



TLEF Project – Final Report

Report Completion Date: (2025/02/14)

1. PROJECT OVERVIEW

1.1. General Information

Project Title:	Student-Curated Informal Learning and Engagement Spaces (SCI-LEnS): Developing a New Course for STEM Graduate Students		
Principal Investigator:	Kirsten Hodge		
Report Submitted By:	Kirsten Hodge		
Project Initiation Date:	April 2022	Project Completion Date:	December 2024
Project Type:	<input type="checkbox"/> Large Transformation <input checked="" type="checkbox"/> Small Innovation <input type="checkbox"/> UDL Fellows Program <input type="checkbox"/> Hybrid and Multi-access Course Redesign Project <input type="checkbox"/> Other: [please specify]		

1.2. Project Focus Areas – Please select all the areas that describe your project.

- Resource development (e.g., learning materials, media)
- Infrastructure development (e.g., management tools, repositories, learning spaces)
- Pedagogies for student learning and/or engagement (e.g., active learning)
- Innovative assessments (e.g., two-stage exams, student peer-assessment)
- Teaching roles and training (e.g., teaching practice development, TA roles)
- Curriculum (e.g., program development/implementation, learning communities)
- Student experience outside the classroom (e.g., wellbeing, social inclusion)
- Experiential and work-integrated learning
- (e.g., co-op, community service learning)
- Indigenous-focused curricula and ways of knowing
- Diversity and inclusion in teaching and learning contexts
- Open educational resources
- Other: [please specify]



1.3. Final Project Summary – *What did you do/change with this project? Explain how the project contributed toward the enhancement of teaching and learning for UBC students.*

The SCI-LEnS project successfully developed and launched *EOSC 518: Science Communication and Outreach in Museum and Other Informal Learning Settings* in January 2025. This new graduate course in the Department of Earth, Ocean, and Atmospheric Sciences (EOAS) will equip students with the skills to translate complex scientific research into engaging, public-facing content, with a strong emphasis on museum-based communication and informal learning environments. Recognizing the critical role that museums and science centres play in public education, the course provides students with both a theoretical foundation and hands-on experience in science communication in museums and other informal learning spaces. Throughout the course, students explore how these spaces leverage narrative techniques, interactive experiences, and digital media to transform complex scientific concepts into accessible, meaningful experiences for a wide variety of audiences. The course structure combines lectures, student-led seminars, hands-on projects, field trips, and guest lectures from experts in museum education and science communication, ensuring students gain both conceptual understanding and applied skills.

One of the original project goals was to have students develop exhibits or outreach programs for the Pacific Museum of Earth (PME) as part of their coursework. However, as the course took shape, we realized that students may not have the time to fully develop and implement a museum exhibit or school program within a single term. Instead, we adapted this part of the course to focus on the development of proposals for a school program or museum exhibit. To extend the impact of student work beyond the course, we will host a public showcase at the end of the term, where students present their proposals to an audience of museum professionals, science communicators, educators, and Indigenous scholars. This event provides an opportunity for students to receive constructive feedback and support from experts in the field. As an additional project extension, we offer students the opportunity to showcase their ideas and preliminary activities during UBC Science's participation in Science Rendezvous each May. This allows students to refine and test their concepts with public audiences, further reinforcing the real-world application of their learning.

A key component of the SCI-LEnS project was its students-as-partners model, in which a significant portion of the course content was co-developed by UBC undergraduate and graduate students in collaboration with museum professionals and Indigenous scholars. This approach ensured that the course is deeply informed by emerging student perspectives while benefiting from expert mentorship. Students worked closely with professionals from the Pacific Museum of Earth (PME), the Museum of Anthropology (MOA), the Beaty Biodiversity Museum (BBM), Science World, and the Vancouver Aquarium, gaining direct exposure to best practices in exhibit design, public engagement, and science storytelling. These partnerships will continue throughout the life of the course as many of the project partners will contribute to the content delivery through guest lecturers as well as hosting the class for field trips to local museums.

