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SCED 545 STEM Leadership Seminar PD proposal

The topic for my professional development seminar is:

Investigating how the core scientific courses of biology, chemistry and physics need to be integrated with STEM concepts to better prepare students for career readiness in new, modern, innovative careers, and work-related activities in the future. Furthermore, these concepts are best taught to students by experienced mentors and coaches, who are professionals in their respective fields. This emphasis will help participants work towards the goal of becoming, or improving, their role and practice as science teacher leaders (STL's).

The professional development (PD) seminar will present a framework for reviewing and modifying pre-existing lesson plans in the three core areas of math and science: Algebra, Geometry, & Pre-Calculus respectively paired with Biology, Chemistry, & Physics using the idea that these core-content areas are all interconnected as math/science bridge topics. They are all best taught using an underlying framework which will be referred to as a STEM-based math/science bridge. The "E" and "T" of STEM will also be emphasized as these topics are presented from the perspective of recognizing the importance in which Engineering and Technology both play a role in helping high school sophomores, juniors, and seniors better prepare for college and career readiness.

The seminar will be structured to incorporate pre and post surveys which assess and evaluate the PD. There will also be follow-up interviews with participants to further the effectiveness of the seminar on helping teachers learn better ways to advocate for STEM-based resources and sustainable PD programs, to enhance the success of students in their districts, school-systems, and local area(s), from rural to urban, & by helping students achieve satisfactory goals for college and career readiness as-well-as improve their overall academic success.

The PD will be structured to include training for teachers on the topic(s) of advocacy, sustainability, and vertical alignment, in addition to the need for developing lesson plans which emphasize coaching and mentoring of students. The seminar will address how to advocate, develop, and create sustainable resources for teachers in the 6 content areas by discussing the importance of putting in place mathematics teachers who understand how to incorporate STEM integration into their existing lesson plans, and help science teachers learn how to advocate and organize professional learning communities which cultivate their role as Science Teacher Leaders (STLs) in their schools.

Teachers will review and discuss resources and coaching methods which can be implemented into their existing pedagogy during the PD seminar. Activities will include small group breakout sessions designed to help teachers better prepare their students for STEM-based college and career readiness. Teachers will also discuss how their school/state learning standards compare to the NGSS* and NCTM** national standards. STEM methods which can be integrated into their classrooms will also be presented during the seminar by sharing one example of each math/science bridge topic: I) Biology & Algebra, II) Chemistry & Geometry, & III) Precalculus

& Physics. Each example topic will be used to share a specific lesson plan I developed in an Endeavor course, with links to NASA resources. There will be examples of how the Endeavor program helps to find mentors who work with, or are affiliated with, NASA and serve as mentors to demonstrate to teachers how to organize and teach a lesson which uses STEM integration and NASA resources. The 5E lesson plan will be the basis for each lesson. Attendees will be given an overview of this lesson plan and will also be encouraged to review NASA resources to learn how the lesson plan can be used to enhance their existing lesson plans, and incorporate NASA based resources into their curriculum.

The goal/intended outcome from the PD seminar is to help attendees become more prepared to return to their school systems and districts to advocate for better programs, which emphasize STEM concepts and possibly implement science teacher leaders (STLs) as full-time positions. Attendees will also be given the opportunity to investigate the Endeavor program as an extended/long-term option to obtain certification as a STEM instructor. At a minimum, attendees will walk away with access to resources which will help them integrate NASA resources into their existing lesson plans. Resources will also include 3 STEM-based lesson plans for use as examples of resources teachers can use to integrate these concepts into their math & science classrooms for vertical alignment and emphasis on technology.

Notes:

**Next Generation Science Standards:*

NGSS Standards are accessible through this website: https://www.nextgenscience.org/

***National Council of Teachers of Mathematics*

NCTM Standards are accessible as a PDF document. Please contact Mr. Scharenborg if you do not have this resource.