Project SALINE

Salish Aquatic Learning & Insights Network Ecology

Enhancing Collaborative Learning Between Institutions Through the Power of Human Connection

Aaron Nather | Museology Graduate Program
Master's Thesis Project | Class of 2023

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Thesis

Connected learning ecologies can amplify learning outcomes for museums, visitors, and communities.

Problem

Humans evolved as socially connected beings. Early in our evolution, survival depended on trusting and supportive relationships (Schrader, 2016). Today, social isolation challenges our ability to learn effectively (Sutcliffe & Noble, 2022).

A *learning ecology* is a physical, social, and cultural context where learning occurs. Ecological approaches to learning emphasize the need to make connections across formal, informal, and everyday education (Bevan 2016). In a post-pandemic world, it is essential to create new opportunities for meaningful and sustained human interactions to help foster learning. Human connection is vital because it exposes students to new learning approaches and builds relationships that increase understanding and success (Kwaske & McLennan 2020; Siemens 2005).

Museums can meaningfully contribute to broader learning ecologies alongside schools, libraries, community centers, and other information repositories. However, due to many constraints, individual museums often operate in isolation and do not create connected learning experiences with other institutions.

Complex factors hamper museums when creating connected guest experiences with outside museums, schools, and experts. Sustainable, connected learning experiences remain rare. In speaking with museum educators over the last 18 months, the root cause of this issue is a need for several key elements: consistent funding, sufficient staff to develop and maintain learning content, internet-connected technologies, and dedicated implementation support. These challenges make it harder to overcome the following barriers:

- **Geographic distance.** Learners, educators, and subject matter experts are geographically isolated from museums and communities. Even small distances can make collaboration between institutions challenging.
- **Selecting and implementing technology.** Some museums and institutions struggle to understand and implement the technologies needed to connect and collaborate effectively with each other. Consultants and technology experts can be expensive.
- **Creation of learning content.** Some institutions struggle to create engaging, accessible new educational content due to being understaffed and underfunded.

Audience

The general audience for this project is all informal and formal learners in museums, classrooms, and homes that want to connect and learn together more effectively.

A prototype learning ecology was built in collaboration with educators at the following institutions to understand and address the needs of this audience.

- MaST Center Aquarium (Des Moines) - The MaST Center Aquarium, situated at Highline College, is a marine biology and aquarium facility. It is a place for both formal teaching and public

learning that aims to enhance awareness and understanding of Puget Sound. (*Highline College MaST Center* 2023)

- Why Not You Academy (Des Moines) – Why Not You Academy (WNYA) is a unique educational institution revolutionizing the landscape of high school education. WNYA is focused on cultivating a network of schools that prioritize mentorship-based, deeper learning approaches to prepare students for success in college, career, and civic life. The academy works collaboratively with local communities to provide a customized learning experience tailored to each student's needs and goals. (*Why Not You Academy* 2023)
- SR^3 (Des Moines) - SeaLife Response, Rehabilitation, and Research (SR^3) is a non-profit organization based in the Pacific Northwest committed to enhancing the health and welfare of marine wildlife. The organization aims to provide rehabilitation and research services to marine animals, promoting sustainable living and protecting our oceans. By working collaboratively with local communities, SR^3 strives to positively impact marine wildlife and inspire individuals to take action to preserve the natural world. (*SR^3 sealife response, rehabilitation, and research* 2023)

Later, including more schools and rotating subject matter experts and members of the Community Marine Centers can expand opportunities for a broader range of learners, providing diverse perspectives and enhancing their educational experience. An approach might be adding more schools, rotating subject matter experts, and members of the Community Marine Centers of the Salish Sea aquarium consortium.

- Feiro Marine Life Center (Port Angeles)
- Harbor WildWatch (Gig Harbor)
- Langley Whale Center
- Nisqually Reach Nature Center (Lacey)
- Puget Sound Estuarium (Olympia)
- Port Townsend Marine Science Center
- SEA Discovery Center (Poulsbo)

Goal and Vision

This thesis project uses the newly created SALINE (Salish Aquatic Learning & Insights Network Ecology) platform to deliver a prototype for a new education and outreach program. SALINE is a modular, scalable, connected learning platform comprised of three core components: an audio-visual hardware- and software-based communication system, an online learning management system (LMS), and a customized learning curriculum. With its flexible framework, SALINE can connect and facilitate collaboration between any combination of institutions, experts, and informal and formal learners, regardless of geographical location.

