

STEM Interest as an Entry Point for OST Learning: A Case Study of the Boys & Girls Clubs of Garden Grove

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Abstract: This paper examines how out-of-school-time (OST) organizations can leverage youth STEM interests as strategic entry points for sustained learning. Drawing on a case study of the Boys & Girls Clubs of Garden Grove, we describe the iterative development of interest survey tools to match youth interests with available programming and career pathways. Findings suggest that understanding and operationalizing youth interests requires careful attention to organizational capacity, differentiated mentorship, and intentional connections between interests, programs, and opportunities.

Introduction

Interest-driven learning has emerged as a critical framework for understanding how young people engage with STEM in informal settings (Azevedo, 2011; Renninger & Hidi, 2016). Unlike formal education, out-of-school-time (OST) programs can center youth interests as starting points for learning—yet identifying, nurturing, and connecting these interests to meaningful opportunities remains a persistent challenge (Ching et al., 2018). This paper examines how the Boys & Girls Clubs of Garden Grove (BGC), active at more than 50 sites across Orange County and serving the 14th largest school district in California, has approached using STEM interest as an entry point for learning. Our central research question is: *How can OST organizations develop systematic approaches to understanding and responding to youth STEM interests in ways that support sustained engagement?*

Interest-driven learning and making connections across OST contexts

Interest-driven learning positions learner passions as the organizing principle for educational experiences (Ito et al., 2013; Ito et al., 2018). This approach aligns with self-determination theory's emphasis on autonomy and intrinsic motivation (Deci & Ryan, 2000) and with research demonstrating that interest predicts sustained engagement and deeper learning outcomes (Renninger & Hidi, 2016). In OST contexts, where participation is typically voluntary, leveraging interests is not merely pedagogically valuable but practically essential for retention (Philp & Gil, 2020). However, young people's interests exist in dynamic relationships with available opportunities, social contexts, and identity development (Azevedo, 2011). Simply asking youth about their interests is insufficient without accompanying structures to match those interests to opportunities and support identity development (Ching et al., 2018; Dahn et al., 2023). For OST organizations embedded within broader learning ecosystems, the challenge becomes one of strategic brokering—understanding the landscape of available resources and intentionally connecting youth to opportunities that align with their emerging interests and developing identities (Ito et al., 2013; Akkerman & Bakker, 2011).

Methods

Data were collected between 2023 and early 2025 and included youth focus groups, program leader and STEM specialist interviews, document analysis of survey iterations and program materials, observation of STEM programming, and analysis of approximately 250 initial survey responses from four sites. We employed iterative qualitative analysis with ongoing collaborative reflection with BGC leadership.

Findings: Iterative development of the BGC interest survey

Problem of practice: The interest matching conundrum

Prior to this work, BGC's STEM efforts—partner workshops, field trips, a community college certification program—lacked strategic coordination. Three interconnected gaps emerged: (a) limited understanding of the STEM initiative landscape; (b) insufficient teen programming, especially around elementary-to-middle-school transitions; and (c) underdeveloped workforce pathways for high schoolers. A common thread was the need to better understand youth interests and match them to available resources.

Tool development: Interest survey iteration

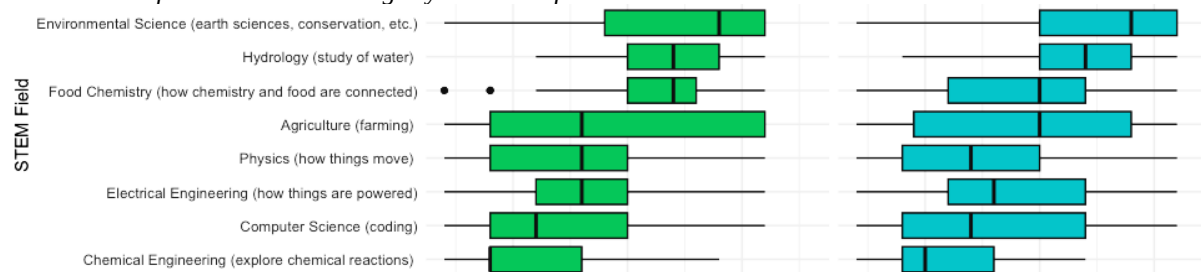
Unable to find an existing tool that matched their unique needs and capacity, BGC developed a "homegrown" survey through iterative design. Key components include: a) a five-point Likert scale general STEM interest assessment; b) ranking of eight domain-specific STEM topics tied to existing curriculum capacity at BGC; c) career interest questions; d) identification of competing interests (hobbies, sports); learning preference questions (social, project and temporal preferences); and desired frequency of STEM participation. The survey undergoes ongoing refinement based on partner and youth feedback.

