

Ingeniería Para Mi Familia

STRENGTHENING THE CULTURAL RELEVANCE OF THE HEAD START ON
ENGINEERING PROGRAM FOR FAMILIES



Final Project Report

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Because math and
science build futures

TERC



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Introduction

[Head Start on Engineering](#) (HSE) is a multi-component, bilingual (Spanish/English) program integrated within the Head Start system and designed to spark and sustain interest in engineering for preschool-age children and their families from low-income backgrounds. HSE fosters connections across preschool and family learning contexts to catalyze enduring family interests related to science and engineering—sometimes called long-term interest pathways. Unlike many other preschool science or engineering programs, HSE focuses on home-based experiences first and then creates complementary classroom activities to support family learning.

The HSE program provides comprehensive services for parents,¹ children, and their teachers, including professional development, hands-on engineering activities for families, parent workshops, preschool classroom extensions, science center field trips, online resources, and rigorous assessment and program improvement. Collectively, these experiences are designed to:

- 1) Develop family interest in engineering,
- 2) Increase parents' and children's engineering and design thinking skills, and
- 3) Support other early childhood development outcomes, such as numeracy and early reading skills.

During the 2018–19 school year, with support from the Boeing Corporation, the project team launched an effort to increase the cultural relevance of the program for Head Start families, and especially Spanish-speaking parents and children who represent almost half of Mt. Hood Community College (MHCC) Head Start participants. HSE has always been offered in Spanish and English, with program events facilitated by bilingual and bicultural educators. However, feedback over the last several years suggested that more could be done to make the program activities and materials culturally relevant for families (Pattison et al., 2018).

Cultural relevance describes the ways that a program connects with, values, and integrates the cultural beliefs, knowledge, and practices of a community (González et al., 2005; Ladson-Billings, 1995; Ladson-Billings, 1995). Research suggests that culturally relevant approaches support learning and identity development (Brown, 2017; Calabrese Barton & Tan, 2018; Carlone et al., 2011; Moje et al., 2004; NCTM, 2018) and are fundamentally at the heart of quality education (Ladson-Billings, 1995).

Given these needs, the project team launched a series of information gathering and parent engagement activities during the 2018–19 school year to collect input from Head Start staff and families and test updates to the HSE activities and materials. The objectives for these efforts were:

- 1) Gather input from Head Start staff and families on the ways that engineering connects to the cultural beliefs, knowledge, and practices of Spanish-speaking communities;
- 2) Use this input to update HSE program activities and materials; and
- 3) Test and revise the updated activities and materials with other Head Start families.

¹ Throughout this report, the term “parent” is used broadly to include the central adults and caregivers in a child’s life, whether or not they are the biological parents.

This report describes the methods and results from this effort. For more information about HSE, including the program guide for educators and findings from research and evaluation studies, visit the project website: <https://hse.terc.edu>.

Methods

To accomplish the goals outlined above, the project team participated in a series of MHCC Head Start events during the 2018–19 school year, including one Head Start staff meeting, one family science night at the Oregon Museum of Science and Industry (OMSI), and four evening parent meetings at three different MHCC Head Start locations. The details of each of these events are described below.

Data Collection

First, the project team leveraged a previously scheduled science night for all MHCC Head Start staff and families on January 14, 2019 to gather initial input from families through a short, bilingual (Spanish/English) survey. The survey was handed out to families by MHCC Head Start staff as they arrived and included the following questions: (1) What is one thing we could do to make science and engineering more relevant and interesting to you and your family? (¿Qué podemos hacer para que la ciencia y la ingeniería sean más relevantes e interesantes para usted y su familia?) (2) What is one thing we could include with these activities that would help you as the parent support science and engineering learning with your children? (¿Qué podríamos incluir en estas actividades que lo ayuden a usted como papá/mamá/cuidador a apoyar el aprendizaje de ciencias e ingeniería de sus hijos?) (3) What is the primary language you use at home? (¿Qué idioma se habla principalmente en casa?) A total of 14 adults completed the survey.

Next, to gather input from Head Start staff, one member of the project team attended the monthly MHCC Head Start family worker meeting on January 24, 2019. Family workers are staff members who compliment the role of Head Start classroom teachers by regularly communicating and conducting home visits with families to support healthy family and child development, including housing, financial resources, health and wellness, government regulations, kindergarten transition, and more. During the meeting with the 25 family workers, the project team facilitated a discussion about the ways that staff support families and the characteristics that are important for the success of programs with the Head Start community.

