

Extended Learning Opportunities (ELO) Program

ELO Design Template

ELO: Seacoast Science Center/Marine Science Fellowship

Grade Level: Grades 10-12

Stage 1: Planning

Project Description

This is a learning experience designed to give high school sophomores, juniors and seniors an opportunity to have a hands on experience learning about the field of marine science. The course is 10 weeks long and requires students to attend a class on Saturday mornings from 10am to 1pm, plus additional study, project, and/or volunteer time to be conducted on the student's own time, as arranged by the program leader. Students can be involved for one semester or two. The First Semester is to broaden the knowledge base for students about marine science. The second semester will allow students to further engage in the field of marine science and to continue with a research project. Students will have an opportunity to present their research in a symposium at the museum. The spring semester is separate from the fall, so students may start at either point.

Please visit <https://www.seacoastsciencecenter.org/programs/grade-k-12/marine-science-fellowship/> for more information.

The Essential Questions/Learning Goals

Each student will be asked to develop their own essential question based on their project (please see Product/Project section for more details). Here are some examples:

- What range of careers exist in the field of marine biology?
- What impact do I have on the ocean and climate and how can I contribute to a sustainable and healthy environment?
- *Student specific essential question based on their own special interests (will guide their individual project)*

Competencies

ELO Experience Competencies:

- **Reflection:** Student will be able to reflect on their daily learnings and their research in a journal format style.
- **Research:** Students will engage in a step by step research investigation on a topic of their choosing. Students will engage research skills ,choose a question, design a hypothesis, research the background of the problem, conduct comparison research and/or an experiment to answer the question, relate their methods and present a discussion about their findings.
- **Research proposal and scientific poster:** Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating an understanding of the subject under investigation.
- **Product:** Each student is required to create a scientific research poster to demonstrate their understanding of their research



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- **Presentation & Communication:** Each student is required to communicate with Seacoast Science Center visitors about weekly topics
- **Practice Symposium Sessions** with fellow students: Students will have a chance to present their research in a practice session with peers at the Seacoast Science Center
- **Final Presentation:** Students will be presenting at the Marine Science Fellows Symposium

Marine Science Competencies

- **Climate Change:** Students will learn about the effects on a local and global scale that climate change poses. They will understand the threats these effects have on organisms in the ocean. Students will design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
- **Human Impact:** Students will learn first hand the impacts of humans on the ocean and local estuaries. They will be able to see the effects of pollution on different areas and how clean water is important. Students will brainstorm on how their actions can help change our oceans.
- **Marine Chemistry:** Students will understand the importance of ocean chemistry and how this relates to different organisms and their health. They will understand how different chemicals react in the ocean. Students will also be able to identify the equation and the effects of ocean acidification.
- **Ocean Currents:** Students will use hands on experiments to research ocean currents and their role in the diversity of marine environments.
- **Ocean Productivity:** Students will be able to identify and understand the reasons of different productivity areas in the ocean. They will learn about different zones and their relation to productivity in the ocean. Students will be able to determine what makes an area productive versus unproductive.
- **Marine Mammals:** Students will investigate the dangers faced by marine mammals through discussions and presentations from Marine Mammal Rescue professionals.
- **Coastal and Ocean Geology:** Students will use models and presentations to understand the role of coastal and ocean geology in the preservation of ocean resources.
- **Marine Ecosystems:** Students will evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.
- **Marine Science Careers:** Students will understand different career pathways and options to pursue in the marine science field. They will learn first hand what jobs are out there and how to pursue them. Students will learn about other programs and college program that might help them achieve their goals. Students will listen to real scientists in the field about their careers and research.

ELO Partners(s)

ELO partners include the following individuals:

- ELO Coordinator
- Science Teacher
- Seacoast Science Center
- Various local partners and guest speakers in the science field

Step 2: Implementation



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Timeline of Activities and Benchmarks

Each student is required to meet expectations around the four components of any ELO experience:

- Research
- Reflection
- Product
- Presentation

Competency:

Activities:

Reflection	Weekly check-ins with ELO Coordinator Class Log (includes handouts and notes from each class) Final Reflection Paper Here is an outline.
Research	Written Scientific Research sections (question, hypothesis, background, comparison/ methods, results discussion, acknowledgements) (progress reviewed at check ins)
Product	Research proposal and scientific poster
Presentation	Each student is required to communicate and do mini presentations for visitors at the SSC. Practice Symposium Sessions with fellow students Final Presentation will be the Marine Science Fellows Symposium (Symposium review sheet below)

If additional help is needed to develop any component of a student's implementation plan they can contact the Extended Learning Counselor or Sean McKenna at s.mckenna@sscnh.org

Communication Plan

Each student will need to develop a communication plan with all partners involved in the ELO experience.

Students will be attending class on Saturdays at the Seacoast Science Center and will have an opportunity to connect with their staff in person at that time. Visit

<https://www.seacoastsciencecenter.org/programs/grade-k-12/marine-science-fellowship/> for exact class dates.

Students will also have to check in weekly with their ELO Coordinator to reflect on their weekly experiences.

It is important that each ELO partner agree to the communication plan they have with the student.



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Step 3: Completion

Final Product/Project

Here is a description of the final product/project:

Students will be required to engage in a project and will present it at the end of the semester. During this project students will have the opportunity to explore different topics in the world of marine science and be able to design research studies where appropriate. The research project can either be experiment based or research based. The students will be asked to formulate their own essential question(s), as well as to write the standard sections of a scientific research poster which includes:

- Essential Question
- Hypothesis
- Introduction
- Background
- Methods or comparison
- Results
- Discussion and acknowledgements/work cited.

This poster will be presented to classmates and others.

ELO Presentation

Here is a description of the ELO Presentation:

Students will present their research in the format of a science symposium at the end of the semester. The presentations will take place at the Seacoast Science Center and will be open to the general public as well as families and their fellow students.

Here is some helpful information regarding presentations students may find helpful:

[Presentation Information](#)

During the Symposium the student is reviewed by fellow students and visitors. See below for assessment format.

Assessing the ELO

Each ELO partner will have the opportunity to assess part or all of the student's learning experience. This assessment will be based on the four components of an ELO:

- Reflection
- Research
- Product
- Presentation

Specifically the student will be assessed formatively using a weekly check-in rubric:

https://docs.google.com/document/d/1YP8Q_AbKGYk0d0mjllF0RdwuJrZlDlw6QLropan3IT4/edit?usp=sharing

The student will also be assessed summatively using the following rubric:



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https://docs.google.com/document/d/1DJV5JNoWOTefdZNzTetPv55zRLUPxM5PN9qPdFcFG_o/edit?usp=sharing

During the Symposium the student is reviewed by fellow students and visitors using the following format:

Peer Review Sheets:

Presenter: _____

Title of Poster: _____

How well did the presenter know their topic (circle one, 5-excellent): 1 2 3 4 5

1 fact that you learned:

1 piece of constructive advice:

Overall how do you rate the poster (circle one 5 = excellent): 1 2 3 4 5

What would you like to learn about this topic:

Ask the presenter 2 questions:

Write these questions here:

1. _____

2. _____

Other Comments:

Visitor Review Sheet:

Presenter: _____

Title of Poster: _____

How well did the presenter know their topic: 1 2 3 4 5

Did the presenter talk clear and understandable: 1 2 3 4 5

Does the presenter show confidence in their research: 1 2 3 4 5

Overall how do you rate the poster: 1 2 3 4 5

What did the presenter do well _____



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Constructive advice:

Other Comments:

