Dep't Earth, Ocean & Atmospheric Sciences

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Translating Classroom-based Hands-on Activities for Distance Ed

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

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EOAS-SEI

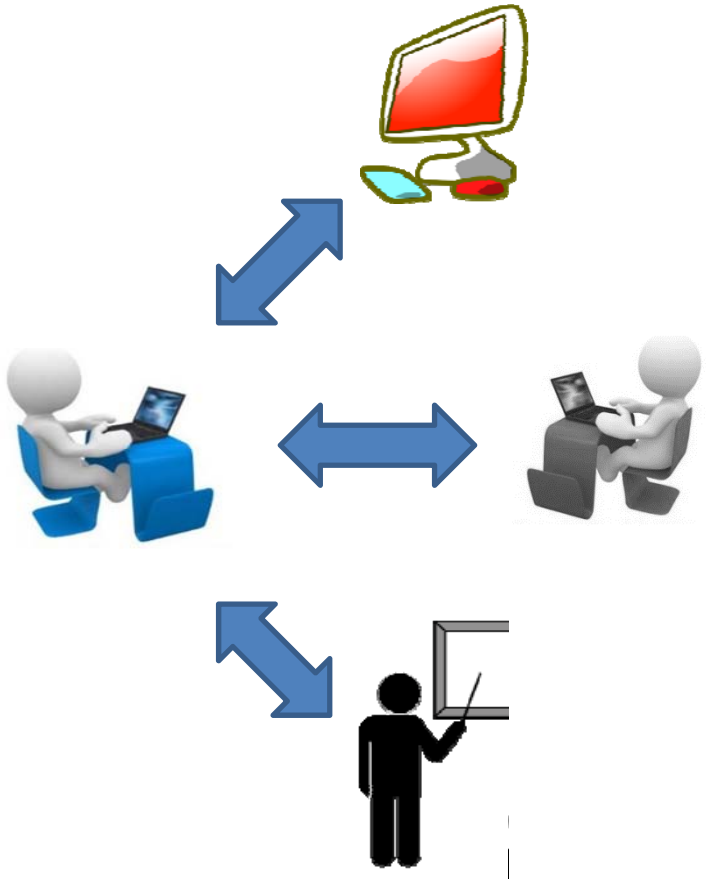
Contributors

- 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 pathways[1]

