



A toolkit to support 8- to 11-year-olds in using the engineering design process across out-of-school settings (Resource Exchange)

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Design Squad Maker is produced by GBH Boston and the New York Hall of Science



Overview

This resource exchange shares a toolkit that introduces children ages 8-11 and their families to the engineering design process through hands-on experiences in museums, makerspaces, and at home. The toolkit includes facilitated workshops, an app, and take-home materials that can be used in flexible ways across a range of educational settings. Toolkit resources were iteratively developed and tested through a design-based research process that involved media producers, researchers, and staff at multiple makerspace sites across the US.

Target age range

Children ages 8-11
Caregivers

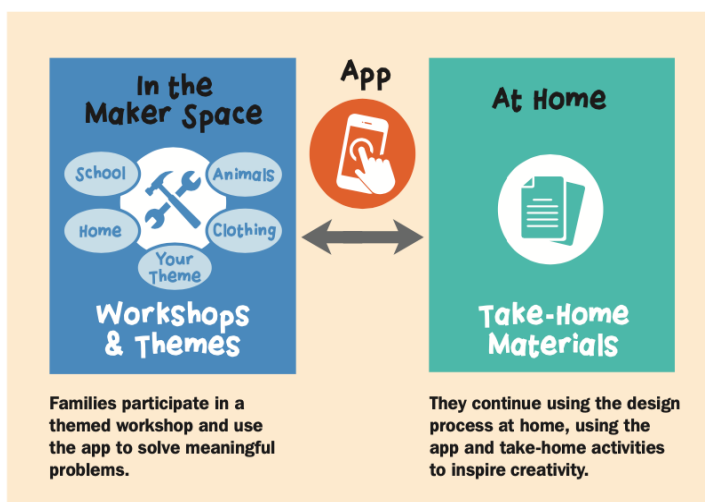
Learning environments

Community-based, museum-based & school-based makerspaces
Home environments

Instructional approach and learning goals

The toolkit builds on research within the maker movement that highlights the importance of engaging learners in using engineering to address problems that are personally meaningful. Our approach also emphasizes the critical role that caregivers play in supporting and guiding children's learning across out-of-school settings and over time. Hands-on family workshops use familiar themes (such as home, school, animals, clothing) to introduce children to the steps of the design process by inviting them to identify problems they want to solve and create a prototype of their design idea. An app offers additional support both during the workshops and at home, and take-home resources support families in starting design projects at home after completing a workshop.

Toolkit components



Learning outcomes

For Children

Using the engineering design process during facilitated workshops:

- defining a problem to solve
- brainstorming and planning solutions
- building a prototype
- testing and iterating their design

Using the app or at-home activities to continue practicing the engineering design process over time and across settings

For Caregivers

Gaining familiarity with the engineering design process

Building interest and confidence supporting children's engineering design projects

The Toolkit Includes:

1. Workshop Facilitation Guide

The Workshop is a step-by-step, scripted guide for makerspace facilitators, describing how to provide an overview of the engineering design process, engage children and their families in coming up with problems to solve based on a theme, and support children in building, testing, and iterating prototypes of their designs. The Workshop also includes information about how to integrate the app into workshop experiences.



2. Workshop Themes

Workshops use familiar themes to inspire children's design projects, including Animals, School, Home, and Clothing, with facilitation prompts and materials tailored for each topic. The toolkit also includes a template to allow makerspaces to create themes on other topics.



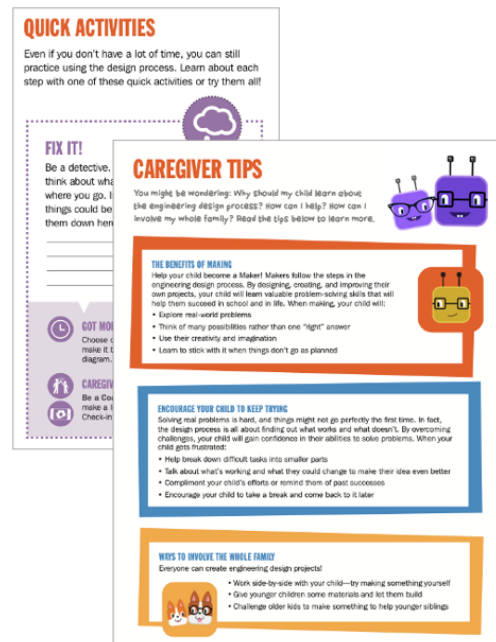
3. App

The app is the bridge that connects children's experiences in the makerspace to home. The app walks children through each step in the process, encouraging them to document their work by taking photos, drawing diagrams, and writing notes. Short animations, tips, and helpful prompts guide children to reflect on their work and promote discussions with caregivers about their ideas. The app is free and works on smartphones and tablets.

4. Take-Home Materials

The toolkit includes take-home resources to encourage families to continue using the design process after the workshops, including:

- *Keep Making at Home*: This booklet includes quick activities that children and caregivers can do together, such as a scavenger hunt to find materials to build with at home.
- *Caregiver Tips*: A one-page handout describes the benefits of learning engineering design, tips for involving siblings of other ages, and a list of roles that caregivers can play in supporting children's design projects.
- The *App* supports making at home, and includes digital versions of the quick activities and tips for caregivers throughout.



To download the toolkit, visit:

bit.ly/designsquadmaker

For more information about this project, contact:

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This material is based upon work supported by the National Science Foundation under Grant No. 1811457. Any opinions, findings, conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.