Estimating the impact of exceptional climate change education on individual lifetime carbon emissions

Eugene Cordero, Diana Centeno, Elizabeth Walsh[1,2]
Anne Marie Todd[3]

[1]Department of Meteorology and Climate Science
[2]Science Education
[3]Department of Communication Studies
San José State University, California

UN Framework Convention on Climate Change (1992)

"Education is an essential element for mounting an adequate global response to climate change"

Clean Technology

Elon Musk

STEM

Science • Technology • Engineering • Math

Cyber Security Challenge

Question

Can we quantify the potential role of education as a mitigation tool?

San José State UNIVERSITY

COMM 168A/B Global Climate Change (2007)

Scientific and social scientific approaches to the process and effects of global climate change: Climate changes in the Earth's past, interactions between climate and life, anthropogenic climate change, socioeconomic contexts of environmental effects, cultural influences on climate change mitigation strategies.

Education

- 500 students took Global Climate Change between 2007-2011

"Exceptional" education experience

- Integrative format blending science and social action
- Focus on how climate change impacts individual students both personally and professionally
- Culminating experience includes community project

Survey

- 20-item questionnaire
- Two categories of questions
  - ***A***: Course engagement and climate literacy
  - ***B***: Behavior change attributed to class

Results (Category A Questions)

- 96% of alumni would recommend the class to their friends
- 80% strongly agree or agree that they have personally experienced the effects of climate change
- 66% think that individual actions can make a difference in reducing climate change
- 74% think that humans can reduce climate change if we change our behavior

Category B Questions

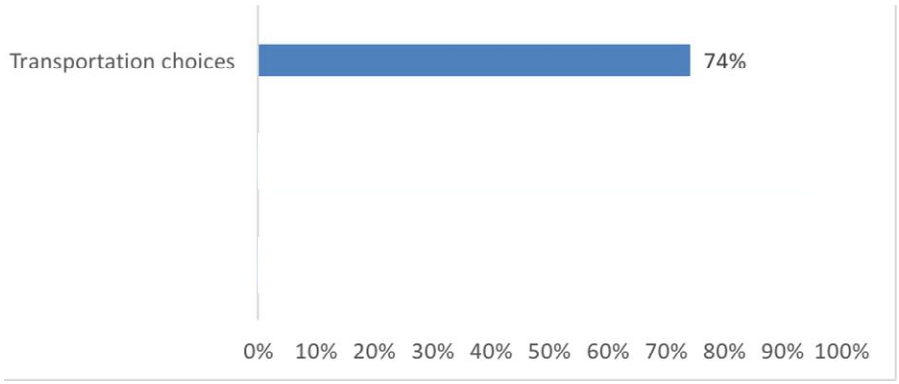
As a result of my participation in this course, I have

- Made the following changes to my transportation methods (e.g., purchase hybrid or electric vehicle, carpool, ride a bike, etc.)
- Made the following actions to reduce energy consumption at home (e.g., purchased energy efficient appliances, installed solar panels, purchased renewable energy, etc.)
- Made food choices to reduce carbon emissions (e.g., reduced red meat consumption)

