APAS

APT Assessment of Program Practices Tool

APT-O

Self Assessment Observation Tool
STEM Activity

Important: Training by an authorized NIOST trainer(s) is strongly encouraged prior to using this tool.
Questions, please call (781) 283-2547 or e-mail niost@wellesley.edu

NIOST National Institute on Out-of-School Time

Wellesley Centers for Women

Massachusetts Department of Elementary & Secondary Education

Spring 2020

Developed by Beth M. Miller & Wendy B. Surr, National Institute on Out-of-School Time, Wellesley Centers for Women, Wellesley College in partnership with the Massachusetts Department of Elementary and Secondary Education 21st Century Community Learning Center Program, October 2003. Revised Fall 2019.
The STEM Activity section was developed in March 2015. Revised Spring 2020.

APT-O
STEM Activity

Observation Instructions

Important:

When creating paper versions of the APT observation tool, the following wording must appear in the footer of the document:

Developed by Beth M. Miller & Wendy B. Surr, National Institute on Out-of-School Time, Wellesley Centers for Women, Wellesley College in partnership with the Massachusetts Department of Elementary and Secondary Education 21st Century Community Learning Center Program, October 2003. Revised Fall 2019. The STEM Activity section was developed in March 2015 and revised in Spring 2020.

APT-O STEM Activity

The STEM Activity Observation is intended for programs whose primary focus is STEM. Substitute this STEM Activity for the entire standard Activity section of the APT-O tool.
This STEM Activity observation is based on the APT-O which is part of the APAS system developed by NIOST. The STEM Activity observation measures youth and staff engagement and interest in STEM activities and youth mastery of STEM skills. It applies to a wide variety of STEM topics including: natural or physical sciences such as gardening, environmental and life science, simple or complex experiments, chemistry, engineering, design, computer science, coding, and robotics. It focuses on youth's active participation in STEM learning opportunities and staff support of the development of curiosity about STEM topics, concepts, and reasoning skills.

APT Rating Scale
The APT offers a four point, "how true" rating scale. Each item in the tool is a statement describing a desired practice/behavior. The scale is designed to answer the question "How true is it that this statement describes the behavior/practice that I observed?"

1=Not True
2=Somewhat True
3=Mostly True
4=Very True

The **bolded statement** that appears in each row of the tool represents a "4" rating-(i.e. the desired practice or behavior). This statement may be followed by further definition and/or an example of a "4". Each row also includes a definition and/or example of a "1" rating in italics. **Note:** An example represents what an observer *might* see—not what they *mus* t see. If the particular example is not observed it should not influence ratings. Use the items, definitions and examples to assign tentative ratings while in the field. Final ratings are assigned after the visit has concluded using the APT Anchors as reference (see below).

N/A= Not Applicable
Observers should seek to rate all items in the APT tool using the 4-point scale. However, when a behavior/practice could not be observed during the observation period, a rating of "NA" can be assigned. For example, if the observer misses the beginning of an activity, an "NA" can be assigned for "Activities begin promptly." The NA rating should be used **sparingly** and **only** when "NA" is included as a rating option. NA scores should always be accompanied by an explanation in Field Notes, unless the item is conditional (see below).

Situational/Conditional Items

If an item is prefaced with underlined, conditional statements such as "when", "during", or "if", and the observer did not see any of these times/practices, then the item should be rated as N/A.

APT-O
STEM Activity

Observation Instructions

Use of APT Anchors:
Observers should always check their tentative ratings (made in the field) against the rating anchors. Anchors provide more definitions and examples for all 4 points on the scale.

Ratings for Multiple Staff:
When rating staff items observers may be considering multiple staff members. Therefore, observers will be factoring staff members who may be in different roles (e.g., lead staff and assistant or volunteer staff). In general, if staff are co-facilitating, staff interactions should be weighted equally and averaged overall when rating. However, if one staff member is clearly leading the activity then the behavior/practices exhibited by this lead staff member should be weighted more heavily since the tool is intended to measure the quality of experiences for youth. When in doubt, ask yourself, "What is the child/youth's experience right now?" This will help mediate ratings where one staff person may overly influence the experience.

