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Creating a Climate Change Intervention to Reduce Students' Psychological Distance

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Assessment Mini-Grant 2022-2023 Project Report

Project Title: Creating a Climate Change Intervention to Reduce Students' Psychological Distance
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Project Description: While most undergraduate students in the United States accept that climate change is occurring, they often harbor alternative conceptions associated with its distance spatially, temporally, hypothetically, and socially (Duke & Holt, 2022; Spence et al., 2012). The construct of psychological distance (PD) explains that an individual may recognize that climate change is a problem; however, they may believe it 1) is only affecting other people (high social distance), 2) is occurring far from their location (high spatial distance), 3) will occur in the future, but is not impacting them now (high temporal distance), or 4) is uncertain and therefore not worrisome (high hypothetical distance) (Spence et al., 2012; Trope & Liberman, 2010). When individuals perceive climate change to be distant, across any scale, they often have reduced concern for climate change effects, often decreasing their willingness to engage in sustainable behaviors (Busch & Chávez, 2022; Gubler et al., 2019; McDonald et al., 2015). Personally and geographically relevant education can not only lower students' PD but can also increase the efficacy of student learning of climate change (Theobald et al., 2015) and environmental action (Altinay, 2017).

Our project aimed to lower undergraduate biology students' social and spatial psychological distance of climate change (Spence et al., 2012) through the creation of a classroom activity that used principles from place-based education (Semken & Butler-Freeman, 2008; Yemini et al., 2023) and the teaching for transformative experience (TTES) model (Pugh 2011; Pugh et al., 2017). Our 3-hour-long climate change activity is situated in local contexts and covers a broad range of ecosystem and human impacts of climate change (Figure 1).

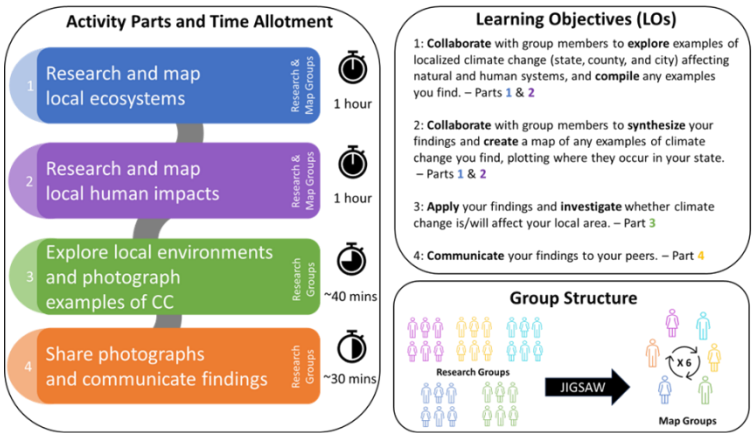

Figure 1: Activity outline and timeline, student learning objectives, and student group structures.

Project Outcomes: Our project aimed to address three main research questions: (1) What trends in spatial and social psychological distances of climate change occur in undergraduate biology students? (2) Following a classroom intervention, do we see a change in biology students' spatial and social psychological distance (PD) associated with climate change? (3)

What other factors (political party, season of data collection, etc.) contribute to differences in students' spatial and social PD?

To determine the impact of our intervention on students' spatial and social PD, we created a pre and post survey that included several validated instruments adapted from Spence et al. (2012) and Gubler et al. (2019, p.133). Two instruments were chosen to measure spatial PD (i.e., Geographic CC Awareness, Ecosystem CC Impacts) and two instruments were chosen to measure social PD (i.e., Human CC Impacts, Self CC Impacts).

We contacted ten instructors across four institutions in CO and GA, and five of these instructors representing two institutions agreed to use our intervention in their classrooms and collect pre- and post-activity survey data. Our final sample included 471 participants who primarily resided in Georgia (n = 392), were sophomores (n = 128), identified as female (n = 309), and were white (n = 251).

RQ 1: To access trends in undergraduate students spatial and social PD of climate change pre and post-participation in our activity, we coded student responses to the question, "*Have you been impacted by the effects of climate change? If so, please specify what those effects are below. If not, please respond with "no impact*". Using content analysis, we coded student open responses into three main categories (identified with capitalization) for the pre and post-responses, including (i) Acknowledgement of Impact, (ii) Environmental Impacts, and (iii) Human Impacts (Figure 2). In general, we noted that student's acknowledgement of being impacted by climate change increased following the intervention (Figure 3A). The second category grouped student descriptions of climate change that impact non-human organisms and/or their environment into four subcategories (Figure 2B). The frequency of mentions in all these categories increased post-intervention, especially within the Ecological and Non-Specific categories (Figure 2B). The change in frequency of these subcategories indicates that student awareness of impacts to their local environment increased following our intervention, as found in similar studies (Fox et al., 2020). The final category consisted of climate change impacts that students described as affecting human populations, divided into 11 subcategories (Figure 2C). While all subcategories

