



# TLEF Project – Final Report

## 1. PROJECT OVERVIEW

### 1.1. General Information

<b>Project Title:</b>	Empowering Students to Engage With, and Contribute to, Multi-Disciplinary Learning Activities Using Open, Interactive Virtual Geoscience Field Sites and Specimens		
<b>Principal Investigator:</b>	Stuart Sutherland		
<b>Report Prepared By:</b>	Francis Jones		
<b>Project Initiation Date:</b>	May 1 2019	<b>Project Completion Date:</b>	April 30, 2020
<b>Project Type:</b>	<input type="checkbox"/> Large Transformation <input checked="" type="checkbox"/> Small Innovation <input type="checkbox"/> Flexible Learning <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. Project Summary

Interactive learning activities, materials and corresponding infrastructure have been developed to engage students in learning experiences related to multi-disciplinary geoscience problems and phenomena. We have developed learning activities and resources involving Google Maps or other map-based resources for six courses: APBI200, EOSC326, EOSC110, EOSC114, EOSC116, EOSC425, GEOG211. In some, students can view, explore and analyze virtual geo-referenced field sites. In others, full-sized zoomable maps, field specimens or materials and allied information are used, including access to an international database of fossils, and physical or virtual resources from UBC’s Pacific Museum of Earth (PME). Results are helping increase the mutually beneficial relationship between the PME and undergraduate learning delivered by the Department of EOAS. There is also a Google-Earth based virtual tour about hazards in the Vancouver-Whistler region. Our work has built upon earlier initiatives to build and test maps-based display or information management tools. Some resources and learning activities are complete, others have not yet been fully deployed in their target courses owing to Covid19, and one is still in the design stage awaiting the time and energy of relevant faculty. All are based on “standard” technologies (i.e. there is no custom programming involved) so they can become accessible beyond UBC while remaining easy to maintain and expand by UBC faculty, staff and students.

**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
Stuart Sutherland	P.I. and instructor of impacted courses	Project admin, and develop learning activities to use the new resources.
Francis Jones	Project coordinator	Coordinate project and supervise the student worker.
Maja Krzik	Instructor of impacted course	Incorporate project outcomes into courses taught.
Louise Longridge	Instructor of impacted course	Incorporate project outcomes into courses taught.
Loch Brown	Instructor of impacted course	Develop learning activities to use the new resources.
Novac Rogik	CTLT web programming support	Advise and WordPress plugin installation
Kaitie Purdue	Undergraduate student in EOAS	Research, design & implement PME and online learning resources and activities under direction of instructors and project coordinator

**1.5. Courses Reached** – Please fill in the following table with **past**, **current**, and **future** courses and sections (e.g. HIST 101, 002, 2017/2018, Sep) that have been/will be 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	Section	Academic Year	Term (Summer/Fall/Winter)
APBI 200	001 002, 98A	2021	Sept '21
EOSC 326	101, 99A, 99C, 98A	2021	Sept '21
EOSC 114	101, 102, 201, 202, 99A, 99C, 98A	2019, 2020	Sep '20
EOSC 116	201, 99A, 99C, 98A	2020	May '20, Sept '20
EOSC 222	102	2020	Sept '20
EOSC 425	101	2021	Sept '21



EOSC 110	101, 102, V01	2021	Sept '21
Learning and outreach activities of UBC's Pacific Museum of Earth, part of the Dep't of Earth, Ocean and Atmospheric Sciences.			

