An Introductory Guide to the Dimensions of Success (DoS) Observation Tool

What is DoS?

The Dimensions of Success observation tool, or DoS, pinpoints twelve indicators of STEM program quality in out-of-school time. It was developed and studied with funding from the National Science Foundation (NSF) by the Program in Education, Afterschool and Resiliency (PEAR), along with partners at Educational Testing Service (ETS) and Project Liftoff. The DoS tool focuses on understanding the quality of a STEM activity in an out-of-school time learning environment and includes an explanation of each dimension and its key indicators, as well as a 4-level rubric with descriptions of increasing quality (see p.4 for sample rubric).

How can you use DoS?

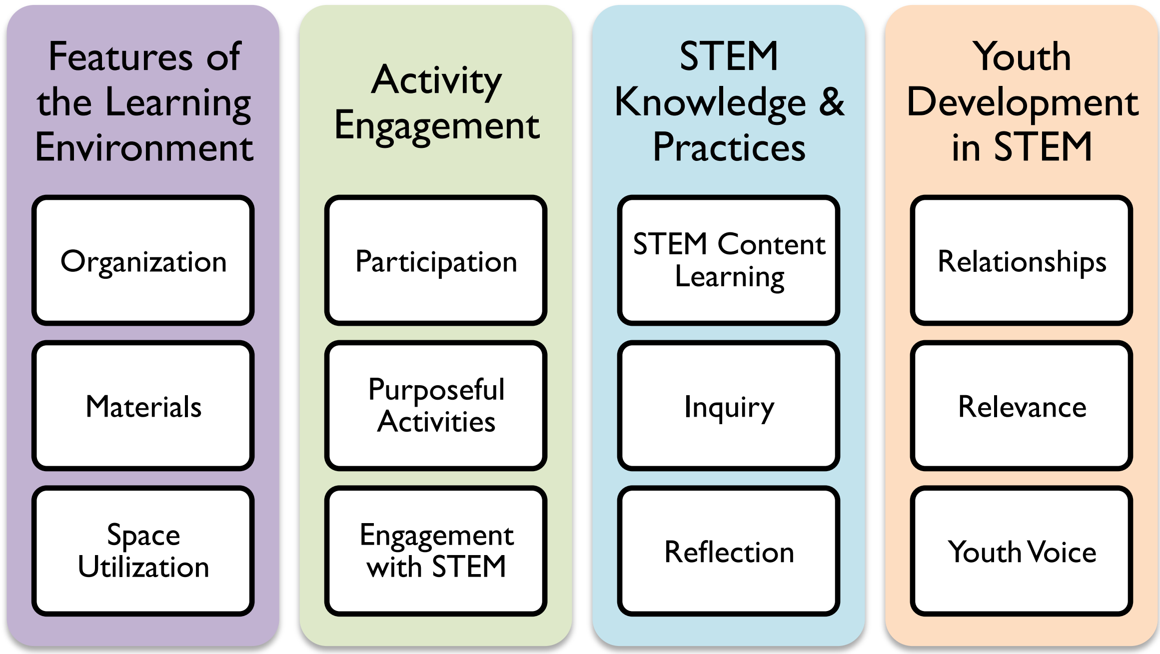
DoS was designed to be a self-assessment observation tool for STEM program administrators and staff. It can also be used by external evaluators or funders to track quality in programs over time or quality across a city or a state.

To use DoS, you must be trained and certified (see section below). After certification, you can use the tool as often as you would like to measure the quality of STEM activities.

Observation notes and scores are entered online, and PEAR provides reports that show trends over time and across particular dimensions.

When used for program quality improvement, we suggest debriefing the activities or lessons with your ratings with staff, and having them join in the process of pinpointing strengths, weaknesses, and next steps for improving quality.

What are the dimensions?



DoS measures twelve dimensions that fall in 4 broad domains: *Features of the Learning Environment, Activity Engagement, STEM Knowledge and Practices,* and *Youth Development in STEM*.