Rating Proportion of Youth:
APT Youth items must take into account the proportion of youth exhibiting the desired behavior. A 4 represents that "all/almost all" (approximately 80-100%) of youth exhibit the desired behavior; 3 represents that "many" (approximately 51-79%) of youth exhibit the behavior; 2 represents that "some" (approximately 20-50%) of youth exhibit the behavior; and 1 represents that very few/no (less than 20%) of youth exhibit the desired behavior. Important Note: Observers should NOT focus on counting youth. Numerical categories are provided to give an approximate suggested guideline for determining proportion.

Rating the Frequency of Staff Practices:
Some staff items measure the frequency of a desired practice. For these items observers can use the quantitative labels and approximate percentage categories provided for youth proportion. For instance, "Staff use a neutral (or positive) tone of voice" all/almost all of the time (approximately 80-100%). Again, observers are not expected to "count" how often staff use a given desired practice. Rather, observers should use these categories merely as a guide in determining approximate frequency.

Development of the APT:
Developed by Beth M. Miller and Wendy B. Surr, National Institute on Out-of-School Time, Wellesley Centers for Women, Wellesley College, in partnership with the Massachusetts Department of Elementary and Secondary Education 21st Century Community Learning Center Program, October 2003. Revised in October 2012 and October 2014 with generous funding from the W.T. Grant Foundation. Piloted for equity and inclusion language in 2018 with funding from the Massachusetts Department of Elementary and Secondary Education 21st Century Community Learning Center Program, released in Fall 2019.
The STEM Activity section was developed in March 2015 and revised in Spring 2020.

STEM Activity Time

Site ID: Observer ID: Date:

Activity Name: _____

Activity # _____

Start Time _____ *Minimum observation duration:*

End Time _____ *30 minutes or see Site Visit Plan*

Observed Number of staff _____

Number of youth _____

□ Start of activity □ End of activity

(check all that apply)

Brief Description of STEM Activity Time

_____

_____

Instructional Approach *(check up to 3)*

□ Adult Led □ Pairs

□ Youth Led □ Youth Work Independently

□ Groups/Teams

□ Other (please describe) _____

Location of Activity Time *(check location(s) that apply)*

□ Classroom □ Science room/Lab

□ Cafeteria □ Library

□ Gym □ Off-Site (please explain)

□ Outdoors □ Other (please describe)

_____

_____

Focus of STEM Activity *(check all that apply)*

□ Life science/biology

□ Environmental science

□ Math

□ Chemistry

□ Physics

□ Engineering/Design

□ Computer science

□ Coding

□ Robotics

□ Vocational Skills/Training

□ Other (please describe) _____

_____

Important Note:

Programs that have activities that focus on academic enrichment are encouraged – but not required – to use the Academic Skill-Building section in conjunction with the Activity Time section.

STEM Activity Time

Site ID: Observer ID: Date:

A. Organization of STEM Activity		Rating				
1	**Activities begin promptly.** (Ex: Youth wait less than 2-3 minutes.) *1=Extended delay; youth are not engaged while they wait. (Ex: Youth wait 8-10 minutes with nothing to do while staff prepare programming*	1	2	3	4	N/A
2	**There are enough materials and supplies for the number of youth participating.** *1=Many youth cannot fully participate due to a lack of supplies. (Ex: Youth must wait for a very long time for their turn with materials.)*	1	2	3	4	
3	**Activity time is free from interruptions/distractions.** *1=Youth are being constantly interrupted by noise or intrusions. (Ex: There is another noisy activity being held in the same space.*	1	2	3	4	
4	**Staff create adjustments and accommodations for youth based on their experiences and needs.** (Ex: Youth with special needs, or English Language Learners are fully included) *1= Youth are excluded from activity if they are not able to conform to the group dynamic.*	1	2	3	4	N/A
5	**There is an appropriate amount of time allotted for the STEM activity.** (Ex: Youth do not appear rushed or bored; most youth finish activities or activity comes to a logical stopping point if an ongoing project). *1=Many youth rush in an attempt to finish or many youth finish early and are bored.*	1	2	3	4	
6	**Staff explain the activity clearly.** (Ex: Purpose and sequence of activity are clear to observer; most youth do not ask for further explanation). *1= Many youth appear confused about what to do.*	1	2	3	4	
7	**Activity is open-ended with no predetermined answer or solution.** Activity requires youth to use problem solving skills, STEM knowledge, creativity, and trial and error to reach a conclusion or solution. (Ex. Build the tallest structure with the materials provided. Find the best route to x,z,y if you were a bird; now if you were a cat.) *1= Youth follow step-by-step instructions.*	1	2	3	4	
8	**Activity includes clear instructions on how to safely use STEM tools, equipment, and materials.** (Ex: Safety glasses are used if necessary). Rate as NA - not applicable - if STEM tools/equipment are not used. *1=No disucssion of safety precautions and procedures for using STEM tools.*	1	2	3	4	N/A

