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Museum staff, caregivers, and preschool teachers collaborating to reimagine family engagement in early STEAM learning

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Purpose

Museums and science centers are capable of challenging traditional and hierarchical pedagogies (Kratz & Merritt, 2011) by integrating STEM content learning with the knowledge and cultural wealth available within local communities. The current study took place within the context of a long-term partnership between a science center and a local public preschool in a culturally and linguistically diverse, urban community in the northeastern US. This study brought together preschool educators, caregivers, and museum staff to co-design new STEAM enrichment possibilities for young children and their families.

Perspectives and Theoretical Frameworks

As their children's first teachers, caregivers are able to extend classroom learning and situate complex concepts in real-world experiences. There is evidence that caregivers support STEAM learning through scaffolding, providing explanations, and connecting with their children's interests (Zimmerman, Perin, & Bell, 2010; Rogoff et al 2016). Informal learning environments like science centers and museums are uniquely positioned to provide space and time for family exploration and learning. Building on ecological systems theory and the concept of "third spaces" (Bronfenbrenner, 1979; Gutierrez & Baquedano-López, 1999), this project explored how science centers might partner with community members, including educators and caregivers, to develop culturally responsive learning experiences. Research on culturally responsive teaching emphasizes the need to develop learning experiences that honor learners' diverse onto-epistemologies that are relevant to their social, historical, and cultural contexts (Bang et al., 2013; Ladson-Billings, 2014). By providing space and time for families to share in STEAM experiences together, museums create opportunities for children and their caregivers to connect and extend the ways of knowing that they engage in at school and at home (Falk & Dierking, 2016; Penuel et al., 2016). This situated application of knowledge across settings and contexts reinforces the life-long and multimodal nature of STEAM learning.

The crucial role that caregivers can play as educational partners is often overlooked in traditional educational models. Specifically, formal educational settings often undervalue or neglect the process of building trusting relationships between home and school (Mapp & Bergman, 2021). Exclusion of caregivers from the learning process is particularly detrimental for students who have historically encountered systematic exclusion from STEAM learning and

career opportunities, including students of color and immigrant students (Gutstein, 2019; Suarez-Orozco, 2018). In addition to these oversights, the idea of caregiver or family “engagement” is ambiguous at best, and is defined differently by institutions, educators, researchers, and caregivers (Gross et al., 2020; Van Voorhis et al., 2013). Due to the polysemous nature of the concept of caregiver engagement, policies and programming for supporting family engagement often reflect the assumptions or expectations of institutions, rather than the perspectives of families themselves. Recognizing the unique power dynamics that play out at museums and science centers make it especially important for museum researchers to consider methods and practices that honor people’s diverse and intersecting identities (Cole, 2009; Crenshaw, 1991). The cultural nuances that dictate caregiver involvement in children’s educational experiences can be flattened or lost in such policies and programming if caregivers are not directly involved in the development process. Applying intersectional and collaborative methods to research and practice is paramount to developing culturally responsive and effective family engagement strategies that support STEAM learning.

Methods and Data Sources

This project took place in the context of a newly established partnership between a science center and a public preschool located on the museum’s campus. Museum practitioners, caregivers of children currently enrolled at the preschool, and preschool educators formed a co-design group, following recommendations for effective research practice partnerships (Coburn et al., 2013). The goal of the group was to develop ideas for new family engagement offerings that the museum might offer to connect learning experiences across the museum, the preschool, and families’ homes. A series of monthly meetings were held at the museum to address the following research questions:

- 1) What aspects of family engagement in early STEAM learning are meaningful to stakeholders across the partnership?
- 2) What opportunities exist for leveraging the museum as a third space to support family engagement in early STEAM learning?

To address these questions, museum staff engaged the group in a series of activities and discussions. Topics included:

- Reflecting on our childhood experiences and current perceptions of STEAM learning, using hands-on materials to create and share our stories;
- Collaboratively analyzing interview data with local caregivers of preschool-aged children, gathered through an exploratory study conducted as part of the same grant-funded project. Group members worked together to sort quotes to find themes that related to caregivers’ priorities for their children and for themselves, the roles and strategies they employed, and the challenges they faced when supporting their children’s STEAM learning.

- Generating personas by combining interview themes and connecting to local knowledge and community level data. Personas are fictional characters that represent the actual goals, values, and behaviors of real people in a dataset, and they provide an evocative way to summarize complex qualitative data about needs of intended audiences.
- Co-creating a vision for family engagement to describe the group's shared goals for caregivers, educators, and museum practitioners within the local STEAM learning ecosystem (e.g., home, school, museum, and other community spaces where STEAM learning can take place), and
- Multiple rounds of brainstorming to generate new ideas for culturally responsive programs that the museum could develop for caregivers of young children, ultimately identifying a set of ideas that emerged as top priorities in this process.

Researchers recorded discussions and ideas in field notes, audio and video recordings, and physical artifacts (drawings, sticky notes, chart paper, and templates). They also used digital tools such as Miro and Google Sheets to organize and visualize overarching ideas after each meeting. Findings were shared with the group during subsequent meetings for feedback and to generate new discussions and ideas.

