

Place-based teaching amidst a global pandemic?

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Abstract

How did the COVID-induced switch to online learning impact attitudes and practices toward place-based teaching? To explore this question, a pair of surveys was administered to students and faculty in the University of Hawaii's School of Ocean and Earth Science and Technology in Fall 2018 (142 respondents) and Fall 2021 (83 respondents). Survey results indicate that PBT practices are highly valued by students and faculty, even (or perhaps especially) when courses are in online formats. Faculty report wanting to use more place-based teaching practices in online courses, but there are obvious challenges. The paper ends with concrete examples of how place-based teaching can be effectively implemented in online courses.

Keywords: *Place-based teaching, geoscience, STEM education, online learning.*

1. Introduction

The COVID-19 pandemic has had a dramatic and enduring effect on higher education. In early 2020, when the global pandemic first hit, nearly all colleges and universities shut their physical classrooms. Online learning rapidly became the norm, forcing students and teachers to grapple with learning new technologies and modes of interaction at breakneck speed. Despite a rocky start, students and teachers rapidly adapted. A year or two later, when the pandemic subsided, many students were no longer interested in returning to in-person instruction: they wanted to continue learning remotely (Inside Higher Ed, 2021, Clary et al. 2022). Students voted with their feet: universities that insisted on in-person-only instruction were punished with plummeting enrollments. Many institutions are now offering courses in various online, hybrid and in-person formats, in an attempt to meet student demand while maintaining academic rigor.

This paper examines the question: *How did the COVID-induced switch to online learning impact attitudes and practices toward place-based teaching at the University of Hawaii's School of Ocean and Earth Science and Technology (SOEST)?* Place-based teaching (PBT) has been shown to increase student interest and motivation (Smith and Sobel 2010), strengthen relationships to place and local communities (Sobel 2004); and raise environmental consciousness (Stapp et al. 1969). Whereas PBT can be a successful approach for engaging all students, it has been shown to be exceptionally effective with indigenous students (Cajete 1994). [See Böttjer-Wilson and Bruno 2019 for more on PBT].

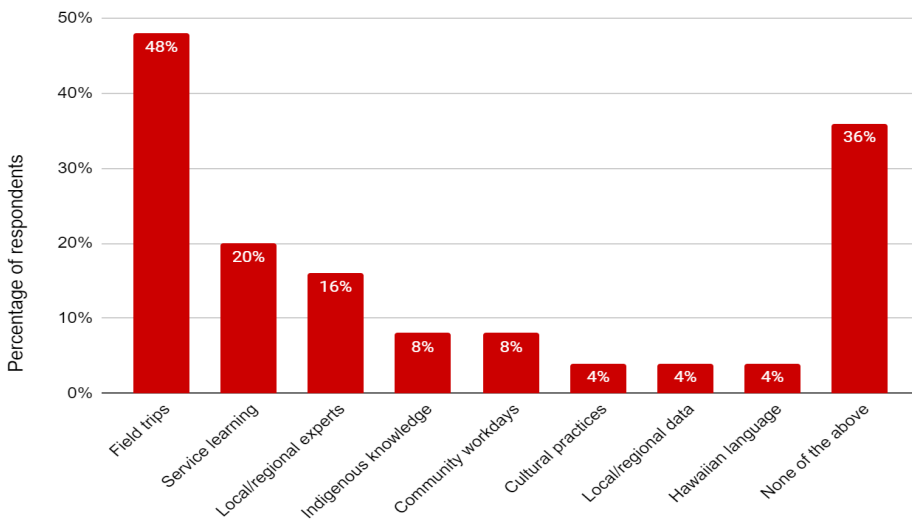
2. Methods

To assess attitudes and experience regarding PBT at SOEST, we distributed an online survey to SOEST faculty and students in Fall 2018 (Böttjer-Wilson and Bruno 2019) and again in Fall 2021. In 2018, there were 142 survey respondents, including 59 faculty and 83 students. In 2021, the response was smaller (83 total), including 31 faculty and 52 students. Not every respondent answered every survey item, so the number of responses to each survey item varies. Comparing the two data sets enables us to gauge how PBT attitudes and practices have changed between 2018 and 2021. The timing of the 2018 pre-survey was fortuitous, as we obviously could not have anticipated the COVID-19 pandemic hitting in 2020, and allows us to consider the effect of the global pandemic on PBT. Throughout this paper, the graphs present the 2018 survey data in blue and the 2021 survey data in red.

