

SUCCEED: Summer Center for Climate, Energy, and Environmental Decision Making



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<http://cedmcenter.org/succeed-program/>

Objectives

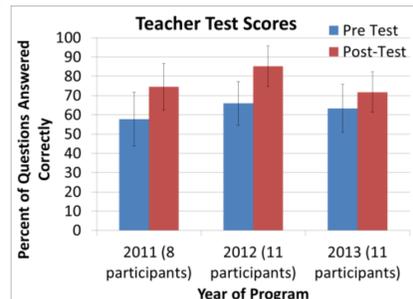
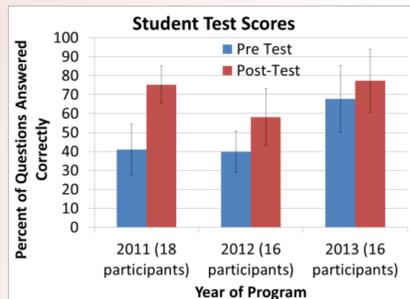
- Raise awareness of the technical, social, and political challenges related to energy, the environment, and climate change.
- Encourage students to tackle these challenges through careers in the fields of Science, Technology, Engineering, and Math (STEM).

Background: The Need & The Pilot Program

STEM fields are responsible for more than half of our sustained economic expansion,¹ and over the past 25 years the science and engineering workforce has remained at over 5% of all U.S. jobs.² However, America lags behind other nations when it comes to STEM education; globally, American students rank 23th in math and 31st in science.³ While our youngest students show an interest in STEM subjects, roughly 40% of college students planning to major in STEM switch to other subjects.⁴ Women and minorities, 50% and 43% of school-age children, are disproportionately underrepresented in STEM fields (25% and 15%, respectively).^{5,6}

Studies show that improved teacher curriculum combined with annual student-centered learning summer programs can promote and sustain student interest in STEM fields. In 2011, Carnegie Mellon University's Center for Climate and Energy Decision Making created SUCCEED: the Summer Center for Climate, Energy, and Environmental Decision Making. SUCCEED consisted of two pilot programs: a 2-day workshop to improve teacher curriculum and a free 5-day summer school targeted at an age gap in the university's outreach, students entering 10th grade. In 2011, 5 student participants were minorities and 16 were female out of 19 participants.

Motivation: Outcomes & Impacts



SUCCEED, repeated in 2012 and 2013, was very successful. A pre/post test demonstrated a significant increase in understanding of STEM topics. In addition, in 2013, 94% of students reported they would do such a workshop again, and on a scale from 1-7 the parents responded on the same scale that they would send their child to a similar workshop with an average score 6.7 and they would recommend the program to others at level 6.6.

I will definitely pay more attention when my science teacher offers summer program and **hopefully drag a friend along...** Please let me know if you or Carnegie Mellon ever have any more Energy or Environmental Engineering programs.
~ Dante Cordaro, Student, SUCCEED 2011

Calista learned a lot; with hindsight, and additional thought, **one week did change her outlook.**
~ Cynde Frederick, Parent, SUCCEED 2011

Additionally, student participants have requested follow-up assistance throughout the year; **two years after SUCCEED, Dante reached out to us for help installing a green roof at his high school.**

Publicly Available Online Curriculum Resource

Specific Pennsylvania lesson plans meet:



General recommendations on:

Climate



Energy



Environment



Decision making



Hosted at: <http://www.cmu.edu/gelfand/k12-teachers/succeed/index.html>

Expanded Outreach, Follow-up, & Long Term

To grow these efforts, two more components are required: expanded outreach and follow-up. Some ideas include:

- **Brand SUCCEED** through professionally designed advertising and social media.
- **Partner with schools** to promote STEM through short school visits with demos.
- **Grow workshop pool** to (first) nearby Beaver County and (second) the state of Pennsylvania via free accommodations & targeting underprivileged populations.
- **Disseminate list of local summer schools** via publically available website.
- **Assess long term outcomes** by conducting interview and/or survey of previous applicants and provide relevant feedback into outputs and activities.
- **Facilitate follow-up activities** such as a high school student's green roof project.
- **Conduct free pilot workshop** following local students for four summers.

Select Activities in Student and Teacher Workshops

SUCCEED consists of two distinct parts: a five-day workshop with approximately 20 ninth-grade students and a two-day workshop with approximately 10 math and science educators.

Conventional Energy

Participants learn about production and usage of conventional energy. Here a participant runs a home energy audit to measure the energy consumption of various electrical devices and calculate the corresponding emissions. Field trips include: Bruce Mansfield coal power plant and Beaver Valley nuclear power plant.



Renewable Energy

Participants learn about production and pros/cons of renewable energy. Lessons involve measuring the power output of model wind turbines and hands on measuring of solar irradiance. Field trips include: Aquion (a battery manufacturing plant) and CMU's electric vehicle lab.



Climate & Environment

Participants learn the differences between weather, climate, and the environment, and how energy usage affects our surroundings. Activities include mapping carbon dioxide emissions and running simulations to decide the fate of the country and world. Field trips include: Carnegie Natural History Museum, CMU's green roofs, and CMU's Intelligent Workplace.



Decision Making

Students learn how stakeholder concerns, consumer preferences, and policy play into our decision making process from a individual to a global level.



Activities include testing preferences for different light-bulbs and lunching with policy makers concerned about climate, energy, and the environment. The student workshop culminates in a formal debate on relevant topics. The teacher workshop results in creating relevant lesson plans.



References

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6. National Academy of Sciences. Expanding Underrepresented Minority Participation. 2011.