

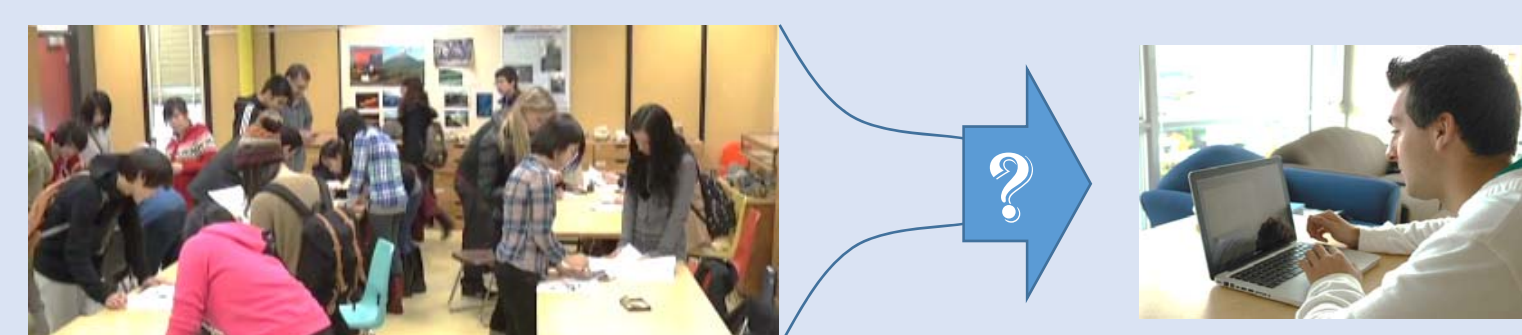
1. Background, objectives & accomplishments

PREMIS:

Most UBC improvement projects target face-to-face (F2F) teaching and learning. But – flexibility for students and efficiency of delivery demands increasing use of distance education.

QUESTIONS:

- Can face-to-face learning activities be adapted for DE courses?
- Can f2f courses benefit from DE strategies?



OUR ANSWER:

Yes – with some caveats. “How people learn” does not change, but each delivery medium imposes distinct opportunities and constraints.

Project Objectives	Accomplishments	Courses
Increase active, experiential and/or collaborative learning in DE.	a. Adapt two F2F labs for asynchronous DE b. Interactive resources to enable labs c. Worksheet-based labs & assignments	326 DE 326, 118 DE 326, 118 DE
Enhance the diversity and frequency of online assessments for both DE and F2F	a. Enhanced quizzes and "data entry". b. Pre-post c. Bloom's Dichotomous Key d. feedback (active readings; sketching instead of writing. e. feedback increased by grading solo prior to group work. f. graphical thinking: online sketch app.	116 DE, 326 DE 116 f2f and DE 220, 326 f2f 326, 118 326 326, 118
Move F2F courses towards a Blended Active Learning modality.	a. Online homework b. Visible geology homework (part 2 of a 3-wk activity)	116f2f 110 f2f
Apply evidence-based best practices.	• Learning goals; • group/solo work; • frequent formative assessment; • scaffolding of expert skills; • knowledge, skills and attitudes; • increased novice/expert interaction.	All
Assessments of learning? Our emphasis was on how to “activate” learning. Assessing that “new” learning is another project.		

Project Framework: “Modes of interaction”

Interactions	EOASC326-DE	EOASC116-DE	EOASC118 (DE) & 110 (f2f)
Student ↔ Content 	• 2 sketch-based assigns • 2 interactive content sets • 1 VisibleGeology activity • Interactive specimens • Use of 3 rd party online fossil D.B. • 1 Lab changed to self-test	• 6 homework assigns • 8 External readings • 1 Interactive content • 2 Worksheet assigns.	• 4 sketch-based assigns. (eosc118) • 1 virtual specimens assign. (eosc118) • Visible Geology hmwrk (eosc110)
Student ↔ Student 	• 4 small grp assignments: → 2-4 times increase in activity (Figs. below) • Increased open discussions	• None designed but... → more posts / stu. in discussion forums	• Worksheets (eosc110) • Work with peers encouraged (eosc118)
Student ↔ Expert 	• Assign. feedback • Sketch feedback • Peer supported feedback • Upgraded test questions • Email Q/A	• Assign. feedback • Upgraded test qu'ns • Email Q/A • Pre-post	• Assign. feedback (eosc118) • Clickers & worksheets (eosc110)