The first three dimensions look at features of the learning environment that make it suitable for STEM programming (e.g., do kids have room to explore and move freely, are the materials exciting and appropriate for the topic, is time used wisely and is everything prepared ahead of time?).

The second three dimensions look at how the activity engages students: for example, they measure whether or not all students are getting opportunities to participate, whether they are doing activities that are engaging them with STEM concepts or something unrelated, and whether or not the activities are hands-on, and designed to support students to think for themselves versus being given the answer.

The next domain looks at how the informal STEM activities are helping students understand STEM concepts, make connections, and participate in the inquiry practices that STEM professionals use (e.g., collecting data, using scientific models, building explanations, etc.).

Finally, the last domain assesses the student-facilitator and student-student interactions and how they encourage or discourage participation in STEM activities, whether or not the activities make STEM relevant and meaningful to students' everyday lives, and the experiences. Together, these twelve dimensions capture key components of a STEM activity in an informal afterschool or summer program.

Planning to use DoS

Step 1: What are your goals for assessment/evaluation?

- Do you want to help individual afterschool science program sites pinpoint their strengths and weaknesses?
- Do you want data about entire programs (e.g., Boys and Girls Clubs or YMCAs)
- Do you want external evaluators to use DoS to report quality across the state?

Step 2: Who will be using DoS and how often?

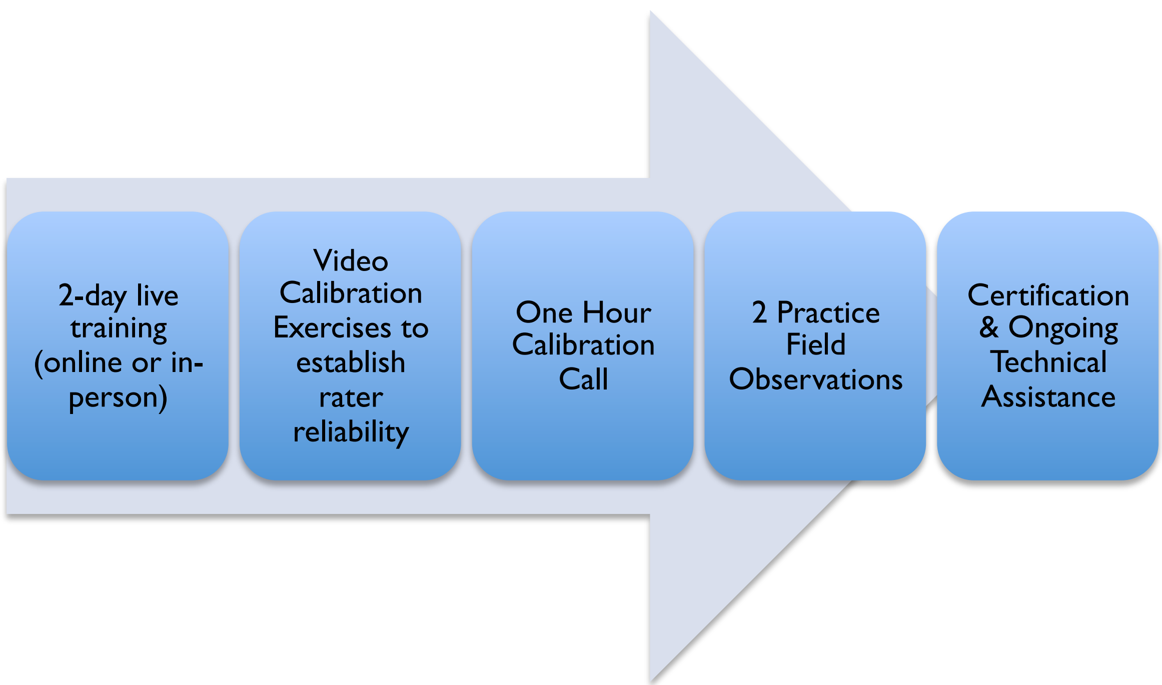
- The staff at each site will observe each other's lessons
- The staff leaders at each site will observe each unit twice
- The program leaders will observe each site twice
- State representatives from STEM board will visit each site in Fall and Winter

Step 3: What will you do with the data?

