

A Model of Climate Change Education at the University Level

Katelin Maatz

Dr. Zhi-Yong Yin, Environmental and Ocean Sciences



Background

While the University of San Diego (USD) offers 395 sustainability-related courses, students at the University of San Diego (USD) are not currently required to learn about climate change. According to the USD Climate Action Plan, the Education Intern at the Office of Sustainability is responsible for implementing campus engagement in environmental awareness. However, this puts student interns in charge of creating and presenting education materials to classes and organizations. Additionally, there is currently a gap in climate change education at the university level in the United States¹. The objective of this proposal is to determine the most effective behavioral model to create a framework for a climate change education model for students at USD in order to change environmental behaviors of students.



Current Condition of University Student Knowledge on Climate Change

American university students are less likely to agree with the statement that climate change is occurring than the American public. American university students are less likely to agree with the statement that climate change is anthropogenic than the American public.

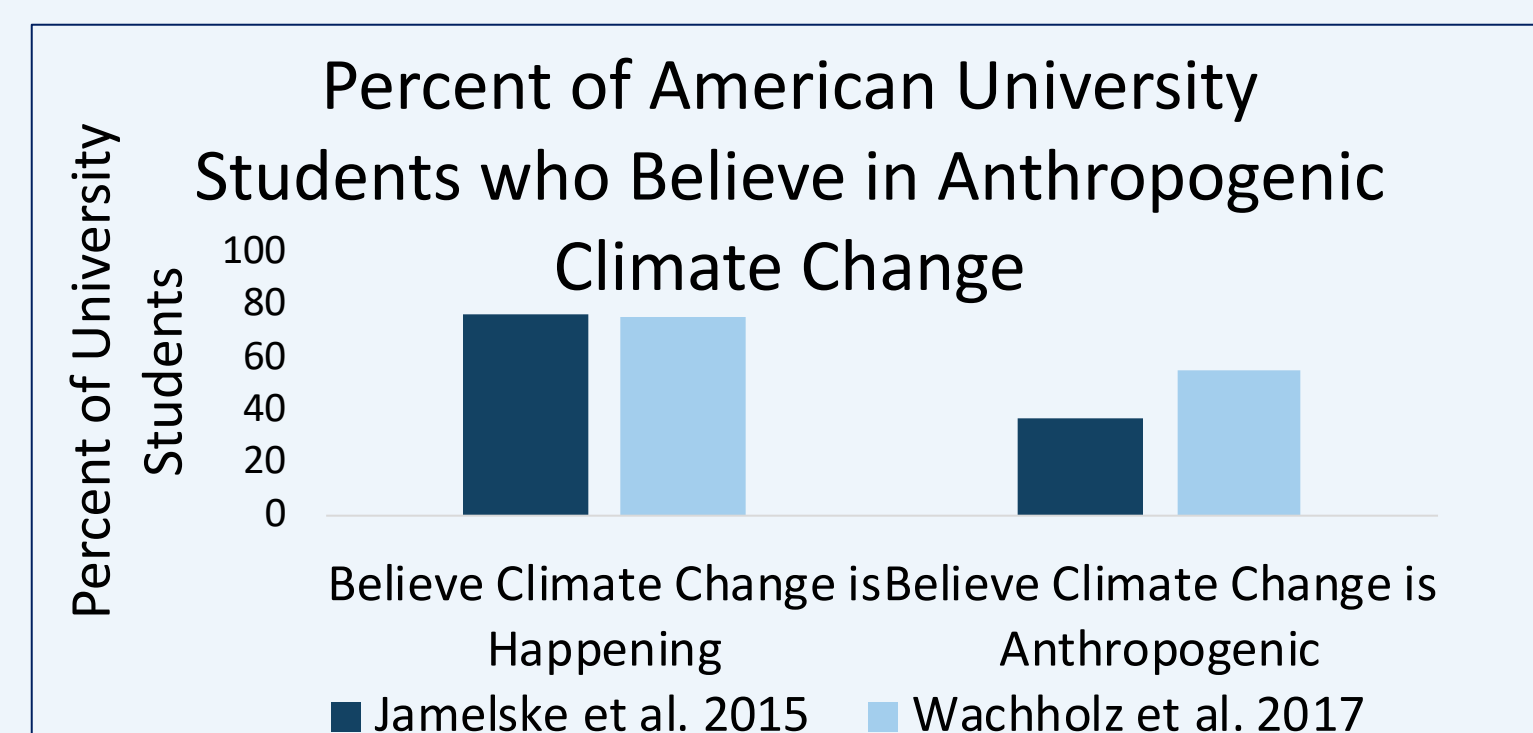


Figure 1. The percent of American university students who believe that climate change is occurring verse the percent of students who believe that climate change is anthropogenic. The results are taken from two studies, Jamelske et al. 2015 (n=2335) and Wachholz et al. 2017 (n=338).

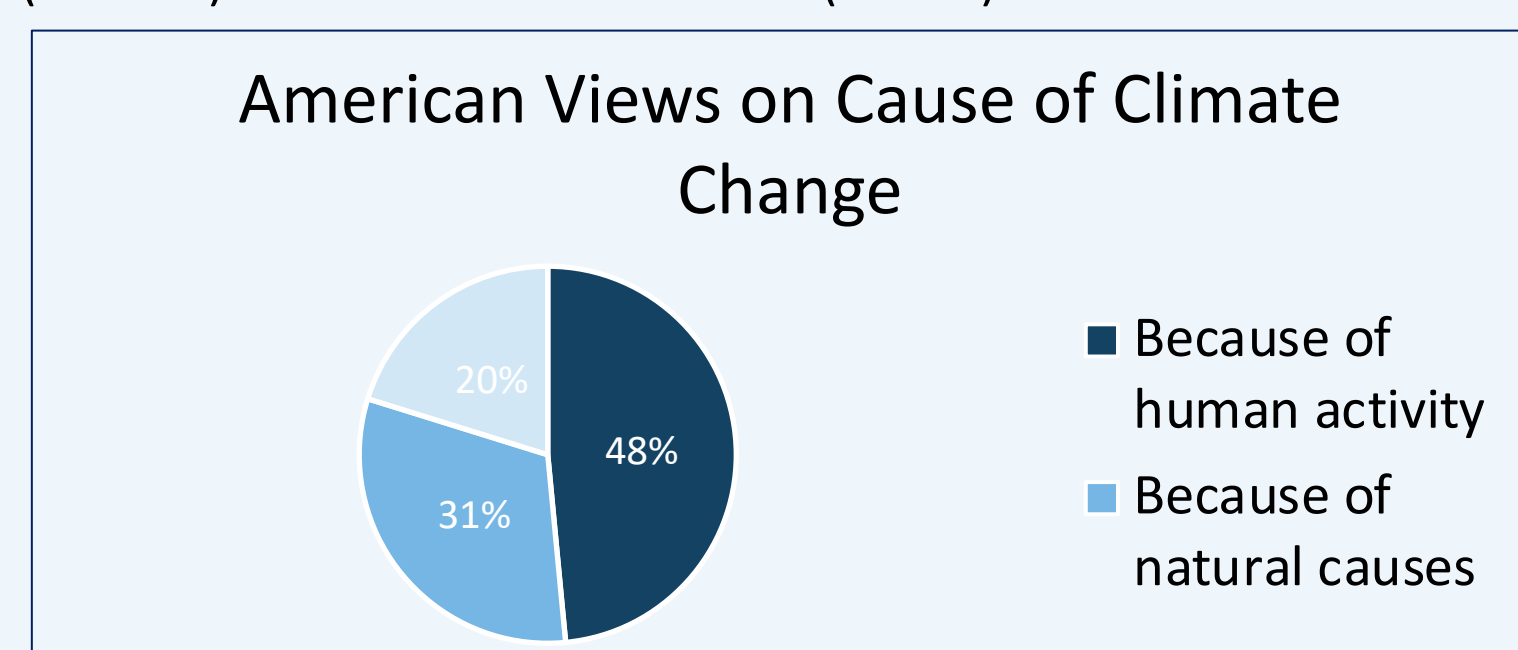


Figure 2. The percent of American adults who believe climate change is caused by human activity, natural causes, or that there is no solid evidence that climate change is occurring at all. The results are taken from a "The Politics of Climate," a 2016 Pew Research Center report.

