

Brick by Brick Research Study

Research and Evaluation Executive Summary

Goal

The purpose of this study is to examine the impact of visiting the Brick by Brick exhibit on guest awareness of the roles and identities of engineers, designers, architects and builders.

Why

There is a current need to increase the number of students prepared for careers in science, technology, engineering and math (STEM). Informal science experiences can improve science understanding, increase participation in scientific activities and raise awareness of scientific careers. Despite a growing number of engineering-based museum exhibitions (such as the Engineering and Innovation Hall at the Perot Museum in Dallas and Innovative Engineers at the Boston Museum of Science), there is little research on the impact these opportunities have on visitors' understanding of engineering careers.

What

We gave an assessment to children aged 8-12. The assessment asked them to draw engineers at work and also circle icons representing what engineers do in their jobs. We pilot tested other assessments that used other language (ex: architects vs. engineers) and found no difference in responses, so we settled on using "engineers."

Who

- 130 children were given a survey after they exited the exhibit (treatment).
- 120 children were given a survey as they passed by the exit of the exhibit and confirmed that they had not visited it (control).

How

Families with children were recruited as they passed the exhibit. They were given an assessment to find what they knew about engineers and their roles.

Both the control and treatment group completed the same assessment which consisted of the Draw and Engineer task¹ and the What is an Engineer² instrument. While the children completed their assessments, parents completed a demographic background survey.

When

Data was collected between October 2016 and January 2017.

Results

Results suggest that the exhibit was successful in increasing awareness of an engineers' role but did not strongly impact children's conceptions of who engineers are.

- On the drawings, we found only two main differences between the control and treatment groups. In both cases, the control group was more likely to include trains in their drawings and also to show engineers fixing something. This ties into other studies finding strong associations between engineers and trains³.
- When circling the icons representing what engineers do, we found the treatment group did a statistically significant better job at separating real engineer tasks (ex: “design things”) vs. unrealistic engineer tasks (ex: “clean teeth”).

²Cunningham, C. M., Lachapelle, C., & Lindgren-Streicher, A. (2005). Assessing elementary school students’ conceptions of engineering and technology. Paper presented at the ASEE Annual Conference and Exposition. Portland, OR.

³Capobianco, Diefex-Dux, Mena, & Weller, 2011; Knight & Cunningham, 2004; Fralick, Kearns, Thompson, & Lyons, 2009; Karatas, Micklos, & Bodner, 2011

Future Implications

Our study shows that exhibits with household construction toys like LEGOs can be a useful element of a broader engineering education program, but these exhibits have limits. The exhibit helped children understand more about the roles and responsibilities of an engineer. However, it did not increase awareness of who an engineer is. This indicates a need to highlight not only the work of engineers, but the engineers themselves and the multitude of identities they hold.

These results have been peer-reviewed. They were accepted for presentation at the 2018 International Conference of Learning Sciences and was published in their proceedings.

Project Lead: G. Segovia
Executive Summary Prepared By: G. Segovia, 2/13/18

For more information contact msiresearch@msichicago.org

¹Knight, M., & Cunningham, C.M. (2004). Draw an engineer test (DAET): Development of a tool to investigate students’ ideas about engineers and engineering. Paper presented at the ASEE Annual Conference and Exposition, Salt Lake City, UT.