Field Notes:

STEM Activity Time

Site ID: Observer ID: Date:

Important Note:
Observers should rate <u>all</u> Nature of Activity Items (i.e. do not rate as N/A simply because you believe an item is not desired or appropriate for a particular activity).

B. Nature of STEM Activity		Rating
1	**The activity is part of an ongoing project, activity series or curricular unit designed to promote STEM skills/concepts over time.** (Ex: Staff explain link with prior activities, emphasize key skills and concepts youth have been learning.) *1=Activity is clearly not connected to any ongoing theme, topic, project, curricular unit, or plan for youth's learning over time. (Ex: Youth have free time outside.)*	1 2 3 4
2	**Activity is appropriately challenging and stimulates youth thinking.** Activity requires that youth learn/apply skills, solve problems, use strategy, focus and concentrate, most of the time in order to participate. (Ex: Activity is not too easy nor too hard.) *1= Activity is not at all challenging. (Ex: Appears very easy, youth appear bored, finish quickly/effortlessly).*	1 2 3 4
3	**Activity offers youth choice and decision-making.** Within a structure youth are able to make many choices/decisions about what they will do and/or how they will do it; shape the activity to reflect their interests, ideas, and preferences. (Ex: Youth chose which specific endangered animal to study or which way to present findings to group). *1= No youth choice or decision-making. (Ex: Activity requires that youth follow adults' specific step-by-step instructions to produce a pre-determined product, or youth simply take in/ give back information.)*	1 2 3 4
4	**Activity offers youth opportunities to work collaboratively in pairs, groups or as part of a team to achieve a shared goal.** Youth are actively engaged in group collaboration for more than half of the time. (Ex: Youth negotiate, compromise, clarify roles, make joint decisions.) *1=Youth have little or no opportunity to interact with peers during the activity. (Ex: Staff provide direct instruction while youth sit at desks and take notes.)*	1 2 3 4
5	**The STEM-related question(s) to be addressed by activity is evident to youth (understood, acted upon, can repeat it).** (Ex: How do large ships float? What species inhabit a saltmarsh? How tall is the flag pole in front of the school?) *1= Youth appear confused about the goal of the activity.*	1 2 3 4
6	**Elements of the scientific process or engineering design theory are evident to youth (understood, acted upon, can repeat it).** (Ex: Youth define a problem, research a topic, brainstorm hypotheses or solutions, plan and design a solution, test it, and improve upon the design). *1= STEM processes are not required to complete task.*	1 2 3 4

Field Notes:

STEM Activity Time

Site ID: Observer ID: Date:

B. Nature of STEM Activity (con't)		Rating
7	**Activity includes youth using tools of the STEM fields.** (Ex: Youth use calculator, magnifying glass, microscope, recorder, log, computer programs for data analysis, design and/or presentation software.) *1= Youth do not use any STEM tools.*	1 2 3 4
8	**The activity culminates (or will culminate) in tangible products or presentation/performances that reflect ideas or designs of youth.** (Ex: Group presentations, sharing times, recognition celebrations, exhibitions, performances are a planned part of the activity.) *1= Activity is one time expereiment unrelated to ongoing curriculum or theme.*	1 2 3 4

Field Notes:

STEM Activity Time

Site ID: Observer ID: Date:

C. Staff Promote Youth Engagement & Stimulate Thinking		Rating				
1	**Staff are energetic, enthusiastic, and/or upbeat STEM topics and activities.** All staff show consistent positive energy and enthusiasm. *1=All staff appear low energy, disinterested, bored or flat in their demeanor the entire time.*	1	2	3	4	
2	**Staff help spark and sustain youth's interest/curiosity throughout the activity.** (Ex: Staff ask youth a series of questions to prompt ongoing curiosity and wonder. Staff encourage youth to experiment with the materials and try new approaches.) *1=Staff do not spark or sustain youth's interest (Ex: Give directions without discussion, or any expression of enthusiasm.)*	1	2	3	4	
3	**Staff are actively engaged in STEM activities with youth.** (Ex: Show interest in the activity, provide ongoing facilitation, participate with youth.) Note: Staff may rotate through group giving youth time just with peers or by themselves. *1=Staff do not engage/interact with youth; show little interest in the activity (Ex: Chat with other staff; busy doing their own activity.)*	1	2	3	4	
4	**Staff encourage youth to share control, responsibility, and decision-making.** Staff want youth to play an active role in organizing, leading and/or making important decisions about the activity. *1=Staff resist youth input and involvement. (Ex: When youth make suggestions, staff dismiss youth's ideas. Staff make it clear that they are in charge, making all the decisions.)*	1	2	3	4	
5	**<u>When providing assistance to youth</u>, staff help youth think through problems and/or questions themselves rather than offering answers.** Staff guide youth's thinking and help them develop problem solving skills. (Ex: Ask "how", "why", "what-if" questions, help youth brainstorm potential solutions.) *1=Staff provide answers to youth, rather than helping them to figure it out on their own.*	1	2	3	4	N/A
6	**Staff ask open-ended questions.** Staff guide, probe and extend youth's thinking, help youth make connections, encourage youth to focus on and share what they are learning, and help them develop problem-solving skills. (Ex: Staff ask "How?," "Why?," and/or "What-if?" questions, and/or help youth brainstorm potential solutions.) *1= Staff do not ask youth any questions to focus their thinking on the activity.*	1	2	3	4	
7	**Staff engage youth in a structured time for feedback and reflection on the activity.** Staff engage youth in an extended discussion (or individual reflection time) about the activity, their feedback, and/or what they learned. *1=Staff do not solicit feedback from youth or engage youth in reflection about the activity.*	1	2	3	4	

Field Notes:

STEM Activity Time

Site ID: Observer ID: Date:

C. Staff Promote Youth Engagement & Stimulate Thinking (Con't.)		Rating
8	**Staff encourage youth to be curious, and to use their creativity and imagination.** Staff show appreciation for all ideas and support creative solutions (Ex: "I'm not sure if that will work. But let's give it a try.") *1=Staff discourage or ignore youth creative thinking and ideas.*	1 2 3 4
9	**Staff encourage youth to make predictions or hypotheses.** (Ex: Staff ask, "How do you think it would be different if we added salt water instead of tap water?" "What other types of materials would work?" "Can you think of any other possible reasons/solutions?") *1= Staff do not ask youth any questions that require youth to make predictions.*	1 2 3 4
10	**Staff use STEM vocabulary appropriately.** Staff use appropriate terms from science, technology, engineering, and math fields demonstrating an understanding of terms. (Ex: spreadsheet, graph, slope, axis or density, mass, volume.) *1= Staff do not use STEM vocabulary or use terms incorrectly.*	1 2 3 4
11	**Staff encourage youth to use STEM vocabulary** Staff explain STEM vocabulary in age-appropriate ways that youth can understand (Ex: "That 'cool light' you see is caused by a prism.", "Do you know the correct term for that?") *1= Staff do not use STEM vocabulary, use terms incorrectly.*	1 2 3 4
12	**Staff attribute youth success in STEM activities to effort and persistence.** (Ex: "That's what engineers do too—when the first attempt does not work they go back and try again." "You all worked together to accomplish this. I'm proud of you all.") *1= Staff do not encourage youth's efforts.*	1 2 3 4
13	**Staff support youth in collecting and recording data, and/or making observations about events and natural phenomenon.** Staff provide appropriate tools and clear instructions to enable youth to actively participate in the data collection. (Ex: staff help adjust binoculars to observe appropriately.) *1= Staff do not encourage or support youth's efforts/attempts at observation and/or data collection.*	1 2 3 4
14	**Staff encourage youth to use data (findings, observations, models) to draw conclusions.** (Staff ask youth to use results to make a generalization. (Ex. "Pollution negatively impacts animal habitats" or "We measured water temperature for 6 weeks, what we can say about what we learned from this exercise?") *1= Staff do not require youth to draw conclusion from data.*	1 2 3 4
15	**Staff ask youth to provide evidence to support their ideas and conclusions.** (Ex: "How do you know that is true? What information do you have to support this idea?") *1= Staff do not differentiate between opinion and facts .*	1 2 3 4