Carbon Footprint Calculator

http://coolclimate.berkeley.edu/calculator

Survey Results

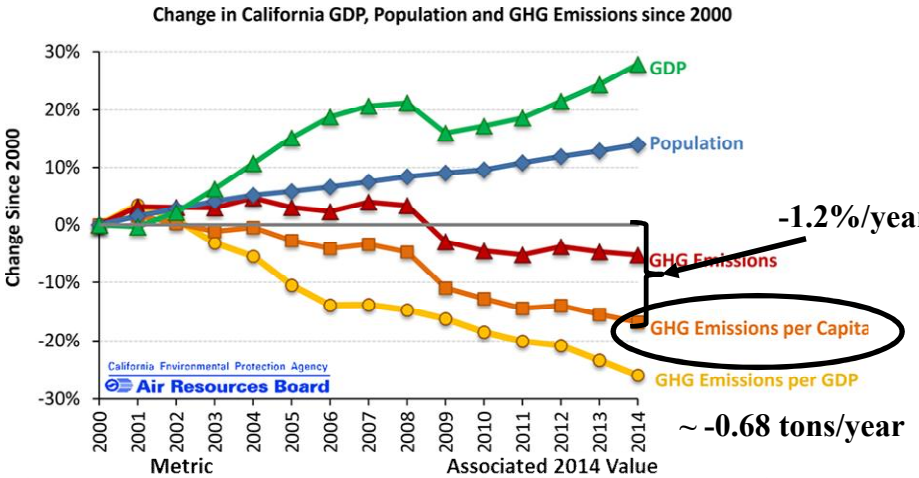


Carbon Reductions

- The average reduction/alumni is: 3.9 tons of CO_2/yr
  - Waste reduction: 27%
  - Home energy conservation: 24%
  - Food choices: 22% tons
  - Transportation choices: 27%

Control Group

Consider average Californian over 5 year time frame



Metric	Associated 2014 Value
GDP	2.1 trillion (2009 $)
Population	38.7 million
GHG Emissions	441.8 MMTCO_2e
GHG Emissions per Capita	11.4 metric tons CO_2e per person
GHG Emissions per GDP	209 metric tons CO_2e per million dollars

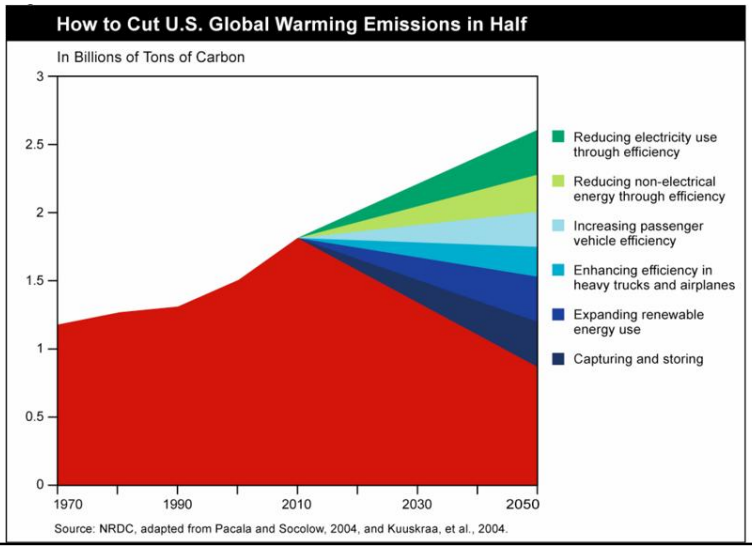
California Air Resources Board, 2015

Results

168 Class:
Reduction of 3.9 tons of CO_2/year

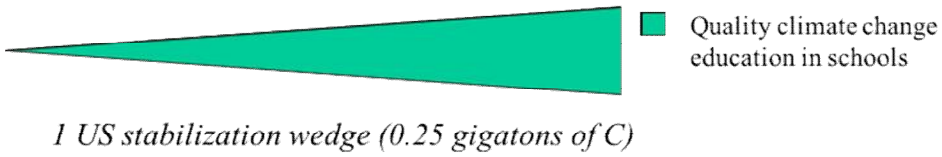
California:
Reduction of 0.68 tons of CO_2/year

Climate Change Mitigation (U.S. Stabilization Wedges)



Can ‘exceptional’ education produce a U.S. Stabilization wedge?