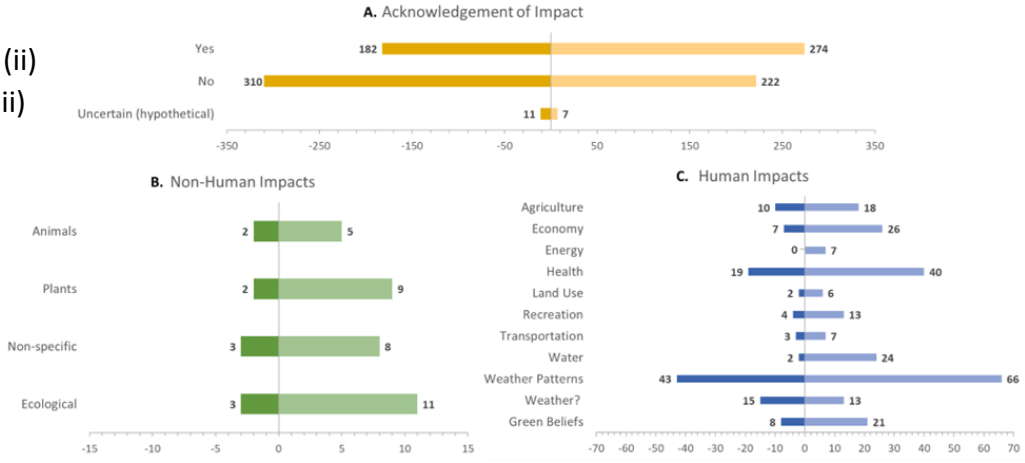

Figure 2: Graphs representing coded student data for each main category. Darker-colored bars (to the left of the origin) refer to pre-survey responses, while lighter-colored bars (to the right) refer to post-survey responses.

increased following participation in our intervention, *Weather Patterns* and *Health* increased the most.

RQ2: Overall, participants scored higher on the post-survey across all four scales (i.e. lower PD following intervention) (Figure 3). Both spatial metrics (Geographic: $p<0.001$, $d = 0.39$; Ecosystem: $p<0.001$, $d = 0.45$) and the Self scale of the social metrics ($p<0.001$, $d = 0.48$) had moderate effect sizes of this difference (sensu 35). The Human scale of the social metrics ($p<0.001$, $d = 0.52$) had a large effect size, where PD was reduced following the intervention (i.e. higher scale scores on post-surveys).

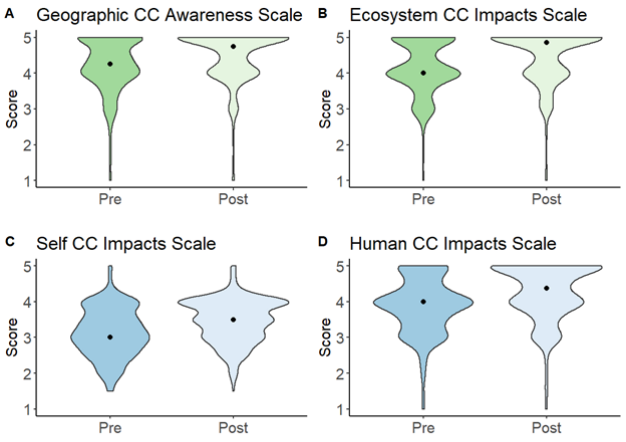

Figure 3: Violin plots of averaged categorical data from the two spatial metrics (Geographic and Ecosystem, green) and two social metrics (Self and Human, blue), separated by whether they were gathered prior to or following the climate change intervention.

RQ3: To determine which factors (e.g., gender, political identity, other PD scales) best-predicted scores on the PD scales, we performed nonparametric multiplicative regressions (NPMR). Of the five student variables included in our models, only Course Level was a strong predictor and it only manifested as a predicator of Ecosystem CC Impacts. The Ecosystem CC scale focuses on how different ecosystems in the participants' state are impacted by climate change, which may be challenging for introductory-level biology students whose post-scores were generally lower than those of advanced biology students, because they may not have yet developed strong ecological literacy (Lewinsohn et al., 2015). Alternatively, our ecology students' pre-Ecosystem CC scores were relatively high but their change over time may be limited by a ceiling effect (Šimkovic & Träuble, 2019; Cramer & Howitt, 2004).

Dissemination of Findings: Over the previous year, we have presented our findings from this project at a national conference and are working to publish our findings (see below).

Presentation:

Localizing Climate Change: A undergraduate student classroom intervention
Ecological Society of America, Portland Oregon, August 8th, 2023

Publications:

Duke, J.R., & Holt, E.A. (2023). Place-based climate change: Lowering students' psychological distance through a classroom activity. – In review, *JMBE*

Duke, J.R., Trump, A., Bretfield, M., Kozlovsky, D., & Holt, E.A. (2023). From humans to ecosystems: An undergraduate activity exploring localized climate change. – In prep

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