

Interconnections: NGSS Crosscutting Concepts and Efs Big Ideas

Grade Level Focus	Sustainability Big Ideas	Next Generation Science Standards Crosscutting Concepts								
		Systems and System Models	Patterns	Cause and Effect	Influence of Science and Technology on Society and Nature	Interdependence of Science, Engineering and Technology	Scale, Proportion and Quantity	Energy and Matter	Structure and Function	Stability and Change
K-8	Sense of Place	●		●	●	●	●	●	●	●
K-8	Ability to Make a Difference	●	●	●	●	●	●	●	●	●
K-8	Community	●	●	●	●	●	●	●	●	●
1-8	Cycles	●	●	●	●	●	●	●	●	●
3-8	Diversity		●	●	●	●	●	●	●	●
3-8	Systems	●	●	●	●	●	●	●	●	●
5-8	Change over Time	●	●	●	●	●	●	●	●	●
5-8	Equilibrium	●	●	●	●	●	●	●	●	●
7-8	Interdependence	●	●	●	●	●	●	●	●	●

Legend

- Excellent link between NGSS Cross-Cutting Concept and Efs Big Idea
- Good link between NGSS Cross-Cutting Concept and EFS Big Idea

Examples:

- Almost all middle school science topics, ranging from cells to weather and climate, incorporate systems thinking.
- Studying water cycles in sixth grade addresses the Big Ideas of Cycles, Systems, Equilibrium, Interdependence, Sense of Place, and Ability to Make a Difference, as well as Crosscutting Concepts of Systems, Patterns, Cause and Effect, Energy and Matter, and others. For example, water cycles, supply and usage tie directly into a local sense of place and an ability to make a difference through maintaining clean water supplies and discharge and wise water use. Interdependence reminds us that all living things rely on the same water supply and is a systems thinking concept as well.
- Energy and respiration studies in seventh grade can incorporate Big Ideas of Cycles, Systems, Equilibrium and Interdependence, while covering Crosscutting Concepts such as System Models, Patterns, Cause and Effect, Energy and Matter, Structure and Function and Stability and Change. Respiration reflects a cycle between organisms and their environments, interdependence between producers and users of different gases, and the importance of equilibrium between these different elements of the system.
- Eighth grade studies of natural selection readily address each of the Big Ideas and each of the Crosscutting Concepts as well. Classes can explore how local conditions (Sense of Place) affect natural selection, how the ecosystem is a Community that affects natural selection, and how Diversity affects natural selection.
- A technology class can design robotics to automate separation of recyclables or design teaching games about conservation. These approaches would incorporate Big Ideas of Sense of Place, Ability to Make a Difference, Community, Systems and Equilibrium. These projects would also address Crosscutting Concepts of Systems and System Models, Cause and Effect, Influence of Science and Technology on Society and Nature, Energy and Matter, and Stability and Change.
- Art teachers can leverage the art curriculum's materials, supplies and resources to encourage students to explore one of the Big Ideas of Sustainability: Limits. Art can be a great connector for student discoveries of what art materials can/can't do. An art project could explore biomimicry as a design approach. Art also relates to STEAM connections about changed states of materials. In another approach, an art teacher challenged classes to create a Zero Waste classroom. To the extent possible, art material scraps and waste -- outputs -- became inputs as art material resources, and student understanding of school-based recycling practices was reinforced.