The discussion was organized into two rounds. The first round focused on working with families in general and included the following three questions: (1) What strategies do you currently use to support families and make sure they are successful inside and outside of school? (2) With other programs for Head Start families, what aspects have been successful or particularly important? (3) What aspects have been less successful or have created barriers for families? In the second round, staff members were asked to think more specifically about support for Spanish-speaking families: (4) What do you think is important to keep in mind when creating programs for Spanish-speaking and Latinx families in Head Start? (5) For other programs designed for these families, what has been successful or particularly important? (6) What aspects have been less successful or have created barriers for families? For each round, staff members first discussed questions in small groups and then shared with the larger group.

Finally, using the initial input from staff and families, the project team facilitated workshops for Head Start parents at four parent evenings across three different MHCC Head Start locations (see Table 1) between February and April of 2019. The parent meetings involved a combination of activities to introduce parents to engineering (and provide ideas to share with their children and families), gather feedback and input from parents to inform the HSE program, and test out new ideas. The first two meetings in February and March primarily focused on input gathering, while the last two in April primarily focused on testing out new activities and materials. Examples of activities and discussion topics used during the parent workshops include: overview of the HSE program; tower building challenge to introduce parents to the engineering design process; engagement with several of the HSE family activity kits (e.g., [Fox and Hen](#) and [Mouse Run](#)), focus group-like discussions with parents about how the HSE program could be improved and the types of support resources that are most helpful to them; and feedback on updated versions of HSE materials, including fliers, books, and parent facilitation guides.

Table 1. Dates and locations for Head Start parent meetings.

Location	Date	Number of Parents
ECC	2/12/2019	9
ECC	4/9/2019	12
Rockwood	3/12/2019	9
Sunrise	4/1//2019	14

Note. For the Rockwood meeting, attendance was recorded as the number of families represented. Therefore, the total is likely an underrepresentation of the number of parents.

All of the workshops were conducted in Spanish and English, with materials provided in both languages. For at least one workshop, translation services were also provided in a third language. Although the primary focus of the Boeing-funded activities this year was to gather input from Spanish-speaking families, all parents were invited and included in the workshops, aligned with MHCC Head Start’s inclusive approach to family engagement (Office of Head Start, 2011). During data analysis, the team paid careful attention to the feedback provided specifically by Spanish-speaking families. However, Spanish-speaking parents were often quite broad in their feedback, providing suggestions for Head Start families in general, rather than specifics connections related to their cultural backgrounds and experiences.

Data Analysis

To analyze the data, the project team followed a team-based inquiry approach (Pattison, Cohn, & Kollmann, 2013) for systematically collecting and reflecting on parent and staff feedback and using this process to make iterative updates to the HSE activities and materials. During team meetings, the group carefully reviewed the data (e.g., responses to the OMSI science night survey) and identified reoccurring themes across families. The group then discussed each of

these themes, implications for the HSE program, and ideas for the next round of data collection. Notes were captured at each meeting to document the team’s decision-making process and evolving ideas. At the end of the year, the project team organized a final debrief to review all of the input across the whole year and identify themes and recommendations for the future.

Findings

Based on findings across the different data sources and discussions, the team developed a set of guiding principles for making the HSE program inclusive and welcoming, especially for Spanish-speaking families:

- **Adopt an inclusive and integrated approach to multiple languages**—Most families expressed a preference for bilingual experiences that connect rather than isolate families. For example, parents wanted books with English and Spanish side by side rather than separate versions, and parents preferred English and Spanish translations back and forth during workshop rather than simultaneous translations using microphones and headsets (with some families listening to the discussion in their native language and others hearing a translation in their ears). This inclusive approach aligns with the Head Start philosophy of family engagement, which emphasizes building a community of learners and leaders across families.
- **Provide welcoming and accessible materials for parents with lower education or literacy levels**—Regardless of the family’s preferred language, parents emphasized making all materials welcoming and accessible, including using fewer words and more pictures. Discussions also highlighted the importance of thinking more about how programs are framed and advertised so that all Head Start families feel comfortable participating. This is especially true for science and engineering—both topics that may be exciting to some parents but intimidating to others. For example, some parents suggested it would be better to initially advertise “hands-on activities for families” and then slowly introduce participants to the idea of engineering.
- **Always include essential services in family programs**—Head Start families are busy and face a variety of economic barriers to program participation. Parents and staff indicated that successful programs for Head Start and other low-income communities must include free attendance, childcare, food, language translation services, and an accessible location (or transportation options). Families are also more likely to participate if there are added incentives, such as free resources or unique educational materials (e.g., blocks, magnifying glasses, children’s books).
- **Address cultural relevance both through people and values**—Addressing cultural relevance through people means thinking about who is represented in the program, how program staff are trained, and how parents are involved. Addressing cultural relevance through values involves thinking about how the program connects to family interests and values beyond engineering, such as spending time together or preparing children to be successful in kindergarten. Staff were particularly vocal about this topic, although more discussions may be needed to better understand how Head Start staff members define cultural relevance. The team also reflected that it is important but

sometimes challenging to be respectful of all family beliefs and values, such as during a family home visit when a staff member sees something that does not align with their own values.