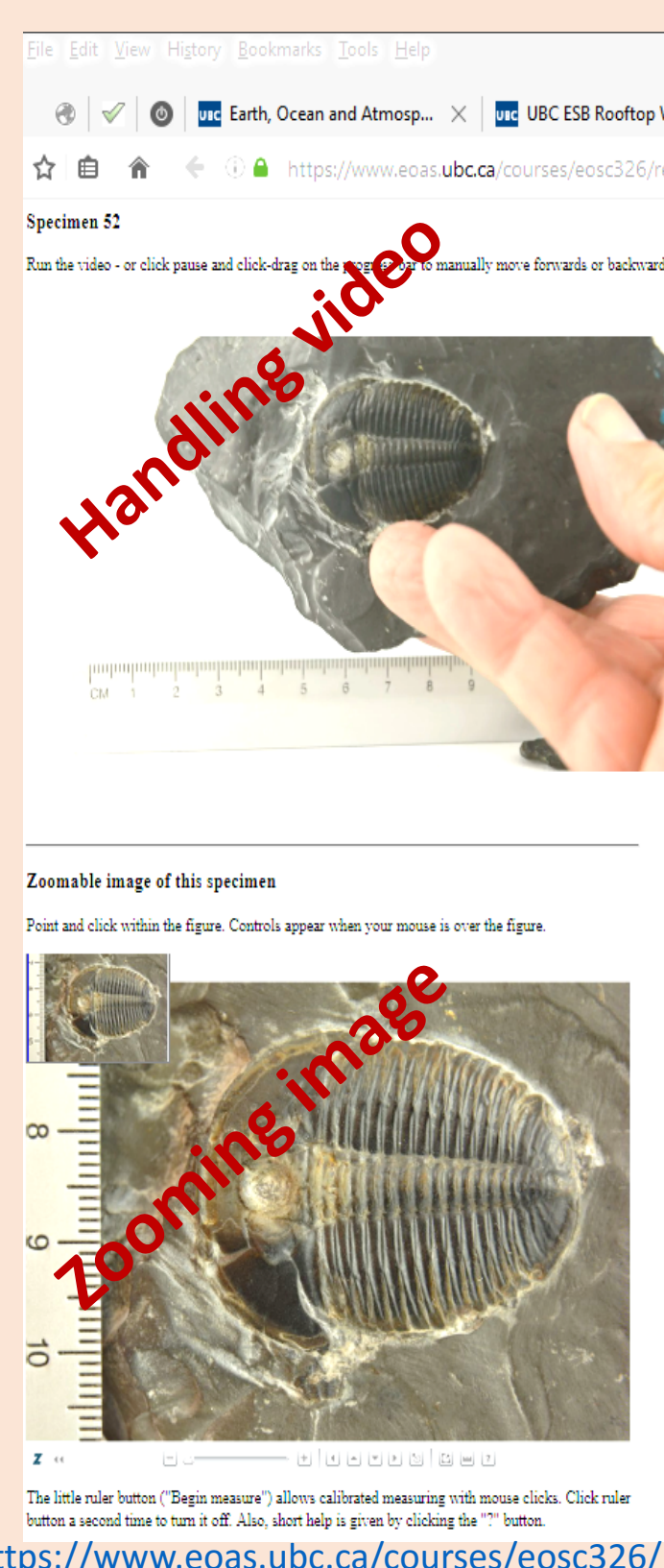
3. Examples: interactive resources

Context: Active-class & lab-based learning strategies and resources have worked well for F2F students (150/yr) since being improved during CWSEI.

See videos 1a, 1b at <http://blogs.ubc.ca/wpvc/>

Goal: Developed equivalent experiences for DE students (> 300/yr).

