

## Nature of STEM Rubric

By Eliana Arias-Dotson  
Informal Educator/Parent

### 1. Criteria: Identify the primary focus of your “nature of” exploration: NOS, NOT, NOM, NOE

The nature of my own exploration is focused on the Nature of Science, as a seismologist (DCI: ESS), in my job I use crosscutting concepts to define models and find solutions. However, as an informal educator, I use core ideas from any of all explorations and apply science and engineer practices

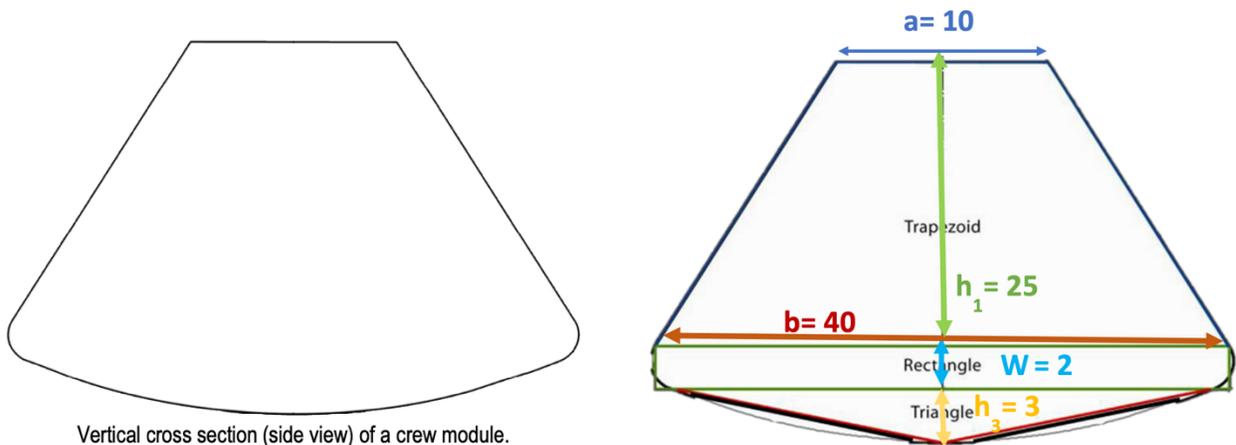
- **Evidence:**

As an example of one of the “lessons” I did recently, I used the NOM as the focused in the class. Third and fourth grade students were challenged to calculate the the area of the crew module (cross vertical and horizontal sections).

For the vertical section, we started by asking questions and allowing the students to figure out efficient and simple ways to calculate the area of familiar shapes and consider the use of symmetry.

Each student developed their own initial approach and then got together to make the problem simpler.

They used simple geometry thinking and construct explanations on how that area was an important concept when building a space.



We used recently studied concepts (area and perimeter) to figure out the total area of the crew module, by adding the area of each shape

Shape name	Dimensions, cm (length, width, height, diameter, etc.)	Formula for area of shape	Area of shape, cm <sup>2</sup>
<b>Total area, cm<sup>2</sup> _____</b>			

I used similar followed a similar approach to calculate the area of the horizontal cross section by starting with the known formula to calculate the area of the circumference, we identified the parts involved in our familiar equation ( $A=\pi*r^2$ ), did measurements of multiple circle's circumference objects, measured their diameter, calculated an estimated value of pi, analyzed our results, put it together to calculate the area of the horizontal cross section, interpreted the data results of our solutions. We discussed how this kind of procedures and concepts are conducted when studying any DCI.

With this exercise, I believe we explored some of the content standards in Mathematics (Number and operations, Geometry, Measurement, Data analysis (error)) by solving problems, reasoning and coming to better solutions in a logical way, connecting the concept of area to the applications and uses in the real world and representation of those ideas in graphics and tables.

- **Comments:**

I am in the learning process, which is why I am taking this class, in my job, the integration of the three dimensions of the NGSS components consistently are part of the learning process. In my regular job, those dimensions come together in a continuous iteration. As a new informal educator I am figuring out how to expand my own learning and be able to communicate that learning into my instruction.

## **2. Describe how you CURRENTLY address the tenets. (~1/2 - 1 page)**

- **Evidence**

Currently, I try to communicate my own experience and understanding of phenomena by sharing with students my own learning process as a researcher and professional. How science and my own grow have changed and mature through the years thanks to collaboration, critical thinking and the access to new information, technology and opportunities.

We start exploring a volcano for example, by our curiosity, observations of its nature and manifestations through time showing us how science is empirical and is accessible to most of us. Based on those observations an earth scientist, infers possibilities, creates associations to other features, relies on multiple other phenomena and areas of knowledge to imagine and create possibilities, but also acts on the idea of designing instrumentation networks, compilation of ideas, images, data and even information provided by locals to understand how a volcano works, its importance, and effects or impacts to a given community.

For me, as an informal educator, I rely on my own experience in my field to communicate how science, as education (learning or teaching) are constantly evolving and becoming a richer, more structured, purposeful, inclusive and accessible path to see the world. I try to show to my small group of students receiving informal education from me, how their own perception at their own age science, knowledge and learning is subject to evolve and even completely change depending on factors as simple as changing schools, moving to a new place (city, country), meeting new friends, finding new books, having access to internet and the most relatable factor, growing. Students can see how their own understanding had changed about a topic since they first wrote their first little book about any topic of interest, and that's perhaps the most personal view of how learning is a constantly evolving part of our lives.

**3. Reflect on how you might ENHANCE your teaching to address other disciplines (~1/2 - 1 page)**

- **Evidence**

My goal is to become fluent on the details and proper practices of the Next Generation Science Standards, to become familiar on how to create purposeful, sequential and integrated lessons that fit the 3D learning. Taking this class, is my first step into enhancing my own learning so I can advocate and facilitate opportunities to students with an educated background to successfully create confident learners.

I would like to integrate the NOT and NOE providing more specifics about the criteria to meet and the constraints that must be met to find and evaluate solutions even previously found so that process leads to new alternatives or improvement of the existing ones.

In terms of NOM, I would like to be able to help students identifying the connection to the problem or question to solve, by using relevant skills from the standards (MP.2. Reason abstractly and quantitatively., MP.4. Model with mathematics and MP.5. Use appropriate tools strategically)

- **Comments:**

Seeing each student and understanding their skills individually and as teams, I believe is a powerful way to help integrate the knowledge and strengths among students and to create meaningful connections with what is familiar and relevant to them individually and/or in a group.

**4. Read another “nature of” document from the list and identify 3 ways that there is overlap. (~1/2 - 1 page)**

- **Evidence**

The Nature of Technology (NOT document reveals how each pillar of STEM in their uniqueness share a common ground to satisfy the dynamic evolution of the human learning process.

They all are dynamic disciplines continuously evolving and supporting each other. The learning process is always nurture by how every pillar of knowledge

evolves and is embraced historically and culturally. However, despite what is our focus of learning and/or teaching (as an educator or parent), each pillar of knowledge is aiming to cultivate an evolving and open-minded path. They all search to:

- Benefit from creative thinking
- Are subject to reevaluation and constant evolution
- Aim to enhance human knowledge to satisfy our needs and wants
- Are designed to facilitate and improve the learning process in all subjects in an integrative way
- Could be adaptable to serve different purposes
- Are used to solve problems and find new ones
- Offers possibilities to satisfy needs/wants in a safer more efficient ways

- **Comments:**

How we learn, practice and communicate our learning is a continuous process that requires constant evaluation and adjustment and it is that need to find answers and solutions that guide us to identify the best way to find their connection and commonality to continue the process.