

LEARNING ABOUT YOUR STEM ECOSYSTEM

PRACTICE BRIEF 1

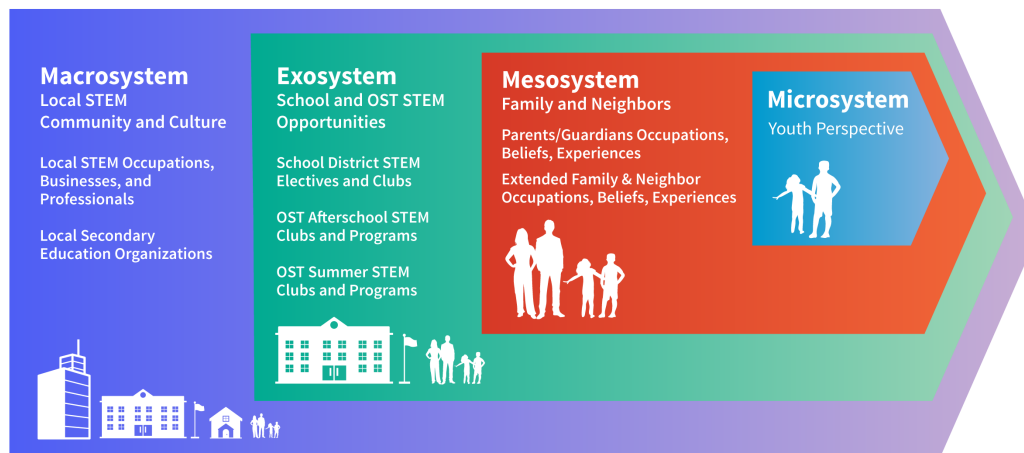


Action Steps:

- » Create a community asset map to explore your STEM ecosystem.
- » Make a list to track STEM opportunities already present in your community.
- » Identify the strengths of current STEM offerings, and look for gaps that could lead to new opportunities.

An “ecosystem” is a useful metaphor to describe the groupings of STEM learning opportunities. Using an ecological perspective allows us to position different learning environments in relation to each other (see Figure 1) and better support youth as they move through this dynamic system. A STEM learning ecosystem comprises diverse resources within a community— beyond what the school provides. Youth develop an understanding of STEM interests and participation pathways while traversing the STEM learning ecosystem.

STEM Ecosystem



A STEM ecosystem comprises four layers. At the center is the youth perspective of STEM - the Microsystem level. The STEM knowledge and experience shared by youths’ family, friends, and direct community comprise the Mesosystem level. The larger Exosystem layer encompasses the educational setting where youth engage with STEM, such as their school and after-school or summer programs. The outer Macrosystem layer holds the larger STEM community (e.g., STEM businesses, secondary educational institutions, and local STEM culture). The youth is served through all layers of the ecosystem.



Strategies to Make it Happen:

Discover Your STEM Ecosystem

A STEM learning ecosystem encompasses schools, out-of-school time (OST) community organizations (such as after-school and summer programs, libraries, science centers and museums), informal STEM experiences at home, and professional STEM environments (such as local businesses) that are the sources of STEM learning opportunities for youth. By coordinating with people and organizations across your STEM ecosystem you can create pathways to diverse STEM settings. These pathways enable young learners to

¹Bronfenbrenner, U. (1995). Developmental ecology through space and time: A future perspective.

become engaged, knowledgeable, and competent in STEM disciplines as they progress toward their life and career goals^{2,3}.

Identify the Strengths and Opportunities for STEM Learning Available in Your Community

Help strengthen the STEM pathways for youth by first identifying **what** key opportunities there are for STEM learning in your community, along with **who** is involved, **when** they are offered, and **why** those opportunities are valued. A good first step is to survey the landscape and identify what partnerships and programs are already in place. Learn about the work currently underway by entities in your community to ensure that you are not duplicating efforts, but instead supporting or expanding those efforts.

