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 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.

End result

Google maps with markers for every student’s submission. [Link]

Three per term. Quiz to explore results.

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

Can intrinsic motivation inspire work to learn?
Choose & research a hazard. Personal or family experience, or interesting to you.

Complete the MS-Word or PDF form provided.

Submit data → and PDF →

A. Short quiz related to a previous map with everyone’s data.

B. Give constructive feedback to BOTH

Repeat: 3 times + self-review

Typical time on task:
- Gather & deliver info: 40 ± 18 mins.
- Peer review: 55 ± 30 mins.

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)
  - Establish and manage grading.

- **TAs**: Build the Google map (1 hr 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.

Testing and deployment

1. First pilot term:
   - Using Connect
   - 7 maps
   - Test / develop map-making procedure

2. Second pilot term:
   - 6 maps
   - Add 2 quizzes
   - Trial peer review using quiz-based procedure (awkward)

3. Third pilot term:
   - Switch to Canvas
   - 4 maps + one made from “favorites”
   - Quiz on each
   - ComPAIR pilot – review 2 plus self-eval

4. 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.

5. 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”?

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

Map-making: personal connection, compliance & perceptions

- **What did you like, or do you think worked well?**
  - Supports self-interest and choice 18%
  - Expand beyond assigned learning 10%
  - Maps; seeing my & others’ entries 30%
  - Helped with learning 10%
  - Real life connection 9%
  - Helped see the big picture 15%
  - Other 5%
  - Reuse of prior work 10%
  - Quick, easy 7%
  - Negative 0%

- **What workload & grading scheme would you prefer?**
  - 62% of respondents want same or more tasks.
  - 81% want same or more weight for grading.

Word counts for submitted “description”

<table>
<thead>
<tr>
<th>Word counts for submitted “description”</th>
<th>avg</th>
<th>med</th>
</tr>
</thead>
<tbody>
<tr>
<td>any</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>eq</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>vsq/ls</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>st</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>st-de</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>
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.

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.

Peer review compliance and perceptions:

Compliance with peer reviewing:

<table>
<thead>
<tr>
<th></th>
<th>Maps 1, 2, 3</th>
<th>Map 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did full requirement:</td>
<td>88%</td>
<td>86%</td>
</tr>
<tr>
<td>Did self-evaluations:</td>
<td>82%</td>
<td>73%</td>
</tr>
</tbody>
</table>

Word counts for ComPAIR feedback:

Comparisons: challenging for ~10% after practicing.

<table>
<thead>
<tr>
<th>Feedback wordcounts, maps 1, 2, 3 &amp; 4</th>
<th>Was doing comparisons: hard? Confusing?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>... was very easy and not at all</td>
</tr>
<tr>
<td></td>
<td>... was fairly easy and not very</td>
</tr>
<tr>
<td></td>
<td>... was a little difficult or confusing</td>
</tr>
<tr>
<td></td>
<td>... was very difficult or confusing</td>
</tr>
<tr>
<td></td>
<td>2% 10% 20% 30% 40% 50%</td>
</tr>
<tr>
<td></td>
<td>First Last</td>
</tr>
</tbody>
</table>

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

Thank you!
Students' map-making task

**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.

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 ...

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.

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

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

Implementation

**Resources used**
- **Forms-based worksheets:** in both MS-Word and PDF formats
- 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.