- Ratings will be discussed internally with staff and then next steps will be outlined
- Quarterly Reports (created by PEAR) will be distributed to stakeholders; these reports show a site or program's scores on each dimension four times a year.
- By Module Reports—show scores on each dimension for each type of module or curricular unit (can be aggregated across sites or just for a single site)
- Regional or Statewide Trend Report—aggregates data across all programs and shows scores on dimensions over a year; or divided by region; or divided by type of program (e.g., school-based program, museum-sponsored program, community-center program)

How do you get certified to use DoS?
To use DoS, a potential observer must complete a certification process. First, he/she must attend a 2-day training (in-person or online) to learn how to define and observe quality in each dimension. Next, potential observers must complete a set of video simulation exercises to practice their understanding of the tool. PEAR will then review their ratings and evidence from these exercises, and will provide customized feedback at a one-hour calibration session (phone conference). At this session, PEAR trainers will help to address any questions and to provide additional examples that might be needed to clarify use of the tool. Finally, potential observers will then arrange to practice using DoS in the field at afterschool sites in their local area. This step allows them to use the tool in the field and to incorporate the feedback they received on the video simulations. Upon successful completion of all these requirements, observers will be DoS certified for 2 years and can use the tool as often as they would like during that period**.** After 2 years, there are opportunities for re-certification if needed.

For pricing and registration for an upcoming training, please contact Dr. Ashima Shah at ashah@mclean.harvard.edu.



How long does the certification process take?
We can support trainees to complete the steps as fast or slow as they would like, but we encourage each trainee to commit to completing the steps within 2 months. The longer one waits, the harder it is to remember what is learned in each step of the process. We have had trainees finish all steps in less than 2 weeks—so you can go as fast as you would like—just let us know, so we can support you and make sure you get feedback at the right times. It is up to your own organization and leaders to set and maintain deadlines—we provide guidelines, but can not enforce deadlines as we know many of our trainees have other jobs/commitments.

What if we need help?
Technical Assistance will be provided by the PEAR team during the training and afterwards as you start using the tool. You will also receive updates about possible professional development opportunities or resources you can use to improve particular dimensions where you are identifying weaknesses.

Overall, DoS can empower afterschool and summer STEM program staff to embrace their role in inspiring the next generation to do STEM, be interested in STEM, and understand important STEM ideas that they can take with them throughout their lives. The tool helps to provide the common language that program/state administrators, staff, evaluators, etc. can use to describe their activities and where they excel and where they can improve.

Overview of DoS Dimensions

FEATURES OF THE LEARNING ENVIRONMENT		
Organization •Are the activities delivered in an organized matter? •Are materials available and do transitions flow?	**Materials** •Are the materials appropriate for the students, aligned with the STEM learning goals, and appealing to the students?	**Space Utilization** •Is the space utilized in a way that is conducive to OST learning? •Are there any distractions that impact the learning experience?
ACTIVITY ENGAGEMENT		
Participation •Are student participating in all aspects of activities equally? •Are boys participating more than girls? Are some students dominating group work?	**Purposeful Activities** •Are the activities related to the STEM learning goals?	**Engagement with STEM** •Are students doing the cognitive work while engaging in hands-on activities that help them explore STEM content?
STEM KNOWLEDGE AND PRACTICES		
STEM Content Learning •Is STEM content presented accurately during activities? •Do the students' comments, questions, and performance during activities reflect accurate uptake of STEM content	**Inquiry** •Are students participating in the practices of scientists, mathematicians, engineers, etc.? •Are students observing, collecting data, building explanations, etc.?	**Reflection** •Do students have opportunities to reflect and engage in meaning-making about the activities and related content?
YOUTH DEVELOPMENT IN STEM		
Relationships •Are there positive student-facilitator and student-student interactions?	**Relevance** •Is there evidence that the facilitator and students are making connections between the STEM content and activities and students' everyday lives and experiences.	**Youth Voice** •Are students encouraged to voice their ideas/opinions? •Do students make important and meaningful choices that shape their learning experience?

