4-H SET
Checklist

Purpose:
- To identify the components that make an experience or project SET-Ready.

Time: 40 minutes

Materials:

Charts around the room with the seven components of the Checklist (each chart has one of the headers listed below)
- National Science Education Standards
- SET Abilities
- Essential Elements
- Trained, caring adult staff working as co-learners with youth as partners
- Experiential approach to learning
- Inquiry to foster creativity and curiosity
- Target SET outcomes with frequency and duration

Trainer Resource:
4-H SET Checklist

Handouts:
- 4-H SET Checklist
- 4-H SET Logic Model

Trainer Notes:

STEP 1:   Context

Begin by distributing the 4-H SET Checklist and saying there are seven key areas that are necessary to make an activity, program, or initiative 4-H SET-Ready.

I want you to take a few minutes to review the 4-H SET Checklist handout and the 4-H SET Logic Model.

Give participants time to individually read through and review.

- What do you notice?

- What was new to you?

- What questions do you have about any of the areas?

Check to make sure participants understand categories and what they mean.
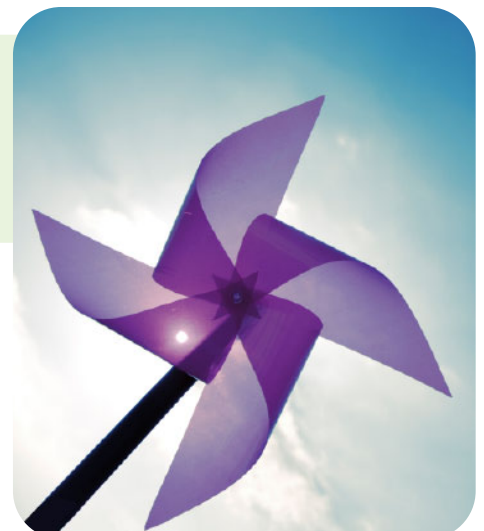
STEP 2:   Choosing a Component and Discussion

Now, I want you to think about each of these components and decide which one you feel most comfortable with already as a facilitator/leader. You will see there are charts around the room and I want you to go stand by that chart. There is no right or wrong answer.

When you get to the chart you chose, introduce yourself to the other participants that chose the same chart. In a small group conversation, share with each other why you chose to stand there.

Give participants a few minutes to discuss. Go to each chart where people are standing and have a representative report why they chose to stand there.

Note any themes that come up as people share. Let participants know these components of SET will be discussed intermittently throughout the training. Use the "trainer support guide sheet" as needed in both the beginning discussion and as people report out. Do not read all this information but become familiar with it so critical elements can be added as people share.

STEP 3:   Choose Again and Discussion

Now I want you to switch and choose another component you would like to learn more about over the next two days of our training.

When you get to your chosen component, introduce yourself to the other participants that chose the same chart. In a small group conversation, share with each other why you chose to stand there.

Once again, ask for a representative to share key items of the conversation. As items come up, refer back to the agenda about where these might best be covered. If something is not going to be covered at this training, be clear about that. Encourage sharing and raise themes or consistencies as they emerge.

STEP 4:   Reflection

Have everyone take his or her seats and ask the following questions.

• What did you notice about how the different areas of the 4-H SET-Checklist were selected?

• What did you learn from this activity that tells you about how you might help each other or where the gaps might be?

• Why do you think National 4-H felt it necessary to create this type of checklist?

• How else might you use this checklist as you are working on your own SET work?

The checklist names the key components of 4-H SET. Whether it is designing and delivering curriculum, preparing staff, or evaluating the 4-H SET work, the logic model and checklist guide the 4-H SET program. Because of that, you will see them repeated in the curriculum. Throughout the training we will be going back to these key areas and intentionally taking time to notice these different components in our training.

STEP 5:   Transition

Now let's take a closer look at the curriculum to familiarize yourself with how it is organized.

