The Concord Consortium
Realizing the Promise of Educational Technology

Evolution Readiness

Fourth-grade students learn Darwin's model of natural selection using computer-based models depicting interacting organisms and their environments. Curricular activities involve formative assessment, labs, and multimedia materials.

The Evolution Readiness project is using computer-based models of interacting organisms and their environments to help fourth grade students learn Darwin's model of natural selection as the process primarily responsible for evolution. We are creating curricular activities and formative assessments that link manipulable computer models to text and multimedia materials.

As the project title suggests, we do not expect that students will come to a full understanding of every facet of evolution in fourth grade. However, we hope that they will come to appreciate that evolution is an emergent behavior, and the remarkable and counter-intuitive outcome of a long series of gradual elementary processes that they can explore through the direct manipulation of computational models. Evolution is perhaps the most challenging subject in the K-12 life science curriculum.

This project is creating a research-based curriculum centered on progressively complex models that exhibit emergent behavior. We log students' actions as they interact with computer-based models, collecting extremely fine-grained performance data and analyzing it to infer their understanding of basic concepts. This line of research is helping to improve the teaching of complex scientific topic areas and to provide a reliable means of directly assessing students' conceptual understanding and inquiry skills, as opposed to their recall of science "facts." In a global economy that is increasingly dependent on advances in science, **it is unacceptable that 150 years after the birth of the theory of evolution only four out of ten Americans believe in** it! (See Gallup Poll results.) Nor can this widespread skepticism be attributed solely to the opposition of religious groups.
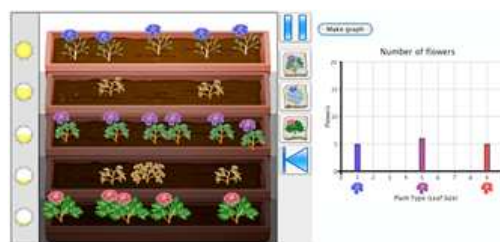
Evolution is a particularly daunting subject to teach and to understand: the evidence for it is indirect and the model rests largely on phenomena that cannot be directly observed, including some that are poorly understood to this day. By combining advances in educational technology with improved understanding of young children's cognitive development, this project will produce an empirically validated curriculum for introducing evolution in the early elementary grades.

Students plant seeds in the Virtual Greenhouse and observe what thrives under different conditions.

Activity Spotlight

Natural Selection

A population of rabbits is divided by a dam. The environment changes on one side of the dam. Some organisms will be well adapted to the new environment. They will be able to survive to adulthood and have more offspring with similarly advantageous traits. Others will die before they can reproduce. This is natural selection.

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