



## Characteristics and Skills of a Systems Thinker

- Critical thinking
- Understanding complexity
- Modeling
- Communication and collaboration
- Seeking and recognizing patterns and structures
- Quantitative thinking
- Testing assumptions
- Seeing the big picture
- Focusing on real-world issues
- Cross-discipline exploration

## English, Language Arts, and Literacy Across the Curriculum

Correlation with the Common Core Standards

| COMMON CORE STANDARDS   | SYSTEM DYNAMICS (SD)  |
|---|---|
| <b>READING</b> —develop staircase of increasing complexity to build comprehension in a diverse array of content.  | <b>DEALING WITH COMPLEXITY</b> —SD helps students understand behavior systemically, seeing the big picture, with graphic tools for representing behavior.   |
| <b>WRITING</b> —express logical arguments and opinions, using research skills frequently.   | <b>CLARITY</b> —SD diagrams and models create visual examples that can be easily understood by readers.   |
| <b>SPEAKING AND LISTENING</b> —employ a mix of one-on-one, small group, and whole class structures, emphasizing collaboration and problem solving.  | <b>LEARNER-CENTERED LEARNING</b> —students using SD tools effectively work in teams to solve problems that arise from their studies.  |
| <b>LANGUAGE</b> —build a precise and varied repertoire of vocabulary.   | <b>PRECISION OF LANGUAGE</b> —describing systems requires concise and accurate wording. The use of SD visual tools helps students clarify and communicate their thinking.   |
| <b>SCIENCE, HISTORY AND SOCIAL STUDIES</b> —apply English language arts skills across the curriculum to promote content area literacy.  | <b>INTERDISCIPLINARY LEARNING</b> —students learn to recognize generic structures that occur across their curriculum. Understanding feedback provides insight into social issues and policies.  |
| <b>MEDIA AND TECHNOLOGY</b> —integrate 21st Century skills throughout the curriculum, and use modern applications for varying assumptions, exploring consequences, and comparing predictions with data. | <b>COMPUTER MODELING</b> —from upper elementary grades through high school, students can use software to build simulations of situations in many content areas. SD tools and models give students the ability to change assumptions, compare predictions and explore consequences in powerful ways. |

## Mathematics

Correlation with the Common Core Standards

| COMMON CORE STANDARDS   | SYSTEM DYNAMICS (SD)  |
|---|---|
| <b>K-5 MATH</b> —build a solid foundation in whole numbers, computation, fractions and decimals, negative numbers, and geometry. Emphasize hands-on learning, to continue through upper grades.   | <b>REPRESENTING DATA</b> —graphing data over time requires students to use a wide array of math skills. Simulations, experiments, and other activities where data are analyzed reinforce quantitative thinking.                                       |
| <b>MATHEMATICAL REASONING</b> —build solid conceptual understanding, as well as procedural skills. Enable 8th graders to understand algebra with an emphasis on linear expressions and functions. | <b>QUANTITATIVE THINKING</b> —SD promotes dynamic understanding through stock and flow thinking. Stocks are quantities that change because of flows, or rates of change. SD modeling creates a visual framework to understand mathematical functions. |
| <b>MATHEMATICAL APPLICATION</b> —guide students to apply math reasoning to real-world issues and challenges, and use math in novel situations.  | <b>GENERIC STRUCTURES</b> —students learn to transfer insights across curriculum areas, connecting diverse topics as they identify behaviors caused by systemic structures.   |
| <b>MATHEMATICAL MODELING</b> —use modeling to link classroom experience to empirical situations, leading to better understanding and decision-making.   | <b>MATHEMATICAL MODELING</b> —using readily accessible, powerful software, students can model sophisticated situations and run simulations to test assumptions, create alternate scenarios and explore consequences.                                  |
| <b>APPLIED MODELING</b> —model quantities and their relationships in physical, economic, public policy, social and everyday situations.   | <b>APPLIED MODELING</b> —students can build and use models that allow “what if” simulations in most curriculum areas.   |

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 Working in K-12 education to develop Systems Citizens  
 27 Central Street, Acton, MA 01720 978-635-9797

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