4-H SET Checklist

National Science Education Standards

The National Science Education Standards outline what youth should know, understand, and be able to do in the natural sciences over the course of their K-12 education. The underlying concepts and processes in science are divided into eight categories:

- Science as inquiry
- Physical science
- Life science
- Earth and space science
- Science and technology
- Science in personal and social perspective
- History and nature of science

How many of you use the National Standards in your SET (Science, Engineering, Technology) work? How many of you also use specific state standards? We use the national standards because they provide a consistent base of quality content on which our programs design, development, delivery and, assessment is built.

SET Abilities

We have identified 30 SET Abilities or science process skills that are practiced in the areas of science, engineering, and technology. How are you, in your work, making sure children and youth are getting these and other science process skills? You will see later that the Exploratorium uses 7 Process Skills and has created a tool for us that frames these 30 in those categories.

Essential Elements

How many of you call your work youth development? 4-H is committed to a positive youth development approach that focuses on having youth walk away from their 4-H experience with a sense of belonging, increased independence, skill mastery, and a spirit of generosity—these are the Essential Elements.

Trained, caring adult staff working as co-learners with youth as partners

We will talk about this a little later as time permits. How we prepare our volunteers as facilitators and front-line youth workers is critical to the effectiveness of 4-H SET. Our commitment is to ensure that people are trained, that we are clear about our expectations, and that we provide the tools to do this work.

Experiential approach to learning

The Experiential Learning Cycle is something that is basic to how we deliver 4-H programming. This is key to moving an activity to something "fun" that youth do and making sure that there is learning occurring as young people apply that learning to the real world.

Inquiry to foster creativity and curiosity

Working with youth to pose a problem, coming up with a plan, investigating, and communicating their results are all critical parts of 4-H SET. This is about their skill development in using an inquiry approach that is youth-led.

Target SET outcomes with frequency and duration

The 4-H SET initiative builds from a logic model that is designed to reach outcomes for youth that include increased knowledge and skills, increased interest and numbers in SET careers, and increased science literacy in the general population. These and other outcomes are best reached by being very intentional about the work we are doing in 4-H SET and ensuring that we are working with the same youth frequently and for a sufficient length of time. Though we don't have all we need to know from research, it does show that frequency and duration are key factors in reaching positive outcomes.

4-H SET Checklist

A "SET-Ready" 4-H experience is a program that is framed in SET concepts, based on SET standards and intentionally targets the development of SET Abilities, and has the outcome articulated by the 4-H SET Logic Model. It integrates the essential elements and engages participants in experiential and inquiry-based learning. In addition to the following criteria below, it also recommends that SET programs offer a sustained learning experience which provides youth the opportunity to be engaged in programs with relevant frequency and duration. Utilize the following checklist to self assess the program you deliver.

To meet the needs of children, youth and the nation with high-quality science, engineering, and technology programs.

☑ *Are you providing science, engineering, and technology (SET) programs based on National Science Education Standards?*

Science education standards are criteria to judge quality: the quality of what young people know and are able to do; the quality of the science programs that provide the opportunity for children and youth to learn science; the quality of science teaching; the quality of the system that supports science leaders and programs; and the quality of assessment practices and policies.
http://www.nap.edu/readingroom/books/nses/

☑ *Are you providing children and youth opportunities to improve their SET Abilities?*

Predict, Hypothesize, Evaluate, State a Problem, Research Problem, Test, Problem Solve Design Solutions, Measure, Collect Data, Draw/Design, Build/Construct, Use Tools, Observe, Communicate, Organize, Infer, Question, Plan Investigation, Summarize/Relate, Invent/Implement Solutions, Interpret/Analyze/Reason, Categorize/Order/Classify, Model/Graph/Use Numbers, Troubleshoot, Redesign, Optimize, Collaborate, Compare

✔️ *Are you providing opportunities for youth to experience and improve in the essential elements of positive youth development?*

- Do youth get a chance at mastery—addressing and overcoming life challenges in your programs?
- Do youth cultivate independence and an opportunity to see oneself as an active participant in the future?
- Do youth develop a sense of belonging within a positive group?
- Do youth learn to share a spirit of generosity toward others?