The SALINE prototype aims to enhance the best of the MaST Center Aquarium's content delivered using the Highline College Hyflex classroom standards (Betty 2022), SR^3 lab environment and experts, and the WNYA classroom setting. When these organizations and experts can easily connect, learners in each location can benefit from better outcomes through experiencing real-time, real-world, and virtual collaboration between instructors, subject matter experts, and their peers.

More than simply projecting an expert into a classroom, SALINE provides the necessary tools to foster human connection and collaborative learning. The underlying goal is to nurture and grow the human

and environmental connections necessary to fuel a joyful lifelong learning journey for everyone. In the future, the SALINE platform can expand to support even more learning communities, schools, museums, non-profits, schools, and businesses.

Outcomes

Project SALINE aims to amplify the power of connection and collaboration between learners, institutions, experts, and online information repositories to help build knowledge and enhance critical thinking, problem-solving, and decision-making skills. The following general SALINE outcomes were derived from Connectivism, a modern learning theory for the digital age, first conceived by George Siemens in January 2005 (Siemens 2005).

SALINE individual outcomes – the SALINE learning cycle

- **Choice.** "I can choose my own way to access information from SALINE (e.g., free exploration within the LMS via computer or mobile device, casually browsing an exhibit space, or facilitated in a physical classroom), including contributions from other institutions, experts, and peers."
- **Easy access.** "I gained knowledge of all other SALINE sites (e.g., SR^3, MaST) as well as outside sources of information (e.g., internet videos, articles, libraries, and Instagram science accounts."
- **Flexible thinking.** "I changed my mind about potentially harmful or unsustainable beliefs about marine animals and their stewardship I may have held in the past based."
- **Decision making. "**I can make ocean- and marine-life-aware decisions."
- **Collaboration.** "I can share my new beliefs, knowledge, and understanding. I can get peer feedback that validates my learning experiences and demonstrates that my peers were inspired and engaged by my work which motivates me to continue my learning journey (e.g., through sharing new information, original blog posts, new photos, and relevant videos from other sources)."

The following curriculum-specific outcomes were derived from the goals of the individual sites within the networked learning ecology.

MaST, SR^3, & WNYA outcomes (Curriculum link**)**

- **HS-LS2-6:** Evaluate 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.
- **HS-LS4-6:** Create or revise a simulation to test a solution to mitigate the adverse impacts of human activity on biodiversity.
- **HS-LS2-7:** Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
- **OLP 5:** The ocean supports a great diversity of life and ecosystems.
- **OLP 6:** The ocean and humans are inextricably interconnected.
- **Learning Objectives:** Participants will learn
    - To identify the most common marine mammals in the Puget Sound
    - The causes of marine mammal deaths in the Puget Sound
    - Ways to reduce human impacts on marine mammals
- **Key Concepts**

- Marine mammals are a diverse group of animals that have adaptations for living all or part of their lives in water.
- Observation is essential in science.
- Making a hypothesis based on evidence, sometimes insufficient evidence.

Since Time Immemorial: Tribal Sovereignty in Washington State outcomes

Washington State's mandate requires schools to teach their students about Tribal Sovereignty in Washington State using either Since Time Immemorial or another tribally-developed curriculum. This initiative has been endorsed by all 29 federally recognized tribes in the state. This curriculum aims to improve the understanding of learners and educators about the past influences of tribal nations and the contemporary and ongoing tribal and state government relations. (Banker, 2023). The curriculum was designed to cover the following requirements.

- Be familiar with High school grade-level marine stewardship concepts like The Boldt Decision
- What political, economic, and cultural forces led to treaties?
- What are the ways in which tribes respond to threats and outside pressure to extinguish their cultures and independence?
- What are local tribes doing to meet the challenges of reservation life? What are these tribes, as sovereign nations, doing to meet the economic and cultural needs of their tribal communities?

Evaluation

As students and instructors begin to use the Marine Mammals of the Salish Sea curriculum, Canvas CMS evaluation tools are used to assess the effectiveness of the curriculum and network. Feedback will drive future changes and improvements.

Understanding content and curriculum outcomes

Canvas LMS offers several assessment tools for tracking and improving student learning in courses.

1. There are two different quiz types in Canvas: Quiz and Survey. Quizzes are evaluated based on right or wrong answers, while surveys can be administered anonymously without evaluating right or wrong answers.
2. A short-form survey was included with each learning module in the LMS. The survey contains one of the following questions:
    a. What was your favorite thing about learning with our online guests today?
    b. What was your favorite thing you learned from the online class today?
3. Canvas outcomes and rubrics can also be used for program assessment and improvement.

