

Expanding a Child’s Network of Learning Opportunities with Design Squad Maker



Kids had fun using Design Squad Maker, saying they liked “figuring out a problem to solve” and “making something useful with my hands and figuring out how it works and how to fix and make it better.”

When science and engineering learning in schools takes a back seat to math and reading, a child’s extended community can fill in the gaps. According to the National Science Teachers Association (NSTA) elementary school science position statement, “Tapping into the broader scientific community allows children to become active participants within diverse cultures of practicing scientists and engineers. Out-of-school settings can provide additional learning experiences for students within the context of their daily lives.” This is where Design Squad Maker can help. The comprehensive program draws on community and home settings to support sustained engineering and design learning for kids ages 8 to 11 and their families.

Project Background

Design Squad Maker was developed by GBH Boston and the New York Hall of Science with funding for Advancing Informal STEM Learning (AISL) from the National Science Foundation. The program’s main objective is to increase opportunities and reduce barriers for families to engage in engineering design projects across a range of settings, from museum and library maker spaces to the home. Using an iterative design-based research and development approach, the team created a toolkit to engage kids and their parents in identifying problems and finding



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solutions that are relevant and meaningful to them. As kids work collaboratively on problem-solving around things they care about, they use their creativity, gain experience in persevering through a challenge, and shape their own beliefs and attitudes regarding their abilities to do science and engineering. To learn more about the research and development process and to access the free Design Squad Maker resources, [click here](#).

The Design Squad Maker Toolkit

The Design Squad Maker toolkit has three main components: themed workshops, a kid-facing app, and take-home materials.

- **Themed workshops:** Families first experience Design Squad Maker at a themed workshop. Following a five-step engineering design process, kids identify real-world problems to solve based on their experiences and interests. Families work at their own pace to build prototypes of their designs, while maker space educators provide support and encouragement. Educators are supported with guidance on facilitating hands-on workshops, including stepped-out agendas, talking points, handouts, and materials to promote the workshops. They are also provided with ideas to encourage family participation and extend learning to the home.



- **Free kid-facing app:** As a tool used during the workshops and at home, the app guides kids through each step of the design process. They can use the app to document their work by taking notes, drawing diagrams, and taking photos of their prototypes. The app includes short animations, tips, and prompts to promote discussions between kids and their parents. Since families are introduced to the app at the maker space, the app helps bridge the engineering design process learning to the home. (Download from [Apple App Store](#) or [Google Play Store](#).)

- **Take-home materials:** In addition to the app, families receive a *Keep Making at Home!* booklet that provides simple activities to sustain engagement with the design process at home. Additional handouts include “Caregiver’s Tips,” which describes the benefits of learning engineering design, ways to support kids, and ideas to engage the whole family, and “Caregiver’s Roles,” which describes ways parents can support and collaborate with their child.

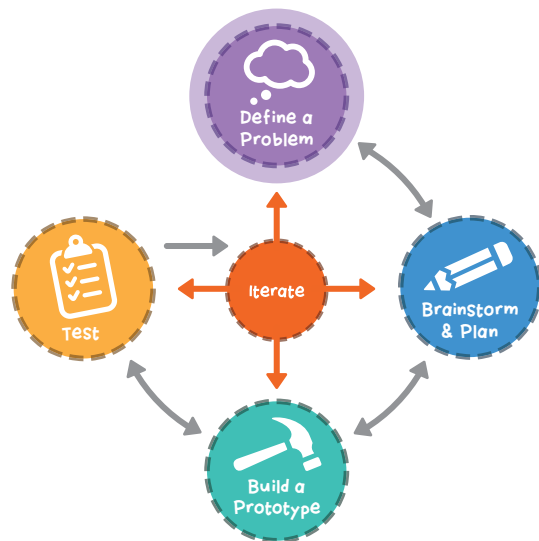
Gauging Impact

Following multiple rounds of iterative development and a multi-site pilot study, Concord Evaluation Group conducted a summative evaluation of the toolkit at library and museum maker spaces. The study measured outcomes among families who used the toolkit (workshops, digital app, and take-home materials) as well as outcomes among informal educators who hosted workshops. Kids,

parents, and educators responded to pre and post surveys, and qualitative data from workshop observations and educator interviews were also collected. Results from the evaluation study indicated that the toolkit:

- **Increased familiarity with the stages of the engineering design process among parents and children.** Pre and post surveys indicated that parents' familiarity ratings increased significantly over time, with a stronger growth rate among parents who did not have a college degree. Children's familiarity ratings showed statistically significant increases for the design process phases of planning a project and building a prototype.

- **Increased motivation among parents to support their child's engagement with the engineering design process and increased interest among children previously unfamiliar with it.** Parents, especially those with less than a college degree, reported increased confidence in helping their children with engineering design projects. Children reported increased interest in doing design projects with their family.



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- **Promoted enjoyment with the engineering design process.** Both kids and their parents reported that they had a lot of fun at the workshops. One parent stated: *“Loved seeing what all the kids designed and created. Everyone had something unique which was great!”*

- **Sustained engagement across settings (maker space, digital, and home).** All families reported that they planned to return for similar workshops. More than half reported continuing to work on prototypes they had started at the workshop and

starting a new design project at home, and 80 percent of children reported interest in doing more engineering design projects. Parents attributed that interest to their experience with Design Squad Maker. Half of the families reported using the take-home materials and app after the workshop. One parent reported, *“I think the app is great and makes the kids really slow down and go through all the steps!”*

- **Provided engaging and flexible workshop materials.** All educators reported that the workshop topics were engaging for their audiences, the materials (including the app) provided enough support and flexibility to tailor the program for their space and community, and they

were satisfied that families learned something. One educator commented, *“I love the ideas and the themes, and the training was super helpful. It helped me get my staff ready to do this workshop. But then also, once you’ve done it, or once you feel comfortable running events, this is a great framework that you can adapt to fit whatever the needs of your individual space are.”*

All educators reported that they planned to continue using the Design Squad Maker Toolkit and would recommend it to other organizations like their own.

Read more about the summative evaluation study [here](#).

In Summary

The Design Squad Maker model shows that tapping into a child’s extended learning network—family and community—is a viable option for supporting a child’s engineering and design process learning. The program makes engineering and design accessible to diverse kids and parents by meeting them where they are with thoughtfully crafted instructions, a free digital app, graphic organizers, and visual supports. Design Squad Maker provides an opportunity for kids to use their knowledge and skills in meaningful ways, encouraging them to consider and create solutions to real-world problems with adult support.

Although the primary audience for Design Squad Maker is community maker space educators and parents, classroom educators may also find value in incorporating the toolkit into their science and engineering curriculum. For instance, during a unit on natural hazards, students can use the design process to brainstorm and create solutions to problems that phenomena such as hurricanes and floods cause in their community. (Pages 15 through 22 of the [Design Squad Maker Toolkit](#) can be adapted for classroom use.)

About Design Squad

Design Squad has been providing multimedia resources to make engineering and design accessible to kids ages 8 to 13 for more than 15 years. Platforms span from broadcast television and community spaces to digital spaces that feature short-form video, games, and learning apps. Design Squad Maker grew out of Design Squad’s evolving nature and core principle to support engineering awareness and engagement to inspire the next generation of engineers. It has found success on different platforms and has been the recipient of a Peabody Award for the show and the YouTube Gold Creator Award for passing 1 million subscribers in 2023. Find Design Squad on [PBS LearningMedia](#), [PBS KIDS Design Squad](#), and the [Design Squad YouTube Channel](#).