

## STEM Careers + Families: Learning from Centers and Museums



Photo Credit: NYSCI

Linda Kekelis, PhD  
Kara Sammet, PhD

In today's fast-paced, entertainment-focused world, the very best museums do so much more than provide rainy day activities that engage in the moment but lead nowhere. These *institutions lay the groundwork for long-term interest and persistence in STEM.*

**What do innovative museums do?** In the best cases they help families connect the dots between doing STEM in museums, making connections at home, and encouraging their children to pursue a future in STEM. Museum activities allow children and adults to engage in hands-on STEM that can make connections to STEM careers.

The research is clear: parents have an incredibly strong influence on their children's academic and career choices.<sup>1</sup> Families are looking to STEM experts for guidance. Pioneering museums leverage the research on parental influence to engage with families around career exploration in STEM.

At STEM Next Opportunity Fund, we're highlighting the most promising practices of family engagement in informal STEM. In this case study, we showcase the work of the New York Hall of Science (NYSCI) and the

Oregon Museum of Science and Industry (OMSI). These museums are engaging families in innovative ways and making career exploration an important piece of their mission. We interviewed Andrés Henríquez, Vice President of STEM Learning in Communities at NYSCI; David Heil, owner of David Heil & Associates, Inc.; and Lauren Moreno, Director of Strategic Partnerships and Programs, and Veronika Nunez, Senior Learning & Engagement Specialist, from OMSI to learn about their efforts and lessons learned in promoting career exploration with families.

While NYSCI and OMSI serve different communities, they share a *common approach to program development with families*. NYSCI and OMSI:

- **Listen to families** to better understand what families want and need.
- **Take information that families share and use it to customize programs that build capacity in communities.**

For NYSCI and OMSI, following this two-step approach led them to one very important goal: to offer parents and guardians experiences that connect them and their children to creative STEM careers and pathways.



Photo Credit: NYSCI

Below, we share four strategies from NYSCI and OMSI for how museums can empower families and open doors to their children's future in STEM.

## ***1. Make programs multi-generational and multi-caretaker***

NYSCI listened to and learned from parents and stakeholders involved in family and community engagement to understand parents' perspectives on their children's career interests. In focus groups, families expressed interest in programs for the entire family, opportunities to interact with people in their native language, and an environment where they feel comfortable and not out of their depth. With support from the Carnegie Corporation of New York, NYSCI developed a Parent University, a multi-faceted program for youth and their

parents, many of whom are first-generation immigrants. Margaret Honey, President and CEO of NYSCI, underscored that the museum's commitment to the community is long-term and supported with resources that will allow museum and staff to learn and grow.<sup>2</sup>

When youth visit museums, they typically design, play, and make things, but the adults who bring children don't always understand why these activities are important to their child's future. In contrast, at NYSCI, museum staff help both youth and adults see the value of STEM activities and how to build on these activities in the future. For instance, museum staff learned that caregivers were often too intimidated to ask questions about their child's school and career path. So NYSCI offers adult-focused programs that explain STEM subject matter and skills like problem-solving, teamwork and critical thinking, which will be important for STEM careers. Other adult-focused programs at NYSCI empower caregivers to be STEM learners and champions through hands-on experiences. NYSCI tailors other programs to youth, like homework help that supports academic success followed by time to explore the museum and participate in activities. A third type of activity supports youth and parents together. These family programs are designed with a two-generation approach to creative STEM learning.

## *2. Help youth and parents make connections between STEM activities and STEM careers*

Career exploration is an intentional part of NYSCI's mission and is both in-depth and long-term. NYSCI hosts quarterly STEM workshops—STEM Nights—with local businesses. These events help families understand the many different career options in STEM in New York City. The goal is for the middle school youth who participate in these programs to have the chance to be the future STEM entrepreneurs and leaders in New York City. The high attendance of these programs demonstrates they are of interest and value to families.