- Student ←→ content
- Student ←→ colleague
- Student ←→ instructor



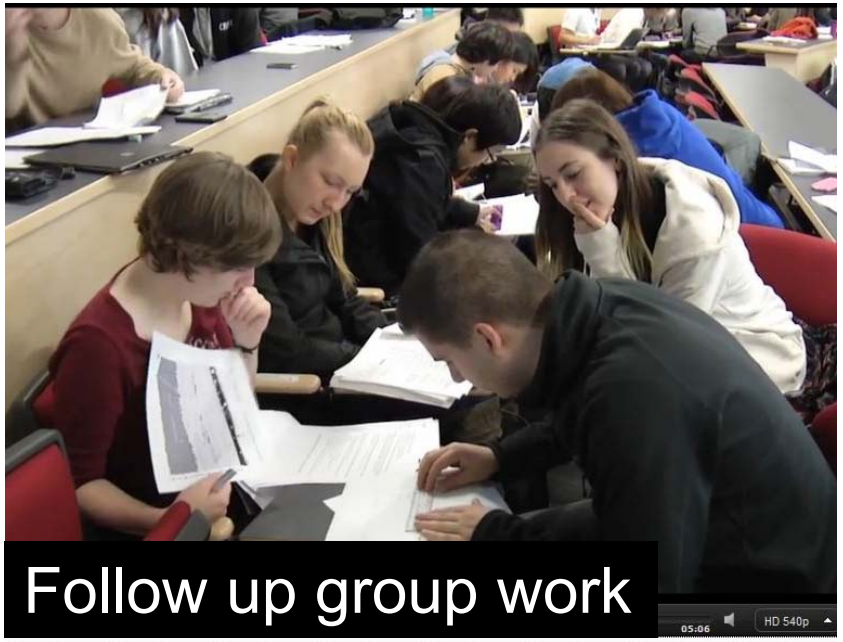
[1]E.G. Kennepohl and Shaw. 2010

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



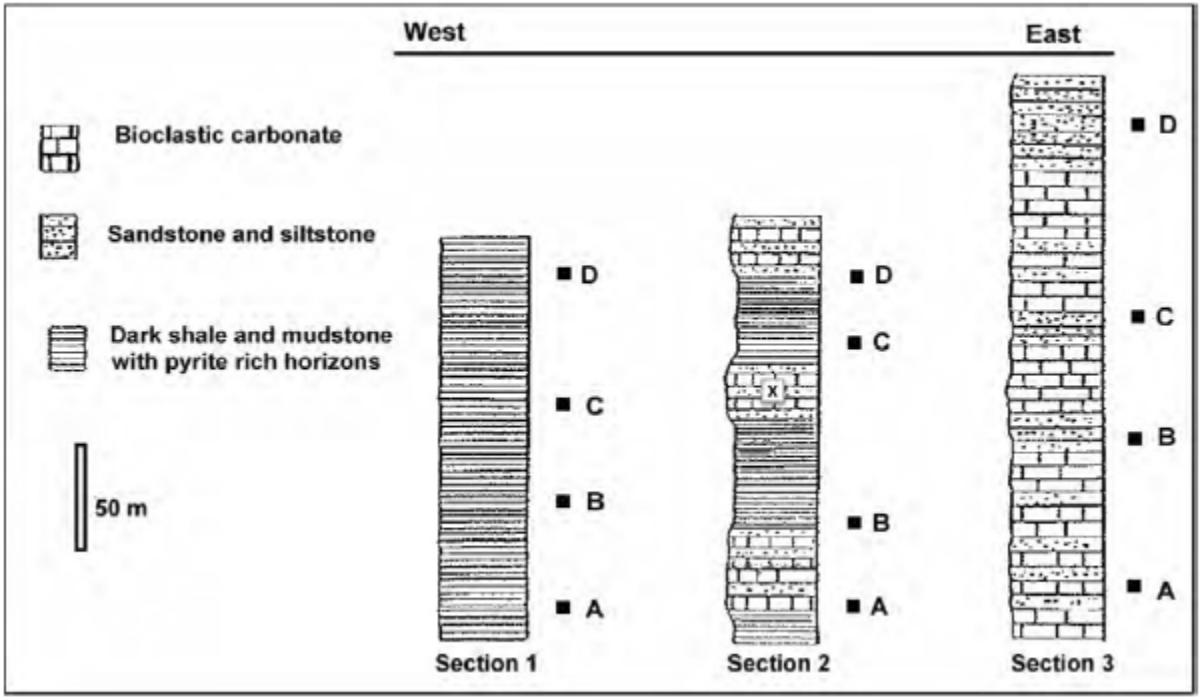
Follow up group work

Real specimens to handle

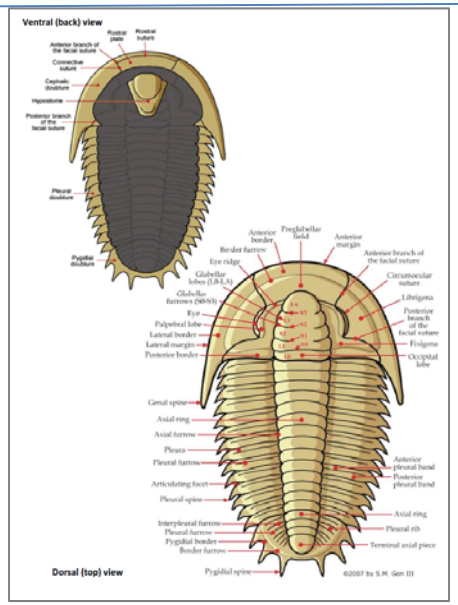
Components for BOTH versions of this exercise:

Same specimens

Same tasks



Same documents



Dendroidea: The most primitive but also the most structurally complex. Generally shall, shrubby to fan shaped colonies around 2 – 8cm in length. Typically sessile but some were planktonic. The stipes have three different types of thecae (these are very often difficult to see) which are generally very small and present in high numbers. Stipes may be connected laterally by branches called **dissepiments**. Dendroid graptolites appear in the Middle Cambrian and were the ancestors of later graptoloids. Dendroid graptolites become extinct during the Carboniferous.