✔️ *Are learning experiences led by trained, caring adult staff and volunteers acting as mentors, coaches, facilitators and co-learners who operate from a perspective that youth as partners and resources in their own development?*

There is a commitment to prepare, train and support our staff and volunteers to work with youth. Youth are seen as assets and individuals who are valued resources.

✔️ *Are activities led with an experiential approach to learning?*

Learning is done with a hands-on approach that includes an experience and deepens learning through sharing, processing, generalizing and application to the real world.

✔️ *Are activities using inquiry to foster the natural creativity and curiosity of youth?*

Youth are encouraged to answer their own questions by planning, investigating and communicating their results.
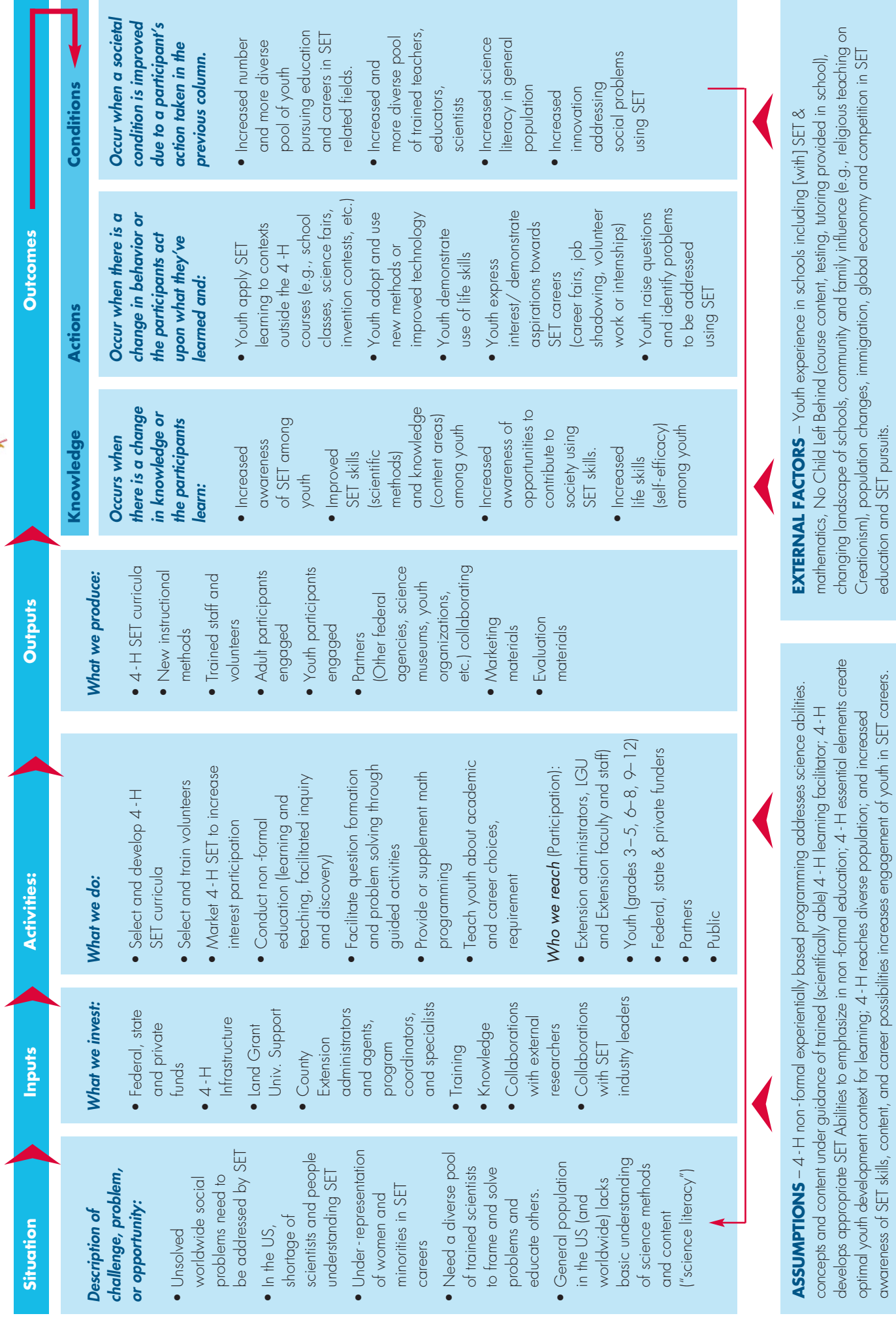
✔️ *Does your program target one or more of the outcomes on the SET Logic Model and have you considered the frequency and duration necessary for youth to accomplish those outcomes?*