Formative understanding of hardware needs across institutions

Hardware needs assessment was performed through extensive meetings and inspections with stakeholders at MaST. Three camera and cable kits were created for distribution to all three locations. Each location required customization with special adapters, screen, and projector configurations during the discovery and implementation phases. Assessment continued with in-person, on-site work to install and train instructors using cameras and classroom equipment at MaST, WNYA, and SR^3.

Activities and Timeline

The following table reflects the original timeline for SALINE activities, including the evaluation plan and the associated timeline. Over the 18-month project, the schedule and scope were dynamically modified

throughout the project in collaboration with site partners to accommodate busy class and exhibit schedules flexibly.

LMS Hosting
Creating a new curriculum sharable between all four institutions was necessary. Most LMS software is designed to be housed at a central institution, like a school, and be used for that single institution alone to teach courses and evaluate each student's learning progress. With the support of the foundry10 and University of Washington leaders and staff, a custom instance of Canvas LMS was installed, which was configured to allow *multiple* institutions and their learners to access and learn from the same online curriculum while complying with numerous requirements and industry standards, including FERPA, COPPA, and GDPR (*Family Educational Rights and Privacy Act* 2021, *Children's Online Privacy Protection Rule 2013, General Data Protection Regulation Compliance Guidelines* 2023).

Content. A portion of foundry10's generous funding was used to hire Dr. Jenny Murphy for three months to create the curriculum for the prototype. Dr. Murphy is a seasoned science and youth educator with expert-level experience building courses in Canvas LMS.

Classroom hardware
Hardware delivery and installation for all three physical classroom locations–MaST, WNYA, and SR^3–was completed in February 2023. Aeriel Wauhob from MaST and Patrick Hutchins from SR^3 performed a dry run class connecting MaST, WNYA, and SR^3 with six students at WNYA's after-school Articulation Club. The dry run approach successfully allowed all the institutions to connect and ensure they felt comfortable with their camera and classroom setups. All equipment operated without issues when operated independently by the educators.

Scheduling and coordination. Scheduling flux presented challenges in hardware installation and content creation. The most significant impact was on curriculum development due to later-than-planned intern hiring. The scope impact was as follows.

1. **Single prototype course curriculum.** The scope of the curriculum is now a single, robust course (*Marine Mammals of the Salish Sea*). The course was built by Dr. Jenny Muphy, a seasoned educator, using a three-tier structure designed using material sourced from MaST and around the internet and quizzes and activities. Four other classes were initially to be derived from other MaST learning modules (approximately four additional) and were descoped for now. They can be added back opportunistically at a later date.
2. **Exhibit material for MaST.** Instead of fully developed exhibit content, at this time, display monitors provided by the SALINE program can support thumb-drive-fed slideshows of material related to what MaST might be teaching on the large interactive screen in the exhibit hall (to be purchased separately by MaST).

Original project scope and timeline

This table shows the preliminary timeline and scope for Project SALINE.

Project SALINE Schedule MaST+SR3+WNYA+Foundry10	2022						2023					
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
	Summer 22			Fall 22			Winter 23			Spring 23		
General												
Hire Human Computer Interation (HCI) Educator												
Set up financial governance with F10												
Define Thesis Project and MaST Goals												
Launch SALINE Classroom Experience												
Iterate on classroom experience												
Launch SALINE exhibit Experience												
Iterate on MaST exhibit hall displays												
Begin thesis project deliverables												
Execute thesis project deliverables												
Write post-grad grant												
SALINE MA Project Completion												
Curriculum												
Create Marine Mammal CSI from existing material												
3D tour of SR3												
Explore 3D Necropsy "choose-your-own" CSI idea												
Explore "Stranding Story" content idea												
Add/change classroom content based on feedback												
Launch exhibit content												
Add/change classroom content based on feedback												
Software												
Evaluate and select an LMS												
Design and create SALINE course experience in LMS												
Fork LMS experience and adapt content for exhibit hall												
Hardware												
Evaluate and select Smart Displays												
Evaluate and select cameras and owls												
Evaluate and select exhibit monitors												
Evaluate and select MaST computer												
Purchase all hardware												
Locate all hardware in prototyping location (s)												
Install classroom hardware at MaST/SR3/WNY												
Create classroom broadcast/collab kits x3												
Train users on broadcast/collab kits x3												
Install MaST exhibit hall hardware												
Evaluation & Sharing												
Develop Evaluation Tools												
Formative evaluation (stakeholder interviews)												
Eval classroom use (student/instructor google forms)												
Eval exhibit use (student/instructor google forms)												
Final evaluation for SALINE MA Project												
Project SALINE Schedule MaST+SR3+WNYA+Foundry10	2022						2023					
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
	Summer 22			Fall 22			Winter 23			Spring 23		

Reflection

SALINE solves many challenges with designing, implementing, and sustaining learning ecologies. At the same time, iterative improvement is essential to adapt to ever-changing learner and educator needs. The level of effort to implement the SALINE prototype showed why designing, implementing, and sustaining learning ecologies for many institutions is very challenging. Through the creation of SALINE, many of these challenges were solved. Key insights emerged throughout the project.

