

Dep't Earth, Ocean & Atmospheric Sciences



Automating Creative, Peer-reviewed Projects to Enhance Motivation in a large 1st yr course (EOSC114, Natural Hazards)

Francis Jones and Lucy Porritt

First Year Educators' Symposium, UBC, January 2019

With thanks to: TLEF funding ~ S. Harris ~ instructors ~ many teaching assistants ~ students during "trial & error"

THE UNIVERSITY OF BRITISH COLUMBIA
Faculty of Science

 *This slide-set licensed under Creative Commons, attribution non-commercial share-a-like.
Contact: Francis Jones, Science Education Specialist, EOSAS, UBC, f.jones@eosas.ubc.ca

1

The teaching goal: Enhance student motivation



- **Tactics known to enhance motivation:**
 - ... **empower:** students choose a topic and context;
 - ... **vested interest:** incorporate a personal perspective;
 - ... **individually create** an information package;
 - ... **Peer review** and provide feedback (not grading);
 - ... **Gather collected work** as a custom learning resource.
- **Also - minimize costs** to the EOSC114 instructing team:
 - ... ~1750 students / year
 - ... 5 f2f and 3 DE sections / year
 - ... 6 instructors / term

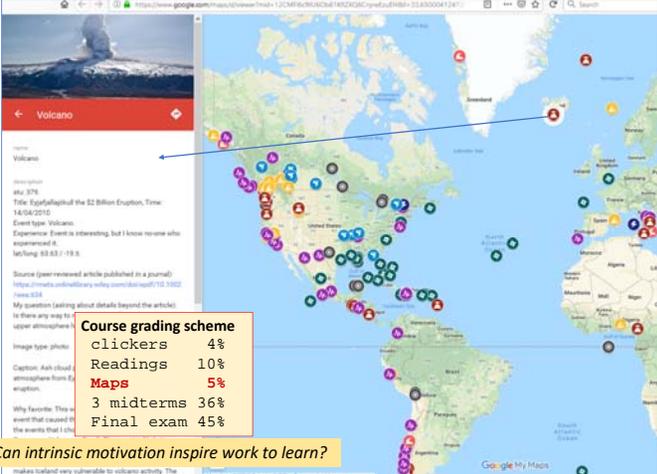
Many references on how motivation factors into learning, and what strategies support or foster it.

2

End result

Google maps with markers for every student's submission.
[\(Link\)](#)

Three per term.
Quiz to explore results.



Course grading scheme	
clickers	4%
Readings	10%
Maps	5%
3 midterms	36%
Final exam	45%

Can intrinsic motivation inspire work to learn?

3

Implementation

Resources used

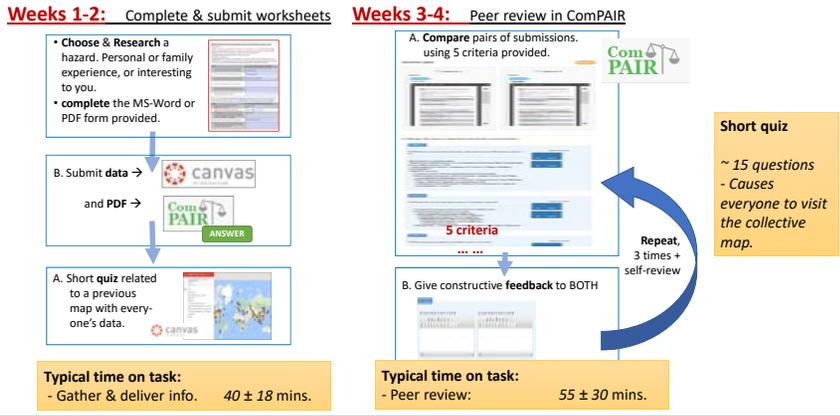
- **Forms-based worksheets** in both MS-Word and PDF format.
- **Canvas** "graded survey" submission of forms-based information .
- **Excel** translates Canvas results for input to **Google Fusion Tables** which format the display.
- **Google Maps** reads KML (map-making code) generated by Fusion Table.
- **ComPAIR** for peer review and feedback.
- **Canvas** graded quiz for revisiting the collective map.