EOSC 518 places a strong emphasis on reconciliation in science communication, encouraging students to critically examine the historical and ongoing impacts of colonialism in museums, public engagement, and scientific research. The course introduces students to key reconciliation frameworks, including the Truth and Reconciliation Commission's (TRC) 94 Calls to Action, the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), and Towards Reconciliation: 10 Calls to Action to Natural Scientists in Canada (Wong et al., 2020). A dedicated Reconciliation in Science session guides students through principles such as OCAP® (Ownership, Control, Access, and Possession), CARE (Collective Benefit, Authority to Control, Responsibility, and Ethics), and FAIR (Findable, Accessible, Interoperable, and Reusable). These frameworks help students understand Indigenous data sovereignty, ethical research practices, and the importance of reciprocal relationships with Indigenous communities in scientific communication and museum work. Through pre-class reflection activities, guided discussions, and case studies, students explore:



- Who benefits from reconciliation in research, and how to ensure research practices are ethical and collaborative.
- Practical ways to integrate reconciliation principles into their own scientific fields.
- The role of museums in reconciliation, and how exhibit design and educational programming can reflect Indigenous ways of knowing.

Rather than treating reconciliation as a standalone topic, Indigenous scholarship and perspectives are threaded throughout the course. Students critically assess the power dynamics in science communication and develop concrete actions they can take in their research, teaching, and outreach. The goal is to move beyond theoretical awareness to meaningful engagement, accountability, and advocacy in their academic and professional careers.

EOSC 518 enhances graduate education at UBC by providing:

- Hands-on, project-based learning, where students actively apply science communication skills both within and outside of class time.
- A dedicated course for science graduate students to explore the fundamentals of science communication and engage with public audiences using museums and informal learning spaces as a venue.
- Training for the next generation of scientists to prioritize engagement, accessibility, and dialogue in their work.
- Interdisciplinary collaboration, exposing students to perspectives from museum studies, Indigenous scholarship, and science communication.
- Sustainable public engagement opportunities, with the PME and Science Rendezvous serving as platforms for students to test and refine outreach concepts.

By integrating formal graduate education with informal learning environments, the SCI-LEnS initiative established a long-term model for training UBC science students as effective public communicators. The course will continue to evolve, with future cohorts contributing to new outreach projects and science communication initiatives at UBC. Through SCI-LEnS, UBC strengthens its role as a leader in science communication education, ensuring that students become not only experts in their fields but also skilled in translating their expertise into meaningful public engagement.

1.4. Team Members – Please fill in the following table and include **students**, undergraduate and/or graduate, who participated in your project.

Name	Title/Affiliation	Responsibilities/Roles
Kirsten Hodge	Lecturer, Department of Earth, Ocean & Atmospheric Sciences (EOAS); Director, Pacific Museum of Earth (PME)	Served as the SCI-LEnS project lead, overseeing course development, coordinating team members, and supervising GAAs/UAs. Instructor for EOSC 518 with Lukes.
Oli Beeby	Undergraduate Academic Assistant (UAA), Digital Media	Served as the lead student course developer, contributing to course design and digital content creation.
Ruth Moore	Graduate Academic Assistant (GAA), EOAS	Assisted in curriculum design and instructional material development as a student course developer.