- Hardware. Suitable webcams and "interactive chalkboard" equipment must be selected to fit the needs and capabilities of institutions and individuals operating them. All components must be easy to operate for users, with minimal training.
- Software. Today's Learning Management Systems (LMSs) require a single host institution to administer the account and manage other sites and participants. Sharing an LMS *across* institutions and learners is only possible when one location hosts the LMS and configures it properly.
- Evaluation. Evaluating the platform with an unconnected control group could unfairly exclude some students. To remain inclusive of all learners, craft evaluation questions to help isolate the online aspects of the platform (e.g., *What was your favorite thing about learning with our online guests today?*)
- Engagement. While SALINE enables humans and multiple institutions to connect and collaborate, learner engagement is not guaranteed. Technology cannot replace ensuring content always aims to be highly engaging and relevant to learners. *Connection on its own does not matter if the content is unexciting.*

SALINE enhances collaborative learning for seamless and rewarding hybrid learning experiences. Today, five institutions collaborate in teaching WNYA students with the SALINE platform. The platform can grow and serve various learning communities, promoting enduring and meaningful connected educational experiences for everyone involved.

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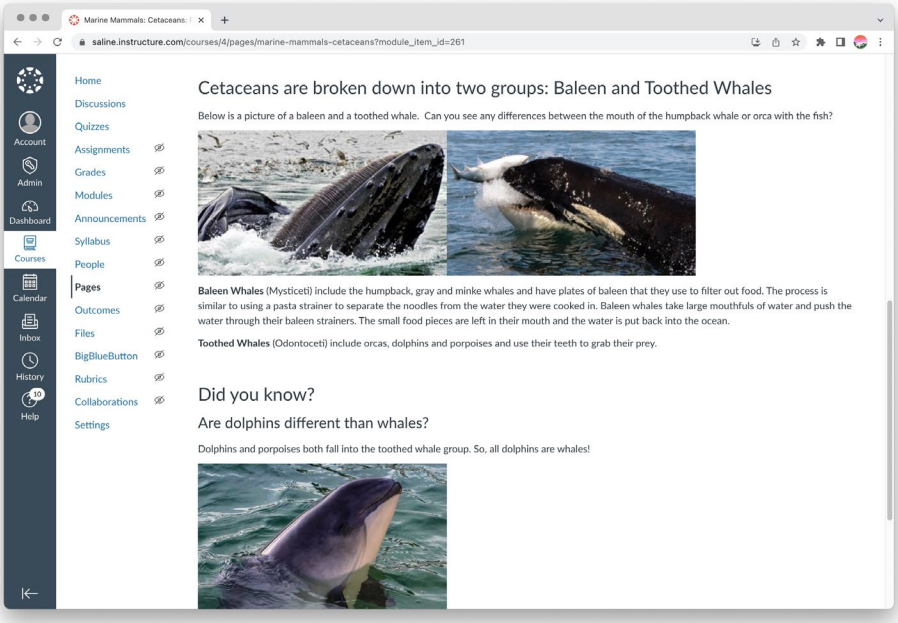
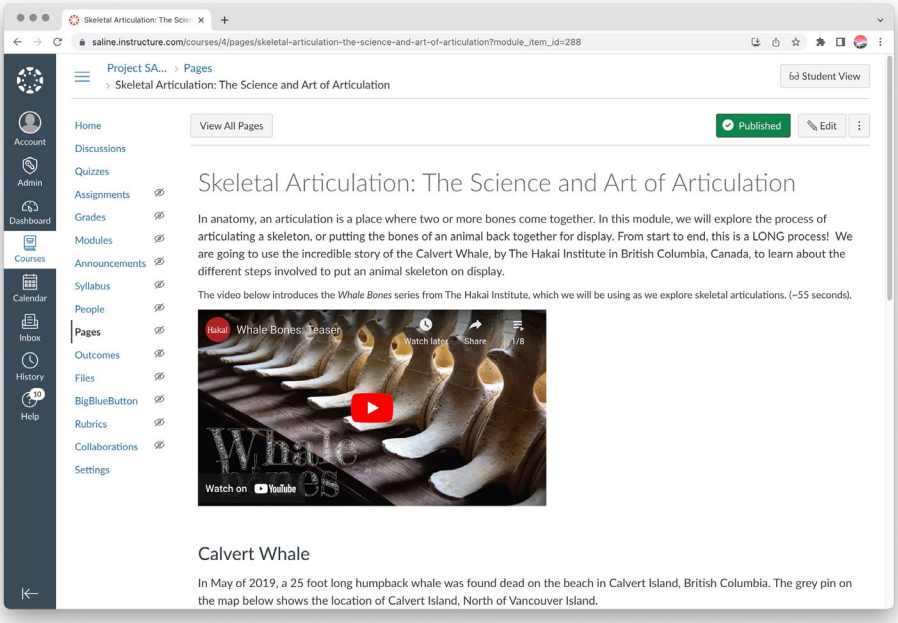
Appendix