Course components

- 6 modules each with an article-reading assignment
- **3 map-making cycles**
 - Earthquakes
 - Volcanoes or landslides
 - Storms or wave-related hazards

4

Map project students' task flow



5

Instructor's and TAs' roles

- Instructor:** mainly managing logistics
 - Review and approve or adjust mapping information forms.
 - Deploy tasks in Canvas and ComPAIR (check links work properly)
 - Manage students' technical "exceptions" (similar to online learning)
 - Check map & associated quiz questions (based on Canvas question banks)
 - Establish and manage grading.
- TAs:** Build the Google map (< 1hr after training)
 - Download from Canvas – quality check (duplicates, etc.).
 - Use templates to translate for import to Google Maps.
 - Fine tune Google map for clarity and ease of viewing.
 - Adapt 15 map-specific questions using existing question templates.
 - Respond to students in office hours and discussion boards.

6

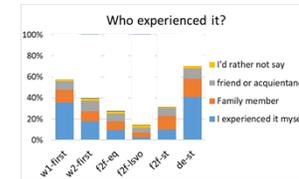
Testing and deployment

- First pilot term:
 - Using **Connect**
 - 7 maps
 - Test / develop map-making procedure
- Second pilot term:
 - 6 maps
 - Add 2 quizzes
 - Trial peer-review using quiz-based procedure (awkward)
- Third pilot term:
 - Switch to **Canvas**
 - 4 maps + one made from "favorites"
 - Quiz on each
 - ComPAIR** pilot – review 2 plus self-eval
- Fourth pilot term (current):
 - 3 maps + 4 longer quizzes
 - Refined ComPAIR; review 3 pairs + self-eval.
 - Try checking compliance using ComPAIR analytics and "sampling" by TAs.
- Final implementation (Sept 2019):
 - 3 maps + 4 quizzes
 - New map-making strategy
 - Fusion Tables are being phased out.
 - ComPAIR: review 3 pairs plus self-eval.
 - Compliance via ComPAIR analytics
 - ComPAIR "ranking"? To select submissions for public display (with permission).

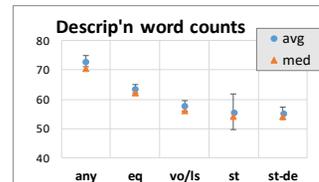
Data collection throughout – done "non-invasively" as part of assignment deliverables.

7

Map-making: personal connection, compliance & perceptions



Word counts for submitted "description"



"What did you like, or do you think worked well?"

Feedback comment codes	% of 100 samples
Supports self-interest and choice	30%
expand beyond assigned learning maps; seeing my & others' entries	25%
helped with learning	16%
real life connection	13%
Helped see the big picture	11%
other	10%
reuse of prior work	9%
quick - easy	8%
negative	7%
	4%

"What workload & grading scheme would you prefer?"

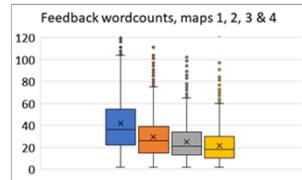
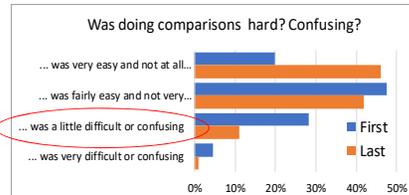
- 62% of respondents want same or more tasks.
- 81% want same or more weight for grading.

8

Peer review compliance and perceptions:

Compliance with peer reviewing:

	Maps 1,2,3	Map 4
Did full requirement:	88%	86%
Did self-evaluations:	82%	73%.

Word counts for ComPAIR feedback.**Comparisons: challenging for ~10% after practicing.**

I asked ... *Can intrinsic motivation inspire work to learn?*
Results are suggestive that - yes, intrinsic motivation can inspire such work.

9

Lessons learned; implications for improvement

- Targeting motivation is possible in large classes using elements of ...
 - > choice
 - > vested interest
 - > peer-review
 - > creating a “collective” learning resource.

Teaching skills required to administer this automated project:

- Logistics:** aligning worksheets & Canvas quizzes; question banks; analysis of results
- ComPAIR:** setting up, designing comparison criteria
- Google map-making** – but still a work in progress.
- Managing** the 10% of students who encounter problems.
- Training and coordinating TAs.

Challenges

- Sustainability / transfer:** challenging, especially with multiple instructors.
- Map-making** environment is a moving target (Google ...)
 - Several ideas; project proposals are awaiting funding.
- Forms:** success with MS-Word forms ...or... PDFs varies (required for delivery to ComPAIR).
- Peer-review** needs refining to promote improvement of skills.