Raveen Sidhu	Undergraduate Academic Assistant (UAA), EOAS	Contributed to course development and supported resource creation as a student course developer.
Wylee FitzGerald	Indigenous Consultant	Provided expertise on integrating Indigenous knowledge into the course, emphasizing cultural perspectives, histories, and ethical considerations in science education.
Emma Betz	Graduate Academic Assistant (GAA), EOAS	Assisted with course curriculum evaluation.
David Anderson	Professor, Department of Curriculum and Pedagogy	Advised on course framing and implementation.
Laura Lukes	Assistant Professor, EOAS	Advised on course design, evidence-based teaching practices, and iterative design processes. Supervised and led project evaluation. Instructor for EOAS 518 with Hodge.
Shandin Pete	Assistant Professor of Teaching, EOAS	Provided expertise in integrating Indigenous knowledge and culturally congruent instruction into the course, ensuring Indigenous perspectives were embedded in the curriculum.
Jill Baird	Curator of Education, Museum of Anthropology	Contributed expertise in museum pedagogies and informal learning strategies. Assisted in developing course modules on collaborative program development and community-based knowledge exchange.
Skooker Broome	Exhibition Designer, Museum of Anthropology	Provided expertise in exhibition design, production, and installation. Assisted in developing course modules focused on museum design principles and practices.
Jackie Chambers	Teaching & Learning Manager, Beaty Biodiversity Museum	Contributed expertise in science museum education and hands-on learning. Helped develop course modules on lifelong learning through museum specimens and interactive discussions.



Damara Jacobs-Petersen	Curator of Indigenous Programming, Museum of Anthropology	Provided expertise in arts-based education and culturally attentive teaching. Facilitated connections to local Indigenous communities and assisted in developing modules on Indigenous traditional ecological knowledge.
Derek Tan	Exhibitions Manager, Beaty Biodiversity Museum	Provided expertise in exhibit design, material fabrication, and cost-effective exhibit production. Assisted in developing course modules on design processes and user testing.
Tom Cummins	Exhibits Director, Science World	Contributed expertise in exhibition planning and production. Assisted in developing course modules on exhibit prototyping and fabrication.
Michael Fairchild-Simms	Former Exhibits Manager, Science World	Provided expertise in program development, informal education strategies, and exhibit logistics. Assisted in course modules focused on backward design, STEAM education, and program planning.
Catherine Po	Exhibit Content Developer, NGX (formerly Vancouver Aquarium)	Contributed expertise in exhibit storytelling and interpretation. Assisted in developing course modules focused on narrative-driven exhibit design.

1.5. Courses Reached – Please fill in the following table with **past** and **current** courses (e.g., HIST 101, 2017/2018) that have been reached by your project, including courses not included in your original proposal (you may adapt this section to the context of your project as necessary).

Course	Academic Year
EOSC 518	2024/2025



2. OUTPUTS AND/OR PRODUCTS

2.1. Please **list** project outputs and/or products (e.g., resources, infrastructure, new courses/programs). Indicate a URL, if applicable.

Output(s)/Product(s):	URL (if applicable):
Course syllabus that outlines module topics, readings, assessments/activities, and evaluation metrics for a new graduate course in the Faculty of Science - EOSC 518 - "Science Communication and Outreach in Museum and Other Informal Learning Settings".	https://www.eoas.ubc.ca/academics/courses/eosc518
A new innovative graduate course that will give science students opportunities to learn and experience how to mediate science stories in museum settings.	
A course module that introduces students to Indigenous perspectives and histories, specifically in relationship to Indigenous Peoples of Canada, guides students in respectful ways of incorporating Indigenous Knowledges into science museum settings in alignment with community-engaged and 4R principles (Respect, Relevance, Reciprocity & Responsibility), as well as helps students navigate the changing dynamics of Indigenous relations in scientific research.	
A catalyst and venue for UBC museum professionals to collaborate on an ongoing basis. An annual student project showcase that features hand-on STEM-focused activities open to the UBC community and general public.	
A reflective summary of how this cross-faculty collaboration came together, and guidelines/recommendations about what was beneficial to the project and what hurdles had to be overcome.	

2.2. **Item(s) Not Met** – Please list intended project outputs and/or products that were not completed and the reason(s) for this.

Item(s) Not Met:	Reason:
A public venue that highlights the research happening "now" at UBC - transitioning the PME from a traditional "geology/rocks & minerals" museum into a living science space that is designed to generate conversation among community members and UBC scientists.	While the PME will continue to be maintained and updated by UBC staff and Work Learn Students, the museum will not have as direct ties to the course outcomes as we had originally anticipated.