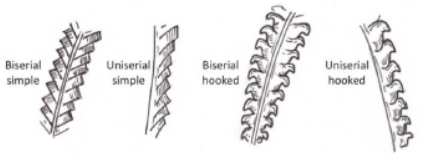


FIGURE 2. THECAE

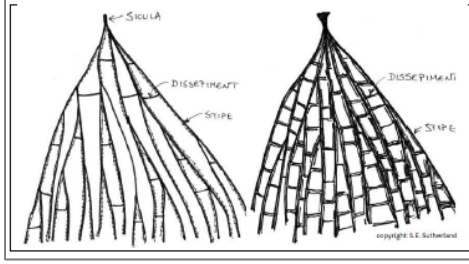


Figure3: Cladia; lateral branches off the main stipe

←Figure 4: Dendroid Graptolites

DE Student ←→ content[1]

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

DE Student ←→ colleague

1. Focus on asynchronous, not synchronous interactions

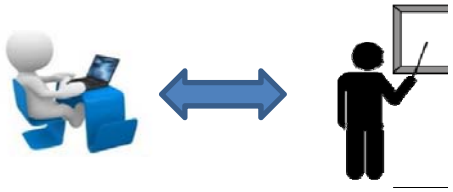
2. Cooperative[1] opportunities
   - Share solo work; generate cooperative products &/or tests

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 ←→ instructor



1. Expert <-> 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 → frequent feedback.

5. "4 S's" from TBL[1] can guide task development.
   - **S**ignificant task; **S**ame task for all; **S**imultaneous report; **S**pecific Choice or **S**imple "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.

Specimen 48 still photos. For larger versions of each, right-click to

- **Figure 1:** Top.
- **Figure 2:** Front 1.
- **Figure 3:** Front 2.
- **Figure 4:** Bottom.

- "Flipbook" images

Other resources for the DE version:

- Online data entry with auto-grading using Jumble Sentence

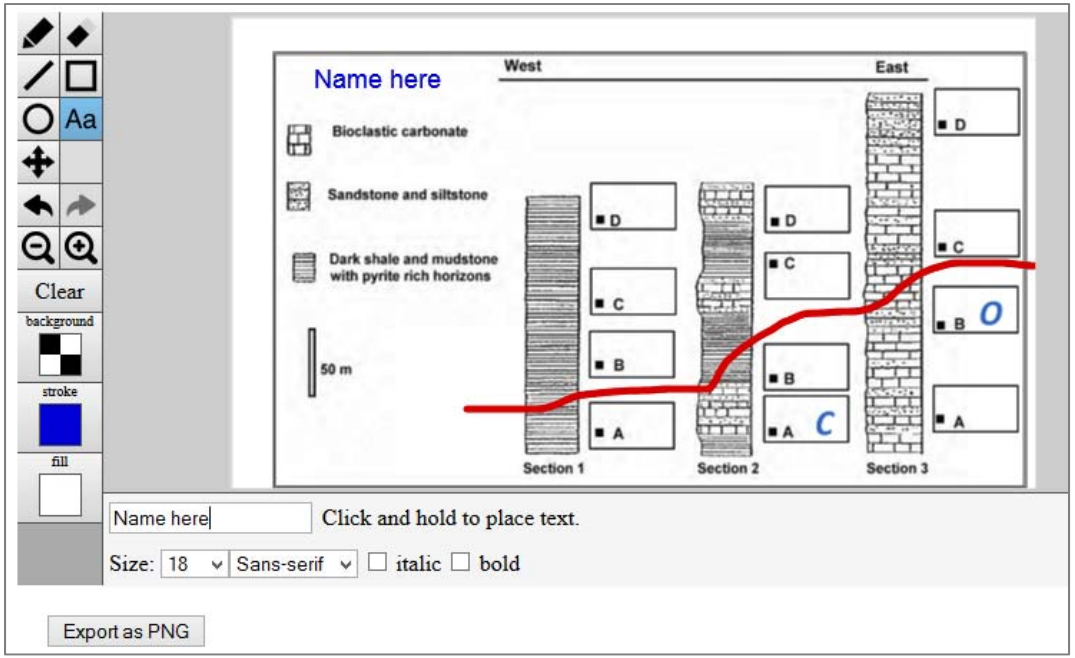
3 points Save Answer

Question 1

These form-filling questiosn are formatted to match the paper form as closely as CONNECT will allow. Please use your results on worksheet #2 to fill out the genus and ages of fossils and the resulting age of the location in geologic column #1.

Location	Specimen#	Genus	Age of Genus	Age of Location
1A	45			

- 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/trilograpto-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

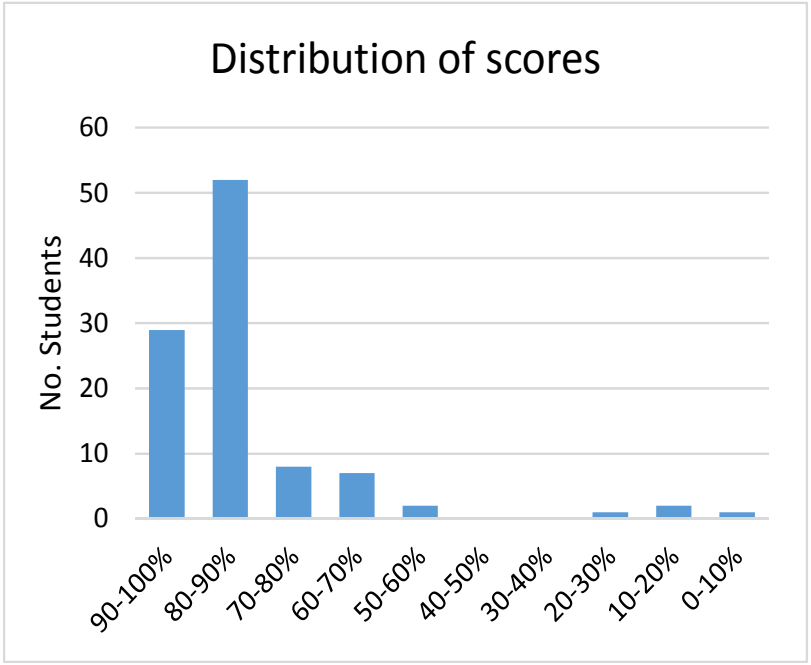
1. Add one level of technical complexity

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

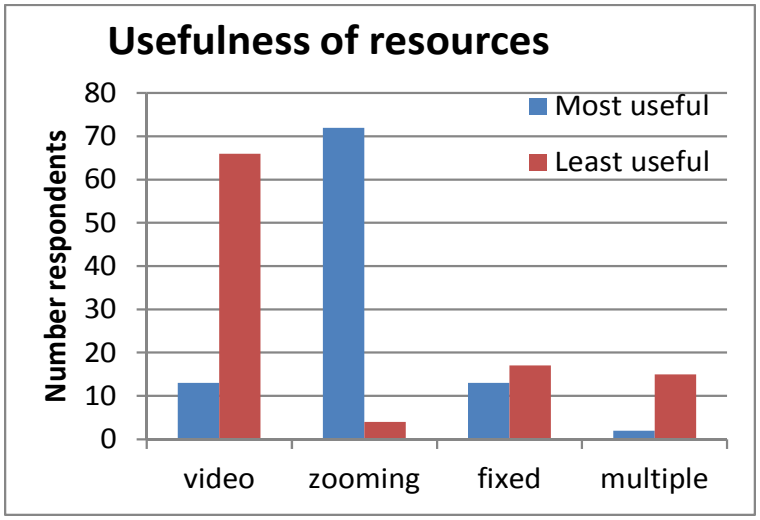
q 01	q 02	q 03	q 04	q 05	q 06	q 07	q 08	q 09	q 10	q 11	q 12	q 13	q 14	q 15	q 16	q 17	q 18	q 19	q 20	q 21	q 22	q 23	q 24	q 25	q 26	q 27	q 28	q 29	q 30	q 31
73%	94%	81%	93%	95%	95%	94%	94%	95%	90%	81%	93%	81%	80%	90%	69%	86%	91%	82%	60%	43%	36%	86%	53%	85%	61%	76%	80%	70%	49%	51%

