Place-Based and Student-Led Climate Change Instruction in the Science Classroom

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Background

- Hurricanes have increased in intensity as the oceans warm due to climate change
- Students in Cocoa Beach live on Florida's east coast which is vulnerable to these strong storms
- Research suggests that student-led instruction is helpful when tackling a potentially controversial topic like climate change
- Place-based instruction allows students to relate what they're learning to their lives and communities
- 2 groups of 11th and 12th grade physics students: in-person and eLearning
- Students received same instruction through their chosen method of delivery

Treatment

- Hurricane Webquest
  - Hurricane structure
  - Hurricane Irma (local impact)
  - Link between rising sea-surface temperatures and hurricane intensity
- Thermodynamics PhET Labs
  - Inquiry-based virtual labs to simulate conditions of global warming and energy transfer
- Thermodynamics Mini-Project
  - Students identify energy transfer links between climate change and hurricane intensity
- Hurricane Building Codes Project
  - Place-based, student-led
  - Students chose two buildings and analyzed them using Florida Building Codes

Research Questions

1. How do students perceive the relationship between hurricanes and climate change?
2. How does place-based learning impact understanding of hurricanes?
3. How does student-led learning impact understanding of hurricanes?
4. How does hurricane instruction impact student attitudes about hurricanes?



Figure 2. Student sample of Hurricane Building Codes Project

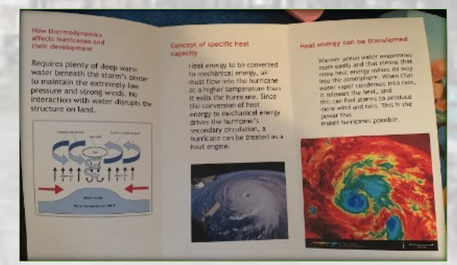


Figure 5. Student sample of Thermodynamics Mini-Project

Data Collection

- Hurricane Likert Survey to gauge student attitudes on climate change and local impact of hurricanes before and after treatment
- Hurricane Knowledge Test before and after treatment
- Students volunteered for final interviews

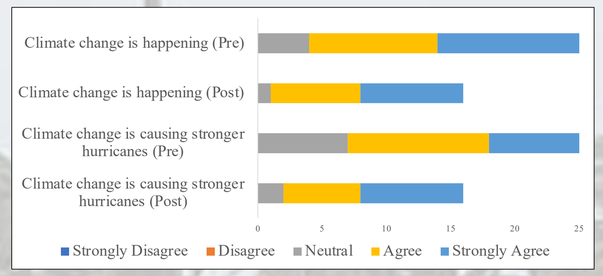


Figure 3. Likert survey results regarding climate change (Pre *n*=26, Post *n*=16).

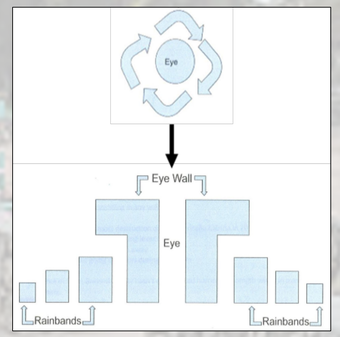


Figure 6. Pre- and post-test diagrams of hurricanes from an online student.

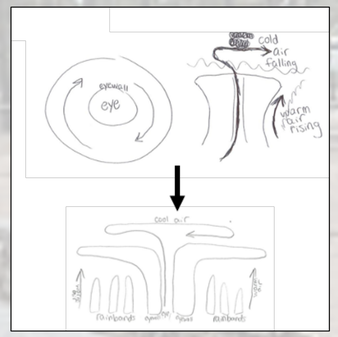


Figure 7. Pre- and post-test diagrams of hurricanes from an in-person student.

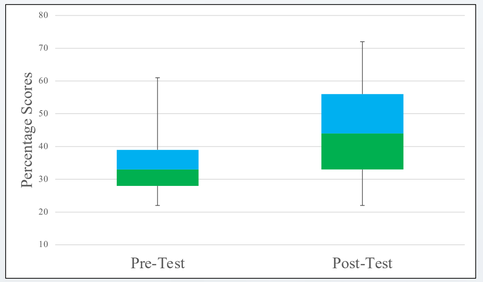


Figure 1. Hurricane Knowledge Test scores before and after treatment, (*n*=19).

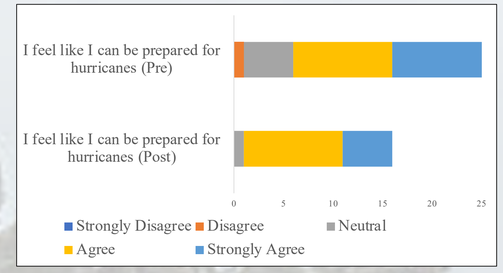


Figure 4. Likert survey results on student attitudes on hurricane preparedness, (Pre *n*=26, Post *n*=16).

Conclusions

- Place-based learning helped students see relationships between their community and climate change science
- Student-led learning allowed students to make inferences independently
- Online students did not participate in classroom discussions, but had similar grades and assignment turn-in rates to in-person students

Image by Getty Images