Sample Rubrics

Inquiry Rubric

EVIDENCE ABSENT	**INCONSISTENT EVIDENCE**	**REASONABLE EVIDENCE**	**COMPELLING EVIDENCE**
There is minimal evidence that students are engaging in or taught about STEM practices during activities.	Students are taught about STEM practices during activities but are not engaging in STEM practices themselves.	Students are engaging in STEM practices during the activities but the engagement is superficial	There is consistent evidence that students are engaging in STEM practices during the activities.
1	**2**	**3**	**4**
Students do not have any opportunities to engage in STEM practices.	Students observe STEM practices (by the facilitator, a guest presenter, or a peer), but do not have opportunities to engage in them on their own. For example, they may watch the activity leader or a student do an experiment or demonstration, or watch the teacher make and explain a scientific model.	Students use some STEM practices, however, they are used superficially and do not help students deeply engage in the thinking and reasoning of STEM professionals. For example, they may do an investigation, but by following a cookbook-approach, step-by-step set of instructions. Participation in STEM practices is scripted or inauthentic.	Students have opportunities to use STEM practices by pursuing scientific questions, tackling engineering design issues, or create mathematical arguments. They are supported to use the practices in authentic ways, where they are trying to actually solve a problem or gather data to answer a question.

Engagement with STEM Rubric

EVIDENCE ABSENT	INCONSISTENT EVIDENCE	REASONABLE EVIDENCE	COMPELLING EVIDENCE
There is minimal evidence that the students are engaged with hands-on or interesting activities where they can explore STEM content.	There is weak evidence that the students are engaged with hands-on or interesting activities where they can explore STEM content.	There is clear evidence that the students are engaged with hands-on or interesting activities where they can explore STEM content.	There is consistent and meaningful evidence that students are engaged with hands-on or interesting activities where they can explore STEM content.
1	**2**	**3**	**4**
The activities mostly leave students in a passive role, where they are observing a demonstration or listening to the facilitator talk. (minimal hands-on opportunities)	Students engage in hands-on activities; however, there is limited evidence that the hands-on activities encourage students to engage with STEM content in meaningful ways. ("hands-on, minds-off")	There are some opportunities for students to engage in hands-on activities that allow them to actively explore STEM content. Some parts of the activities still leave students as passive observers while the facilitator does all the cognitive work.	There are consistent opportunities for students to actively explore STEM content by engaging in hands-on activities, where students do the cognitive work themselves and the facilitator maintains the role as facilitator versus teller.

Sample of how an observer scored an activity using this rubric:

Dimension	Evidence	Rating (1-4)
Engagement with STEM	• *Students are <u>engaged in a hands-on activity</u> where they can touch several aquatic organisms.* • *However, the students are only hearing disconnected facts or descriptions about the animals, and are <u>not having a hands-on experience that allows them to explore STEM content</u>.* • *The <u>Activity Leaders are doing all the cognitive work</u> by providing information, they are not asking students to think This is a good example of a very hands-on activity that is unfortunately only designed to be fun and not "mind-on"*	2