## 2. OUTPUTS AND/OR PRODUCTS

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

Product(s)/Achievement(s):	Location:
New maps-based learning activity "Western Inland Sea" (WIS), for 116 (f2f and DE), 326 DE, and later 326 f2f. This is currently (2021W) being adapted separately for use in 100-level general courses and for 300-level science students. There are both new online facilities and new uses of existing UBC, EOAS, museum and external facilities & resources (eg. <a href="https://paleobiodb.org/">https://paleobiodb.org/</a> ).	Face to face version was produced and delivered via UBC Blogs. Activities for different target audiences are being finalized for use in upcoming summer and fall terms.
New maps-based commodity chain assignment for GEOG211.	In draft form in a UBC blog space, but currently awaiting faculty support.
A virtual field trip about natural hazards of the Sea-to-Sky region (Vancouver to Whistler), deployed in Google Earth.	This <a href="#">Google Earth link</a> takes you to the completed tour. It is a featured Virtual Exhibit at the Pacific Museum of Earth and available for teaching/learning use in courses such as EOOSC114, GEOG316, or others.
Rejuvenated maps-oriented soils resource "Soilx.ca" for APBI200 and other courses, based on the original 2013 version, but without the dependence upon Google's Fusion Tables, which are no longer supported by Google.	<a href="https://www.soilx.ca/">https://www.soilx.ca/</a> Completed and awaiting review and incorporation into courses, including APBI200 and possibly others.
The PME 10,000-specimen minerals database is now online, half including images, for access by courses involving minerals (eg EOOSC220). This was not part of the original proposal but was completed in conjunction with other project components as we learned more about deploying resources within UBC's WordPress environment.	<a href="https://pme.ubc.ca/collections/collections/">https://pme.ubc.ca/collections/collections/</a> Also available for outreach to the public and schools.
Strategies, opportunities and limitations of using the WPGmaps WordPress plugin on UBC Blog or CMS websites. The license is perpetual although upgrades will cost a few dollars. A Google API account is required, but cost is zero for low numbers of hits to the Google Maps used.	Generally, this plugin can be installed by CTLT web programming (N. Rogic). It is now included on 3 course blog sites (EOOSC 116, SoilX, GEOG 211) and the PME's Wordpress website see <a href="https://pme.ubc.ca/exhibitions/natural-disasters/">https://pme.ubc.ca/exhibitions/natural-disasters/</a> .
Back-end infrastructure for running WordPress software, and sufficient memory for large image collections is now more accessible than a year ago.	CTLT web programming support makes this more sustainable than if work was contained only within a department.
For EOOSC 110, interactive introduction to geology of British Columbia.	Started as a TLEF project component, completed by the Pacific Museum of Earth; see <a href="https://pme.ubc.ca/geology-of-british-columbia/">https://pme.ubc.ca/geology-of-british-columbia/</a> . Available for UBC EOOSC 110, other courses, and for public/school outreach.



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

Item(s) Not Met:	Reason:
Actual piloting of exercises in face to face courses	Piloting was scheduled for March 2020, but classes were forced to go online due to Covid19. Piloting will occur in a later teaching term.
Geological maps activity for eoscl10.	We ran out of time and resources owing to scheduling difficulties for some other project components. However, the interactive geology map resource was completed, now presented via the PME <a href="#">website</a> .
Geography 211 exercise is in draft form only rather than being completed and tested.	Faculty support for that geography course was unavailable at the same time as our project personnel had planned to work on this component.
FieldPress plugin was not adapted for use within UBC’s WordPress ecosystem.	This was deemed not essential for success with other project components. Also, FieldPress is expected to be adapted by UBC Web Programming unit, but is not ready at the time of this report.
EOSC 425 had planned to use physical specimens and corresponding map-based and online resources.	These were going to be a component of the seminars presented by students, each about a specific fossil from the Pacific Museum of Earth. Specimens were found and researched, but we had to back off as those real samples were unavailable during the COVID lockdown.

**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 teaching practice and satisfaction
- Student wellbeing, social inclusion
- Awareness and capacity around strategic areas (indigenous, equity and diversity)
- Unit operations and processes
- Other: [please specify]

**3.2. What were you hoping to change or where were you hoping to see an impact with this project?** – Please describe the intended benefits of the project for students, TAs, instructors and/or community members.

Because the number and variety of mapping apps and their accessibility or ease of use is growing rapidly, we wanted to increase students’ opportunities to learn with maps and map-based learning resources. All targeted courses involve learning about natural processes and/or human activities such as: the relationship between soil types and geography; paleobiology and Earth’s history; natural hazards; demographic, economic, and ecological factors underlying environmental challenges – all these topics require students to observe, analyze, compare or discuss map-based information. Our hope was to find



tools and develop strategies to increase the ease with which instructors could generate and teach with map-related content. We also hoped to introduce ways for students to readily contribute material they have found or constructed into map-based facilities. As a result of this project, we have found such facilities and developed them to the point where an instructor or set of students can use, develop or maintain such resources with a minimum of technical knowledge or procedural learning.