At the NYSCI workshops, kids and their families learn about academic coursework and pathways to STEM-related careers, such as internship opportunities and paid summer programs. These topics make for meaningful discussions that interest kids and parents. Especially for first-generation families with both high needs and high aspirations, connecting museum activities to STEM careers helps make pathways to STEM opportunities more explicit and less of a mystery.

Families expressed interest in programs for the entire family, opportunities to interact with people in their native language, and an environment where they feel comfortable and not out of their depth.





Photo Credit: Designing Our World, OMSI

Like NYSCI, OMSI hosts programs that show families the exciting opportunities in STEM careers. For example, OMSI created Designing Our World to introduce girls to engineering with funding from National Science Foundation.<sup>3</sup> Engineering is a career field in which females are significantly underrepresented. This education program and exhibit offers girls and families engineering experiences that highlight humanitarian, personally relevant, and social aspects of engineering. Research by OMSI and others suggest that these elements are especially appealing to girls and influence their academic and career choices.<sup>4</sup> Career exploration is embedded into the project, helping connect engineering design activities to careers. For instance, girls learned about engineering careers through challenges such as designing a wheelchair accessible ramp, or engineering surgical tools specialized for specific tasks. OMSI's success with Designing Our World was due to the collective efforts of its partnership with Adelante Mujeres, Girls Inc., Boys and Girls Club and Hatfield Marine Science Center.

### ***3. Introduce families to diverse and effective role models***

At OMSI, exposure to a wide range of role models and careers is the “secret sauce” for showing the many possibilities and paths to meaningful work in STEM. Role models and mentors are getting considerable attention in STEM programs these days.<sup>5</sup> Yet if you ask middle school kids to draw an engineer or computer scientist, what will they create? Likely someone who looks nerdy (wearing glasses, with messy hair and a lab coat), works alone in an office, and is male and white. Role models that are diverse across race, age, gender, home language and area expertise can help dispel these stereotypes. OMSI developed role model profiles on display panels that accompany their engineering exhibits. The personal and professional sides of these role models are shown. Seeing photos of engineers with their families helps youth and parents learn about their personal interests in and out of work and replaces the stereotypes with authentic “faces” of engineers.

With few exceptions, most role model programming focuses on youth and leaves out parents and other important adults in kids' lives. Not so at OMSI or NYSCI. From their start over 30 years ago, Family Engineering and Family Science programs at OMSI have recognized the importance of role models for kids

and parents. They encourage recruiting engineers as volunteers, facilitators, and guest speakers. This may be the first time that families meet an engineer. In *Designing Our World*, OMSI has learned that role models help impact how girls and their parents envision engineering and its ability to help people and solve problems. At NYSCI, role models talk to kids about what it “looks like” if they want to become a chemical engineer or have a career in high tech. They talk to parents about STEM careers and what they can do in the here-and-now to support their child in STEM. Kids and parents alike make connections and find inspiration in different role models.

While role models hold promise to inspire kids and parents, they require support to achieve their potential. It takes time and training to become an effective role model. The Family Engineering team increases role model impact by supporting them to develop skills in how (i.e., pedagogy) and what (i.e., content) to present.

- Before leading an activity, role models observe the Family Engineering team facilitate an event using best practices for engaging families. Once role models start working with families, the Family Engineering team observes and offers role models support, encouragement, and feedback. Through this cycle of observation and coaching, role models gain confidence and skills to be effective ambassadors for engineering careers.
- New role models often try to communicate too much and overload on content. The Family Engineering team helps role models understand that it’s the personal connection that’s most important. They encourage scientists and engineers to leave their lectures and jargon behind, share their personal stories, and lead simple and engaging activities with families.

## 4. *Start early*

For some parents, their kids’ careers are seen as “light years away.” Yet we know career interests are shaped very early. Work by Adam Maltese and Robert Tai found that interest in eighth grade was a leading predictor for science careers.<sup>6</sup> Having an interest in something by the eighth grade means personal exposure and positive, confidence-building experiences in this arena long before that age. It’s especially important to support girls in STEM early on. Research shows that girls as young as 6 years old already have beliefs about computing that are gender-stereotyped.<sup>7</sup> With these stereotypes, girls express less confidence and interest in tech pursuits like robotics and programming. The good news is that gender gaps can be changed with experiences and encouragement from parents. Museum programs like OMSI’s *Designing Our World* are working with families to inspire young girls in STEM.