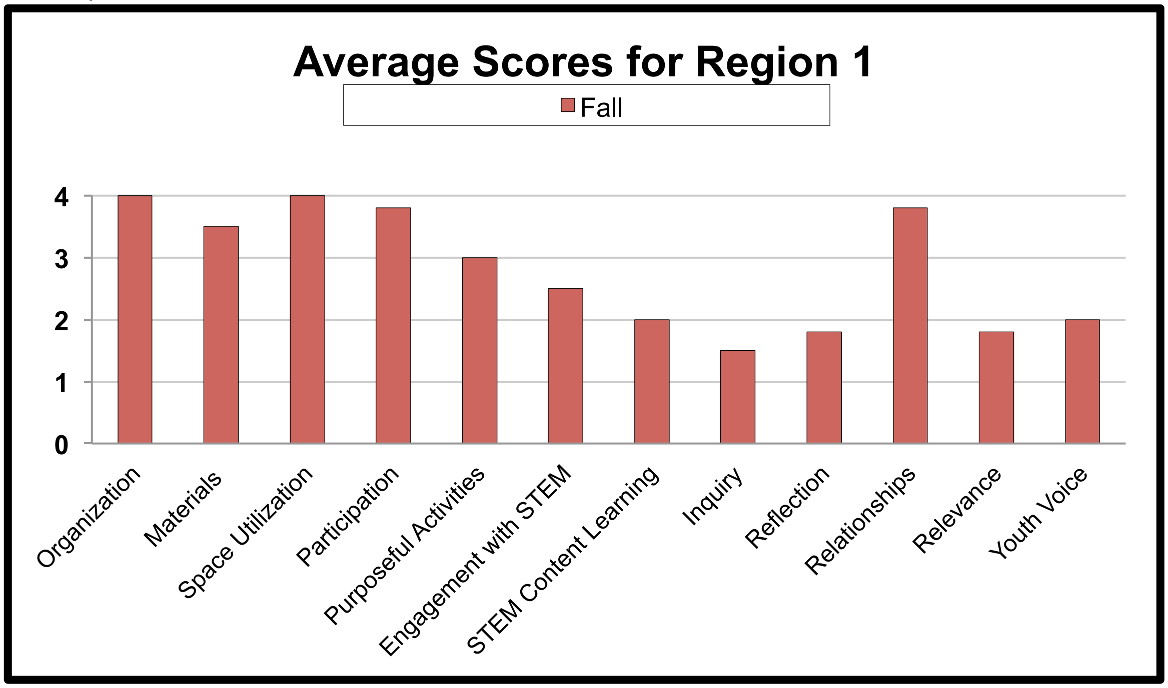
- Feedback to program: Have a few big questions to guide students' observations of the different animal tanks. For example, "what do you observe on these animals that might help them survive under water?" "how are the legs different on this animal from this other animal or how are the legs similar or different from yours and why?"—this way the students are observers with the purpose of gathering information to answer these questions.

Sample Reports

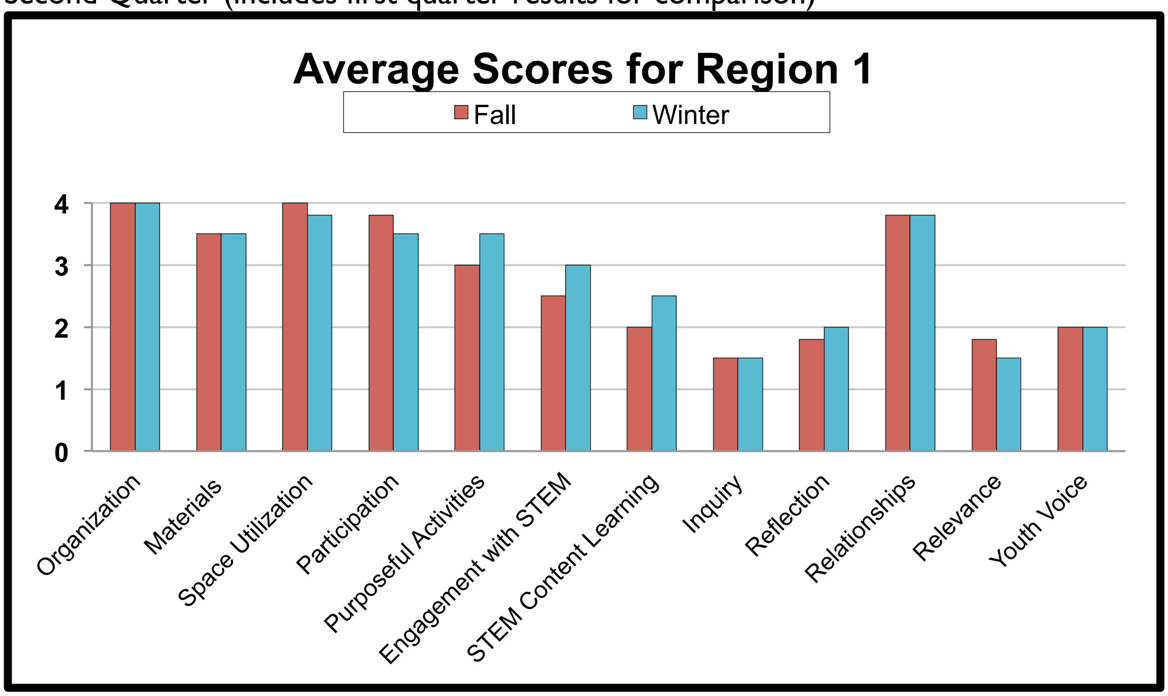
(reports will be customized to the needs of each region/state/network)