3. PROJECT IMPACT

3.1. Project Impact Areas – *Please select all the areas where your project made an impact.*

- Student learning and knowledge
- Student engagement and attitudes
- Instructional team-satisfaction
- Teaching practices
- Student wellbeing, social inclusion
- Awareness and capacity around strategic areas (Indigenous, equity and diversity)
- Unit operations and processes
- Other: [please specify]

3.2. Please provide details on each of the impact areas you selected in 3.1. – *For example, explain in which ways your teaching practices changed; how student wellbeing was impacted; how students wellbeing benefited from your project, etc.*

The SCI-LEnS project has had a significant impact on student learning by engaging graduate and undergraduate students in the co-development of EOSC 518: Science Communication and Outreach in Museums and Informal Learning Spaces. As student assistants, they played a key role in designing course content, curating weekly reading lists, developing public engagement strategies, and exploring best practices in museum-based science communication. This hands-on, collaborative experience provided them with valuable skills in curriculum planning and design and interdisciplinary collaboration.

Now in its first term of delivery, EOSC 518 is actively engaging a group of UBC graduate students in applied science communication through museum-based projects. Students are reflecting on the role of museums in science education, designing their own proposals for public engagement initiatives, and critically examining reconciliation in science and science communication. The course fosters collaborative learning, encouraging students to work together in small teams to develop student-led seminars, and proposals for outreach activities and exhibits. We plan to run a mid-course survey asking students to indicate what is working well and what needs updating in the course content and delivery methods.

The instructional team has benefited from interdisciplinary collaboration, drawing on expertise from the Faculty of Science, Faculty of Education, and museum professionals from PME, MOA, BBM, Science World, and Vancouver Aquarium. These partnerships have strengthened the integration of informal science education into the course, ensuring students receive a well-rounded perspective on public engagement and science communication.

A core goal of SCI-LEnS has been to increase awareness and capacity around Indigenous knowledge, equity, and diversity. Indigenous consultants contributed to course development by providing guidance on the integration of Indigenous perspectives. EOSC 518 students are critically reflecting on how museums



present scientific knowledge, engaging in discussions about the colonial history of museum collections, and exploring ways to incorporate Indigenous ways of knowing into science communication. The course fosters a deeper awareness of the responsibilities scientists and educators have in shaping public narratives about science and the environment.

3.3. How do you know that the impacts listed in 3.1/3.2 occurred? – *Describe how you evaluated changes/impacts (e.g., collected survey data, conducted focus groups/interviews, learning analytics, etc.) and what was learned about your project from the evaluation. You are encouraged to include graphical representations of data and/or scenarios or quotes to represent and illustrate key themes.*

The SCI-LEnS project demonstrated meaningful impacts across multiple areas, particularly in student learning, engagement, and awareness of inclusive and interdisciplinary teaching practices. The impact was assessed through structured evaluations, including student and partner feedback, syllabus review, and curriculum evaluation using established rubrics. Below are key insights into the project’s impact:

Student Learning and Knowledge

The development and implementation of the SCI-LEnS course provided graduate students with a unique opportunity to explore science communication in informal learning spaces. The course introduces pedagogical approaches tailored for museums, science centers, and other public engagement settings. Students gain practical experience designing exhibition proposals, creating hands-on outreach activities, and engaging in peer evaluation and reflection. Prior to the first iteration of the course, focus group participants indicated that the material covered content gaps in existing Faculty of Science courses and that the course would support their future career plans.

Student Engagement and Attitudes

Students actively contributed to the course both as co-developers and as participants in its inaugural offering. Feedback gathered from early course reviews highlighted a strong interest in real-world applications of science communication. Focus group participants valued opportunities to develop skills in public engagement, interdisciplinary collaboration, and exhibit development. The iterative approach to course design, which incorporated student suggestions, strengthened engagement by ensuring the content was relevant and responsive to their needs. Some students requested a pass/fail grading option to encourage participation from those without prior experience in informal education.