A. Curriculum Outline

A seasoned college and youth educator, Dr. Jennifer Murphy created a custom curriculum for the SALINE prototype. The course was designed in three tiers, each with several one-hour classes containing learning content, assignments and activities, quizzes, and a single-question evaluation question. Classes were designed to be taken sequentially, so earlier classes provided scaffolding for later ones. However, they can be taken in any order. Besides online class content, students at WNYA worked on articulating their own Harbor Seal skeleton in their after-school Articulation Club. Aeriel Wauhob from MaST and Patrick Hutchins of SR^3 joined WNYA students virtually to explore and pose their skeletons. Classes are accessible from all three locations on projected screens, smart boards, computers, and mobile devices.

1. Level 1 - Investigate!
    a. Introduction to the Large Marine Mammals of the Puget Sound
    b. Overview of Marine Mammal Anatomy and Physiology
    c. Studying When Marine Mammals Get Hurt or Sick
    d. Career Connections
2. Level 2 - Deep Dive!
    a. The Human Impacts on Marine Life
    b. How We Can Help
    c. Career Connections
3. Level 3 - Explore!
    a. Community, Environment, & the Law
    b. The Marine Mammal Protection Act (MMPA) and the Endangered Species Act (EPA)
    c. Career Connections
4. Bonus Class – Skeletal Articulation





B. Detailed Outcomes for MaST, SR^3, and WNYA

Participants will become wildlife detectives in this series of hands-on investigations. Analyzing necropsy reports, articulating skeletons, and finding patterns in field data are just a few of the skills students practice as they explore the issues facing our local Puget Sound marine mammals.

Next Generation Science Standards & NOAA Ocean Literacy Principles

- MS-LS1-6: Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.
- MS-LS2-1: Analyze and interpret data to provide evidence for phenomena.
- MS-LS2-3: Develop a model to describe phenomena.
- HS-LS2-6: Evaluate 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.
- HS-LS4-6: Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.
- HS-LS2-7: Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
- OLP 5: The ocean supports a great diversity of life and ecosystems.
- OLP 6: The ocean and humans are inextricably interconnected.

Learning Objectives

Participants will learn:

- To identify the most common marine mammals in the Puget Sound
- The causes of marine mammal deaths in the Puget Sound
- Ways to reduce human impacts on marine mammals

Key Concepts

- Marine mammals are a diverse group of animals that have adaptations to live all or part of their lives in water.
- Observation is essential in science.
- Making a hypothesis has to be based on evidence and sometimes you do not have enough evidence to solve a mystery.

Guiding Questions

- Why is it important to understand how strandings occur or how to respond to marine mammal strandings?
- How might humans cause marine mammal strandings?
- Why can a hypothesis not be formed without evidence?

Vocabulary

- BAR - Bright, Alert, Responsive. A good sign that a stranded animal is relatively healthy.
- Endoparasite - An organism that lives inside a larger organism and does it harm by living there.
- Intramuscular (IM) - An injection of medication into the muscle tissue.
- Marine debris - any human-made object that ends up in the marine environment such as straws, soda bottles, plastic grocery bags, etc.
- Necropsy - When a scientist or veterinarian looks at the internal and external anatomy of an animal to try and determine how they died.
- Stranding - When a marine animal is found dead on the beach or floating in the water, or alive and in need of medical attention or are unable to return to the water.
- Subcutaneous (SQ or Sub-Q) - An injection of either medicine or fluids into the tissue that connects the skin and muscle.