Behavioral Models

Social psychology is a key component that should influence educational models in order to evoke behavioral change in an audience. The following are typical behavioral models that inform climate change education.

Knowledge-Deficit Model²

The traditional climate change education model relies simply on imparting knowledge on students to achieve a change in behavior. However, this model is too simple for effective education, as a variety of factors besides knowledge influence behavior.

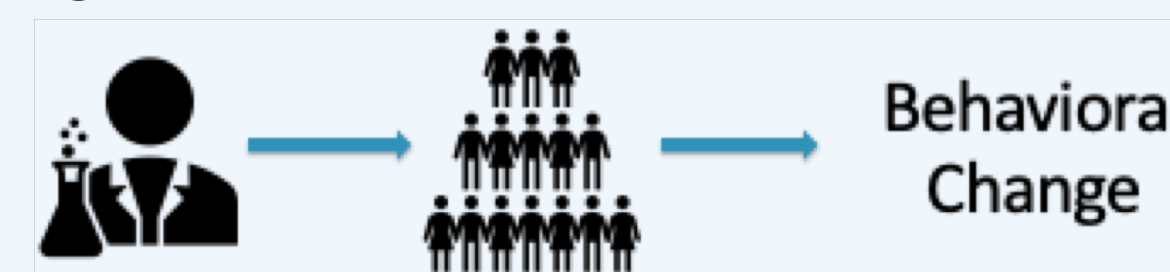


Figure 3. The knowledge-deficit model follows the idea that increased information from experts will lead to a behavioral change by the audience.

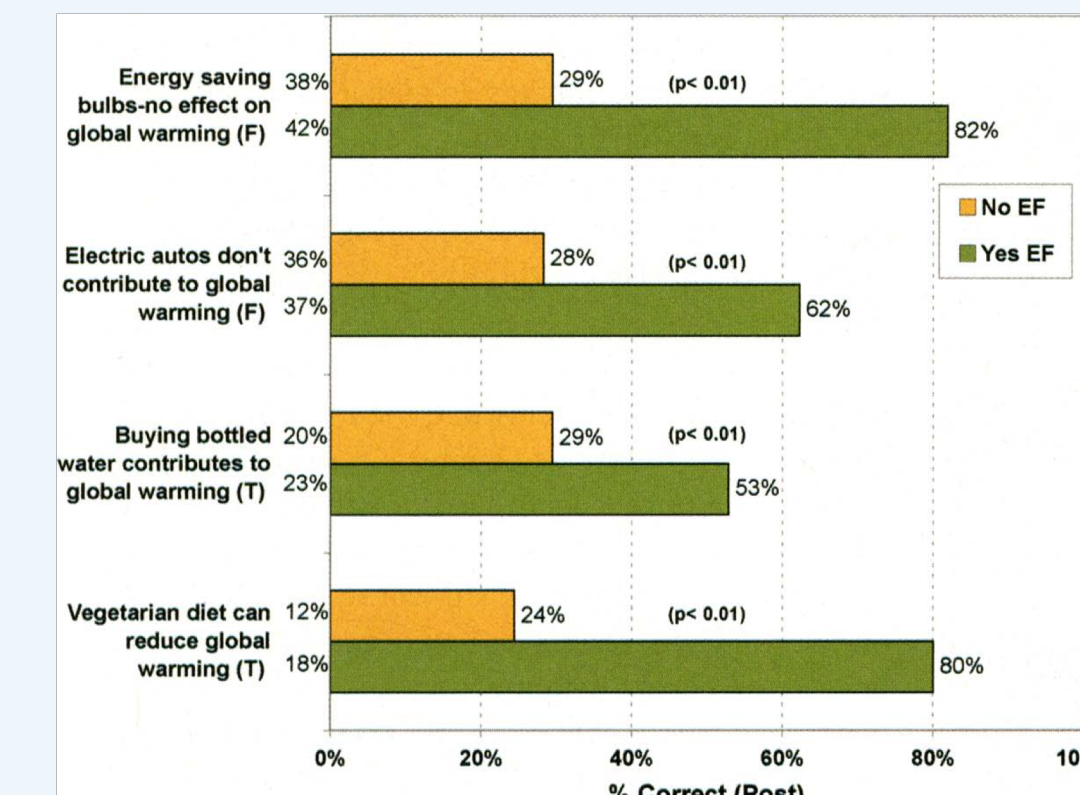


Figure 4. Results from Cordero et al. 2008 showing improvement in university student knowledge of climate change concepts with and without an personal ecological footprint activity. The percentage of correct student responses from the end of semester questionnaire (n=24) for Meteorology 112 classes with and without the ecological footprint activity.

Educational Tripartite Integration Model of Social Influence (E-TIMSI)²

E-TIMSI is the model used by the Climate Education Partners in implementing climate change education programs for influential leaders and communities in San Diego. E-TIMSI is more effective than a traditional knowledge-deficit education model at shifting behavior². This model is highly effective because of its emphasis on community building and social influence².



Figure 5. The E-TIMSI model is based on the idea that behavioral change in individuals increases when climate change knowledge is presented in a way that increases efficacy, identity, and values.

Effectiveness of E-TIMSI

Although there has not yet been a study measuring the effectiveness of the E-TIMSI model of climate change education for university students, Estrada et al. 2017 conducted a study testing the E-TIMSI model in the context of climate change education for the San Diego general public.

