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Project proposal for SCED 545 STEM Leadership Seminar

## **STEM Educational Strategies to Fortify the Learning Experience for 21<sup>st</sup> Century Students**

When researching the needs of the 21<sup>st</sup> century classroom, it became clear to me that the traditional model of science education is not meeting the demands of our society now or as it is predicted to be in the future. Students and adults, alike, struggle to understand science-related media. STEM associated educational strategies may show us a way to convert our traditional model of science education into a model that engages students with real-world issues and affords them the time to explore content in a meaningful way.

### **Strategies that will be shared will be:**

- Embedding the Engineering Design Process in lessons (The E in STEM)
- Inquiry-Based Instruction as a model for open-ended exploration
- Focusing on real-world problems (SPRINTT)
- Utilizing real-world data to create authenticity for students
- Collaboration among subjects for comprehensive experiences for students

### **Proposed audience:**

- 6<sup>th</sup>, 7<sup>th</sup>, and 8<sup>th</sup> grade teachers in the science and math departments at Sparkman Middle School
- This includes 6 math teachers, 6 science teachers, and 1 instructional coach, as well as potentially including 3 special education teachers and 4 administrators
- These 3 grades together serve a total of 800 students

My proposed professional development will seek to show teachers how to create their own STEM experiences for their classrooms. By incorporating real-world data and authentic problems, teachers can immerse students in memorable experiences that will hopefully prepare them to be free-thinkers and problem solvers in the real world. The engineering design process will be presented as a way to enable students to have a flexible way to meet their challenges. Understanding that many different solutions may apply to a problem and that failure is part of the process is crucial to the real-world and STEM learning experiences. Emphasizing hands-on, team experiences, will also simulate for students a more authentic, workplace setting.

As examples for the participants in my PD, I will have 6 lesson plans that are written for the middle school life science curriculum. These lessons focus on the human body and the standards are as follows:

## **Alabama Course of Study- Life Science:**

7.4 Construct models and representations of organ systems (e.g., circulatory, digestive, respiratory, muscular, skeletal, nervous) to demonstrate how multiple interacting organs and systems work together to accomplish specific functions. (Retrieved from: <https://alex.state.al.us/standardAll.php?grade=7&subject=SC2015&cocode=LSC7&summary=2>)

## **NGSS:**

LS1-6 Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms. [Clarification Statement: Emphasis is on tracing movement of matter and flow of energy.] (Retrieved from: <https://www.nextgenscience.org/pe/ms-ls1-6-molecules-organisms-structures-and-processes>)

## **Location and times for PD:**

I intend to carry out this PD in our Cougar Center which is a room that we have set up for PD and other meetings in our building. It is big enough to hold all of the participants. We have weekly PD during the day during a special time set aside (AO period) where a different department meets on a certain day every week. I will meet with the science department on Wednesday and the math department on Monday. Each session is 45 minutes. I intend to meet with each department on the first week and then do a follow up meet during their next week's meeting. Total estimated time with each department is 1 hour. The dates are to be determined. Most likely, the dates will be the last week of March and the first week of April. Teachers will have access to their computers along with an interactive computer on the wall for presentation purposes.

## **Survey questions:**

I intend to have my pre-survey inquire about teachers' level of comfort with complete inquiry-based instruction. Many members of my faculty are familiar with STEM already, as most of us have attended some training in the area. I want to ask if they have any concerns about the implementation of STEM and inquiry lessons. I also want to ask if they have a favorite topic that they would like help turning into full-fledged STEM inquiry lessons. Additionally, do they have a lesson they want to collaborate with the other department on? Post-survey questions will inquire about additional support they may need with implementation or any further questions they may have.

## **Outcomes of proposed PD:**

I hope to inspire the attendees of my PD to begin to look at lessons in a STEM frame of view where the components of math and science (along with

engineering and technology) begin to fuse into a 'real-world' image and less of a stand-alone picture. There must be a way to teach the individual standards in a more comprehensive and unified way. I hope to begin that emphasis on preparing our lessons to delve into the richness that is 21<sup>st</sup> century education.

As a first step forward after training, I would like to see the math department using authentic data for their calculations and the science department using real-world problems to bring their investigations validity and a sense of urgency. To follow up with attendees, I will use face-to-face interactions and email connections. Post-surveys will be used to analyze the PD's success.