Initial results: Patterns in youth STEM interests

Analysis of 250 responses revealed meaningful site-level variation in interest patterns, findings that validate the need for differentiated programming, enable data-driven resource allocation, and raise questions about what drives differences across communities. Critically, this shifts BGC from assumption-based to evidence-based programming decisions. A noted limitation: the survey's eight pre-selected domains render invisible youth whose interests fall outside those categories.

Figure 1.

Distribution of STEM Field Rankings by a Subset of Sites



Mentorship as connection-making infrastructure

BGC treats mentorship as critical infrastructure for translating interests into engagement. Mentors provide both instrumental support (connecting youth to programs) and identity support (helping youth see themselves as STEM-capable). Youth described the importance of authentic relationships: *"it feels like you're talking to a person with their own life and their own feelings versus like just another figure to tell you what to do and what not to do."* Without trust relationships, youth are less likely to share emerging interests or take risks.

High-quality programming as interest development context

Interest data is only valuable if organizations can respond to it. BGC's Imagine Science programming—Sphero Robotics, Water Guardians, Power Up!, and Space Quest—offers low-cost, career-linked programs that connect learning to home and community contexts, providing the sustained engagement needed for interests to deepen into STEM identity.

Discussion

The BGC case illuminates a critical design principle: interest surveys must be calibrated to organizational capacity. Asking about interests only has value when organizations can meaningfully respond. Interest identification alone is also insufficient—human infrastructure for mentorship and sustained programming must accompany any survey tool. BGC's emphasis on sustained engagement over one-off experiences reflects understanding that interest development is longitudinal; moving from "triggered situational interest" (sparked by novelty or activity) and "well-developed individual interest" (enduring personal connection to domain) (Hidi & Renninger, 2006) requires repeated opportunities to engage, increasing competence, and belonging within a community of practice. Finally, the case reframes the OST organization's role: less as a sole program provider and more as a strategic broker connecting youth to a broader ecosystem of community college programs, industry partnerships, and workforce development opportunities. Interest-driven learning in OST contexts is less about simply asking youth what they want and more about building organizational capacity to hear, honor, and respond to diverse interests while creating conditions where new interests can emerge and deepen over time.

References

- Akkerman, S. F., & Bakker, A. (2011). Boundary crossing and boundary objects. *Review of Educational Research*, 81(2), 132-169. <https://doi.org/10.3102/0034654311404435>
- Azevedo, F. S. (2011). Lines of practice: A practice-centered theory of interest relationships. *Cognition and Instruction*, 29(2), 147-184. <https://doi.org/10.1080/07370008.2011.556834>
- Ching, D., Santo, R., Peppler, K., & Hoadley, C. (2018). "He saw I had a loving for it": Youth interest signaling as a means of generating social support in technology pathways. *Hive Research Lab*.
- Dahn, M., Peppler, K., & Ito, M. (2023). Making connections to and from out-of-school experiences. *Review of Research in Education*, 47(1), 443-473. <https://doi.org/10.3102/0091732X231211271>
- Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, 11(4), 227-268. https://doi.org/10.1207/S15327965PLI1104_01
- Hidi, S., & Renninger, K. A. (2006). The four-phase model of interest development. *Educational Psychologist*, 41(2), 111-127. https://doi.org/10.1207/s15326985ep4102_4
- Ito, M., Gutiérrez, K., Livingstone, S., Penuel, B., Rhodes, J., Salen, K., Schor, J., Sefton-Green, J., & Watkins, S. C. (2013). *Connected learning: An agenda for research and design*. Digital Media and Learning Research Hub.
- Ito, M., Martin, C., Pfister, R. C., Rafalow, M. H., Salen, K., & Wortman, A. (2018). *Affinity online: How connection and shared interest fuel learning (Vol. 2)*. NYU Press.
- Philp, K. D., & Gill, M. G. (2020). Reframing after-school programs as developing youth interest, identity, and social capital. *Policy Insights from the Behavioral and Brain Sciences*, 7(1), 19-26. <https://doi.org/10.1177/2372732219892647>
- Renninger, K. A., & Hidi, S. E. (2016). *The power of interest for motivation and engagement*. Routledge.

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