3. Data & Results

3.1 Faculty Survey Results

In Fall 2020 and Spring 2021, all SOEST instructors used online course formats, with 92% teaching online synchronous classes. The majority of instructors (60%) taught only online synchronous classes, but some also used asynchronous (20%), hybrid (12%) and/or in-person (16%) formats. When asked which PBT practices they would have normally used during Fall 2020 and/or Spring 2021 but did not due to the COVID-19 pandemic, most faculty listed one or more practices (Figure 1). Topping the list of PBT practices reported were field trips (used by 48% of faculty), service learning (20%), and local/regional experts as guest speakers (16%) – all of which would have been much more difficult to do in online courses. About one-third (36%) of faculty responded “None of the Above”, which could either indicate that these faculty used PBT practices pre-pandemic and continued to use them post-pandemic, or that they never used PBT practices pre-pandemic.



PBT practices that faculty normally used, but did not because of the COVID-19 pandemic

Figure 1. These data on PBT practices were compiled from faculty responses to the 2021 (n=25) survey question: Which of the following PBT practices would you have normally used during Fall 2020 and/or Spring 2021, but did NOT because of the COVID-19 pandemic? (Check all that apply). The listed practices (from left to right) are: Field trips; Service learning; Local/regional experts as guest speakers; Indigenous knowledge, or ways of knowing; Community workdays; Cultural practices; Local/regional data sets; Hawaiian language terms; and None of the above.

3.2 Student Survey Results

In student surveys administered in both 2018 and 2021, SOEST students were asked to state their agreement or disagreement to the survey item: “SOEST lab and lecture classes with strong ties to place (Mānoa, O’ahu, Hawai’i or the Pacific region) have greatly improved my learning experience” by selecting an answer choice on a five-point scale ranging from Strongly Agree to Strongly Disagree. Results are presented in Figure 2.

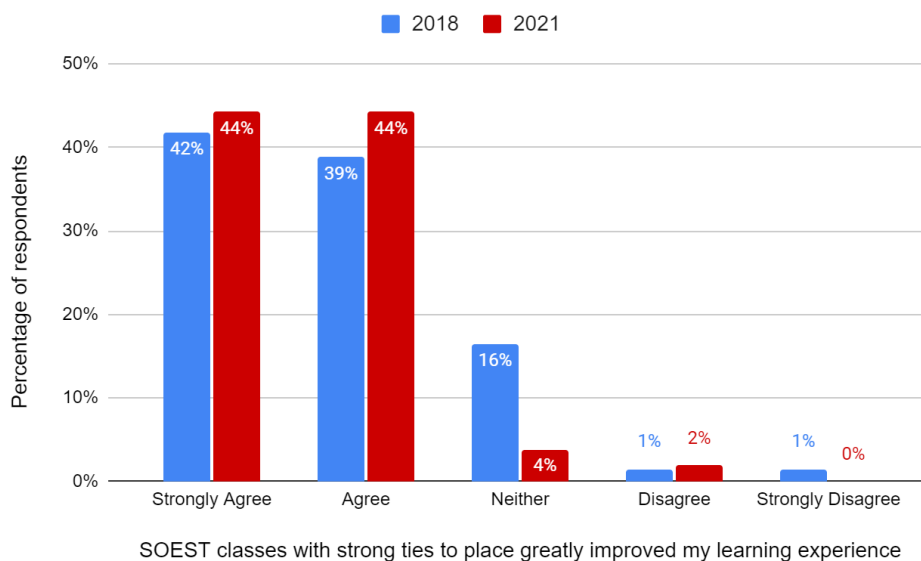


Figure 2. Student responses to the 2018 (n=67) and 2021 (n=52) survey item: SOEST lab and lecture classes with strong ties to place (Mānoa, O’ahu, Hawai’i or the Pacific region) have greatly improved my learning experience. “Neither” means Neither agree nor disagree.