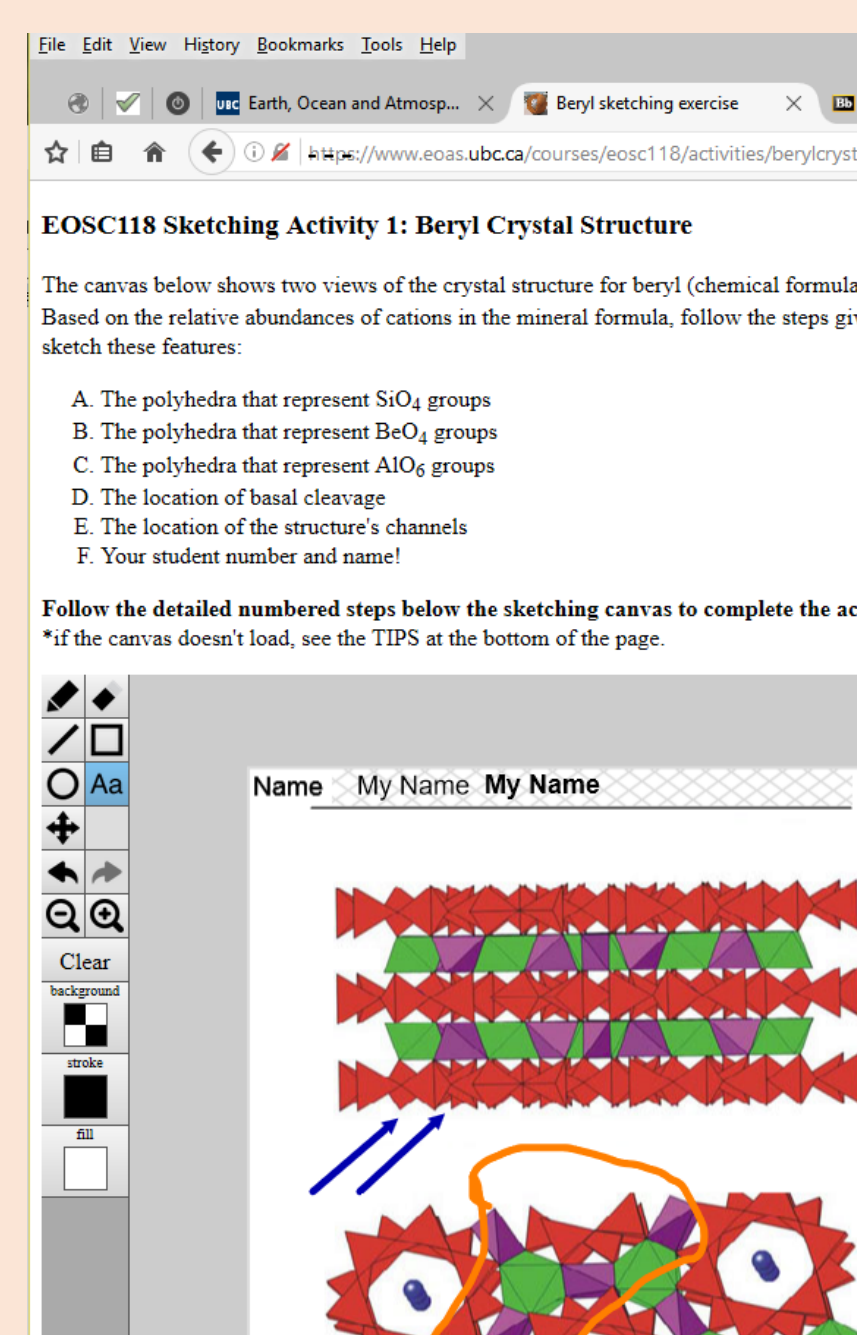
2. High-resolution Interactive images of samples, with videos of handling to see scale and rock context.



3. Online sketching app; simple, save to *.png, ensures consistency of student product for assessment and sharing or discussing.