Quarterly Report for a Region

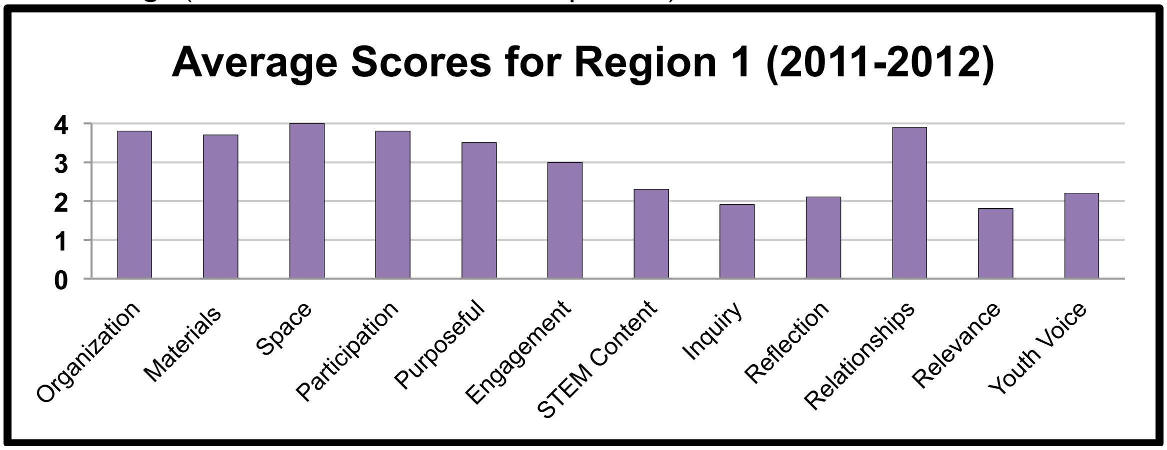
First Quarter



Second Quarter (includes first quarter results for comparison)



Year Average (includes data across all four quarters)