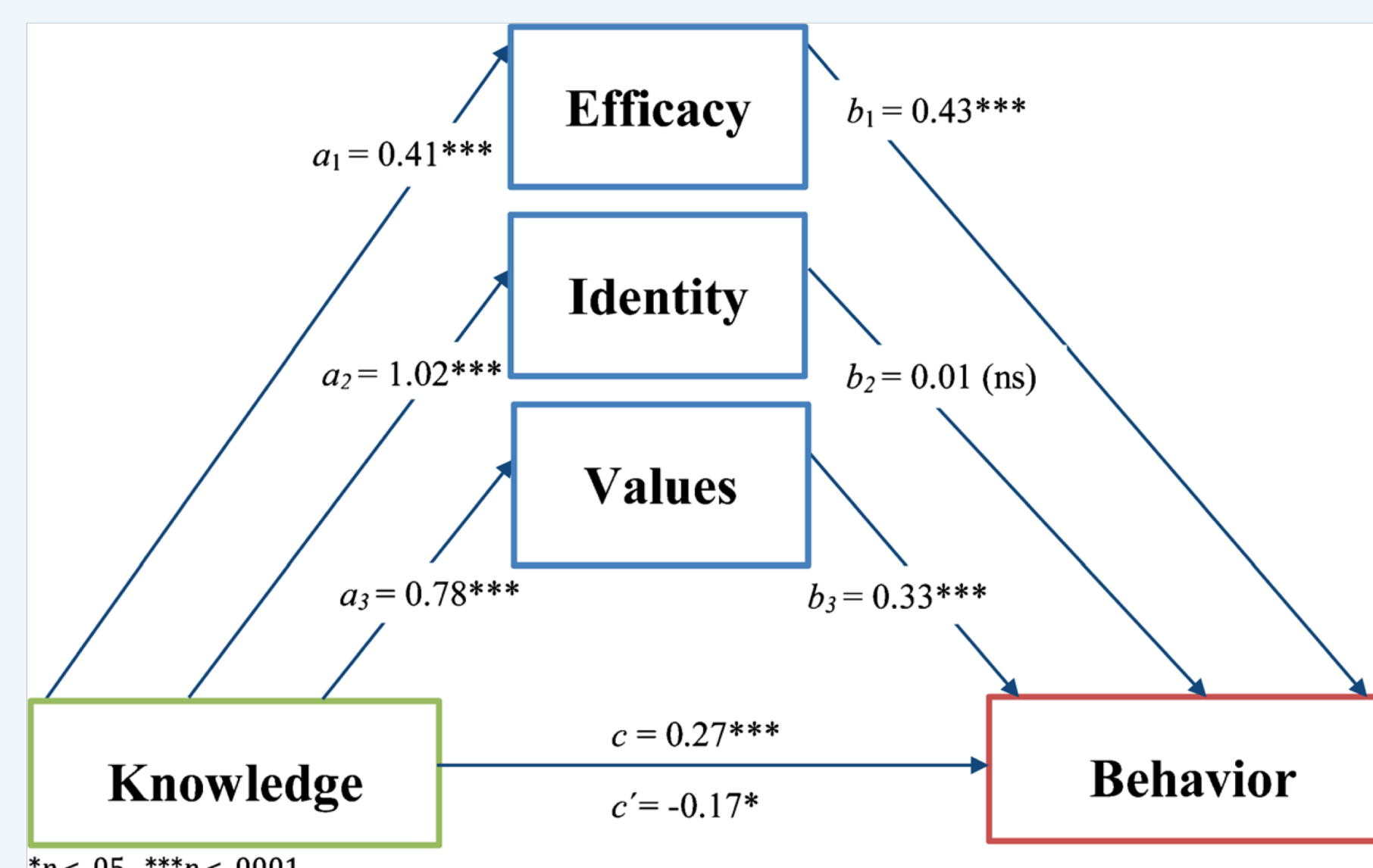


Figure 6. The parallel multiple mediator model from Estrada et al. 2017 that displays the results of the effectiveness of the E-TIMSI model. Efficacy and values strongly and independently predicted behavior.

Literature Review of Climate Change Education Models

A literature review of climate change knowledge and education determined key components that should be incorporated in climate education for effective retention of knowledge and behavioral change.

- Active learning^{1,3}
- Local problem solving³
- Small scale to increase efficacy^{2,3}
- Personal relevance^{4,5}
- Complex concepts explained with simple graphics³
- Experiential learning³
- Group discussion¹