Results

What aspects of family engagement in early STEAM learning are meaningful to stakeholders across the partnership?

While interpreting interview data and developing personas, the co-design group reflected on what early STEAM learning and family engagement can look like for families with different priorities and values. The group iteratively developed a set of six distinct personas that were representative of local caregivers' lived experiences (using community-level data about household size, occupations, cultural backgrounds) and the early STEAM learning goals, values, parenting strategies, and challenges that emerged in the interviews and within our own group discussions. The personas reflected a wide range of goals that caregivers had for their children's STEAM learning — for example, wanting children to learn important skills like reading and counting, to explore and appreciate nature, build creativity and independence, or learn social skills. They also highlighted different types of challenges and desires that caregivers had, including wanting to spend more time with their children, feeling unsure about how to answer children's questions, trying to encourage children to keep trying, and helping children cope with their emotions. The group used the personas to imagine how different caregivers' and their families might spend a typical weekend, and whether and how they might visit museums and other cultural institutions, based on their existing goals and values. This activity surfaced the extensive knowledge and lived experiences of the caregivers and preschool educators in the group, who described what types of cultural experiences the personas might value (such as visiting cultural food markets, children's museums, or the local park), and what personal and

obligations might take priority over museum visits, such as laundry, attending religious services, caring for family members, working on weekends, or practicing self-care.

To synthesize and build on these discussions, the group created a shared vision for family engagement in early STEAM learning that could guide work within the partnership. To do this, the group reflected on who is involved in young children's STEAM learning (caregivers, family members, teachers, museum staff), where family engagement in STEAM learning happens (schools, museums, home, community settings), and what elements are important to local families (spending time together as a family, sharing in new experiences, continuing the learning experience beyond museum walls). These discussions allowed the group to collaboratively identify elements, strategies, and challenges of early STEAM learning and family engagement that were important to all stakeholders in the partnership (see Table 1).

What opportunities exist for leveraging the museum as a third space to support family engagement in early STEAM learning?

During the year's second half, the co-design group used the group's shared vision to brainstorm different experiences that would support families with young children. Group members were first encouraged to think of different ideas without any constraints, to avoid limiting the group's imaginations. After an initial list of ideas was generated, group members grouped and reflected on the possibilities, and engaged in subsequent rounds of brainstorming to elaborate on ideas they found most interesting or promising. Finally, the group prioritized the ideas. Each person voted on their favorite ideas by first imagining the perspective of one of the personas, and then by sharing their own preferences (see Table 2).

Museum staff were invited to share their experiences implementing similar programs with other age groups or audiences, providing an opportunity for the group to ask questions and develop suggestions for tailoring the museum's previous offerings to local families with young children. The group also used reflection prompts to ensure their ideas aligned with the group's vision by integrating important elements of early STEAM learning and family engagement.

As of February 2024, the group has begun presenting these findings and ideas to the broader community, including other local families with young children, preschool educators, school leadership, and museum practitioners. The group is continuing to gather feedback and input from local families to assess the community's needs and priorities for early STEAM learning and integrate community voice into the development of family engagement initiatives at the museum.

Scientific or Scholarly Significance

This co-design project sheds light on the intricate dynamics of family engagement in education, emphasizing the importance of recognizing and valuing the diverse experiences and

perspectives that ultimately shape trajectories for children's STEAM learning. Specifically, understanding the interplay of formal and informal learning experiences for culturally and linguistically diverse families has significant implications for culturally responsive pedagogy, research, and practice. Acknowledging and understanding the nuanced ways in which families engage in STEAM learning across learning contexts can help researchers, educators, and museum staff develop more holistic and inclusive programming and strategies that support both family engagement and early children's STEAM learning across learning ecosystems.

By directly involving caregivers in the research and co-design process, this project aimed to challenge traditional notions of caregiver engagement in young children's learning, and create space to critically question and potentially shift existing educational paradigms. This is especially important in a post-pandemic context, in which the unique needs of students, caregivers, and educators have drastically changed. The intersectional approaches at the center of our co-design process acknowledged and validated the diverse ways in which caregivers supported learning within their families.

Positioning caregivers as experts in the educational journey of their children opens up exciting possibilities to reimagine how preschools, science centers, and families might collaborate with one another. In this project, the co-design group reframed family engagement as a communal and collective process that involved many people across the entire community ecosystem, and that touched upon many settings and everyday experiences over time. By recognizing the important contributions to children's early STEAM learning that happen across learning ecosystems within local communities, researchers can cultivate generative partnerships that leverage the strengths and resources of each stakeholder (caregiver, educator, student, museum staff, etc). This collaborative approach has the potential to enhance the quality and relevance of STEAM experiences for young children, ultimately contributing to more inclusive, culturally sustaining, and effective learning.

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References

Bang, M., Warren, B., Rosebery, A. S., & Medin, D. (2013). Desettling expectations in science education. *Human Development*, 55(5–6), 302–318. <https://doi.org/10.1159/000345322>

Bronfenbrenner, U (1979). *The ecology of human development: Experiments by nature and design*. Harvard University Press.