Seeing photos of engineers with their families helps youth and parents learn about their personal interests in and out of work and replaces the stereotypes with authentic “faces” of engineers.



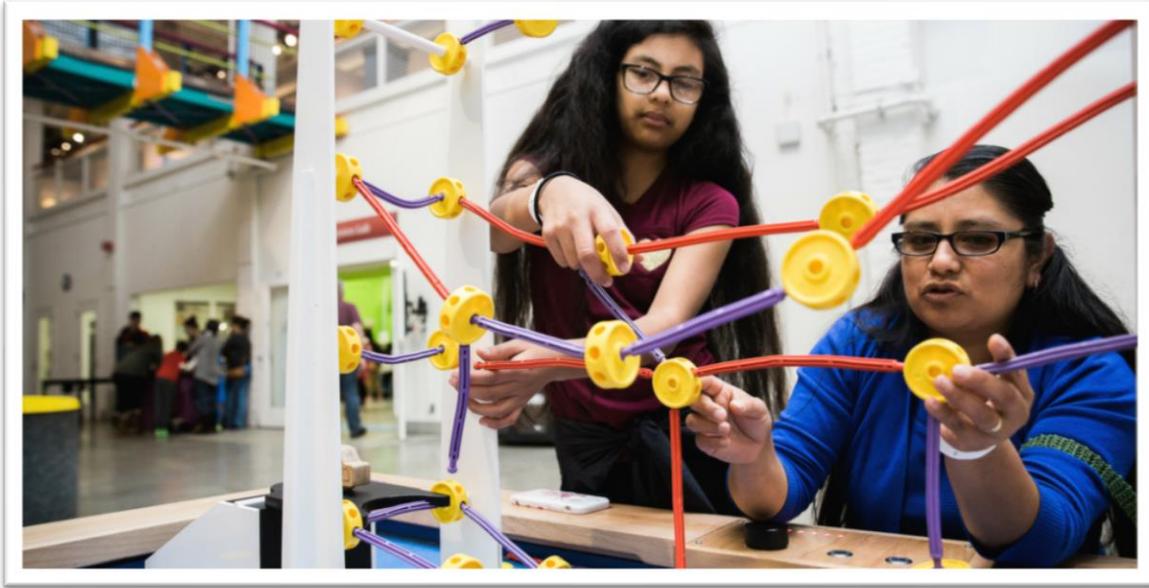


Photo Credit: Designing Our World, OMSI

It is never too early to expose children to STEM careers. Because parents' beliefs and attitudes toward STEM profoundly influence their children's attitudes and actions,<sup>8</sup> both NYSCI and OMSI offer STEM programming and career exploration to reach families early and often. The Foundation for Family Science and Engineering, who pioneered family STEM programming two decades ago, has recently adapted its signature Family Science and Family Engineering programs for families with children ages 2-6 with Supporting Early Engagement and Development in STEM (SEEDS). In addition, NYSCI supports a number of early childhood programs that allow very young children and their families to be engaged in STEM. These include Little Makers, a maker program for preschoolers and kindergarten children, and Big Data for Little Kids that allows very young children and their families to be engaged in STEM.

Whether your work is at a museum, in school, or out of school at a community center, we hope that the strategies we have shared in this case study from NYSCI and OMSI inspire you to find your own ways of empowering parents in STEM and opening doors to career possibilities for their children.

## *Additional Resources*

**[A Parent's Role in STEM Education](#)** offers resources from NYSCI. From this essay by Margaret Honey, CEO of NYSCI, you will learn how to help parents access resources to support their kids in STEM.