C. Final Project Scope & Timeline

This table shows the final timeline and scope for Project SALINE after scheduling and scope adjustments.

NEW MVP Project SALINE Schedule MaST+SR3+WNYA+f10	2022						2023					
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
	Summer 22			Fall 22			Winter 23			Spring 23		
General												
Hire MaST Intern												
Hire SALINE intern												
Set up financial governance with F10												
Define Thesis Project and MaST Goals												
Launch SALINE Classroom Experience												
Iterate on classroom experience												
~~Launch SALINE exhibit Experience~~												
Iterate on MaST exhibit hall displays												
Begin thesis project deliverables												
Execute thesis project deliverables												
Write post-grad grant												
SALINE MA Project Completion												
Curriculum												
Create Marine Mammal CSI from existing material												
~~3D tour of SR3~~												
~~Explore 3D Necropsy "choose-your-own" CSI idea~~												
~~Explore "Stranding Story" content idea~~												
Add/change classroom content based on feedback												
~~Launch exhibit content~~												
~~Add/change exhibit content based on feedback~~												
Software												
Evaluate and select an LMS												
Design and create SALINE course experience in LMS												
~~Fork LMS experience and adapt content for exhibit hall~~												
Hardware												
Evaluate and select Smart Displays												
Evaluate and select cameras and owls												
Evaluate and select exhibit monitors												
Evaluate and select MaST computer												
Purchase all hardware												
Locate all hardware in prototyping location (s)												
Install classroom hardware at MaST/SR3/WNY												
Create classroom broadcast/collab kits x3												
Train users on broadcast/collab kits x3												
Install MaST exhibit hall hardware												
Evaluation & Sharing												
Develop Evaluation Tools												
Formative evaluation (stakeholder interviews)												
Eval classroom use (student/instructor google forms)												
~~Eval exhibit use (student/instructor google forms)~~												
Final evaluation for SALINE MA Project												
Project SALINE Schedule MaST+SR3+WNYA+Foundry10	2022						2023					
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
	Summer 22			Fall 22			Winter 23			Spring 23		

~~Strikethrough~~ = Scope reduction
Red block = Missed deadline
Yellow block = At risk/pushed out

D. Example Hardware Kit

SK#2 Inventory
Kit delivered to Patrick Hutchins and Kate Hruby SR[3]. Aaron Nather installed it on Friday, 1/6/23.

Setup notes
For the Meeting Owl setup, make sure all Zoom camera and mic settings are set to "Meeting Owl." When switching the camera views to the Insta 360 for a detailed view of something you want to show viewers up close, simply make sure the 360 is plugged into the same computer as your Owl and switch the camera source to the Insta 360 for that portion of your meeting. Switch back and forth between Owl and the 360 at any time. Leave microphone settings on Owl at all times.
Meeting Owl Setup Guide | Insta360 Link Tutorials and Quickstart Guide

Meeting Owl
1x Meeting Owl: **SALINE MO#2**
1x USBC cable
1x USBc to standard USB adapter

Owl Extender Mic
1x Meeting Owl Mic Extender: **SALINE MM#2**
1x Mic cable (plug-n-plays into the front of Owl)

HD Camera
1x Insta 360 Link HD Webcam: **SALINE WC#2** (for broadcasting details and zoom-ins the Owl cannot)
1x Insta 30 link tripod
1x USBC cable
1x USBc to standard USB adapter

Miscellaneous
Pelican Meeting Owl Hard Case
15' Kensington power strip
USB adapter kit

E. Original Budget

This budget was created to request funding support from foundry10. It includes all the components needed to create a flexible toolkit to create and evaluate 1) a collaborative, connected marine lab classroom spanning MaST Center Aquarium, SR³, and WNYA, 2) an interactive tryptic digital exhibit at MaST, and 3) the ability to add future sites to the ecology easily. Although some items were standard across all locations to create a balanced, consistent learner experience, each institution was budgeted separately to account for individual needs.

After gaining funding, the toolkit was further refined in collaboration with the institutions to meet their needs and minimize expenses, overhead, and barriers to learner and instructor access.

SALINE Hub - MaST Aquarium

The MaST SALINE Hub is 1) a connected classroom with a Meeting Owl and an online gamified curriculum accessible by other SALINE Sites by instructors and students, along with 2) a tryptic exhibit comprised of one touch screen display and two non-touch monitors where instructors, docents, and Aquarium visitors interact with SALINE curriculum on the exhibit hall floor.