Coburn, C. E., Penuel, W. R., & Geil, K. E. (2013). *Research-practice partnerships: A strategy for leveraging research for educational improvement in school districts*. William T. Grant Foundation.

Cole, E. R. (2009). Intersectionality and Research in Psychology. *American Psychologist*, 64(3), 170–180. <https://doi.org/10.1037/a0014564>

Crenshaw, K. (1991). Mapping the margins: Intersectionality, identity politics, and violence against women of color. *Stanford Law Review*, 43: 1241–1299.

Falk, J. H., & Dierking, L. D. (2016). *The museum experience revisited*. Routledge.

Gross, D., Bettencourt, A. F., Taylor, K., Francis, L., Bower, K., & Singleton, D. L. (2020). What is parent engagement in early learning? Depends who you ask. *Journal of Child and Family Studies*, 29(3), 747–760. <https://doi.org/10.1007/s10826-019-01680-6>

Gutiérrez, K. D., Baquedano-López, P., & Tejeda, C. (1999). Rethinking diversity: Hybridity and hybrid language practices in the third space. *Mind, Culture, and Activity*, 6(4), 286-303.

Gutstein, E. (2009). “The real world as we have seen it”” Latino/a parents’ voices on teaching mathematics or social justice. *Mathematical Thinking and Learning*, 8(3), 331-358.

Kratz, S., & Merritt, E. (2011). Museums and the future of education. *On the Horizon*, 19(3), 188-195.

Ladson-Billings, G. (2014). Culturally relevant pedagogy - the remix. *Harvard Educational Review*, 84(1), 74–84.

Mapp, K.L., & Bergman, E. (2021). *Embracing a new normal: Toward a more liberatory approach to family engagement*. Carnegie Corporation of New York.
<https://www.carnegie.org/newnormal>

Penuel, W., Clark, T., & Bevan, B. (2016). Infrastructures to Support Equitable STEM Learning across Settings. *Afterschool Matters*, 24, 12-20.

Rogoff, B., Callanan, M., Gutiérrez, K. D., & Erickson, F. (2016). The Organization of Informal Learning. *Review of Research in Education*, 40(1), 356–401.
<https://doi.org/10.3102/0091732X16680994>

Suárez-Orozco, C. (2018). Ecologies of care: addressing the needs of immigrant origin children and youth. *Journal of Global Ethics*, 14(1), 47–53.
<https://doi.org/10.1080/17449626.2018.1496348>

Van Voorhis, F. L., Maier, M. F., Epstein, J. L., & Lloyd, C. M. (2013). *The impact of family involvement on the education of children aged 3 to 8: A focus on literacy and math achievement outcomes and social-emotional skills*. MDRC.
<https://files.eric.ed.gov/fulltext/ED545474.pdf>

Zimmerman, H. T., Perin, S., & Bell, P. (2010). Parents, Science, and Interest: The role of parents in the development of youths’ interests. *Museums and Social Issues*, 5(1), 67–86.

Tables

<i>Elements of STEAM Learning</i>	<i>Elements of Family Engagement</i>
<ul style="list-style-type: none"> Exploring materials Experimenting and problem-solving Learning from failure or mistakes Creating, making, and designing Literacy and Early Math Skills Being curious 	<ul style="list-style-type: none"> Spending time together as a family Connecting to family's cultures and personal interests Helping families learn together Prioritizing caregivers' and community well-being
<i>Strategies</i>	<i>Challenges</i>
<ul style="list-style-type: none"> Valuing who people are Building on Familiar Routines & Cultural Traditions Modeling STEAM learning Offering new hands-on experiences Following kids' interests 	<ul style="list-style-type: none"> Adapting to different learners Limited Time and Resources Supporting socio-emotional skills Curriculum Demands and Limitations

Table 1: Elements, Strategies, and Challenges of STEAM Learning and Family Engagement

<i>Adult/Caregiver Only Events</i>	<i>After-school Programs</i>	<i>STEAM Activities in the Neighborhood</i>	<i>STEAM Activities at Home</i>
<p>Features:</p> <ul style="list-style-type: none"> art-based activities food-based activities <p>Priorities:</p> <ul style="list-style-type: none"> self-care community building social support well-being 	<p>Features:</p> <ul style="list-style-type: none"> After-school programming for Pre-K <p>Priorities:</p> <ul style="list-style-type: none"> experiential, hands-on learning large scale STEAM projects 	<p>Features:</p> <ul style="list-style-type: none"> Maker activities Simple hands-on experiments <p>Priorities:</p> <ul style="list-style-type: none"> Meeting families where they are in the learning ecosystem: parks, markets, laundromats, sporting events, etc. Partnering with local organizations 	<p>Features:</p> <ul style="list-style-type: none"> STEAM activities that center everyday materials <p>Priorities:</p> <ul style="list-style-type: none"> Engaging the whole family across generations Revealing how science is part of everyday (i.e., Kitchen Science, maker activities with recycled/repurposed materials)

Table 2: Family engagement experiences generated by co-design group