

Generation ECO

Educating the next generation for informed, pro-active sustainability

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Climate Change: bringing math & science back

Climate change is one of the most challenging and complex events in human history, potentially affecting every aspect of our lives. However, a major impact has gone mostly unnoticed: *it brought mathematics and science back to the forefront of public discourse*. Who would have expected, five years ago, that carbon dioxide would be a household name, or that results of the Intergovernmental Panel on Climate Change would be as anticipated as a sitcom season finale?

If the usefulness of science and mathematics used to be a mystery for many students, it is now beyond any doubt that scientific knowledge has a major importance for our immediate survival. However, there is a fundamental difference in how scientific knowledge needs to be mobilized now. *We cannot outsource the work to scientists and research labs as we used to do in the past, since the solutions for climate change are collective endeavors* – we all have to be part of it. And since everyday behaviors need to be changed, a deep understanding of environmental impact of our behaviors is crucial. Therefore, understanding the science and mathematics behind our actions is key for generating sustainable and lasting change, and not only environmental fads.

The purpose of this project is to train K-12 students to develop the knowledge, skills, and habits of mind to actively participate and understand the challenges of sustainability in the age of climate change, with a special focus on using computational technologies as data-collection and modeling tools – in other words, train students for *computational ecoliteracy*, in three steps: (1) collect data, (2) build scientific models, and (3) design solutions. Learners will use advanced technologies, such as electronic sensors, GPS-enabled devices, and data-loggers to rigorously measure and collect data about different aspects of everyday behaviors. Then, using computer simulation tools normally only available to college or graduate students, such as agent-based modeling and system dynamics tools, they will analyze and build scientific models of those behaviors and their environmental impact. Finally, using computer programming, robotics, digital media, and cutting-edge rapid-prototyping equipment, students will design devices, behaviors, or media campaigns to address the main issues emerging from their research.

A key aspect of this project is its focus on the rich STEM learning opportunities brought about by the need to prevent climate change. Instead of using online carbon footprint calculators, we want to train a generation of youth who can build their own calculators. The urgency for actions around climate change and its pervasiveness in the public discourse provide strong motivation for youth to engage in such endeavor. The generation that entered middle- and high-schools in recent years has an acute awareness for such issues – a generation of *eco-conscious* students. Some have also been exposed to a large amounts of information on environmental issues, becoming, to a certain extent, *ecoliterate*. But schools have not yet offered the curricula or the tools to make sense of the complexity of all this data. Computational tools and computational thinking are crucial because they are the only way to model these data – and that is how scientists work. Therefore, *computational ecoliteracy* will be a fundamental 21st century skill that we need schools to urgently integrate into their curricula.