SET programs increase young people's knowledge and skills and reach intentional outcomes by ocurring frequently over a sufficient length of time.

HANDOUT 4-H SET Logic Cycle

Situation

Description of challenge, problem, or opportunity:

- Unsolved worldwide social problems need to be addressed by SET

- In the US, shortage of scientists and people understanding SET

- Under-representation of women and minorities in SET careers

- Need a diverse pool of trained scientists to frame and solve problems and educate others.

- General population in the US (and worldwide) lacks basic understanding of science methods and content ("science literacy")

Inputs

What we invest:

- Federal, state and private funds

- 4-H Infrastructure

- Land Grant Univ. Support

- County Extension administrators and agents, program coordinators, and specialists

- Training

- Knowledge

- Collaborations with external researchers

- Collaborations with SET industry leaders

Activities:

What we do:

- Select and develop 4-H SET curricula

- Select and train volunteers

- Market 4-H SET to increase interest participation

- Conduct non-formal education (learning and teaching, facilitated inquiry and discovery)

- Facilitate question formation and problem solving through guided activities

- Provide or supplement math programming

- Teach youth about academic and career choices, requirement

Who we reach (Participation):

- Extension administrators, LGU and Extension faculty and staff)

- Youth (grades 3–5, 6–8, 9–12)

- Federal, state & private funders

- Partners

- Public

Outputs

What we produce:

- 4-H SET curricula

- New instructional methods

- Trained staff and volunteers

- Adult participants engaged

- Youth participants engaged

- Partners (Other federal agencies, science museums, youth organizations, etc.) collaborating

- Marketing materials

- Evaluation materials

Outcomes

Knowledge

Occurs when there is a change in knowledge or the participants learn:

- Increased awareness of SET among youth

- Improved SET skills (scientific methods) and knowledge (content areas) among youth

- Increased awareness of opportunities to contribute to society using SET skills.

- Increased life skills (self-efficacy) among youth

Actions

Occur when there is a change in behavior or the participants act upon what they've learned and:

- Youth apply SET learning to contexts outside the 4-H courses (e.g., school classes, science fairs, invention contests, etc.)

- Youth adopt and use new methods or improved technology

- Youth demonstrate use of life skills

- Youth express interest/demonstrate aspirations towards SET careers (career fairs, job shadowing, volunteer work or internships)

- Youth raise questions and identify problems to be addressed using SET

Conditions

Occur when a societal condition is improved due to a participant's action taken in the previous column.

- Increased number and more diverse pool of youth pursuing education and careers in SET related fields.

- Increased and more diverse pool of trained teachers, educators, scientists

- Increased science literacy in general population

- Increased innovation addressing social problems using SET

ASSUMPTIONS – 4-H non-formal experientially based programming addresses science abilities. 4-H concepts and content under guidance of trained (scientifically able) 4-H learning facilitator; 4-H develops appropriate SET Abilities to emphasize in non-formal education; 4-H essential elements create optimal youth development context for learning; 4-H reaches diverse population; and increased awareness of SET skills, content, and career possibilities increases engagement of youth in SET careers.

EXTERNAL FACTORS – Youth experience in schools including [with] SET & mathematics, No Child Left Behind (course content, testing, tutoring provided in school), changing landscape of schools, community and family influence (e.g., religious teaching on Creationism), population changes, immigration, global economy and competition in SET education and SET pursuits.