10



11

Abstract

Promoting student motivation is challenging in very large classes because it is difficult to interact with, or assess, students individually. We are exploring one approach to promoting students' sense of personal relevance, interest and motivation in EOSC114 “The Catastrophic Earth; Natural Disasters”, which has annual enrollments of over 2000 in both face-to-face and distance education sections.

Students choose any personally meaningful hazardous event and create their own information package that is submitted using an online form. Results are converted into a Google Map with markers and corresponding personally unique information created by every student. Peer-reviews are then carried out using structured-comparison in ComPAIR, and the assignment concludes with a short quiz about the collectively created map. Automating these steps (completed three times each term) enables hundreds of students to choose, research, create and peer-review individual contributions to a global map that students then explore.

We will summarize objectives, students' tasks and logistics for delivering this automated learning sequence. Preliminary results will be presented demonstrating student outcomes, success at meeting our teaching goals, and lessons we are learning about this approach to delivering personally meaningful learning experiences in very large classes.

12

Students' map-making task

Time on tasks:
 - Gather & deliver info. 40 ± 18 mins.
 - Peer review: 55 ± 30 mins.

Weeks 1 & 2

1. Choose any (volcano or landslide) event
2. Gather information for recording using forms. ([Demo the form](#)).
3. Submit to a Canvas "Graded Survey" with identical questions.
4. Deliver completed form to ComPAIR.

Weeks 3 & 4

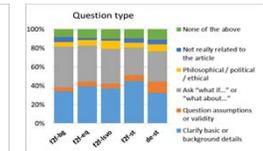
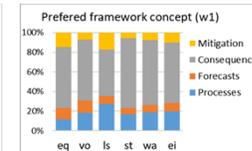
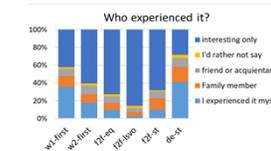
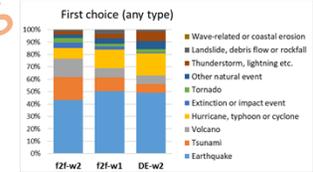
1. View two randomly chosen submission PDFs in ComPAIR.
2. Make five guided decisions about "which of the two is better at ..."
3. Write succinct feedback to BOTH.
4. Repeat 3 times.
5. Revisit your own submission and offer feedback to yourself.
6. Complete a 15-qn quiz based on the current collective global hazard map.

13

Some descriptive data

Students' chosen events include:

- Favorite hazard types
- Written descriptions: 60-100 words
- Nature of personal experiences ...
- Aspect of hazards that is of most interest ...
- Type of question posed to author ...



14

Examples of student perceptions & feedback data

"What workload and grading scheme change would you prefer?"

- 62% of respondents want same or more tasks
- 81% want same or more grade-weight for that work.

Proportion of respondents (N=387)	Strong a	Agree	Neutral	Disagree	Strong d
Understand the course concepts better than if there had been no project.	7%	41%	33%	12%	6%
Increase your own interest in at least some of these natural hazards topics.	14%	50%	23%	8%	5%
Appreciate choice, & exploring aspects that you are most interested in.	0%	62%	25%	9%	4%
Appreciate opportunity to see and compare the work of other students.	12%	41%	30%	14%	4%

Generally: agreed that map project was interesting and beneficial.
Especially: "Choice" & "Exploring an aspect you are most interested in".

15

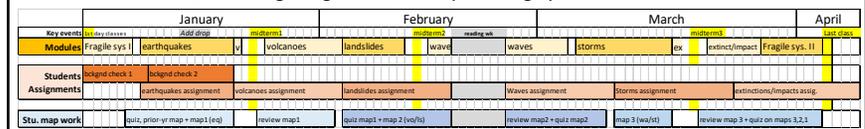
Implementation

Resources used

- Forms-based worksheets in both MS-Word and PDF format.
- Canvas "graded survey" submission of forms-based information.
- Excel translates Canvas results for input to Google Fusion Tables which format the display.
- Google Maps reads KML (map-making code) generated by Fusion Table.
- ComPAIR for peer review and feedback.
- Canvas graded quiz for revisiting the collective map.

Course components

- 6 modules, 6 reading assignments, 3 map-making cycles.



16