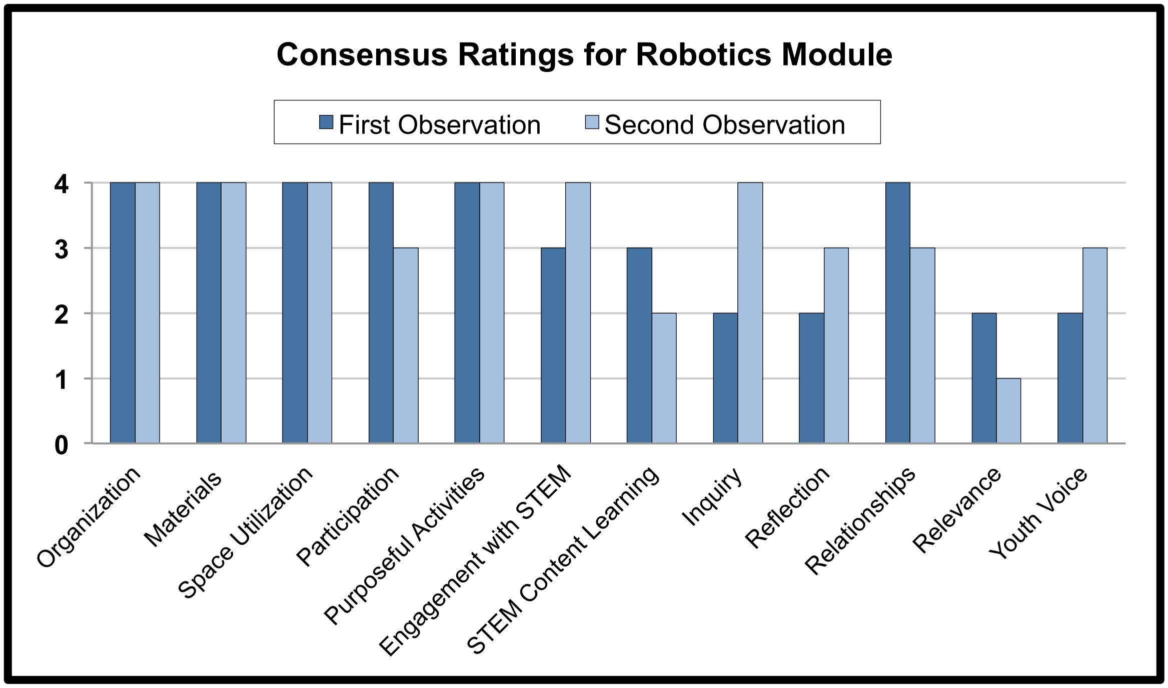


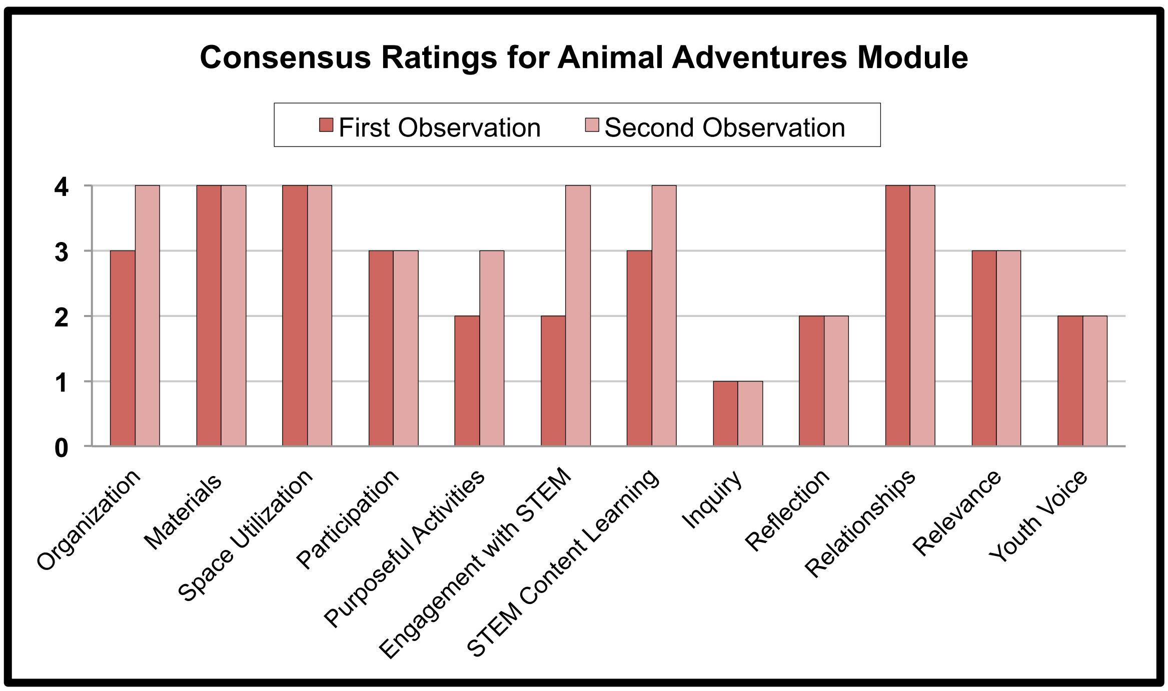
Summary Table for Region 1 (2011-2012)

