

## Definitions for Planning Quality STEM Programs

*Vermont Afterschool is committed to helping all afterschool and summer learning programs implement quality STEM programs. To this end, it is important to have common criteria to define what makes a “STEM Program.” This document is designed to help you and your staff research, select and/or design quality STEM programs, and find the right professional development and STEM partners to engage more fully with STEM learning opportunities.*

### What DEFINES a “quality STEM program” in afterschool or summer?

1. Follows inquiry-based learning practices and that emphasizes hands-on/minds-on learning.
2. Explores and/or engages science phenomenon, engineering design, computer science, and/or the intersection of art and science referred to as tinkering or “making”.
3. Provides opportunities for youth to engage in authentic science and engineering practices (“asking questions and defining problems”, “planning and carrying out investigations”, “communicating ideas”, etc.)
4. Makes a connection to one or more “big ideas” – the NGSS *Cross-cutting Concepts*. (“patterns”, “cause and effect”, “structure and function” etc.)
5. Uses real tools.
6. Involves youth in 21<sup>st</sup> Century (transferrable) skills such as problem-solving, communication, perseverance, collaboration and critical thinking.
7. Attempts to make meaning through purposeful questions and other forms of informal science “talk” with peers.
8. Supports STEM identity and STEM career exploration.
9. Attends to issues of equity, access and relevance to the learner’s cultural experience.
10. Provides an opportunity to demonstrate understanding through journals, showcase, video, field trip reflection, culminating project, formative assessment or other forms of creatively documenting STEM experiences.
11. Provides additional resources for going deeper and applying their learning by accessing experts, websites, books, videos, extension activities, field trips, citizen scientist projects and service learning.

STEM Programs are not...

- Reconstituted lesson plans from the school day – repeating something kids have already done.
- A recreational hike, playing Legos, or watching a science video with no intentional STEM learning goal.
- Math or science skills not *intentionally* embedded into sports, art or other programs.
- Homework help in math or science.
- A string of science demonstrations for “wow factor” with no context or purposeful STEM learning goals.

### What SOURCES support STEM learning in afterschool and summer?

1. **Commercially Designed STEM Program** – an external source based on commercially designed materials or curriculum typically “owned” by a business entity or corporation. I.e. LEGO Robotics, Minecraft, K’Nex, Goldieblox, Magnetos, Engineering Adventures, STEMfinity Kits, etc.

2. **Partnership STEM Program** – an external partner, often non-profit, state or local, that provides direct instruction to youth, staff professional development and/or coaching, material loan, kits or space for free or nominal fee. I.e. Vermont Energy Education Program, 4-H, Crazy 8's, Vermont Project Learning Tree, Project WILD, etc.
3. **Internally Designed STEM Program** – designed by site staff who are accessing a wide range of resources to design a STEM program with intentional learning goals that engage youth in science and engineering practices, ignites or supports STEM identity, or provides opportunities for authentically engaging in transferrable skills. I.e. Math Munchies, Tinkering Studios, Rube Goldberg Challenge, Nature Explorers, STEAM, etc.

## What are the Vermont Afterschool STEM Professional Development LEVELS?

The guide below will help each program determine which STEM Level best supports their STEM professional development needs.

### EXPLORATORY LEVEL

- ✓ Site Director has no STEM background but desires building quality STEM programs and a culture for STEM learning.
- ✓ The program *had* staff competent in STEM, but turnover occurred with little transfer of knowledge.
- ✓ No STEM programs are offered that meet the criteria that defines a “STEM Program.”
- ✓ Only 1 – 2 staff have participated in STEM professional development in the last 18 months.
- ✓ Staff acknowledges the need for basic STEM professional development to initiate skills as STEM educators.
- ✓ No STEM external supports to offer STEM programming currently exist (or if a support exists it is unsustainable).

### FOUNDATIONAL LEVEL

- ✓ Site Director has basic STEM background but desires building quality STEM programs and a culture for STEM learning.
- ✓ 3+ staff have participated in STEM professional development in the last 18 months (hosted onsite, regionally or at a conference).
- ✓ 1 – 2 STEM programs are offered at the program site for a total of 10 – 20 hours per year and these programs meet some of the criteria for a quality STEM program.
- ✓ Staff acknowledge need for further STEM professional development to build existing competency as STEM educators.
- ✓ At least 1 sustained external support offer STEM programming during the year (can include summer).
- ✓ Willing to attend training and implement the retroactive STEM youth survey – *Common Instrument*.

### IMPROVEMENT LEVEL

- ✓ Site Director has (or will have) completed a STEM strand through Vermont Afterschool's Professional Learning Strands (APLS) or has a proven strength in STEM program design and/or implementation.
- ✓ 50% of direct service staff have participated in STEM professional development in the last 18 months (hosted onsite, regionally or at a conference)
- ✓ 3+ STEM programs are offered at the program site for a total of 20+ hours per year and these programs meet many of the criteria for a quality STEM program.
- ✓ At least 2 sustained external supports offer STEM programming during the year (can include summer).
- ✓ Willing to attend training and implement the retroactive STEM assessment – *Common Instrument*
- ✓ Willing to attend training, engage in a *Dimensions of Success* external assessment and implement recommendations for supporting staff competency in the implementation of STEM programs.