- If 5.6 million U.S. students receive quality climate education (extrapolating from our results)



1 US stabilization wedge (0.25 gigatons of C)

1 US stabilization wedge - double fuel economy of US fleet (54 mpg)
1 US stabilization wedge - 6x increase in renewable energy (30% total)

Climate Change & Education

Green Ninja

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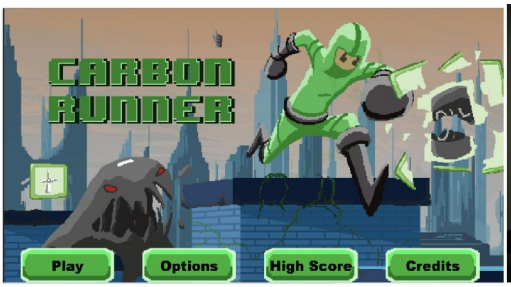
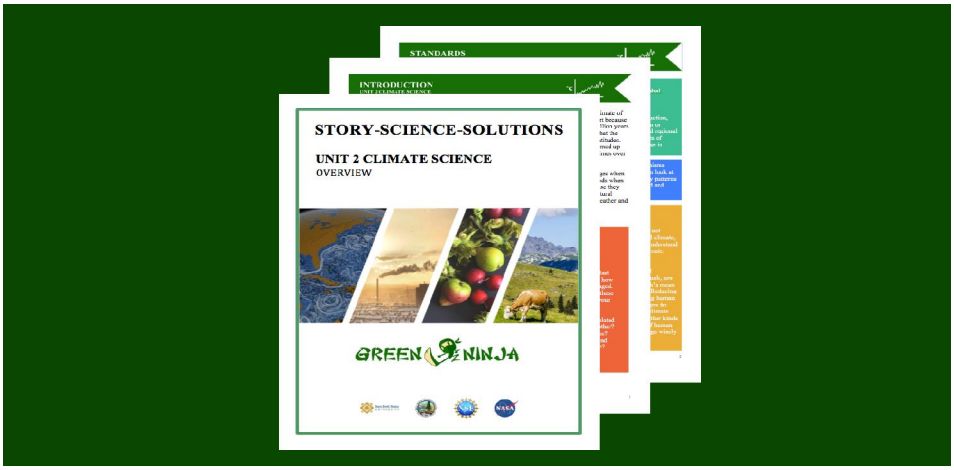
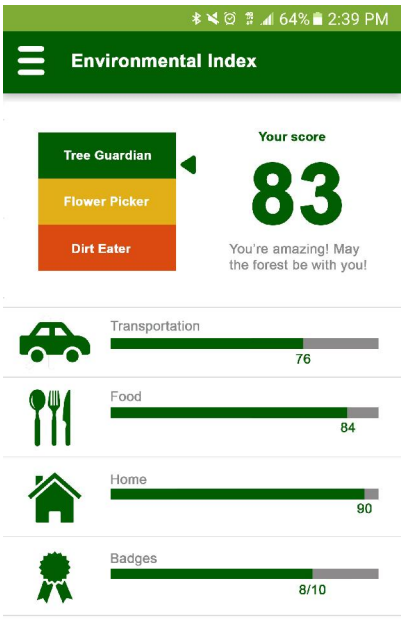