- **Build relationships and maintain communication**—As noted, Head Start families have busy schedules, and parents must constantly make choices about how they prioritize time and resources. To successfully engage families, programs must build and maintain trusting relationships by leveraging connections with Head Start staff members, encouraging attendance, communicating regularly through texts and other strategies, and making time to visit families in their homes.
- **Provide extensions and activity adaptations for the needs and goals of different families**—Families and parents were excited by the existing HSE activities and materials. However, they emphasized the importance of helping each family adapt the activities to their own needs and interests. Examples shared by families include ideas for using household materials to extend the engineering design challenges, making the activities engaging and accessible to older and younger siblings or children with disabilities, and providing online program components. These adaptation ideas may be especially important for the take-home activity kits, which are of high value to families.
- **Recognize differences across families**—While many of the perspectives outlined above were shared across participants, there were also unique opinions within the group. For example, some parents said that they were attracted to engineering-specific language in the HSE program recruitment materials (e.g., the name of the program and descriptions of the engineering design process), while other families indicated that they would be intimidated by the topic. Similarly, some families wanted books with words while other families preferred books with only pictures. Overall, these differences suggest the importance of keeping the programs flexible and open to different family approaches, perspectives, and needs.

Beyond these broad guidelines, staff and parents also mentioned recommendations for specific HSE components, activities, and materials that were shared during the events:

- **Flyers and program advertising**—For program advertisement and recruitment, parents recommended that materials be simple and designed to catch the eye, highlight the OMSI brand (which is highly motivating for many parents), emphasize fun and other value for families, and provide basic information that parents need (e.g., cost, location, topic, language, services provided). As noted, there are tradeoffs to mentioning the word “engineering.”
- **Parent guide**—For the HSE parent guides, families almost universally expressed interest in including example questions and facilitation tips for parents to use when engaging their families with the take-home activities.
- **Online videos**—For the online videos accompanying each take-home activity kit, parents suggested making the clips shorter and simpler (e.g., basic introduction and example interactions, rather than a comprehensive depiction of all the aspects of the activity kit and possible extensions).

- **Communicating with families**—Parents preferred text messaging as a primary mode of communication related to Head Start programs, including event reminders.
- **Children’s books**—For the books that are included in the take-home activity kits, most parents suggested that they prefer bilingual books, or books without words, and that the books should not be too long for preschool-age children. As noted, parents did have different perspectives on this topic (e.g., words versus no words), suggesting the importance of offering a variety of books and partnering with libraries to provide different options beyond those in the kits. The team also reflected on the reality that providing translations for monolingual books (e.g., inserting stickers with the Spanish text) is very time intensive.
- **Take-home activity kits**—Several comments by parents and staff highlighted the power of novel tools, materials, and objects in the take-home activity kits. For example, families indicated that they loved the foam blocks in the Fox and Hen kit.

Finally, the team also reflected on a number of lessons learned about the process of facilitating these types of discussions and feedback events:

- Playful icebreakers are helpful to engage parents and make them feel more comfortable. For example, families seemed to respond well to one of the team members dramatically reading a children’s book from the activity kits.
- The format of the parent meetings, which attempted to balance hands-on activities and parent input, seemed to work well for meeting the goals of the team, Head Start staff, and parents.
- The alternative methods for gathering parent input (e.g., asking parents to put stickers on their favorite versions of the materials and then discuss) were highly successful and seemed especially helpful for encouraging participation from the whole group, rather than only a few more vocal participants.
- Because parents and Head Start staff are busy, it worked better to incorporate program activities into already scheduled Head Start events, rather than schedule and coordinate separate parent or staff meetings. This included leveraging existing staff meetings to gather input and incorporating HSE workshops into the regular monthly parent meetings at each Head Start location.

Conclusion

The goal for this project was to gather input from Head Start staff and families to help make the HSE program more welcoming, inclusive, and culturally relevant for the Head Start community, and especially for Spanish-speaking families. Overall, the process was highly successful, providing input to guide the overall approach for HSE and make improvements to specific program components. Throughout, parents and staff continually expressed their support for the HSE program and for additional resources to engage families and children with

the topic of engineering. With new funding from the National Science Foundation² and other funders, the team is moving forward with improving and expanding the program for Head Start and other organizations. The lessons learned from this project will be critical for guiding these future efforts.