From 2018 to 2021, the combined positive responses (Agree and Strongly Agree) increased from 81% to 88%, the neutral response (Neither Agree nor Disagree) decreased from 16% to 4% and the combined negative responses (Disagree and Strongly Disagree) decreased from 3% to 2%. [Note: Although Figure 2 suggests the combined negative responses remained at 2%, the combined 2018 value is 3%, due to rounding.] Together, these results indicate that, compared with the 2018 student respondents, the 2021 student respondents reported higher levels of agreement. In order to test whether the higher agreement in 2021 (vs. 2018) is statistically significant, we quantified the Likert Scale on a scale of 1 (Strongly Disagree) to 5 (Strongly Agree). This enables us to calculate mean values and run an unpaired, one-tailed t-test, using $\alpha=0.05$. The results were: 2018 mean = 4.18; 2021 mean = 4.42, t-statistic = 1.68 and $p = 0.048$, indicating statistical significance (as $p < \alpha$) – that is, the students reported significantly stronger agreement to PBT learning benefits in 2021, compared with 2018. This

result underscores the importance for faculty to use PBT practices, even (or especially?) when teaching online courses, despite the obvious challenges.

Figure 3 summarizes the types of PBT practices that students would like to see included in future classes. Each PBT practice listed on the survey was selected by 47-84% of 2018 respondents and 58-88% of 2021 respondents, with field trips (84% and 88%) topping the list in both years. All (100%) respondents who answered this question selected at least one practice; no one selected “None of the Above”. The percentage of respondents who selected each practice increased from 2018 to 2021. One possible explanation could be the COVID-19 pandemic, which caused many students to feel socially isolated and perhaps strengthened their desire to be connected to people and places (Smith et al. 2022).

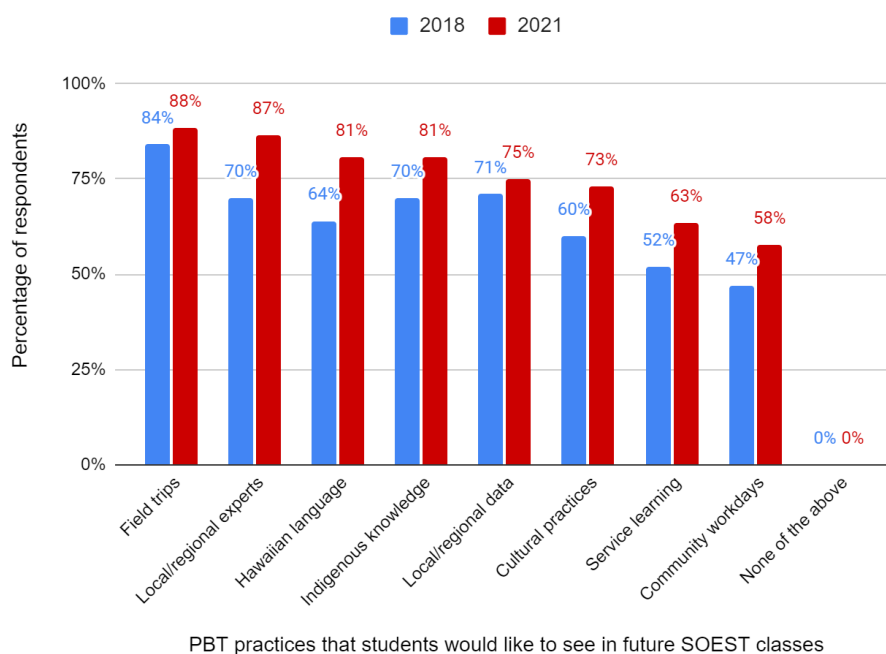


Figure 3. Student responses to the 2018 (n=73) and 2021 (n=52) survey question: What aspects of PBT would you like to see included in your SOEST lab and lecture classes in future semesters? (Check all that apply). The listed practices (from left to right) are: Field trips; Local/regional experts as guest speakers; Hawaiian language terms; Indigenous knowledge, or ways of knowing; Local/regional data sets; Cultural practices; Service learning; Community workdays; and None of the above.

