

Standards Analysis

SCED 545

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## Standards Analysis

The three different standards I analyzed were the Colorado State Standards, International Technology and engineering Education Association (ITEEA) STEL Standards, and Next Generation Science Standards (NGSS). All three intertwine across content areas, and with similarities between the sets. Colorado State Standards is used within my district and school; however, I use NGSS when developing STEM lessons. Each set has various standards related to problem solving and engineering design. All three sets of standards converge in their emphasis on problem-solving and engineering design. They encourage students to use math, science, and technology knowledge and skills to define problems, generate solutions, evaluate outcomes, and communicate their findings effectively. These standards collectively strive to prepare students to apply problem-solving strategies and engineering design principles to real-world challenges. The Colorado State Standards, ITEEA STEL Standards, and NGSS are all frameworks that provide guidance for teaching and learning in the fields of engineering and STEM.

Colorado State Standards use appropriate problem-solving strategies, such as drawing a diagram, making a table, predicting and check, and working backwards to solve contextual problems within the mathematics standards. Science standards have students apply scientific knowledge and reasoning to design and conduct experiments to solve real-world problems. Within the ITEEA STEL Standards, the engineering design process implements problem-solving procedures of identify needs, apply criteria and constraints, and has students develop and justify solutions. Additionally, technological problem-solving will have students apply a thinking process that includes defining a problem, brainstorming and researching ideas, selecting and developing a solution, and

evaluation and communication the results. NGSS engages students in engineering practices to define problems, develop and optimize solutions and evaluate solutions within their science and engineering practices. Additionally, NGSS crosscutting concepts include applying knowledge of patterns, cause and effect, and systems to solve problems and design solutions.

Similarities between the three sets of standards emphasize the importance of developing critical thinking and problem-solving skills. They all promote inquire-based learning and the use of the engineering design process as a way to address real-world issues. Additionally, they all prepare students for the demands of the 21<sup>st</sup> century workforce by fostering skills such collaboration, creativity, and communication. However, there are differences between the three sets. The Colorado State Standards are specific for Colorado and provide detailed descriptions of what students should know and be able to achieve at each grade level. The ITEEA STEL Standards are broader and encompass technological literacy across various areas. NGSS covers a wide range of scientific concepts and integrate engineering practices within the science curriculum.

The concept of engineering design problem solving as a unifying concept/skill holds significant value. Engineering design problem solving teaching students to approach challenges systematically, critically analyze problems and generate innovative solutions. These skills are transferable to various academic contents and real-world situations. By integrating engineering design problem solving as a central idea, students can develop a deep understanding of how to apply knowledge from multiple subject

areas to tackle complex problems. This approach cultivates essential skills that are highly valued in our 21<sup>st</sup> century society.

## References

Colorado Academic Standards. 2020. <https://www.cde.state.co.us/apps/standards/>

International Technology and engineering Education Association STEL Standards.

<https://iteea-stel-etool.github.io/>

Next Generation Science Standards. 2020. <http://www.nextgenscience.org/overview-dci>