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Developing a Place-Based Curriculum for Environmental Education Aligned to Next Generation Science Standards

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Developing a Place-Based Curriculum for Environmental Education Aligned to Next Generation Science Standards

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Abstract

With the adoption of the Next Generation Science Standards, schools opting for early adoption are fundamentally changing their science instruction. Synergistically, the environmental education community is also adopting these new 3-dimensional standards. The purpose of our study was to work with Western Washington University's new SEA Discovery Center in Poulsbo, WA to develop an NGSS aligned 6th grade curriculum centered on Olympia Oyster restoration. The place-based curriculum would need to utilize the Center's unique resources while addressing relevant environmental education programming goals. During the summer of 2017 we met with a variety of stakeholders including the SEA Discovery director, Center volunteers and scientists specializing in oyster restoration. As a planning team, we developed a curriculum and piloted it during a summer youth camp. Upon completion of the pilot program we submitted a final curriculum to the SEA Discovery Center for implementation during the 2017-2018 school year. Through this process we learned that curriculum development is a complicated and fluid progression requiring constant feedback and revision that includes all stakeholders in an iterative design process.

Introduction

The SEA Discovery Center in Poulsbo, WA is an environmental education center that provides marine science field trips to five districts in Kitsap county at the elementary level. The center is now working to establish a place-based curriculum for middle school and high school that aligns to Next Generation Science Standards. The purpose of this project was to meet with the SEA Discovery Center staff and professionals in the field of marine restoration to produce a 6th grade phenomenon-based curriculum centered around ongoing restoration projects in the area.



Final Product

The final curriculum centered around the overarching question: *How can we use our knowledge of the life cycle of the Olympia Oyster to help restore its population here in Liberty Bay?*

This was further broken down into four sub-questions that students would investigate on their field trip to Sea Discovery Center.

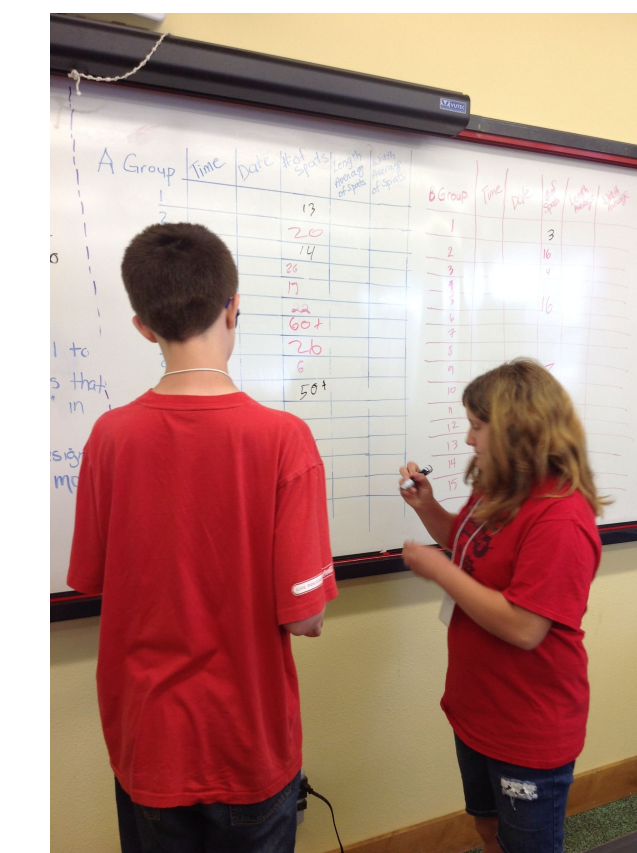
1. Do all organisms have the same life strategy for survival in marine environments?
2. How do organisms like oysters, that are "stuck" in one place, thrive?
3. What can the changes in size and structure of plankton tell us about survival strategies?
4. How can we support the restoration of Olympia Oysters?

Hands-on activities in the final curriculum included: an aquarium scavenger hunt, Olympia oyster stewardship and restoration, and physical data collection in the floating lab. Students investigated several phenomena related to marine organisms and were challenged to develop a model for how fixed or sessile organisms such as shellfish can thrive in marine environments.

Consequently, as students explored the lifecycle of the Olympia Oyster, they were better able to help support its restoration in Liberty Bay. By creating a curriculum centered around restoration, the students were able to meet key Next Generation Science Standards, engage in science practices and focus on a place-based phenomenon intimately tied to Poulsbo and Discovery Bay.



Students cleaning, counting and measuring oyster spat.



Drafting a protocol for Olympia Oyster measurements..



Observing and identifying plankton in the SEA Discovery Center's floating lab.

Methods

The research team met over the Summer of 2017 to compile and create a Middle School curriculum. The team visited the SEA Discovery Center to understand the elementary curriculum, researched marine science activities and learned what resources were available at the Center. They met with SEA Discovery staff, visited professional researchers including restoration scientists and wrote a place-based curriculum centered on Olympia Oyster restoration. There was a one week trial of some of the cornerstone lessons during a summer marine program in July. Based on the pilot, a final curriculum was produced for the Fall of 2017 school year that included all lesson plans and a schedule.

Conclusion

Being new to the Marine Center gave us an "outsider's perspective" that enabled us to offer a fresh perspective on many traditional activities. Based on the Center's foundational activities, the research team incorporated 3-dimensional NGSS standards tied to the new learning activities.

There were many challenges throughout the development of the new curriculum. For example, attempting to create a place-based curriculum for educators in Poulsbo, which is four hours away from Bellingham, was hard. Despite bridging this gap with collaborative online workspaces, this type of hands on teaching and work required many face-to-face meetings to clarify and align expectations. The curriculum was in constant flux as new ideas were heard.

Moving forward, the curriculum is still evolving with the new school year. There are plans to add 7th and 8th grade units. More importantly, as pre-service science teachers, our research gave us a new perspective on the challenges of curriculum development, the value of environmental education and how key collaboration with community partners can be in meeting NGSS standards. Future curriculum will focus on the importance of estuaries in the greater marine ecosystem and how ocean currents can move plastic pollution from one side of the Pacific to the other. Both of these topics will be pertinent to Liberty Bay, an estuary and ecosystem affected by marine plastic pollution.

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