The team reflections also highlighted a variety of emergent questions:

- At a deeper level, what does “cultural relevance” mean to Head Start staff and families? And how does it relate to the more recent notion of “culturally sustaining pedagogy” (Paris, 2012; Paris & Alim, 2017)?
- Although families expressed value in bilingual events, would different parents attend if the project offered language-specific nights? What strategies will allow the team to provide better support for languages other than Spanish? What about adding a third language, such as Arabic? Or focusing more on visual support and physical modeling?
- What other strategies will help parents and caregivers feel comfortable with engineering activities (e.g., multiple family members participating, support from family workers and teachers, staff modeling “I don’t know, let’s try it together”)?
- What are other ways to make the engineering design challenges directly relatable to the lives of families and children, such as connecting with everyday activities like chores, teeth brushing, or repairing household items?
- What other topics, materials, and everyday connections should be explored in new HSE activity kits? What other novel materials or objects (e.g., slime or flubber) are promising?
- How can the program balance the desire expressed by parents of having both adult-only events as well as time for parents to engage their children with the support of staff? Should the program include time for parent-child interactions during the workshops or is the parent-only time the highest priority?
- What are ways to better involve Head Start teachers and family workers in the parent workshops and prepare them for their role in supporting families throughout the program? How can family workers be more involved in the planning and delivery of the parent workshops?
- Given the high-level of content expertise needed to facilitate engineering engagement for staff and families, how can HSE team members continue to deepen their expertise in engineering?

All of these questions will be important for the team to consider as the HSE program continues to grow, expand, and improve in order to support lifelong science and engineering learning for low-income families.

² [Research Exploring Activity Characteristics and Heuristics for Early Childhood Engineering and Developing a Learning Community to Study and Support Family-level Interest in Engineering.](#)

References Cited

- Brown, J. C. (2017). A metasynthesis of the complementarity of culturally responsive and inquiry-based science education in K-12 settings: Implications for advancing equitable science teaching and learning. *Journal of Research in Science Teaching*, 54(9), 1143–1173.
- Calabrese Barton, A., & Tan, E. (2018). A longitudinal study of equity-oriented STEM-rich making among youth from historically marginalized communities. *American Educational Research Journal*.
- Carlone, H. B., Haun-Frank, J., & Webb, A. (2011). Assessing equity beyond knowledge- and skills-based outcomes: A comparative ethnography of two fourth-grade reform-based science classrooms. *Journal of Research in Science Teaching*, 48(5), 459–485.
- González, N., Moll, L. C., & Amanti, C. (2005). *Funds of knowledge: Theorizing practice in households, communities, and classrooms*. Mahwah, NJ: Erlbaum.
- Ladson-Billings, G. (1995). But that's just good teaching! The case for culturally relevant pedagogy. *Theory Into Practice*, 34(3), 159–165.
- Ladson-Billings, G. (1995). Toward a theory of culturally relevant pedagogy. *American Educational Research Journal*, 32(3), 465–491.
- Moje, E. B., Ciechanowski, K. M., Kramer, K., Ellis, L., Carrillo, R., & Collazo, T. (2004). Working toward third space in content area literacy: An examination of everyday funds of knowledge and Discourse. *Reading Research Quarterly*, 39(1), 38–70.
- NCTM Research Committee. (2018). Asset-based approaches to equitable mathematics education research and practice. *Journal for Research in Mathematics Education*, 49(4), 373–389.
- Office of Head Start. (2011). *The Head Start parent, family, and community engagement framework: Promoting family engagement and school readiness, from prenatal to age 8*. Retrieved from <http://eclkc.ohs.acf.hhs.gov/hslc/standards/im/2011/pfce-framework.pdf>
- Paris, D. (2012). Culturally Sustaining Pedagogy: A needed change in stance, terminology, and practice. *Educational Researcher*, 41(3), 93–97.
- Paris, D., & Alim, H. S. (Eds.). (2017). *Culturally sustaining pedagogies: Teaching and learning for justice in a changing world*. New York, NY: Teachers College Press.
- Pattison, S. A., Cohn, S., & Kollmann, E. (2013). *Team-based inquiry: A practical guide for using evaluation to improve informal education experiences*. Retrieved from http://www.nisenet.org/catalog/tools_guides/team-based_inquiry_guide
- Pattison, S. A., Svarovsky, G. N., Benne, M., Corrie, P., Núñez, V., & Smith, C. (2018). *Head Start on Engineering: 2017–18 program year evaluation report*. Retrieved from <https://HSE.TERC.edu>