GREEN NINJA

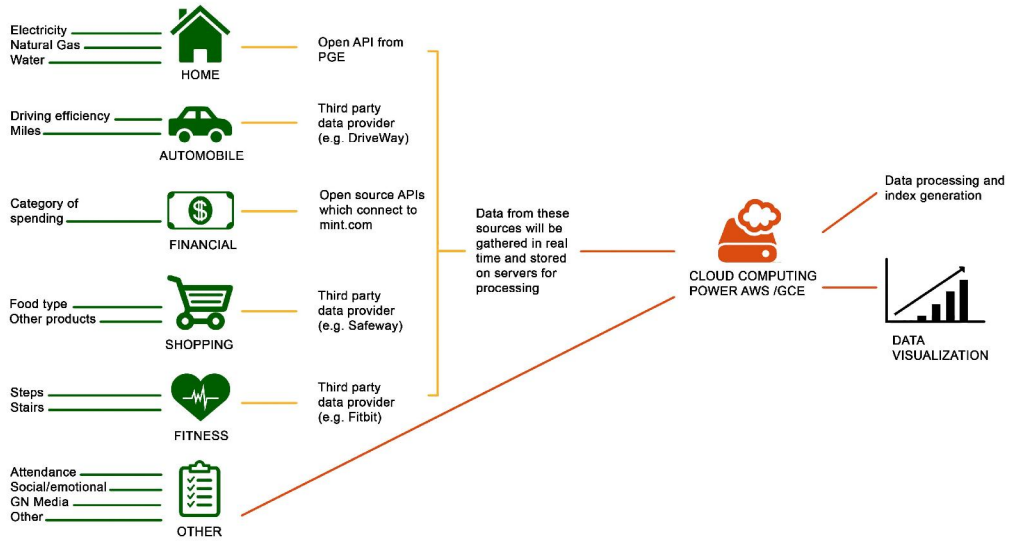


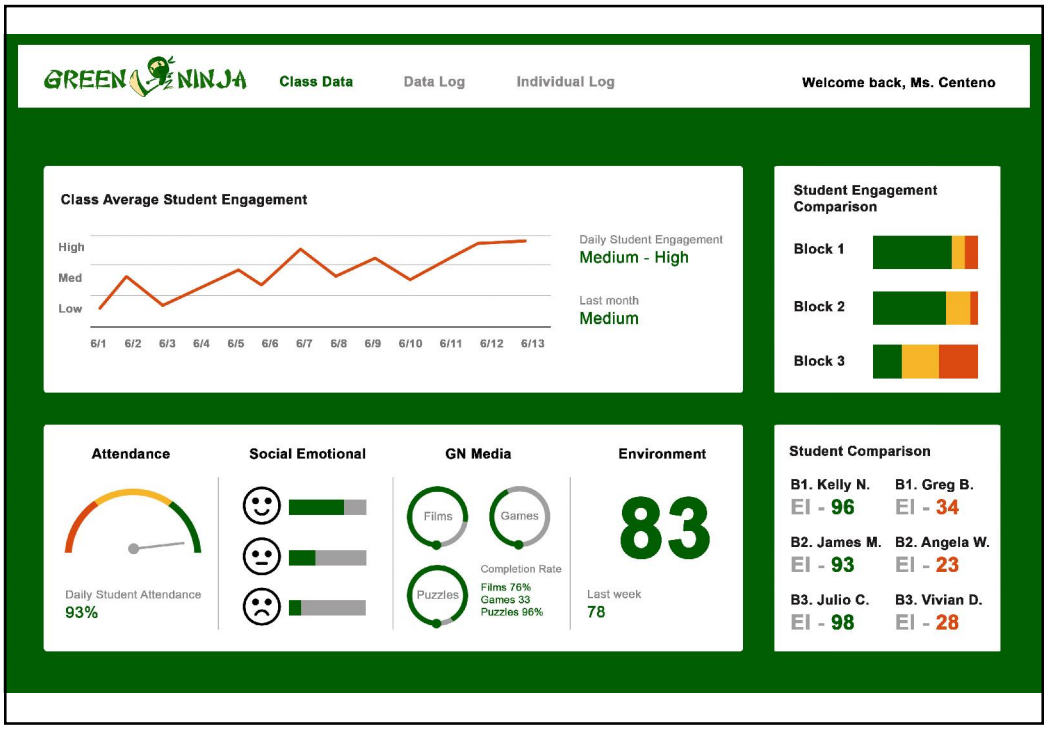
A middle school science curriculum that satisfies the new standards and produces verifiable reductions in carbon emissions.

Fitbit for Environmental Education



Data Aquisition





Summary

- Our analysis suggests that education can potentially be as effective as other proven mitigation measures…
  - *Provided the education is well designed!*
- We are currently developing ‘exceptional’ education curriculum for middle schools.
  - *Monitoring student achievement and behavior*

Thank You!

Eugene Cordero
Dept. Meteorology and Climate Science
eugene.cordero@sjsu.edu

Green Ninja: www.greenninja.org