

A Step Towards NGSS Through STEM Integration

Deanne Chadinha

Background Information:

My campus is a pre-K through 5th grade campus in the Bay Area near San Francisco. 64.1% of the student population is Hispanic and 49% are English Language Learners. We service low to moderate income families. Many students are children of immigrants. Student enrollment is 521, with 23 full-time teachers. Consequently, we are a literacy-based school where all classes are self-contained.

Summary of Proposal and Justification:

I am proposing a professional development to show teachers how to integrate STEM into their curriculum through the lens of the NGSS standards. Many California school districts adopted the NGSS standards within the last five years. Our district just adopted the standards last year. This year will be the first year all 5th graders take a state standardized science test for state-wide data collection. The test is aligned to the NGSS standards. Last year 5th graders took a state test, but I believe it was to test “field” questions before the actual test this spring.

Our district has not yet adopted an NGSS aligned curriculum for Science, Technology, or Engineering. Many of our teachers are not yet comfortable with the standards, so science, technology, and engineering are not explicitly taught. I would like to change this by showing teachers how fun and engaging teaching science, technology, and engineering can be through the use of low risk/high engagement activities that are aligned to the standards.

NGSS Standards addressed:

The Standards I will focus on are:

K-PS2-1, Motion and Stability: Forces and Interactions. 1) Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on an object.

3-PS2-1, Motion and Stability: Forces and Interactions. 1) Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.

Science and Engineering Practices: Planning and Carrying out Investigations

Cross-Cutting Concepts: Causes and Effects

Common Core Math Standard: Represent and Interpret Data (this standard threads from kinder through 5th grade)

PD Structure:

To summarize the professional development, I plan to hold a school-wide professional development opportunity for pre-K through 5 teachers which will focus on implementing low risk-low materials-high engagement lesson on the forces of Lift, Drag, Thrust, and Gravity. I will provide an hour-long PD that engages the teachers to explore these forces as if they were the students through a series of mini activities that culminates in making their own airplanes to test for distance, adjusting for the variable of weight or mass.

The Science standards outlined above will be addressed in this PD. Technology will be addressed through the use of Kahoot-it, a NASA interactive foil simulation, and a pHet interactive forces simulation. Engineering will be addressed through designing and making paper airplanes. Math will be addressed through the measurement of distance the airplanes travel. Differentiation will be embedded to address pre-K through 2nd, and 3rd through 5th grades. All teachers will have access to computers.

I believe that if teachers are provided with opportunities and resources that demonstrate the value of integrated curricula through the lens of the NGSS standards, they will be more apt to utilize this approach in their classrooms. I aim to show teachers how complimentary the 3-dimensional standards are in STEM integration. Students will also benefit due to the inquiry-based nature of STEM activities.

Audience:

My audience will be at least 12 of the 23 pre-k - 5th grade teachers at my campus. Each Wednesday afternoon is a “teacher planning day”. I plan to offer a one-hour professional development opportunity on a teacher planning day in late February or the first week of March. To entice the teachers to attend, since I cannot make this mandatory, I plan to offer lunch from Subway. Teachers love food and don’t usually turn it down!

Pre and Post Survey:

A pre-survey over teacher understanding of NGSS standards and how they can be utilized through STEM integration will be done within a week prior to the PD. A post survey will immediately follow the PD to see how attitudes have changed about the NGSS standards and STEM integration. Both surveys will be administered using google docs.

Follow-up:

I plan to follow up with teachers collectively and individually by making myself available to clarify questions and concerns, address misconceptions about the NGSS standards, and to share additional STEM and STEAM resources. I also plan to start a school wide google folder for STEM and STEAM activities to be collected and archived. Many of our teachers are likely already doing STEM and STEAM activities and just don't know it yet. Having a shared folder will promote collaboration among our staff and give them opportunities to share their resources and mine for additional ones. No reason to re-invent the wheel. Finally, I will propose and encourage more teacher-based campus professional development as an opportunity for teachers to develop themselves as teacher leaders.