Teaching Data Literacy in the Middle School Science Classroom

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<u>Justification</u>

Students are exposed to a firehose of information beginning from the moment they first learn to use a search engine. They sometimes express the opinion that learning math and science in the classroom isn't valuable to them because they have a world of information at their fingertips. The reality is that while they can call up any number of facts with a few finger swipes, they too often lack the data literacy skills necessary to understand and evaluate information. Working with authentic data can engage students in math and science practices and improve critical thinking skills.

Authentic data is any data, either quantitative or qualitative, that comes from observations of a real phenomenon. Authentic data can be collected first-hand in the classroom through hands-on investigations, generated through models and simulations. Second-hand data may be collected from external sources such as NASA's citizen science projects.

<u>NASA Resources</u>
- NASA JPL education site (https://www.jpl.nasa.gov/edu/) is home to a wide variety of lesson plans that can be searched by grade level, NGSS or Common Core standard, and topic. Activities can be used as-is or adapted to meet the needs of the class.
- My NASA data (https://mynasadata.larc.nasa.gov/) has a wide variety of data-based lesson plans and has a robust search engine including grade

band, each of the three dimensions of NGSS standards, lesson duration, and more.

My professional development will be open to all middle school science teachers in Prince George's County Public Schools (Maryland). Based on attendance at previous professional development sessions within the district, I expect between 20-40 teachers would attend, serving an average of 120 students each.

Standards

Using authentic data can be taught within any of the NGSS Disciplinary Core Ideas (DCI). The PD will encourage teachers to apply the Science and Engineering Practice of Analyzing and Interpreting Data within the DCIs that they are already teaching. Small group work will be organized by grade level so that teachers can focus on meaningful content.

Session Details

The session will be taught as a synchronous/asynchronous hybrid for a total of one day (7.5 hours) of professional development time. We will meet synchronously via Zoom for four hours to introduce the topic and resource and work in small groups on developing lesson plans. For the asynchronous portion of the PD, the teachers will teach the lessons, and then upload evidence (video of teaching, photographs, sample student work, etc.) and a reflection on the lesson

with pluses and deltas. The lesson plans and teacher comments will remain available for participating teachers to use.

Pre- and Post-Survey Questions

Teachers will be surveyed before the session, as an exit ticket at the synchronous session, and again after the post-lesson reflection. Questions will assess how familiar teachers are with the concept of authentic data, how comfortable they feel teaching with authentic data, what resources they are familiar with, and where they believe authentic data can be addressed in NGSS.

Expected Outcome

After completing the professional development session, the participants will have created a new lesson plan based on available data sets, or modified an extant lesson plan to include the use of authentic data. The lesson plans will be focused on the content the teacher is teaching or will be teaching in the near future and will be written in the 5E format used by many schools and districts.

Follow-up

As described in Session Details, part of the PD time will be asynchronous and will occur after the lesson has been taught. In addition to the post-session survey, teachers will be asked to reflect on the lesson they taught and share feedback for future sessions.