Instructional Team Satisfaction

The collaborative nature of the project fostered meaningful cross-disciplinary engagement between faculty members, museum professionals, and science communication experts. Course instructors reported satisfaction with the course’s alignment with its intended learning objectives and noted the importance of continued refinement to balance theoretical and practical components. Partner organizations, including museum educators and exhibit designers, provided feedback that shaped the course content and delivery.

Awareness and Capacity Around Strategic Areas (Indigenous, Equity, and Diversity)

A key objective of SCI-LEnS was to enhance students’ understanding of Indigenous perspectives and equity-centered approaches to science communication. Indigenous consultants and scholars contributed to the course development, ensuring that Indigenous scholarship and ways of knowing were meaningfully integrated.



How We Measured Impact

The project evaluation team employed multiple evaluation methods to assess the course's effectiveness and areas for improvement:

- **Partner Feedback:** Local museum and science communication professionals reviewed course modules and provided recommendations on language clarity, assignment expectations, and content relevance.
- **Student Feedback:** A preliminary syllabus was shared with graduate students, followed by a short survey and focus group discussions. Students highlighted strengths in course relevance and applicability while identifying areas needing further clarity.
- **Rubric-Based Evaluation:** The course syllabus was reviewed using established frameworks, including the Palmer et al. (2014) syllabus rubric and the InTeGrate rubric for informal education settings. These assessments highlighted the need for clearer learning objectives and strengthened alignment between assignments and course goals.

Key Takeaways

- The course filled an identified gap in graduate-level training on science communication in informal settings.
- Students valued opportunities for hands-on learning, interdisciplinary collaboration, and public engagement.
- The iterative approach to curriculum development ensured responsiveness to student needs and partner insights.
- Continued refinements to assessment structures, learning objectives, and Indigenous content integration will enhance future iterations of the course.

The SCI-LEnS project continues to evolve, with the first offering of EOSC 518 currently underway. Future evaluations will further assess student experiences and long-term impacts on their careers in science communication and outreach.

4. TEACHING PRACTICES – Please indicate if **your** teaching practices or those of **others** have changed as a result of your project. If so, in what ways. Do you see these changes as sustainable over time? Why or why not?

My teaching practices have significantly evolved as a result of this project. Most notably, I am now teaching the first-ever science communication and outreach course in the history of EOAS. This course, *EOSC 518: Science Communication and Outreach in Museum and Informal Learning Settings*, directly aligns with both my expertise and professional interests as the Director of the Pacific Museum of Earth (PME), holding a PhD in Geophysics and a Master of Museum Education. Teaching this course has allowed me to bridge my background in Earth Science with my passion for public engagement, making science more accessible, relevant, and engaging for both students and broader audiences.

One of the most impactful shifts in my teaching practice has been co-teaching with Dr. Laura Lukes. This is my first experience with paired teaching, and it has been invaluable for professional growth. We bring complementary expertise—Laura's background in educational research and learning science enriches the pedagogical foundations of the course, while my experience in science communication and museum education grounds the course in real-world applications. Through this collaboration, I have learned new instructional methods, including active learning strategies, student-centered facilitation techniques, and approaches for fostering an inclusive classroom climate. This exchange has strengthened both of our teaching practices and has demonstrated the benefits of interdisciplinary teaching partnerships.



Additionally, this course places a strong emphasis on student-led learning, which has further refined my approach to instruction. Through student-led seminars, graduate students take ownership of their learning, selecting topics, leading discussions, and designing interactive components for their peers. This approach not only deepens their engagement with the material but also reinforces their ability to communicate scientific concepts effectively—an essential skill for science outreach. Facilitating these sessions has encouraged me to step back from traditional lecturing and instead guide students in shaping their own learning experiences, reinforcing a participatory and inquiry-driven classroom environment.

