Amanda Matthiesen, Professional Development Proposal, SCED 545, Fall 2020

1) **Title:** Coding Across Curriculum
2) **Why this topic?** I find that coding can teach students many different facets of the scientific process, as well as research and problem solving skills. By beginning coding instruction across multiple levels of curriculum, we will be able to have coding proficient students by the end of the year. This could lead to students taking part in coding as their career and prepares them of the tech centric roles of the 21st century.
3) **How does this integrate NASA concepts or Endeavor resources?** The lesson will be based in the program Scratch, developed by MIT and used as a teaching instrument in the Coding classes taught through the Endeavor Program.
4) **Proposed Audience?** 14 teachers in grade eight covering Math, Science, History, English Language, and Foreign Language. These teachers each have an intertwining class load of 150-180 students in 6 periods a day.
5) **What STEM concepts or learning goals will you and your materials address which can potentially replace other classroom activities?** BY instructing educators on the basic principles of Scratch projects, their students could potentially create their own quizzes and learning activities through coding them on the project website. Teachers can view their classes work to view for mastery of subject matter. This could potentially replace the quizzes or projects that would incorporate old world research and production methods.

6) **NGSS Standards** the PD will cover NGSS standards as follows.

Standard Identifier: 6-8.DA.8

Grade Range: **6–8**
Content Area: **Computer Science** Category: **Data & Analysis**

Standard:
Collect data using computational tools and transform the data to make it more useful.

Descriptive Statement:
Data collection has become easier and more ubiquitous. The cleaning of data is an important transformation for ensuring consistent format, reducing noise and errors (e.g., removing irrelevant responses in a survey), and/or making it easier for computers to process. Students build on their ability to organize and present data visually to support a claim, understanding when and how to transform data so information can be more easily extracted. Students also transform data to highlight or expose relationships.

For example, students could use computational tools to collect data from their peers regarding the percentage of time technology is used for school work and entertainment, and then create digital displays of their data and findings. Students could then transform the data to highlight relationships representing males and females as percentages of a whole instead of as individual counts. (CA CCSS for Mathematics 6.SP.4, 7.SP.3, 8.SP.1, 8.SP.4)

Alternatively, students could collect data from online forms and surveys, from a sensor, or by scraping a web page, and then transform the data to expose relationships. They could highlight the distribution of data (e.g., words on a web page, readings from a sensor) by giving quantitative measures of center and variability. (CA CCSS for Mathematics 6.SP.5.c, 7.SP.4)

Standard Identifier: 6-8.IC.20

Grade Range: **6–8**
Content Area: **Computer Science** Category: **Impacts of Computing**

Standard:
Compare tradeoffs associated with computing technologies that affect people's everyday activities and career options.

Descriptive Statement:
Advancements in computer technology are neither wholly positive nor negative. However, the ways that people use computing technologies have tradeoffs. Students consider current events related to broad ideas, including privacy, communication, and automation.

For example, students could compare and contrast the impacts of computing technologies with the impacts of other systems developed throughout history such as the Pony Express and US Postal System. (HSS.7.8.4)

Alternatively, students could identify tradeoffs for both personal and professional uses of a variety of computing technologies. For instance, driverless cars can increase convenience and reduce accidents, but they may be susceptible to hacking. The emerging industry will reduce the number of taxi and shared-ride drivers, but may create more software engineering and cybersecurity jobs.

California Environmental Principles and Concepts:
Principle I
The continuation and health of individual human lives and of human communities and societies depend on the health of the natural systems that provide essential goods and ecosystem services.

Principle II
The long-term functioning and health of terrestrial, freshwater, coastal, and marine ecosystems are influenced by their relationships with human societies.

California Common Core State Standards Connections:
ELA/Literacy
WHST.6-8.7: Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.
WHST.6–8.8: Gather relevant information from multiple print and digital sources (primary and secondary), using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.

Mathematics
6.RP.1: Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.
6.EE.6: Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.

7) **Session Length, Recruitment, and Advertisement:** I will host this PD with my small group during a regular staff development collaboration time, which averages one hour to one and a half hours. I will recruit the entire Eighth grade teaching team via email and office mailbox notifications, and open the PD to any other educators who wish to join via flyers detailing the PD in the break rooms and lounge.

8) **Pre-and Post-Survey, Follow Up questions.** All participants will have the chance to scan a QR code and enter a basic coding task on Scratch to test their abilities before the PD. There will also be interactive polls and quizzes throughout the PD, and a post-presentation survey will be required before exiting the PD. After 2 weeks, I will send a final follow up survey to check retention and effectiveness of the PD. The pre-survey will ask what knowledge the educators have of basic coding principles and will have them attempt to complete a basic Scratch project. The questions on the polls will be decided when reading the reaction of the crowd, and I plan to have multiple options for them to complete. The final survey will ask them 5 of the main points of my presentation and will ask them to complete a Scratch project as well. The follow up survey will ask how they have implemented coding in their various curriculums across multiple subjects.

9) **Outcomes and Expectations:** Leaving this PD, educators will be able to have a basic knowledge of coding, a basic understanding of how to use the Scratch program, and a list of possible ways they can implement coding as part of their classrooms. After the completion of the PD, teachers will be expected to complete the final survey 2 weeks later and demonstrate one way they incorporated coding into their classroom.