MaST Center Salish Aquatic Learning and Insight Network Ecology (SALINE) Hub	Capital Expenses	Operational Expenses
Curriculum		
Dedicated MaST Human-Computer Interaction (HCI) Educator specialist staff position responsible for building and maintaining a core and growing library of online network-accessible, expanding "K through Gray" educational content. This role drives collaboration with SR³ and WNYA and interfaces with Aaron N Note: The multi-module Curriculum might be called 'Messengers of Change. The Biology, Ecology, and Stewardship of the Large Creatures of the Salish Sea (MoC)'		65,000/yr. (Source: Rus Highly. Full-time MaST staff salary includes benefits.)
Virtual Choose-Your-Own-Path CSI Marine Mammal Necropsy to be included in the above MoC curriculum Note: Content created by a to-be-hired videographer/editor (e.g., Jess Newley, who has done videos for the Friends of the San Juans) and supervised by the HCI educator. Content to be accessible to SALINE in the LRM	5,000.00	
Virtual SR³ Tour. Same as above, to be included in the above MoC curriculum. Content to be accessible to SALINE in the LRM	5,000.00	
LRM Software Infrastructure		
LearnWorlds LMS (or comparable) Learning Center Plan to build and house curriculum courses, content, and guest interactions Notes: Supports all SALINE sites, community, learners, *Foundry10* researchers, and educators (*see LearnWorlds plan comparison*). Includes built-in *reporting* and *3P analytics integration*, *gamification*, and integrations with *Zoom* and *Google Forms surveys*. Compare to *MoodleCloud* for 1,000 users and 5 GB of storage at 1,410.00/yr and limited features		2988.00/yr (240.00/mo. Billed annually)

The modular content library is distributed and leveraged across the ecology by curious learners in the community. Ongoing learning outcomes are directly observable by Foundry10 researchers We also need to look at Google and other commonly used LMS tools and assess options for extensibility and low barriers to entry and usability for all roles		
Hardware Toolkit		
~~**Touch-enabled classroom display.** 75" SMART Board 6000s series with iQ - 3,000 - 5,000 + 250 shipping~~ Note: RH may be able to get one for the classroom, so we are holding off on this for now, but he will not have an answer soon. Leaving in the budget for tracking purposes but not included in the totals	5250.00	
Touch-enabled exhibit display. 75" SMART Board 6000s series with iQ - 3,000 - 5,000 + 250 shipping	5250.00	
2x non-touch-enabled exhibit hall displays. Exhibit-grade, wide-angle display panels for permanent SALINE/MaST content exhibit use in MaST Exhibit Hall (e.g., 2x Sony XBR-65A9G 65-inch TV @ 2200.00 ea. + 2x 100.00 ea. shipping) Note: Together, the SMART Board and the 2x non-touch displays form a triptych in the MaST exhibit hall	4600.00	
SALINE Computer, Tower. Located in the classroom or MaST HCI Educator office space. Houses curriculum content library. Drives hardwired non-touch Exhibit Hall displays. Feeds content to Hardwired SMART Board. Broadcasts and receives SALINE network content activity from other Sites and community participants. (e.g., HP Pavilion 27 TOUCH Desktop 1TB SSD 32GB RAM Win 11 PRO) Note: RH Confirmed this is a need	2700.00	
Meeting Owl Pro. All-in-one, 360-degree camera, mic, and speaker for collaborative classroom use across SALINE Sites	999.00	
Hard-Sided Meeting Owl® Carrying Case	199.00	
Misc. Meeting Owl Cables and Lock	100.00	
Logitech HD Pro Webcam C920 for recording visually accessible video educational content. SR³ to connect equipment to existing computer equipment. (2x @$70 ea.) Note: This camera (along with the lights and mic) provides an inexpensive option for high-quality 4k video broadcasting	140.00	
Fovitec 2-Light Fluorescent Studio Lighting Kit for recording visually-accessible video educational content	80.00	

Blue Yeti X USB Microphone for recording hearing-accessible video educational content. SR³ to connect equipment to existing computer equipment	120.00	
Genie Backup Manager Home 9 software for desktop hard drive and media storage automated daily backups	50.00	
Misc. HDMI cables, connectors, and power strips for all displays and peripheral hardware	250.00	
Hardware Contingency Budget. Unplanned overages and additional emergent needs like extra webcams, lights, mics	500.00	
IT Infrastructure		
N/A		
Facilities		
4x wall mount, HDMI cable, pass-through power carpentry, and drywall parts and labor. Highline College staff or contractor labor Note: ROM cost validated with RH	5000.00 (ROM estimate. RH and AN to research cost and who is responsible)	
Estimated MaST Site Cost	29,988.00	67,988.00

SALINE Site #2 - SR³

The SR³ SALINE site is a connected marine science classroom with a Meeting Owl. Instructors contribute asynchronously and in real-time to an online gamified curriculum collaboratively accessible by other SALINE Sites.