Field Notes:

STEM Activity Time

Site ID: Observer ID: Date:

D. Staff Positively Guide Youth Behavior		Rating				
1	**Staff closely supervise youth and activities.** Staff are watching youth all the time, prevent unsafe or address disruptive behavior. *1=Staff are not watching youth or do not respond to events or interactions that are unsafe or disruptive.*	1	2	3	4	
2	**Staff interactions with youth (manner, affect, tone) are positive and supportive.** *1=Staff use a negative, punitive, irritable, or harsh tone of voice most of the time.*	1	2	3	4	
3	**Staff treat youth respectfully and assume best intentions.** (Ex: Staff pull youth aside to discuss their behavior in private; hear youth's point of view.) *1=Staff constantly correct, criticize, or reprimand youth.*	1	2	3	4	
4	**Staff are able to quickly and positively gain youth's attention and cooperation when needed.** *1=Staff's repeated attempts to control group are negative and/or are ineffective, or staff allows group to become chaotic and out of control.*	1	2	3	4	
5	**Staff are flexible in their management of youth.** (Ex: Staff appear comfortable as youth move freely, use equipment, leave the area to get water, use the bathroom.) *1=Staff over-control youth. (Ex: Staff expect children/youth to sit quietly, obtain permission before getting up; always raise hand before speaking.)*	1	2	3	4	
6	**Staff use simple reminders and redirection to support positive behavior.** Staff are always calm and straightforward. (Ex: Let youth know what is inappropriate and remind them of rules and behavioral expectations.) *1=Staff always over-react to youth's behavior. (Ex: Staff are visibly short-fused "How many times do I have to tell you not to….?")*	1	2	3	4	
7	**<u>When addressing behavioral issues</u>, staff use strategies which are developmentally appropriate.*** *1=Time-out, loss of privileges is a primary behavior management strategy; consequences are completely out of proportion with youth's infractions. (Ex: Time out for minor behavioral infractions or youth that have not received other warnings.)*	1	2	3	4	N/A

Field Notes:

STEM Activity Time

Site ID: Observer ID: Date:

E. Staff Build Relationships & Support Individual Youth		Rating				
1	**Staff engage in friendly exchanges (chats) with youth.** Staff show interest in youth as individuals (Ex: Staff make a point of connecting with all youth--inquire about youth's interests, solicit youth's thoughts and opinions on a topic, ask about youth's day or something they made.) *1=Staff do not have friendly exchanges with any youth; communication is primarily directional or informational. (Ex: Staff remind youth to hang up coat.)*	1	2	3	4	
2	**Staff encourage individual youth.** (Ex: "I like your thinking," "I noticed that you are really taking your time on this project" "You can do it—give it another try.") *1=Staff do not offer encouraging remarks to any individual or groups of youth.*	1	2	3	4	
3	**Staff exhibit appropriate, professional conduct around youth.** *1=Staff behavior is inappropriate to their role with youth. (Ex: Staff, react "personally" to youth criticisms, exhibit behavior not allowed in program, such as talking on their cell phones.)*	1	2	3	4	
4	**Staff listen (focus, pay attention) actively, attentively, and patiently to youth during activity time.** (Ex: focus on youth when speaking, give youth time and accommodations to express themselves, summarize back what they heard youth saying.) *1=(Ex: Staff ignore, dismiss and/or interrupt youth when they are trying to speak to staff.)*	1	2	3	4	
5	**<u>When youth need or ask for help,</u> staff provide individualized assistance to youth.** Staff take the time to really understand and focus on individual youth needs. (Ex: Answer questions, explain how to do something. *1= Staff do not help youth. (Ex: Staff tell youth they will help them later.)*	1	2	3	4	N/A
6	**<u>When an individual youth is having a problem or is upset</u>, staff pay attention and try to help them*.** (Ex: When a youth has accidentally broken their project and is upset, staff offer comfort; stay and help youth calm down.) *1= (Ex: Staff ignore or dismiss a youth who is crying.)*	1	2	3	4	N/A

