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**COMMENTARIES AND LETTERS TO THE EDITOR**

# The Power of New Online Opportunities to Connect to the Ocean: The Journey of a Research Student and Mentor

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This commentary shares a unique collaborative experience between a student and faculty mentor, made possible by the shift from in-person to virtual conferences during summer 2020. Although the two never met face-to-face, online technologies made it possible to facilitate the mentoring, project development, and dissemination of ArcGIS StoryMaps themed on ocean literacy, the United Nations Sustainable Development Goals, and United Nations Decade of Ocean Science for Sustainable Development. The StoryMap collection is available at: <https://bit.ly/thepowerofconnections>.

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Between the spring and fall semesters, undergraduate students seek out discovery-based summer experiences under the mentorship of university faculty. Students majoring in STEM programs especially are eager to gain laboratory and/or field experience to advance their content knowledge and exploration of careers. The onset of COVID-19 cancelled many summer research opportunities in 2020 because of social distancing requirements, yet at the same time opened up new possibilities and new projects for student engagement in ocean science. This narrative is one example of a student/mentor collaboration conducted entirely through virtual access to meetings, communication tools, and dissemination products.

Originally, Dr. Laura Guertin (Professor of Earth Science, Penn State Brandywine) and Isabella (Bella) Briseño (rising sophomore, Penn State University Park) planned to complete a short-term summer project. Briseño wanted to expand and deepen her introduction to ocean science beyond her one freshman-level course in the subject, and oceanographer Dr. Guertin had a one-month window to work with a student during the summer. Dr. Guertin and Briseño were going to travel to Washington, D.C. to attend Capitol Hill Ocean Week (CHOW) 2020 to learn more about protecting the biodiversity in ocean and freshwater ecosystems and the role of policy and management. Briseño was then going to generate an outreach product with the information she learned, making connections to the ocean literacy principles and United Nations Sustainable Development Goals (SDGs).

As the pandemic caused gatherings like CHOW 2020 to move online and forced Dr. Guertin and Briseño to cancel their original summer plans, the mentor and mentee decided to revisit their project idea and explore what else they could engage with. It turned out that not only did CHOW 2020 become available online for free participation, but so did other conferences and webinars, such as the 2020 Virtual Ocean Literacy Summit, Blue Hope Conservation Roundtable, and the National Marine Educators Association Virtual Student Conference. Any student was now able to be a participant in these national and international virtual opportunities for learning.

Both Dr. Guertin and Briseño participated in all the events listed above (except only Briseño was in the NMEA Student Conference) and took notes to share with each other. They used Microsoft Teams as the hub for documentation of and collaboration on their work. Virtual meetings between Dr. Guertin and Briseño also

took place once or twice per week in Teams for mentoring and planning the next steps of virtual exploration. With the wealth of information gathered, Briseño decided to create a collection of educational resources that would be useful to middle school-through-college-level students and teachers to learn more than the physical science from a traditional first-semester oceanography course. She would use ArcGIS StoryMaps to tap into the multimedia options for the narrative and utilize her Spanish language skills to translate each StoryMap into Spanish to expand the reach of dissemination beyond linguistic borders.

From the wealth of information gathered during the four virtual sessions, three ocean themes emerged to Briseño: disciplines, cultures, and generations. Inspired by the presentation from IOC Secretariat Julian Barbière at the end of the Virtual Ocean Literacy Summit, Briseño's notes taken across the conferences were categorized under these three themes with an emphasis on the *connections* across disciplines, cultures, and generations. Briseño then pictured the invisible strings tying together these topics and the work of individuals and organizations. Her collection of six original StoryMaps, "The Power of Connections for the Ocean," was subsequently created with the intent of communicating these themes using supplementary multimedia and resources, such as videos, audio, images, and external links. The collection consists of: an introductory StoryMap with an overview of the collection; one StoryMap on the Ocean Literacy Principles and United Nations Sustainable Development Goals; three StoryMaps that each dive into the themes of disciplines, cultures, and generations; and one final StoryMap consisting of questions for the StoryMap collection based on Bloom's Taxonomy for classroom and other educational purposes.

"The Power of Connections for the Ocean" StoryMap collection was completed at the end of summer 2020 and can be viewed at: <https://bit.ly/thepowerofconnections>. Initial feedback from a high school teacher stated, "[The collection is] so comprehensive and [contains] so much valuable information." As conferences continue in a virtual format, this provides additional opportunities for not only conference attendance but for Briseño to share her work. For example, Briseño will be presenting her StoryMap collection at the American Geophysical Union (AGU) Fall Meeting in December 2020.

Although the student and mentor never met in the same physical space during the summer, they viewed the collaboration as a success. Dr. Guertin had prior experience mentoring students located at another campus in her university system and advising commuting students who are not always on campus, so she was comfortable with the technology tools and need for instructions, for a timeline with deadlines, and for clearly defined outcomes. Although this was the first time she mentored a student 100 percent virtually, she found that the process of maintaining communication through live and quick chat messages in Teams was critical to continued focus and engagement. The availability of so many online conferences was an exceptional opportunity and one she hopes to continue utilizing into the future, so that the content, resources, scientists, policy makers, and all that are involved in ocean science become accessible to students eager to advance their learning and careers.

From Briseño's perspective, this successful collaboration is measured by how much she has learned from this experience. For one, the contents of the StoryMap collection were all concepts she was previously unfamiliar with and instead learned at the various conferences the pair attended. Briseño's knowledge of the ocean had been limited to the biological, chemical, and physical aspects behind the ocean that, while important, represent only the scientific approach to viewing ocean-related issues. She had not previously been exposed to relevant topics like the Ocean Literacy Principles or Marine Protected Areas. Now having that exposure, Briseño has a greater appreciation for the upcoming United Nations Decade of Ocean Science for Sustainable Development (<https://oceandecade.org/>) and is committed to helping make it successful. She hopes that her StoryMap collection has a hand in getting others more involved in the Ocean Decade, as well. She has also learned the value of being a member of professional organizations like AGU and The Oceanography Society to share her work with an international audience and connect with professionals in the discipline.

Online educational opportunities in ocean science continue to be offered during this period, expanding in the number available and quickly archived online for free access. This challenging time in education is opening doors for students to hear from marine scientists, policy experts, and ocean advocates worldwide. Experiences like Dr. Guertin's and Briseño's are facilitating the dialogue about issues that affect us all and establishing these much-needed partnerships in support of the upcoming UN Ocean Decade. With one ocean that circles Planet Earth, both authors are hopeful that solutions for the grand challenges the ocean faces will be reached even sooner with these expanded powerful connections.

## Competing Interests

The authors have no competing interests to declare.

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