Using System Dynamics and Systems Thinking (SD/ST) Tools and Learning Strategies to Build Science, Technology, Engineering, and Math Excellence

One of the hardest areas of the STEM curriculum and, in fact, all curriculum, is creating the context for students to gain experience and practice in the process of critical thinking. The utilization of SD/ST offers a unique methodology for addressing these higher-order thinking skills in a way that creates a framework to gain knowledge, as well as the tools to communicate thought. SD/ST offers an integrated way of thinking, in practical and useful ways, about the systems that surround us, and how they change over time.

Science, Technology, Engineering, and Mathematics Learning Goals

- Map the structure of systems
  - Use computer models to simulate varieties of scenarios and ask “what if …?”
  - Use, recognize, and analyze models

- Analyze and graph data over time; study rates and accumulations
- Build models of complex systems
  - Use equations and functions

- Use technology and math, and apply abstract and quantitative reasoning
- Use, recognize, and analyze models

System Dynamics and Systems Thinking Tools and Learning Strategies

- Communicate effectively
  - Focus on inquiry and investigation while working in teams
  - Use a variety of graphic tools

- Investigate how elements change over time in order to focus on patterns and trends
  - Work in teams on problem solving

- Recognize generic structures and see recurring patterns and structures in different situations
  - Identify leverage through understanding of system structure and apply insights across curriculum areas

Effective STEM Education

- Gain knowledge of contemporary issues and appreciate personal and social context
- Understand multiple content areas

- Track change over time to question how and why things change
  - Build models that include social and personal issues

Creative Learning Exchange - Working in K-12 education to develop Systems Citizens
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