Design & Pitch Challenges in STEM: Build Future Entrepreneurs

Students think like an entrepreneur as they design real solutions to complex STEM problems using their knowledge and expertise in creative ways to invent new products or processes that meet customers' needs. Design & Pitch drives students beyond the end solution, and challenges them to integrate skill sets necessary to build persuasive arguments, build business models and address real-world problems. Inspirational STEM professionals show real-world connections and career pathways:

Dr. Kris Ludwig - United States Geological Survey
Kristin Vicari - V.P. Engineering, Tesla, Inc.
Cardell Patillo - Mile HIgh Kids and Community, Inc.; Head Start Executive Director
Cathy Lee - CEO and Founder of Incluvie
Tyler Maloney - Materials Engineer and Entrepreneur; Founder of Faves
Oscar Ekponimo - CEO and Founder of Chowberry
Gitanjali Rao - Inventor and STEM Promoter; Top Young Scientist - at 11 years old designed test for lead in water
Kelsey Dominick - Designer and CEO of DiDomenico Designs
Clifford Okoth Owino - CEO and FOunder of Chemolox

- ***Challenge 1: Operation Lifeline:*** Transport medical supplies in disaster zones.
- ***Challenge 2: Power Me Up:*** Bring electric vehicle charging to the people.
- ***Challenge 3: Keep It Real:*** Stop phubbing, stay connected.
- ***Challenge 4: Building Algorithms:*** Use algorithms to rate or rank aspects of a business.
- ***Challenge 5: Prototype to Profit:*** Build a business plan from idea to investment.
- ***Challenge 6: Erase Food Waste:*** Reduce food waste, help customers, and make money.
- ***Challenge 7: Fix It: Design for Community Impact:*** Find and solve a problem in your community.
- ***Challenge 8: Flashy Fashion:*** Design a wearable item that uses LEDs.
- ***Challenge 9: Pollution Solution:*** Package a liquid in a dissolvable or edible container.

Cross-Curricular Connections

Business, Marketing, Information Technology, & Entrepreneurship (Middle School)

Students apply concepts of economic conditions, market competitions, financing strategies, innovation and opportunity recognition; while integrating their knowledge of business management and marketing principles, in order to design and develop a successful new venture.(MLB-18.1-7)

Introduction to Engineering Design and Engineering Design and Development (High School)

Students work as teams and/or individuals to research, design, test and construct a solution to an open-ended engineering problem. The product development life cycle and a design process are used to guide the team to reach a solution to the problem.(IED 1.5.1 - IED-7.11.5) (EDD-1.5.1-EDD-4.8.4)

Reading & Writing for Technical Subjects:

LST.1: Read and comprehend science and technical texts independently and proficiently and write effectively for a variety of discipline-specific tasks, purposes, and audiences
LST.2: Extract and construct meaning from science and technical texts using a variety of comprehension skills
LST.2.2: Determine the central ideas or conclusions of a text; provide an accurate, objective summary of the text.
LST.2.3: Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
LST.3.1: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to texts and topics.

LST.4.1: Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
LST.7.1: Conduct short research assignments and tasks to answer a question (including a self generated question), or test a hypothesis, drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.

Math: Algebraic Problem Solving, Using Ratios, Surface to Volume Ratios, Creating and Analyzing Graphs (Bar, Pie, Best-Fit Line), Geometry and Coordinate Geometry, Economics (Supply and Demand), Unit Conversions, Algorithms

Social Studies: Global Communities: Food Waste, Plastic pollution, Medical supplies, Environmental Impacts

Art: Wearable Art and Design; LED design

Grades 3-5 Science Content Standards

3.ESS.2 Develop solutions that could be implemented to reduce the impact of weather related hazards. (Challenge 1)
4-ESS.4 Develop solutions that could be implemented to reduce the impact of humans on the natural environment and the natural environment on humans. (Challenges 2,6,7,9)
5-ESS.3 Investigate ways individual communities within the United States protect the Earth's resources and environment. (Challenges 2,7,9)
3-5.E.1 Identify a simple problem with the design of an object that reflects a need or a want. Include criteria for success and constraints on materials, time, or cost. (Challenges 1-9)
3-5.E.2 Construct and compare multiple plausible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. (Challenges 1-9)
3-5.E.3 Construct and perform fair investigations in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved. (Challenges 1-9)

Grades 6-8 Science Content & Engineering Standards

7.PS.7 Construct a device that uses one or more of Newton's laws of motion. Explain how motion, acceleration, force, and mass are affecting the device. (Challenge 1)
7.PS.9 Compare and contrast the three types of heat transfer: radiation, convection, and conduction. (Challenge 1)
8.ESS.3 Research how human consumption of finite natural resources (i.e. coal, oil, natural gas, and clean water) and human activities have had an impact on the environment (i.e. causes of air, water, soil, light, and noise pollution). (Challenge 2)
6-8.E.1 Identify the criteria and constraints of a design to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions. (Challenges 1-9)
6-8.E.2 Evaluate competing design solutions using a systematic process to identify how well they meet the criteria and constraints of the problem. (Challenges 1-9)
6-8.E.3 Analyze data from investigations to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success. (Challenges 1-9)
6-8.E.4 Develop a prototype to generate data for repeated investigations and modify a proposed object, tool, or process such that an optimal design can be achieved. (Challenges 1-9)
ETE-4.1 Apply the steps of the design process. (Challenges 1-9)
ETE-4.2 Use the design process to create a product that addresses a real world problem. (Challenges 1-9)

Grades 9-12 Science Content Standards

ES 4.5 Chart and explain the changes in weather as it relates to humidity, air pressure, and temperature. Explain how these factors result in local wind patterns and cloud cover. Explain the origin, life cycle, and behavior of weather systems, especially severe weather. Create an emergency plan for severe storms, both summer and winter. (Challenge 1)
Env.2.4 Recognize and describe the different sources of energy, including fossil fuels, nuclear, and alternative sources of energy provided by water, wind, geothermal, biomass/biofuels, and the sun. (Challenge 2)
Env.7.7 Describe and explain the product life cycle and waste stream and its implications to waste management. Explain the difference between reduce, reuse, and recycle. (Challenge 6)
Env. 8.7 Understand and explain that waste management includes considerations of quantity, safety, degradability, and cost. Also understand that waste management requires social and technological innovations because waste-disposal problems are political and economic as well as technical. (Challenge 6)
ICS-2.1 Use the design process to iteratively develop a computing artifact. (Challenges 3,4)
CSI-6.1 Describe the function of a computing artifact (for example, code or design). (Challenges 3,4)
CSI - 6.2 Identify the purposes of a computing artifact. (Challenges 3,4)
CSI - 6.4 Describe how to use a computing artifact. (Challenges 3,4)