It is also important to learn about the history and nuanced relationships of current and past partnerships between schools and other members of the STEM ecosystem. Have there been changes to otherwise successful STEM programs due to shifting priorities, funding, or leadership? Are there opportunities to revitalize programs or fill gaps in your project? If you are a STEM program provider or researcher, learn all you can by engaging with different levels at the school district (i.e., central administration, building administration, teachers). If you are a science coordinator, learn about the outreach goals of entities within your STEM ecosystem. Be on the lookout for opportunities to make connections and have discussions about mutually beneficial partnerships.

Consider the following:

What are the STEM learning opportunities available in your community?

- » Learn about the formal STEM classes and after-school or community events available at all age levels.
- » Search community calendars for classes, workshops, or festivals focusing on STEM, keeping in mind that STEM may be offered by various entities, including: libraries, community centers, governmental agencies, non-profit organizations, and businesses.
- » Consider online STEM offerings, such as STEM-oriented podcasts, apps, or social media that may be popular in the community.

Who supports the STEM learning opportunities and how are they involved?

- » What businesses with a STEM focus engage in outreach with the local schools or community? How are they involved?
- » What businesses with a STEM focus are not currently engaging in outreach that could be potential new partners?

When have these STEM learning opportunities been offered?

- » Understand the scheduling constraints and opportunities STEM providers are working under. For example, schools offer STEM primarily during the school year. Some providers focus on times when families are more available, such as during school breaks.
- » Note any opportunities that were offered in the past but are no longer available. This will help you understand what makes existing STEM work successful and where there are barriers.

Why is this entity offering STEM learning?

- » Review “about” sections of websites and mission statements to better understand goals.
- » Consider whether there are requirements from funders or sponsors that might influence the scope of STEM programming being offered.
- » Identify how youth benefit from these offerings.

²Dierking, L., Falk, J. H., Shaby, N., & Staus, N. L. (2021). Thriving STEM learning ecosystems—for all. *Connected Science Learning*, 3(6).

³Shaby, N., Staus, N., Dierking, L. D., & Falk, J. H. (2021). Pathways of interest and participation: How STEM-interested youth navigate a learning ecosystem. *Science Education*, 105(4), 628-652.

Remember that relationship-building will be an ongoing process and that people can sometimes be complex. Embrace the challenges and look for opportunities to build on and make connections between the existing STEM program offerings and partnerships. Identify ways your project or program can become something of value to both the partner and the youth your program serves. For example, your project could help connect a local business to youth by developing a STEM mentoring program. Even after your work is underway, be open to inviting new organizations and individuals to get involved and find room for them to add their unique offerings to the goals of your partnership.



Tool: Community Asset Mapping

The Community Asset Mapping facilitator guide provides step-by-step instructions and examples for creating a local asset map representing different aspects of STEM in your community.

Tool: STEM Learning Providers in my Community

Use this table to keep track of STEM learning opportunities already present in your community and to help identify gaps.



STEM Career Connections Spotlight:

Discovering the STEM Ecosystem as an Outsider

In our project, discovering the STEM learning ecosystem was an ongoing process. As outsiders to this rural community, we relied upon the initial partners to introduce us to the organizations and people that are most influential within the STEM ecosystem. We initially partnered with the local school district. One of our participating STEM teachers introduced us to a local organization that provides after-school STEM programs. We quickly realized that our goals aligned with this organization and a new partnership developed - we wanted to bring rich STEM programs and computing technology to underserved youth in the community and they wanted to use STEM experiences to develop environmental stewards within their community. We provided professional development for their education staff to implement sensor technology in their after-school programs, along with sensor technology equipment and ongoing teacher support during implementation. Our team also worked closely with the STEM coordinator to design a unit to help youth address a local engineering problem. Furthermore, the relationships between this well established local organization and the community helped us access other parts of the STEM ecosystem, which resulted in partnerships with STEM mentors who worked closely with youth on STEM projects. By discovering this local organization, we were able to develop a rich Community STEM education partnership (CSEP) and gain access to the STEM learning ecosystem.



Reflection Questions

- » In what ways will knowledge of your STEM Ecosystem support your efforts to build community partnerships?
- » What other information could you collect to help you understand the experiences of youth as they navigate STEM learning opportunities in your community?



Next Steps

[Practice Brief 2 - Laying the Foundation for Community STEM Education Partnerships](#)