Another key development in my teaching has been the increased collaboration with other UBC museums and Vancouver-based science organizations, particularly Science World. Through these partnerships, students gain direct exposure to informal learning environments and connect with professionals in the field. This collaboration has also expanded my own teaching expertise by integrating diverse perspectives on science communication, exhibit development, and public engagement strategies. Strengthening these professional relationships has not only enriched the course but has also enhanced PME's role as a hub for science outreach and education at UBC.

These changes in my teaching practice are sustainable over time. The experience of paired teaching, implementing student-led learning approaches, and fostering cross-institutional collaborations has reshaped how I approach instruction—not just for *EOSC 518* but for future courses and mentorship opportunities. These practices enhance student engagement, build professional networks, and reinforce the importance of interdisciplinary and applied learning in science education.

5. PROJECT SUSTAINMENT – *Please describe the sustainment strategy for the project components. How will this be sustained and potentially expanded (e.g., over the next five years). What challenges do you foresee for project sustainment?*

The sustainment strategy for the SCI-LEnS project focuses on ensuring the long-term viability of the newly developed graduate course, *EOSC 518: Science Communication and Outreach in Museums and Informal Learning Settings*, and maintaining the collaborative partnerships that supported its creation. The course is now running for the first time, and the goal is to offer it regularly within the Department of Earth, Ocean & Atmospheric Sciences (EOAS). By embedding it into the EOAS curriculum, we ensure that future graduate students continue to develop essential science communication and outreach skills.

Sustainability also relies on continued collaboration with UBC museums, Science World, and community partners in science journalism and exhibit evaluation, who have provided guest lectures, professional development opportunities, and student engagement experiences. Strengthening these relationships will help maintain the course's relevance and experiential learning opportunities.

Challenges to sustainment include securing ongoing institutional support and faculty commitment to teaching the course. Currently, the course benefits from the expertise of multiple instructors, including paired teaching with Kirsten Hodge and Laura Lukes, which enhances instructional methods and classroom climate strategies. However, if faculty availability or workload considerations shift, maintaining this co-teaching model may become challenging. Additionally, continued financial support for student-led initiatives, guest speakers, and museum collaborations will be necessary to keep the course dynamic and impactful.

Looking ahead, potential expansion could include advertising the course more broadly outside the Faculty of Science to include teacher candidates and other graduate students in the Faculty of Education, developing an undergraduate version, or collaborating with other faculties to broaden its interdisciplinary reach. To ensure long-term success, ongoing evaluation and refinement of the course will be essential, incorporating student feedback and aligning with best practices in science communication and museum education.



- 6. DISSEMINATION** – *Please provide a list of scholarly activities (e.g., publications, presentations, invited talks, etc.) in which you or anyone from your team have shared information regarding this project. Be sure to include author names, presentation title, date, and presentation forum (e.g., journal, conference name, event). These will be included on the TLEF scholarly output page.*

Conference Presentations (*denotes student presenters)

Beeby Maglaque, Frederick O.*, Hodge, Kirsten F., Moore, Ruth, Sidhu, Raveen, Fitz-Gerald, Wylee, Lukes, Laura, Betz, Emma, Anderson, David, & Pete, Shandin. (2024). *Co-Creating the Future of Science Communication: The SCI-LEnS Project at the University of British Columbia*. Poster presented at Earth Educators' Rendezvous 2024, Philadelphia, PA, July 19, 2024.

Betz, Emma*, Lukes, Laura, Beeby Maglaque, Frederick O., & Hodge, Kirsten F. (2024). *Evaluating the Course Curriculum for a Graduate Course Focused on Teaching and Learning in Informal Spaces*. Poster presented at Earth Educators' Rendezvous 2024, Philadelphia, PA, July 15, 2024.