



# Can Informal Learning Help Promote Science Identity And Learning In College Students Impacted By Climate Change Disasters?

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## Abstract

- ❖ **Aim:** To examine outcomes of an informal environmental education intervention for college students impacted by recent hurricanes
- ❖ **Results:** Participants reported higher STEM identity following the informal learning experience. We also found increased resilience, but only for male students.

## Introduction

- ❖ In recent years, natural disasters have increased at unprecedented rates (Hoeppe, 2016; Ibarrarán, Ruth, Ahmad, & London, 2009).
- ❖ Following natural disasters, students experience high rates of stress and academic difficulties (Richardson et al., 2015; Joseph, 2012).
- ❖ Little is known about how to foster resilience and academic identity for disaster-impacted students.
- ❖ However, informal learning experiences are critical in building students' career interest and in shaping their science trajectories (National Research Council, 2009).
- ❖ To address this need, we implemented an informal learning experience for hurricane impacted students. The students collected photographs and oral histories documenting damage to their home communities over a 2-week period in May of 2019.

## Participants

- ❖ 50 students impacted by Hurricane Florence
  - 54% female;
  - 59.1% STEM majors
  - 75% White/European-American, 0.04% Hispanic/Latino; 9.1% Black/African-American, 6.8% Asian/Asian-American; 9.06% Other
- ❖ All students selected were provided with a stipend of \$1000 for their participation in the informal learning experience.



## Method

- ❖ Participants completed a one-day training in advance of participation.
- ❖ Participants were grouped into teams of two from the same geographic region.
- ❖ The teams worked collaboratively to collect data at 20 targeted locations per team and to record oral histories.
- ❖ Each student team used a Theta 360° camera, selfie stick, and tripod (24 sets purchased using grant funds will be available for NC State course use in the future via the NCSU Libraries).
- ❖ Teams also identified at least 2 community members whom they interviewed, gathering oral histories of forest damage following hurricanes.
- ❖ Students were instructed in protocols and equipment use prior to field work.
- ❖ All data collection occurred over a 2 week period in late May of 2019.
- ❖ After data collection, student groups focused on different aspects of analysis and reporting, including virtual reality (VR) visualization of images and oral history transcription, coding, and analysis.
- ❖ Some students co-presented sample visualizations at an academic conference, modelling the public presentations that students are beginning to give back in their communities in eastern North Carolina.

## Measures

- ❖ Measures were given before training (pre-test) and 2 months after the learning experience (post-test).
- ❖ Participants also completed daily measures of science interest and science enjoyment for one month (pre-training until after all data were collected).
- ❖ **STEM identity:** This measure presents 7 sets of circles which overlap in varying degrees. One circle represents STEM and the other the participant. Participants indicated which circle best represents their STEM identity (1 = No Overlap to 7 = Total Overlap) (London et al. 2011).
- ❖ **Resilience:** The Academic Resilience Scale (ARS-30) was used to measure processes of resilience, in particular cognitive-affective and behavioral ways in which students respond to adversity (1 = Likely to 5 = Unlikely) (Cassidy, 2016).
- ❖ **Science Interest and Enjoyment:** Single-item measures; “How interested are you in science right now?”; “How much do you enjoy science right now?” (1 = Extremely Interested/Really Enjoy to 7 = Extremely Uninterested/ Really Did Not Enjoy).

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## Results

- ❖ **STEM Identity.** Participants expressed higher STEM identity at post-test ( $M = 5.50$ ,  $SD = 1.78$ ) than at pre-test ( $M = 5.15$ ,  $SD = 1.95$ ).

Resilience				
	Pre-test		Post-test	
	Males	Females	Males	Females
Perseverance	22.87 (5.33)**	23.33 (7.99)	30.07 (9.95)**	25.05 (6.59)
Help-seeking	16.00 (4.05)**	17.20 (5.55)	23.20 (8.95)**	17.20 (5.33)

- ❖ **Interest and Enjoyment.** Participants reported higher Science Interest and Enjoyment on days when their data collection experiences were more positive.
  - ❖ Interest:  $B = .3479$ ,  $SE = .05$ ,  $t = 6.764$ ,  $p < .001$
  - ❖ Enjoyment:  $B = .3066$ ,  $SE = .04$ ,  $t = 6.294$ ,  $p < .001$ .

## Discussion

- ❖ We found that informal learning experiences can promote science identity in hurricane impacted students.
- ❖ Informal forestry learning can also foster resilience. However, resilience effects were only found for men, raising new questions:
  - ❖ Were team dynamics different for men and women?
  - ❖ Do stereotypes around STEM for females impact resilience?
- ❖ We also found that interest and enjoyment fluctuated daily and were related to how positive data collection experiences were that day.
- ❖ Overall, our results have important implications for intervention to promote STEM identity and resilience for disaster-impacted students.

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Scan here for more about the project