**3.3. Were these changes/impacts achieved? How do you know they occurred?** – *What evaluation strategies were used? How was data collected and analyzed? You are encouraged to include copies of data collection tools (e.g. surveys and interview protocols) as well as graphical representations of data and/or scenarios or quotes to represent and illustrate key themes.*

Four accomplishments from this project are enabling these impacts: (1) a Google-Maps plugin was implemented for Wordpress at both the “blogs.ubc.ca” and “cms.sites.olt.ubc.ca” to support four of the seven courses targeted; (2) a Google Earth Tour was completed about natural hazards in the Vancouver region and the procedure was established so others can follow up; (3) a maps-oriented learning activity about North American paleo geography and paleontology was developed and is being adapted for use in two courses – both in classroom and DE sections; (4) and a map-based learning sequence was designed, although not completed, for a geography course.

Although these resources now exist online, testing with students was not completed owing to various delays, therefore the actual impact is hard to measure. Instructors in three of the courses remain enthusiastic and supportive and are adapting map-based activities, targeting actual implementation for after UBC’s return to “normal” teaching (following COVID). Although they remain keen, two instructors were unable to contribute as planned for several legitimate reasons. This is unfortunate but we hope to leverage our existing progress when these instructors are able to re-engage.

**3.4. Dissemination** – *Please provide a list of **past** and **upcoming** scholarly activities (e.g. publications, presentations, invited talks, etc.) in which you or anyone from your team have shared information regarding this project.*

Presentations were planned for Faculty of Science’s Skylight education openhouse and TLEF showcases.

An abstract was to be submitted for presentation at the GSA 2020 convention, 25-28 October 2020, in Montreal. However, this was not accomplished as there was little incentive to attend this year. There is a good chance this project (and others) will be discussed at other geoscience education meetings in the next year or two as scholarly contributions are a priority (when feasible) among education faculty and staff in our Department (EOAS).

Progress made will also be incorporated into current and future education projects in EOAS and will factor into discussions associated with the upcoming Departmental Review.

**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?*

The three most significant changes in teaching practices arising from this project are (1) increased use of online resources (eg. [paleobiodb.org/#/](http://paleobiodb.org/#/), Google Earth, Wordpress, and the WP Google Maps plugin at [www.wpgmaps.com](http://www.wpgmaps.com)), (2) resulting increased opportunities for students to experience and use real and virtual resources involving maps and map-based thinking, and (3) avoidance of “special purpose” or custom software



so that maintenance and deployment are more straightforward and easily managed over the long term. These impacts are sustainable in the sense that the resources, WordPress plugins, and Google Earth tour builder are both easy to use and likely to remain supported for the foreseeable future. They do take a little time for familiarization, but the undergraduate student helping with this project was working productively on all these facilities within only a few hours after starting.

**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 achieving the expected long-term impacts listed above?*

We do need to develop demonstrations and documentation. This too has been delayed owing to “all hands on deck” since mid-March 2020 as UBC pivoted to fully on-line delivery of all courses. This has consumed project workers and will remain the focus of educational support personnel and instructors until UBC is back to normal.

However, a key objective of this project was to adapt or develop resources and learning / assessment strategies that use existing technology housed and maintained within UBC’s education technology ecosystem. Significant progress has been achieved regarding this objective. Also it has been well worth while establishing a working relationship with Novak Rogic and the UBC web support team as they continue to enhance UBC’s capacity to provide and support map-based learning resources and activities.

Further opportunities for leveraging this project’s outcomes are also expected as we strive for greater integration with both the Beaty Biodiversity Museum (BBM) and our own Pacific Museum of Earth (PME). Building stronger relationships between museum resources and undergraduate teaching & learning are expressed in the PME’s current 5 year Strategic Plan, are recognized in documentation for the upcoming Department Review, and are anticipated by EOAS teaching faculty. Our TLEF project’s outcomes represent concrete “proof of concept” regarding opportunities, benefits and tactics for continuing to build these connections over the upcoming years. Undergraduate learning about Earth, geoscience and geography will undoubtedly benefit as thinking with maps is a critical aspect of these disciplines.

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