicitly focused on child and youth development at multiple levels of analysis (from cells to society), the Society also attends to development across the life span. To learn more about SRCD, please visit: www.srcd.org.