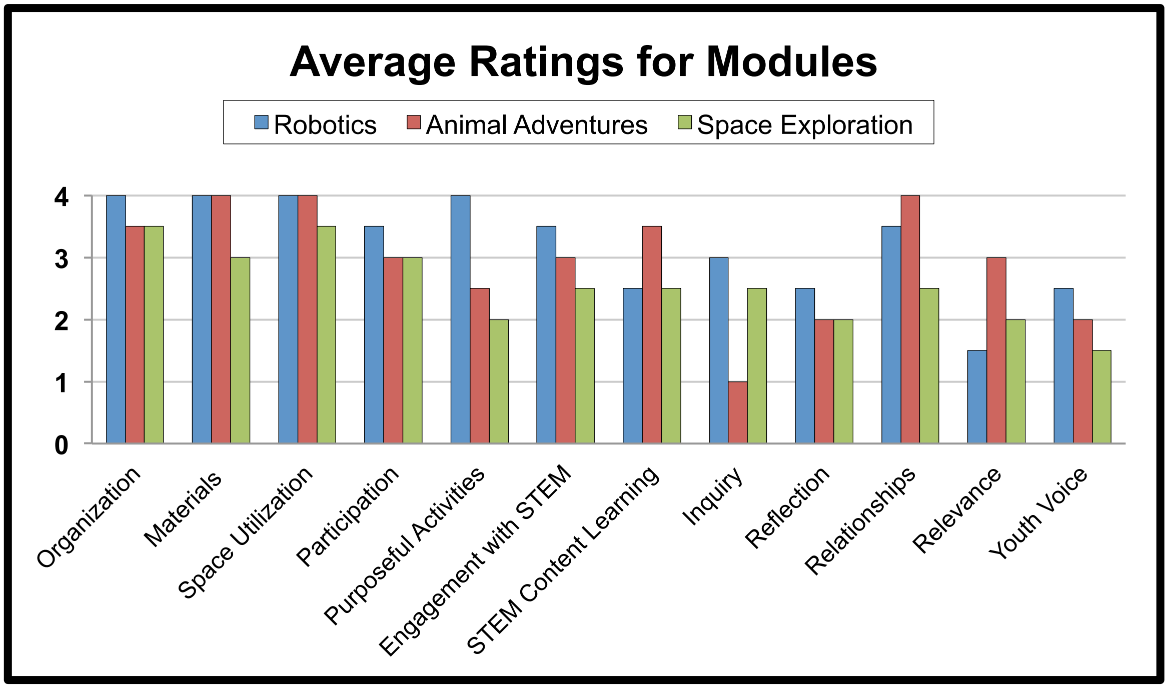
Dimension	Fall Quarter	Winter Quarter	Spring Quarter	Summer Quarter	Year Average
Organization	4	4	3.8	3.5	3.8
Materials	3.5	3.5	3.8	3.8	3.7
Space Utilization	4	3.8	4	4	4
Participation	3.8	3.5	4	4	3.8
Purposeful Activities	3	3.5	3.8	3.5	3.5
Engagement with STEM	2.5	3	3	3.5	3
STEM Content Learning	2	2.5	2	2.8	2.3
Inquiry	1.5	1.5	2	2.5	2.1
Reflection	1.8	2	2.5	2	2.1
Relationships	3.8	3.8	3.8	4	3.9
Relevance	1.8	1.5	2	1.8	1.8
Youth Voice	2	2	2.2	2.5	2.2

* Includes data for Boys and Girls Club of Cityville, Cityville Community Center, Science Center of Cityville, and Cityville Afterschool STEM Project

Module Report (allows for comparisons across different science units)







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