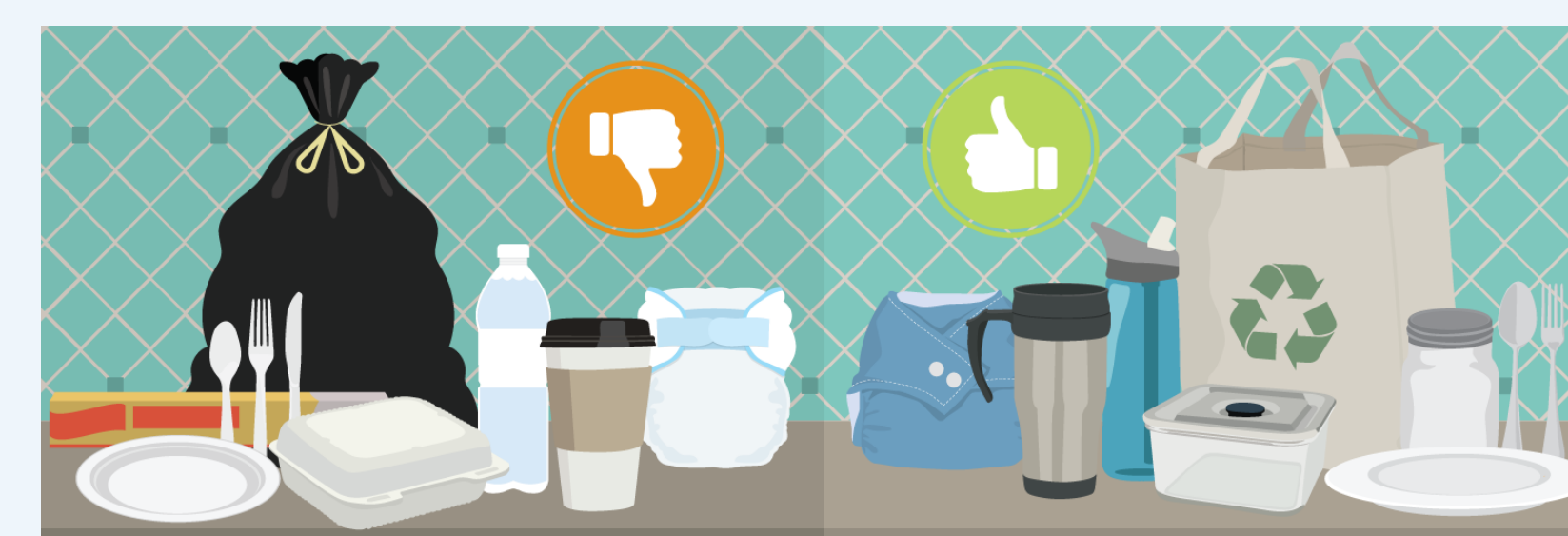


Figure 7. An example of a simple graphic explaining the concept of recycling used in sustainability education presentations by the USD Office of Sustainability.

What is the best model for USD?

The climate change education model will be implemented into university curriculum within the introductory course to each student's major. The goal is for each university department to develop an interdisciplinary, climate-change-focused introductory course.

1. Pre-Education and Post-Education Survey and Emissions Assessment:

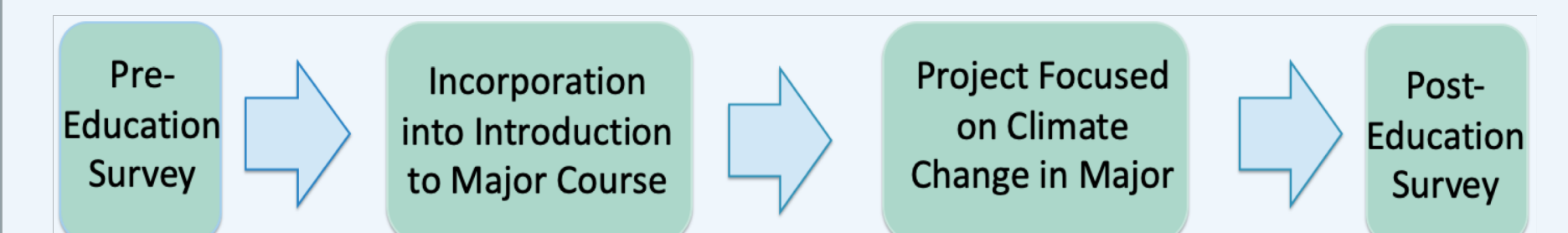
- Students will take a standard survey and online emissions assessment at the beginning and end of their sustainability-focused course as a measurement of improvement in climate change understanding.
- The survey follows the model of the climate change education surveys conducted by Pruneau et al. 2003 and Estrada et al. 2017.

2. Incorporation of Climate Change Education into Introduction to Major Course

- Introductory lecture to establish definitions and base knowledge of anthropogenic climate change
- Group discussions with peers focused on local problem solving
- Focus on mitigation and adaptation behaviors

3. Project Focused on Climate Change in Major

- Group research project within course in major relating area of study to climate change at the local level



Expected Results

The pre- and post-education survey will provide quantitative data to determine the effectiveness of the climate change education model.

With the successful completion of the climate change education model, students will have a significantly better understanding of the causes and effects of anthropogenic climate change.

Students will be able to identify and will implement climate change mitigation and adaptation strategies.

Selected References

- [1] Monroe, M.C., R.R. Plate, A. Oxarart, A. Bowers, W.A. Chaves. 2017. Identifying effective climate change education strategies: a systematic review of the research. Environmental Education Research.
- [2] Estrada, M., P.W. Shultz, N. Silva-Send, and M.A. Boudrias. 2017. The Role of Social Influences on Pro-Environment Behaviors in the San Diego Region. Journal of Urban Health. 94:170-179.
- [3] Pruneau, D., H. Gravel, W. Bourque, and J. Langis. 2003. Experimentation with a Socio-constructivist Process for Climate Change Education. Environmental Education Research 9(4):429-446.
- [4] Nam, Y., and E. Ito. 2011. A Climate Change Course for Undergraduate Students. Journal of Geoscience Education 59(4):229-241.
- [5] Monroe, M.C., R.R. Plate, A. Oxarart, A. Bowers, W.A. Chaves. 2017. Identifying effective climate change education strategies: a systematic review of the research. Environmental Education Research. DOI: 10.1080/13504622.2017.1360842