Context: Why transform this course?

Course:
- eos326, "Earth and Life Through Time".
- Effective for 150 non-geoscience B.Sc. Students.
- 82-84% students in 2010 – 2012 are in Combined Major in Science. Life Science.
- Mostly 3rd and 4th-year students.
- Younger students in 2011 and 2012.

Course Level Learning Goals:
- Express how the concept of geological time is an important factor in our understanding of the evolution of the Earth System.
- Apply basic geological principles and geoscience knowledge in the interpretation of Earth’s geological and biological history.
- Describe how the biosphere has adapted to exploit various environments in the Earth’s oceans over time.

Before 2010, then after:
- Originally 3 x 50 min. lectures for 13 weeks.
- Active Fridays introduced 2011 – refined in 2012.

Class & grading comparison ... 2010 2011 & 2012
Labs / midterms / final 1 / 1 / 1 2 / 2 / 1
Hours: lecture / active 35 / 2 22 / 13
Final exam: MC / Short Ans. weights 50 / 50 40 / 60
Grading Scheme:
- Final exam: 45% - 1 midterm: 25% - 1 lab exercise: 25% - Homework: 1%
- Final exam: 40% - 2 mid terms: 15% / 15% - 2 labs: 10% / 10% - Clickers in class: 4% - Homework: 4% - Diagnostic test: 1% - Activities in class: 2%

Course improvement objectives:
- Incorporate known "best practices" into a senior science elective for 150 students.
- Have senior, non-geoscience, B.Sc. students study the tightly coupled geologic and biologic history of Earth using the tools and modes of thinking of experts.
- Enable non-specialists to engage in the unique aspects of geoscientific thinking.
- Incorporate more active learning within class time.
- Enhance the variety of ways in which students engage with new concepts and skills.
- Increase individual interactions, with feedback, from experts (instructor & TAs).
- Minimize low level content delivery in lectures.
- Balance the competing needs of large enrollment against the importance of the hands-on experiences.

Initiatives: What changes were made?

Pedagogic choices:
- Pre-course diagnostic + remedial content.
- Text: weekly readings + online quizzes.
- 2 lectures/week with clickers. Eg. →
- 2 hands-on laboratory experiences.
- 8 "active Fridays" (no lecturing)

"Active Fridays":
- Group work (4-6), worksheets, 50 minutes
- Apply knowledge, practice skills, Lab follow-up
- Enables expert ↔ novice interaction
- Well liked (data to the right)

Lab experiences:
- 150 students in 3 groups
- Enables expert-novice interaction for a large class
- 1D, fossil & rock samples
- Analyze for genus, age, structures and environment
- Construct bio & biostratigraphies
- Mix of in-lab, at-home and in-class group work.

Complexity of thinking:
- Before (also for labs): simpler, 3-section settings.
- Now: more sophisticated settings; used in class with expert guidance as clicker questions, group activities and in exam questions.

Compare two 50 minute classes:
- What are students doing during two types of classes?
- Class observations protocol is active research in Faculty of Science, UBC (2012).

Results: What evidence of improvements?

Student perceptions of value

Student engagement:
- Avg lecture: 2010 → ~80% 2012 → ~90%
- Grop-work class: 2012: @30min: ~90% @45mins: ~75%

Analyze for genus, age, structures and environment

Compared to other courses, time you spent on exams was ... 2010 2011

Overall rating of the course:
- 2010 (N=82/141)
- 2011 (N=98/140)

Workloads & Overall Rating
- Compared to other 3rd / 4th year science courses, more balanced work loads in 2011 than 2010.
- Higher overall rating of this course in 2011 than 2010.