(Note # of youth who have extended, 1:1 conversations with staff *i.e. each person has minimum of 2-3 turns.)*

Field Notes:

<u>Item Format</u>

Bold: Anchor and/or (Example) of a "4" rating

1=: Anchor and/or (Example) of a "1" rating

Rating Scale:

1-Not True 2-Somewhat True

3-Mostly True 4-Very True

STEM Activity Time: Rating of Youth

Site ID: Observer ID: Date:

F. Youth Relations with Adults		Rating
1	**Youth show interest in staff; seek out positive contact/interactions.** (Ex: Youth show staff something they made, initiate friendly interactions.) *1=Youth actively avoid or ignore staff.*	1 2 3 4
2	**Youth are cooperative with staff's requests or directions.** Youth comply or negotiate easily with staff. *1=(Ex: Youth are resistant, oppositional, refuse to comply, get into power struggles.)*	1 2 3 4
3	**Youth listen (focus, pay attention) to staff.** (Ex: Youth focus, don't interrupt, get clarifications, or ask follow up questions.) *1=(Ex: Youth ignore, interrupt, or walk away from staff when they are speaking.)*	1 2 3 4

Field Notes:

G. Youth Participation in STEM Activity		Rating
1	**Youth are busy and engaged in STEM-related activities and/or conversations.** Youth ask relevant, thoughtful questions demonstrating understanding and/or curiosity about STEM topic. (Ex: Youth are engaged in hands-on activities, raising hands to ask and answer questions, show enthusiasm and eagerness.) *1=Very few/no youth are constructively engaged (Ex: Youth are passive observer and/or listener, youth refuse to participate, appear bored, engage in off-task behaviors.)*	1 2 3 4
2	**Youth follow program rules and behavioral expectations.** *1=Very few/no youth follow rules on their own. (Ex: Youth need constant reminding about rules or expectations by staff/adults.)*	1 2 3 4
3	**Youth appear in control; they regulate their behavior and energy to the environment.** During academic learning times, or activities which require focus on a task, youth actions and affect are regulated to these activities. *1=(Ex: If it is quiet reading time, most youth are wound up and out of control; excessively loud, disrupting other's participation or enjoyment of the activity.)*	1 2 3 4
4	**Youth help select, lead or contribute to the running of the activity.** Youth led activity, and/or all youth contribute in some way to the nature and direction of activity time. (Ex: Help to choose, make decisions about the activity, make their own choices about how they will spend free time, offer ideas to staff for modifying the activity, help set up.) *1=Youth do not select, lead or contribute to the running of the activity. (Ex: Youth simply participate in activity as instructed by staff.)*	1 2 3 4

Field Notes:

STEM Activity Time: Rating of Youth

Site ID: Observer ID: Date:

G. Youth Participation in STEM Activity (con't)		Rating
5	**Youth are cognitively engaged and/or focused on solving problems.** (Ex: Youth are focused on solving activity-related challenges, answering questions, exploring ideas verbally or physically, questioning, hypothesizing, testing, and/or actively seeking information about mechanical or natural phenomena or objects.) *1=Very few or no youth appear cognitively engaged. (Ex: Youth watch a video or adult demonstration without faciliated Q & A.)*	1 2 3 4
6	**Youth use STEM tools** (Ex: Youth use calculator, magnifying glass, microscope, recorder, log, computer programs for data analysis, design, and/or presentation.) *1= Youth do not use STEM tools.*	1 2 3 4
7	**Youth use STEM vocabulary** (Ex: Youth use proper terms for instruments such as microscope or magnifying glass instead of "thingy".) *1= Youth do not use STEM terminology or vocabluary.*	1 2 3 4
8	**Youth have the opportunity to share their ideas, describe what they are doing, and explain what they are thinking about to others.** (Ex: Youth share either formally through presentations of findings or informal conversations where youth input is solicited, compare/contrast to other activities.) *1= Youth do not describe their activity, actions, or ideas with staff or peers.*	1 2 3 4
9	**Youth appear to enjoy the STEM activity** Youth demonstrate curiosity, talk to each other about the activity, ask inquisitive questions during the activity, smile, etc. *1= Youth appear bored or disinterested in activity.*	1 2 3 4
10	**Youth collect data, measure, record data, and/or make observations about events and natural phenomenon.** (Ex. Youth capture, count, and classify insects in a field; youth use rulers to measure length, thermometers to track daily water temperature.) *1= Youth do not particpate in making observations or data collection.*	1 2 3 4
11	**Youth use observation to describe and or predict a pattern/problem.** Youth use identification, naming to describe STEM principles. (Ex: Youth collect and identify insects using chart.) *1= Youth do not have opportuntiy to make observations or predictions.*	1 2 3 4
12	**Youth use strategic talk.** Youth explain how to do/use something in order to better participate and/or understand the STEM activity/concept. *1= Youth do not have opportuntiy to describe their actions or thinking.*	1 2 3 4

Field Notes:

STEM Activity Time: Rating of Youth

Site ID: Observer ID: Date:

H. Peer Relations		Rating
1	**Peer interactions have a positive affective tone; youth appear to enjoy each other's company.** (Ex: Youth mix freely, lots of smiling, laughing, playful exchanges, include each other.) *1=(Ex: Negative, tense social atmosphere. Many youth do not mix with youth from other groups. Evidence of social exclusion.)*	1 2 3 4
2	**Youth listen (focus, pay attention) to each other.** (Ex: Show interest, ask follow up questions.) *1=(Ex: Youth ignore or interrupt peers when they are communicating.)*	1 2 3 4
3	**Youth cooperate with each other.** (Ex: Share materials/space, help each other, take turns, compromise, problem solve.) *1=(Ex: Tension and competition amongst youth. Youth rarely share materials, take turns or compromise without arguing.)*	1 2 3 4

Field Notes:

STEM Activity Time

Site ID: Observer ID: Date:

I. STEM Connections		Rating
1	**Staff help youth connect current activity to previous STEM knowledge.** Staff help youth make meaningful connections to STEM concepts. (Ex: "I know you've been studying this topic in life sciences." "How does this relate to the concept of ____?") *1= Staff do not make any connections between current STEM activity and previous STEM knowledge or concepts.*	1 2 3 4
2	**Staff help youth connect current activity to everyday activities and situations.** Staff help youth make meaningful connections of STEM concepts to everyday situations. (Ex: "What does this remind you of? Something we all have a home…" "How could we use at home or in our community?" "How does the concept of buoyancy relate to swimming? Does it change in a pool, lake, the ocean?") *1= Staff do not make any connections between current STEM activity and everyday activities or situations.*	1 2 3 4
3	**Staff help youth connect current activity to STEM careers or job-related activities.** (Ex: "There are a many kinds of engineers." "How do you think a worker in the medical field would use this knowledge or process?") *1= Staff do not make any connections between current STEM activity and STEM careers or job-related activities.*	1 2 3 4
4	**Staff help youth connect current activity to broader community and/or current events, societal issues, and/or problems.** Staff prompt youth to actively contribute to conversations. (Ex: "How does our garden impact our school?" "How could it impact the larger community/neighborhood?" "What did we learn that could be useful to other gardeners?") *1= Staff do not encourage any connection to community or current events.*	1 2 3 4

Field Notes:

STEM Activity Time: Rating of Youth

Site ID: Observer ID: Date:

J. Youth Demonstrate Mastery of STEM Skills		Rating
1	**Youth demonstrate self-confidence in STEM skills.** Youth show belief in their ability to understand and engage in STEM, that STEM is accessible and useful to them. (Ex: Youth exhibit "I can do it, I will try again when necessary" attitude.) *1=Youth express negative attitude, make comments such as, "I can't" and/or refuse to try/participate.*	1 2 3 4
2	**Youth make and test predictions or hypotheses.** Youth plan and/or carry out an investigation, and/or design a solution to a STEM problem. Students design ways to investigate research questions choosing appropriate variables, techniques, and tools to gather, record, and analyze data. (Ex: Students devise their own organizational schema for recording data.) *1= Students are passive participants. They do not make predictions or plans to test ideas.*	1 2 3 4
3	**Youth analyze and interpret data.** (Ex: Youth use math and/or computation to solve problems. Students use math to transform, organize, and/or interpret data.) *1= Youth do not solve problems or use data to answer questions.*	1 2 3 4
4	**Youth develop and use models to demonstrate STEM understanding and concepts and theory.** (Ex: Youth use pictures, diagrams, and story board, replica, flow charts, graphs, collage, and/or power point presentations.) *1= Youth do not manipulate materials. Youth are passive observers.*	1 2 3 4
5	**Youth provide evidence to support their ideas and conclusions.** Youth construct an argument supported by evidence. Youth make live or multimedia fact-based presentation. (Ex: Youth use facts, data, observations, historic evidence.) *1= Youth do not differentiate between opinion and facts.*	1 2 3 4
6	**Students access and utilize secondary data and/or sources.** Youth assess the reliability and/or validity of knowledge generated or information gathered by investigating and critiquing methodology and fidelity of sources. (Ex: Youth use multiple websites to confirm information and gather a full-picture of the topic/issue; can differentiate between opinion and facts.) *1= Youth use one source to complete task.*	1 2 3 4
7	**Youth help select, lead, or contribute to the running of the activity. Youth make important and meaningful choices that shape their learning.** Students formulate strategies to investigate STEM problems (versus being told how to do something). (Ex: Youth make their own choices about which endangered species to study. Youth and/or peer teams work independently the majority of the time, with staff support as needed.) *1= Adults make all decision and resist youth input or ideas.*	1 2 3 4

Field Notes:

Activity Time: Rating of Youth

Site ID: Observer ID: Date:

J. Youth Demonstrate Mastery of STEM Skills (con't)		Rating
8	**Youth demonstrate leadership and STEM skills.** Youth have opportunities to demonstrate their skills and knowledge. (Ex: Youth have opportunities to mentor or assist others in doing STEM activities. Youth manage STEM projects with minimal staff support.) *1= Youth do not have opportunity to demonstrate leadership skills. Staff make all decisions and youth follow staff instructions as directed.*	1 2 3 4
9	**Youth engage in group-processing skills.** Youth actively listen, contribute ideas and/or actions to the group, do a task with others, take responsibility for a part, negotiate, compromise, and/or make joint decisions. (Ex: Students evaluate and revise their explanations or predictions in light of alternative ideas posed by staff and/or peers.) *1 = Youth simply follow directions of staff. There is not opportuntiy for peer interactions or decision making.*	1 2 3 4
10	**Youths' comments, questions, and performance reflect an accurate uptake of STEM content/concepts.** Youth's predictions make sense from a scientific standpoint. (Ex: Youth explain how and why things work to a peer. Youth ask thoughtful questions.) *1= Youth comments or questions show confusion, inaccurate information.*	1 2 3 4
11	**Youth demonstrate problem solving and higher-order thinking skills.** Youth show the capacity to think logically, reflect, explain, and/or justify their strategies. (Ex: Youth use a variety of methods or use trial and error for working on and solving problems for activities that have no clear-cut answer.) *1= Youth follow and/or ask staff for step-by-step instructions to complete tasks. No original thought or problem solving is required by youth.*	1 2 3 4
12	**Youth employ a variety of skills and subject areas to complete and/or participate in STEM Activity.** Youth use reading, writing, math, computation, and art in STEM activity. *1= Youth do no use any other academic skills or curriculum during STEM activity.*	1 2 3 4

Field Notes:

STEM Activity Time

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