STEM Resources and Curriculum Alignment PD

I selected this topic because I want to offer a PD that allows teachers to collaborate and develop a foundation for a STEM program that is meaningful, versatile, and accessible. As the STEM teacher in a small K-8 district, I teach every student in every grade over the course of each school year. This broad perspective has afforded me a sense of where gaps or overlaps exist in our curriculums, as well as an increasing familiarity with the science, math, and technology standards. Combined with the offerings of this program, I feel well-equipped to lead a PD focused on inventorying our collective materials, cataloging resources, aligning standards, and modifying the curriculum to help facilitate and support STEM initiatives.

This PD would begin by highlighting the use of phenomena as a fundamental STEM methodology. It would then touch upon basic STEM skills and concepts, such as the scientific method and computational thinking, as well as measuring, data collection, and analysis. Building upon this foundation, teachers would then brainstorm a list of current activities and resources to identify gaps or redundancies in both lessons and standards. Finally, an overview of NASA resources would be presented as a means of filling any holes in the curriculum. And perhaps, looking forward, consider implementing cross-curricular projects.

This PD would target math and science teachers in grades K-8. Math teachers, in particular, could potentially replace book work and word problems with hands-on lessons. NASA assets provide real-world data and other resources that greatly lend themselves to this purpose. Most recently, I've had great success with many of the JPL activities.

Numerous New Jersey Core Curriculum Content Standards and NGSS relating to math, science, computer science and design thinking would be addressed in this PD. Below is a list of standards that could be used in many middle school STEM lessons.

- Computer Science and Design Thinking (2020) 8.2.5.ED.5 Describe how specifications and limitations impact the engineering design process.
- Computer Science and Design Thinking (2020) 8.2.5.ED.4 Explain factors that influence the development and function of products and systems (e.g., resources, criteria, desired features, constraints).
- Computer Science and Design Thinking (2020) 8.2.5.ED.3 Follow step by step directions to assemble a product or solve a problem, using appropriate tools to accomplish the task.
- Science NJSLS (2020) The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center. (5-PS2-1)
- Science NJSLS (2020) 3-5-ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

- Science NJSLS (2020) 3-5-ETS1-2 Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.
- Science NJSLS (2020) 3-5-ETS1-3 Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.
- Mathematics (2023) 5.M.A.1 Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.
- Mathematics (2023) 5.DL.A.4 Using appropriate visualizations (i.e. double line plot, double bar graph), analyze data across samples.
- Mathematics (2023) 5.NF.B.6 Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.

I'm hoping to get a 3-hour session during one of our in-service days. The opportunity to present PDs has been granted to staff members in the past. We also have grade level PLCs that could provide time for shorter PD sessions and/or follow-up sessions or interviews. We are a small, close-knit school and I'm confident that most of my math and science collegues would welcome the chance to collaborate on content.

Pre- and post- teacher surveys would serve as a type of needs assessment. First, to determine what the needs are and then evaluate how effectively the PD met those needs. Questions would measure satisfaction regarding material and resource availability, student skill sets, and any curriculum concerns. It would also seek to enhance the school climate as it relates to collaborating and communicating with colleagues. Follow-up interviews that note changes in student performance as a result of incorporating STEM would also be used to evaluate the impact of the PD.

I hope that my colleagues leave my PD feeling more confident and better equipped to implement STEM activities into their classrooms. I hope that we produce an aligned curriculum, and that each teacher walks away with new resources. I also hope they gain an increased sense of accomplishment and comradery.

It is my intention to follow up with teachers during their PLCs which occur bi-monthly to reflect on lessons and discuss student performance.

A post-survey (Likert scale) and follow-up interviews/discussions that include reflections and student performance data (standardized tests, teacher generated tests, report cards) would be used to analyze the PD's success.