4. Discussion and Conclusions

SOEST survey results indicate that PBT practices are highly valued by students and faculty, even (or perhaps especially) when courses are in online formats, and faculty report wanting to use PBT. When they do, students report their learning is greatly improved. Thus, an online

course format should not be considered a reason to discontinue PBT. Looking at the strategies listed in Figure 3, the most in-demand PBT practices were field trips. Through field trips, student can apply the knowledge learned in the classroom to real-life settings – for example, in the field, they can identify rocks and minerals in situ, conduct geological mapping exercises, detect evidence of glaciation, examine volcanic deposits and infer eruption styles, observe weathering and erosion, and use all of this information to unravel the geologic history of an area. Field trips also help students create connections with place and with other participants, strengthening student motivation and their sense of belonging to a learning community. But can these benefits be realized through virtual field trips?

Prior to the COVID pandemic, virtual field trips existed, but were relatively uncommon in the geosciences (see Bond et al. 2022 for a literature review of pre-pandemic virtual field trips). Their popularity exploded during the pandemic, driven by necessity. Virtual field trips pose unique challenges, and do have limitations, but there are many excellent virtual geoscience field trips that serve as exemplars in achieving well-defined learning outcomes. The Science Education Resource Center at Carleton College (SERC 2022) has perhaps the most extensive and varied collection of virtual geoscience field trips in the world, and includes a top-tier “Exemplary Collection”. Other useful collections of virtual geoscience field trips have been compiled by the American Geophysical Union (AGU 2022) and the European Geosciences Union. The latter highlighted 19 examples of virtual field trips, on topics ranging from simulations of traditional geologic mapping to gamified experiences, in a recent joint special issue (Toy et al. 2022).

Although the virtual field trips described above may not contain PBT content relevant to all areas, they can serve as useful models. In SOEST, instructors were able to quickly adapt their in-person field trips to virtual formats that retained PBT content, using a variety of strategies. One adaptation converted a campus-based geology field trip (Bruno et al. 2022) to a self-guided walking tour, using interactive prompts that the students could access via their cell phones. Another faculty member took photos and video of sites around O‘ahu, then voiced over content that allowed students to answer geology questions online without having to travel to the sites. The Hawai‘i Division of Forestry and Wildlife (2023) hosts virtual field trips that include geographic, historical and cultural information, which serves as an example of how locally relevant, pre-made virtual content could be used to fulfill PBT goals with a minimal time investment on the part of the instructor.

Apart from field trips (88%), several other PBT practices were in high demand by the student respondents, including Local/regional experts as guest speakers (87%); Hawaiian language terms (81%); Indigenous knowledge, or ways of knowing (81%); and local/regional datasets (75%) (Figure 3). While using local and regional datasets is a relatively accessible pedagogical technique for most faculty, the vast majority of SOEST faculty are neither Native Hawaiian nor from Hawai‘i, and few are experts in Hawaiian language, culture or indigenous

knowledge. Thus, it is essential for faculty to construct their own knowledge as well as partner with experts. Here are a few suggested starting points for incorporating PBT content into online classes, beyond virtual field trips and local and regional datasets. Though conceived for Hawaii-based SOEST faculty, these strategies can be extrapolated for a global audience:

- Regularly use Hawaiian terms (including place names) in geoscience classes, and learn to write and pronounce them correctly.
- Learn about history and culture, by visiting local museums (for example, Bishop Museum in Hawaii) and cultural sites, attending lectures, and reading.
- Volunteer at local community events, to learn, give back, and make connections with local experts. Investments in the community may result in opportunities to invite local experts into virtual classrooms.
- Incorporate local and indigenous knowledge into geoscience course content in consultation with cultural practitioners. Hawaiian-language newspaper archives are a repository of traditional practices (IHLRT 2018) – see Swanson (2008) for an example.
- Invest in reciprocal community-research partnerships, following protocols outlined in Kūlana Noi'i (2021)

In summary, an online course format should not be considered a reason to discontinue PBT practices, but an opportunity to explore new and innovative ways of incorporating this important content.

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