SR³ SALINE Site	Capital Expenses	Operational Expenses
Curriculum		
Convert existing Sealife Response, Rehabilitation, and Research material to an online learning curriculum. Notes: Existing SR³ staff partners with to-be-hired MaST Center HCI Educator specialist The modular content library is distributed and leveraged across the ecology by curious learners in the community. Ongoing learning outcomes are observable by Foundry10 researchers		0.00
LRM Software Infrastructure		
Instructor Accounts. LearnWorlds LMS Learning Center Plan. Included in MaST Hub setup		0.00
Hardware Toolkit		
Meeting Owl Pro. All-in-one, 360-degree camera, mic, and speaker for collaborative classroom use across SALINE Sites	999.00	
Hard-Sided Meeting Owl® Carrying Case	199.00	
Misc. Meeting Owl Cables and Lock	100.00	

Logitech HD Pro Webcam C920 for recording visually accessible video educational content. SR³ to connect equipment to existing computer equipment. (2x @$70 ea.) Note: This camera (along with the lights and mic) provides an inexpensive option for high-quality video broadcasting	140.00	
Fovitec 2-Light Fluorescent Studio Lighting Kit for recording visually-accessible video educational content	80.00	
Blue Yeti X USB Microphone for recording hearing-accessible video educational content. SR³ to connect equipment to existing computer equipment	120.00	
Hardware Contingency Budget. Unplanned overages and additional emergent needs like extra webcams, lights, mics	500.00	
IT Infrastructure		
N/A		
Facilities		
N/A		
Estimated SR³ Site Cost	2138.00	0.00

SALINE Site 3 - WNYA

The WNYA SALINE site is a connected Charter School classroom with a Meeting Owl where **instructors** and **high school students** access and collaborate asynchronously and in real-time with an online gamified curriculum accessible by other SALINE sites.

WNYA SALINE Site Note: This budget includes the cost of setting up a physical classroom	Capital Expenses	Operational Expenses
Curriculum		
Full access and collaboration with SALINE and Curriculum Notes: WNYA Charter School Learners (and the larger online community) leverage content created by the HCI Educator to learn about Sealife Response, Rehabilitation, and Research (SR³) in an interactive, gamified, connected fashion Learners take and give back to the modular content library hosted at the MaST Hub LearnWorlds LMS. Ongoing learning outcomes are observable by Foundry10 researchers		0.00
LRM Software Infrastructure		
Instructor Access. LearnWorlds LMS Learning Center Plan. Included in MaST Hub setup		0.00
Student Access. LearnWorlds LMS Learning Center classes have the option to be free of charge or fee-based, or a mix of both		0.00
Hardware Toolkit		
Meeting Owl Pro. All-in-one, 360-degree camera, mic, and speaker for collaborative classroom use across SALINE Sites	999.00	

Hard-Sided Meeting Owl® Carrying Case	199.00	
Misc. Meeting Owl Cables and Lock	100.00	
Logitech HD Pro Webcam C920 for recording visually accessible video educational content. SR³ to connect equipment to existing computer equipment. (2x @$70 ea.) Note: This camera (along with the lights and mic) provides an inexpensive option for high-quality 4k video broadcasting	140.00	
Fovitec 2-Light Fluorescent Studio Lighting Kit for recording visually-accessible video educational content. It can be cut if classroom lighting is sufficient	80.00	
Blue Yeti X USB Microphone for recording hearing-accessible video educational content. WNYA to connect equipment to existing computer equipment. It can be cut if classroom audio is sufficient	120.00	
Hardware Contingency Budget. Unplanned overages and additional emergent needs like extra webcams, lights, and mics.	500.00	
IT Infrastructure		
N/A		
Facilities		
N/A		
Estimated WNYA Site Cost	2138.00	0.00

SALINE Hub and Site Totals

Project SALINE Program Summary Expenses	Summary Capital Expenses	Summary Ops Expenses
MaST Highline SALINE Hub	29,988.00	67,988.00
SR³ SALINE Site	2138.00	0.00
Why Note You Academy SALINE Site	2138.00	0.00
Estimated Total SALINE Program Cost	34,264.00	67,988.00
Total Year-One Program Cost (pre-value engineering)	102,252.00	