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

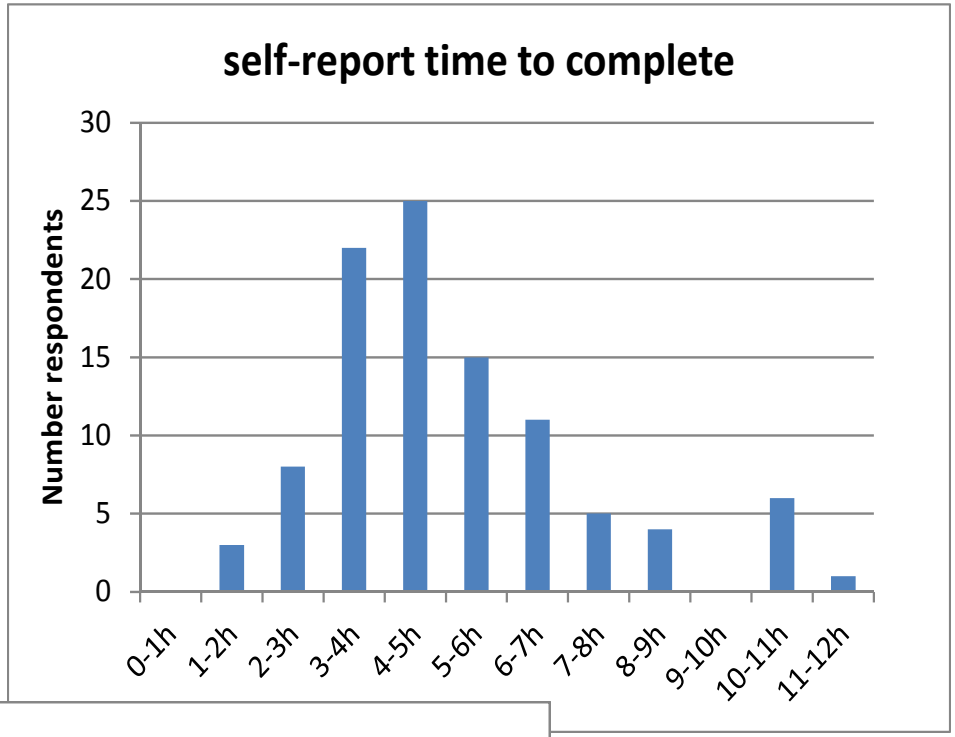
  Detailed open responses not yet analyzed.



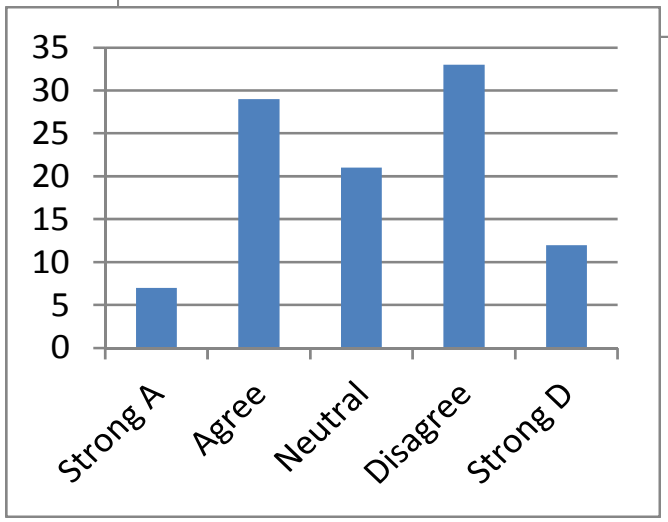
- *Did you use "outside" resources?*
  Yes = 49, No = 51.
  - Details to be explored later
  - Suggests *requiring* outside sources

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

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