Translating Classroom-based Hands-on Activities for Distance Ed

The UBC FoS Science Education Open House, April 13th, 2015.

Francis Jones*, Louise Longridge, Stuart Sutherland, Paul Smith.

*This slide-set licensed under Creative Commons, attribution non-commercial share-alike.

Contact: Francis Jones, Science Teaching and Learning Fellow, EOAS, UBC, fjones@eos.ubc.ca
Contributors

• Teaching and learning support (F. Jones)
  – Coordinate, produce, follow up.
  – Build resources (images, video, interactions, etc.).
  – Deploy onto Blackboard 9.x.

• Lead DE instructor (Dr. L. Longridge)
  – Taking the “risks” of deploying in a DE course.
  – Fitting new tasks into existing course structure.
  – Handling all feedback and communication with students.

• Re-configured for a F2F service course (Dr. S. Sutherland)
  – 50-min. hands-on lab experience for 150 students.
  – 50-min. group-based whole-class follow-up with homework.

• Original design of the exercise (Dr. P. Smith)
  – For 2nd year geoscience majors.
  – Still used as a 2-hr laboratory exercise with reporting.
“Active” courses

Balance and variety of interactive learning pathways¹

• Student ↔ content

• Student ↔ colleague

• Student ↔ instructor

¹E.G. Kennepohl and Shaw. 2010
Components of “active” F2F courses

• Context + vested interest (intrinsic motivation).
• Variety / balance of grading (extrinsic motivation).
• Well crafted, useful learning goals.
• Pre-class readings with scaffolding.
• Classes foster expert-novice interaction.
• Classes incorporate peer instruction.
• Lecturing based on “time to tell”.
• Student “products” and elements of choice.
• Feedback / rubrics for intermediate & final deliverables.
Components for F2F versions of this exercise:

- Hands on lab time
- Follow up group work
- Real specimens to handle
Components for BOTH versions of this exercise:

Same specimens

Same tasks

Same documents
DE Student 使劲– content¹

1. Interactive readings: instant feedback on questions.

2. Interactive figures using image maps and JavaScript.

3. Low stakes quizzes – more is better.

4. Higher stakes tests are similar.

5. Self-guided active exercises using “active content”, Google Earth, simulations, “mind-mazes”, etc.

¹ E.G. Clark and Mayer, 2011
1. Focus on asynchronous, not synchronous interactions

2. Cooperative\(^1\) opportunities
   - Share solo work; generate cooperative products &/or tests

3. Collaborative\(^1\) opportunities
   - Construct knowledge and/or products; more autonomous
   - Blogs, journals, wikis, Google Docs, Google Earth, etc.

4. Peer review, critique, feedback, assessment
   - Explicit self & peer assessment; Implicit in coop/collab work

---

\(^1\) Cooperative vs collaborative: see eg. Panitz. 1999
DE Student $\leftrightarrow$ instructor

1. Expert $\leftrightarrow$ novice interaction is important

2. TAs are important (& need training)
   - “Semi-expert”, more “student-like”, reduced “power”

3. Useful, visible rubrics.

4. Low stakes quizzing $\rightarrow$ frequent feedback.

5. “4 S’s” from TBL$^1$ can guide task development.
   - Significant task; Same task for all; Simultaneous report; Specific Choice or Simple “instant” deliverable.

---

$^1$ TBL=Team Based Learning; Michaelsen, L. K., M. Sweet, and D. X. Parmelee, eds. 2009
Components for DE version of this exercise:

- Zoomify Hi-Res images
  - Linear & area measuring
  - Clickable HotSpots
- Videos of handling specimens.
- “Flipbook” images
Other resources for the DE version:

- Online data entry with auto-grading using Jumble Sentence

<table>
<thead>
<tr>
<th>Location</th>
<th>Specimen #</th>
<th>Genus</th>
<th>Age of Genus</th>
<th>Age of Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A</td>
<td>45</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Sketch app. with delivery of annotated figures
Week 1, F2F lab exercise:

1. Manual / instructions

2. Paper worksheet for 21 fossil IDs and ages

3. Hand samples & photos of specimens
   - 1 hr with specimens & instructors/TAs

4. Online questions about fossils (all MC).

5. Sketched chronostratigraphy on given sections.
   - All graded by TAs
### Phase 1, DE “lab” exercise:

[http://eos.ubc.ca/courses/eosc326/content/trilogramto-lab/](http://eos.ubc.ca/courses/eosc326/content/trilogramto-lab/)

ID=eosc326 PW=ammonite

| 1. Manual / instructions including [scenario](#) |
| 2. Paper worksheet: 17 fossil IDs & ages (including 3 examples) |
| 3. Digitized samples of all specimens. |
| - [Interactive](#) “lab environment” |
| - [Images](#): high resolution, zooming, multi-view or “flip book”. |
| - [Videos](#): of “handling” specimens |
| - [Digital input & autograding](#) of IDs / ages |
| 4. Online q’ns ([not all MC](#)) about fossils; [consistent with scenario](#). |
| 5. [Digitally sketch](#) chronostratigraphy on given sections. |
| - Sketch submission only graded by TAs. |
Week 2, F2F lab exercise

1. Groups agree on and re-submit fossil ID and ages.
2. Groups answer 2 point-form written questions.
3. Groups answer the sketched “interpretation”.
4. Graded by TAs.
5. Solution set: PDF provided online.

Instructor + TAs support class work
### Phase 2, DE “lab” exercise

**Add cooperative group work**

1. Agree on & re-submit fossil ID and ages.

2. Agree on & re-submit 2 point-form written questions.

3. Agree on & re-submit sketched “interpretation”.

4. Sketch graded by TAs.

5. Solutions via auto-grading & PDF online.

6. Incorporate activity concepts into “real” assessments.

Planned for summer or fall 2015.
Phase 3, DE lab exercise – tentative:

Add collaborative group work

1. Add one level of technical complexity

2. Add a student product; eg. research a specimen in the context of the given scenario & Google Earth.

3. Incorporate peer-assessment of product.
Results after adjustment (104 students)

- If cooperating, some tasks should be more uncertain.
- For “hard” questions, review ...
  - Learning goals
  - Content provided
  - Learning activities
  - Assessments

Avg. across each question

| q 01 | q 02 | q 03 | q 04 | q 05 | q 06 | q 07 | q 08 | q 09 | q 10 | q 11 | q 12 | q 13 | q 14 | q 15 | q 16 | q 17 | q 18 | q 19 | q 20 | q 21 | q 22 | q 23 | q 24 | q 25 | q 26 | q 27 | q 28 | q 29 | q 30 | q 31 |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 73%  | 94%  | 81%  | 93%  | 95%  | 95%  | 94%  | 95%  | 94%  | 95%  | 90%  | 81%  | 93%  | 81%  | 80%  | 90%  | 69%  | 86%  | 91%  | 82%  | 60%  | 43%  | 36%  | 86%  | 53%  | 85%  | 61%  | 76%  | 80%  | 70%  | 49%  | 51%  |
Feedback from 104 students

- More ad-hoc discussion board use than for other components.

- Which resource types were most/least useful?
  1. videos of handling specimens
  2. zooming high resolution images
  3. fixed images
  4. multiple “flipbook” images
  Detailed open responses not yet analyzed.

- Did you use “outside” resources?
  Yes = 49, No = 51.
  – Details to be explored later
  – Suggests requiring outside sources
More feedback from 104 students

• Self reported time to complete

• “It would be great to have more of these activities”

• 4 open questions about resources and the “sketch” application.
  – Not yet analyzed.
Needs improving based on pilot (104 students)

• Testing CONNECT quiz for all “failure modes” is hard!
  – Designer, instructor and TA all tested it, but errors still occurred.

• “Jumbled Sentence” drop/dwn questions for data entry:
  – 6 questions needed re-grading

• “Multiple Answer” type questions are tricky.

• A few questions were about concepts not fully “covered”.

References and resources

- http://eos.ubc.ca/about/faculty/F.Jones.html
- http://eos.ubc.ca/research/cwsei/
- http://ctlt.ubc.ca/distance-learning/courses/eosc/eosc326/