**[Family Engineering: An Activity and Event Planning Guide](#)** from the Foundation for Family Science and Engineering helps engineers become effective role models. This resource includes proven engineering activities for families along with practical tips for planning events with partners.

**[Family Science](#)**, the first publication from the Foundation for Family Science and Engineering, focuses on activities and strategies for supporting volunteers and role models with introducing science to families with young children.

**Role Models Matter** offers online training and resources for role models from Techbridge Girls. You will find icebreakers, hands-on activities, and ideas to host an engaging and effective role model visit or field trip.

**STEM Starts Early** champions for STEM in early childhood by the Joan Ganz Cooney Center at Sesame Workshop and New America. This work offers recommendations for research, policy, and practice to promote high-quality STEM learning for all children.

*We welcome your feedback on this case study. Send us your comments and questions at [info@stemnext.org](mailto:info@stemnext.org)*



Linda Kekelis, PhD, is a consultant with a longstanding commitment for ensuring that all youth, particularly girls and youth of color, have access to STEM opportunities. Family engagement has been a passion for Linda and at the center of the research and programs she has led. [lkekelis@gmail.com](mailto:lkekelis@gmail.com) @LindaKekelis



Kara Sammet, PhD, is an inclusion strategist, professional speaker and founder of **Gender Lenz LLC**, a consulting firm that supports organizations to leverage inclusion to transform the world. Dr. Sammet received her doctorate from UC Berkeley in Social & Cultural Studies/Measurement & Evaluation with an Emphasis in Gender, Women and Sexuality. @karasammet

*We would like to thank Andrés Henríquez, David Heil, Lauren Moreno, and Veronika Nunez for their input for this case study. Their examples of listening and learning from families in their community show how we can empower families and support career exploration through STEM programs. We also thank Gail Breslow at the Museum of Science, Boston; Jean Ryoo at the University of California, Los Angeles; and Cary Sneider at Portland State University for their review and suggestions on this case study.*

## References

1. Lazarides, R., Harackiewicz, J., Canning, E., Pesu, L., & Viljaranta, J. (2015). The role of parents in students' motivational beliefs and values. In C. Rubie-Davies, J. Stephens, & P. Watson (Eds.), *The Routledge International Handbook of Social Psychology of the Classroom* (p. 5). Routledge.  
  
Rozek, C. S., Svoboda, R. C., Harackiewicz, J. M., Hulleman, C. S., & Hyde, J. S. (2017). Utility-value intervention with parents increases students' STEM preparation and career pursuit. *Proceedings of the National Academy of Sciences*, 114(5), 909-914.  
  
Wilder, S. (2014). Effects of parental involvement on academic achievement: a meta-synthesis. *Educational Review*, 66(3), 377-397.
2. Honey, M. (2016). A Parent's Role in STEM Education. Medium.
3. Designing Our World. A Community Envisioning Girls as Engineers. (2016). NSF Poster (DRL #1322306) Oregon Museum of Science and Industry, Oregon State University, & Garibay Group.
4. Boucher, K.L., Fuesting, M.A., Diekman, A.B., & Murphy, M.C. (2017). Can I Work with and Help Others in This Field? How Communal Goals Influence Interest and Participation in STEM Fields. *Frontiers in Psychology*, 8, Article 901.
5. Cheryan, S., Master, A., & Meltzoff, A.N. (2015). Cultural stereotypes as gatekeepers: increasing girls' interest in computer science and engineering by diversifying stereotypes. *Frontiers in Psychology*, 11, 6, 49.
6. Maltese, A.V. & Tai, R. H. (2010). 'Eyeballs in the Fridge: Sources of early interest in science.' *International Journal of Science Education*, 32: 5, 669- 685.
7. Cheryan, S., Master, A., & Meltzoff, A.N. (2017). Op-Ed The Gender Gap in Tech Isn't Set in Stone. *Los Angeles Times*.
8. McClure, E. (2017). 4 Things Everyone Should Know about STEM Learning. *Common Sense Education*. Medium.