4-H STEM Learning Checklist

The checklist is designed for use in the planning, development, and evaluation of new and existing 4-H STEM learning experiences, curriculum materials, and professional development for staff and volunteers.

### OUTCOMES

Targeted outcomes include increasing scientific fluency and supporting positive youth development.

#### Youth scientific literacy
- Content (based on youth interests and program goals)
- Reasoning skills (such as Next Generation Science Standards scientific and engineering practices or 4-H Science Abilities)
- Interest and attitudes towards science
- Contribution through applied participation

#### Positive youth development
- Competence: Positive view of one’s actions in specific areas, including healthy habits, life skills, love of learning, emotional competence, and social skills.
- Confidence: An internal sense of overall positive self-worth, persistent resourcefulness and self-efficacy.
- Connection: Positive bonds and relationships with people, institutions, and communities.
- Character: Respect for societal and cultural norms, possession of standards for correct behaviors, a sense of right and wrong (morality), and integrity.
- Caring: A sense of sympathy and empathy for others.
- Contribution: Giving to self, family and the institutions of society.

### TRANSFORMATIVE RELATIONSHIPS

Learning experiences facilitated by trained, caring adult staff and volunteers who work from the perspective that youth are partners in their own learning and development.

#### Educational practices
- Experiential learning
- Inquiry learning

#### Learner practices
- Curiosity
- Reflection
- Apply and share learning

### LEARNING ENVIRONMENT

4-H recognizes that learning happens everywhere. Learning environments are both physical and social spaces.

#### Youth development practices
- Physical and emotional safety
- Relationship building
- Youth engagement and youth-adult partnerships
- Community involvement
- Skill building: sparks, mindset, goal management, and self-reflection
- Culture: Learning experiences honor and engage youth in the dynamic interplay of cultural influences (including youth and family’s culture, 4-H organizational culture, and the culture of the larger learning community) on learning.

### LEARNING PATHWAYS

4-H learning pathways provide hands-on, real-world learning that takes place in community and provides young people opportunities to develop relationships, skills, and leadership.

- Progressive: Learning experiences are organized in a sequence (multiple contacts; extended duration) to reinforce one another; concepts build upon one another over time.
- Connected: Learning experiences are connected to the larger STEM Learning Ecosystem, including other 4-H, school, afterschool, community, and home learning opportunities available across the contexts of a young person’s life.
- Evaluated: Learning experiences include opportunities for evaluation.
Further Reading

- Outcomes
  - Scientific Literacy
    - http://www.nextgenscience.org/
    - http://calag.ucanr.edu/Article?article=ca.v069n02p92
    - Eyeballs in the Fridge: Sources of early interest in science
      http://www.tandfonline.com/doi/abs/10.1080/09500690902792385
    - K. Ann Renninger, Interest and Identity Development in Instruction: An Inductive Model
      http://dx.doi.org/10.1080/00461520902832392
    - Eberbach, C. and K. Crowley. From everyday to scientific observation: how children learn to
      observe the biologist’s world. http://dx.doi.org/10.3102/0034654308325899
  - Positive Youth Development
    - http://4-h.org/about/research/
    - http://www.actforyouth.net/
    - https://www.nap.edu/catalog/10022/community-programs-to-promote-youth-development

- Transformative Relationships
  - http://www.search-institute.org/what-we-study/developmental-relationships
  - https://www.exploratorium.edu/education/ifi
  - http://www.click2sciencepd.org/
  - http://ambitiousscienceteaching.org/
  - Heather Banchi and Randy Bell, The Many Levels of Inquiry, Science and Children (October 2008)

- Learning Environment
  - http://www.informalscience.org/how-culturally-responsive-teaching-can-demystify-science

- Learning Pathways
  - http://stemecosystems.org/what-are-stem-ecosystems/
  - http://www.informalscience.org/projects/learn-experience
  - http://4-h.org/professionals/common-measures/

STEM Activity Plans and Curriculum Sources

http://www.4-hmall.org/Category/educationresources.aspx
https://ecommons.cornell.edu/handle/1813/9399
http://4hstaff.cce.cornell.edu/stem/library
http://www.birdsleuth.org/investigation/
https://nifa.usda.gov/program/4-h-learning
http://www.nsfresources.org/home.cfm