Free facility (a little tricky to implement) at <http://literallycanvas.com/>

<https://www.eoas.ubc.ca/courses/eosc118/activities/berylcrystal-sketchex.html>

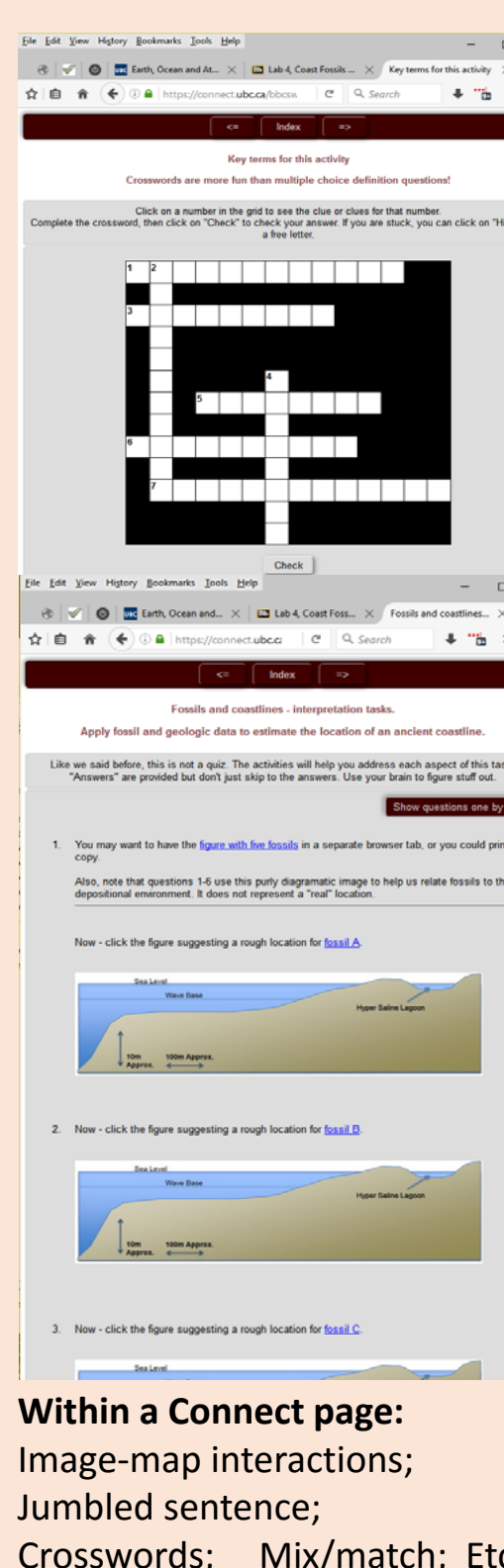


4. Interactive content means “instant” feedback at the same time as consumption. Built outside Connect, but runs in Connect.

Two free tools:

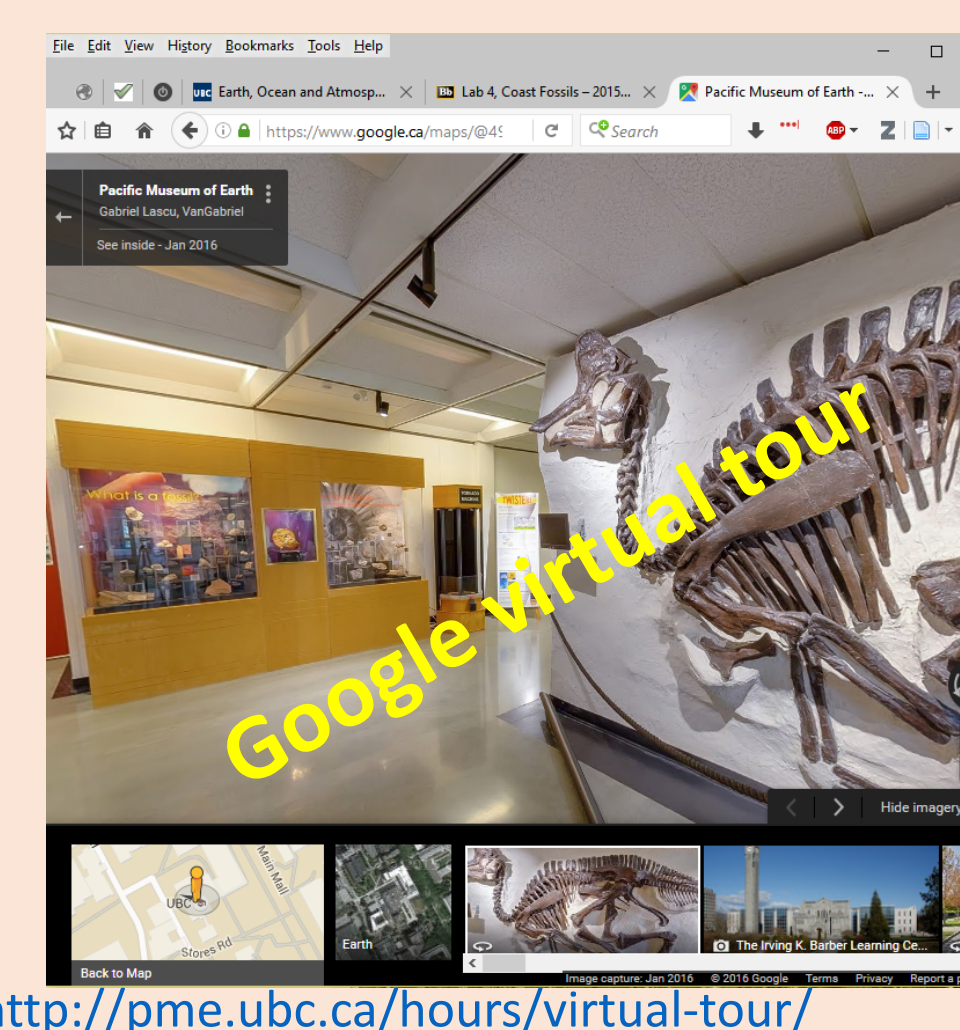
i) “Hotpotatoes” at <https://hotpot.uvic.ca/>

ii) Image map builder with mouse-over & click feedback at <http://bit.ly/1RFOLks>



5. Virtual tour of The UBC Pacific Museum of the Earth (PME).

Goal: overlay links to interactive resources including rotating, zooming, high resolution, video, etc.



Examples:

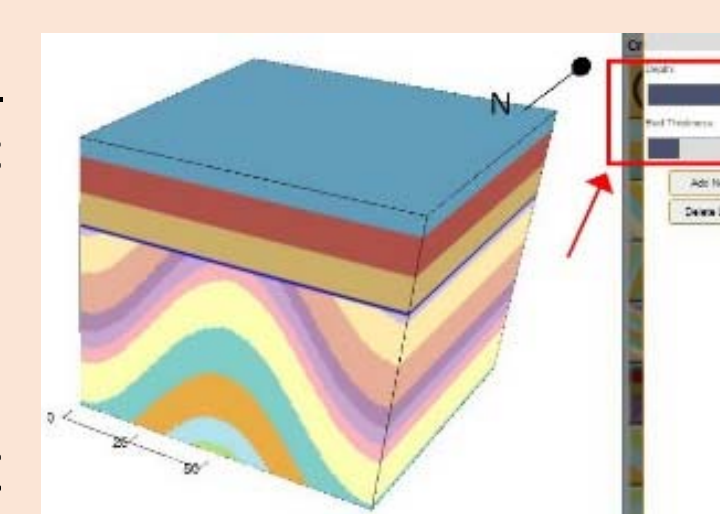
- <https://www.eoas.ubc.ca/courses/eosc118/activities/mineralid/mineralid-case.htm>
- <https://www.eoas.ubc.ca/courses/eosc118/activities/mineralid/berylcorundum.htm>
- <https://photosynth.net/preview/view/426fa325-0be5-49c5-98aa-371fa5298ba?startat=20>

See all 10 via

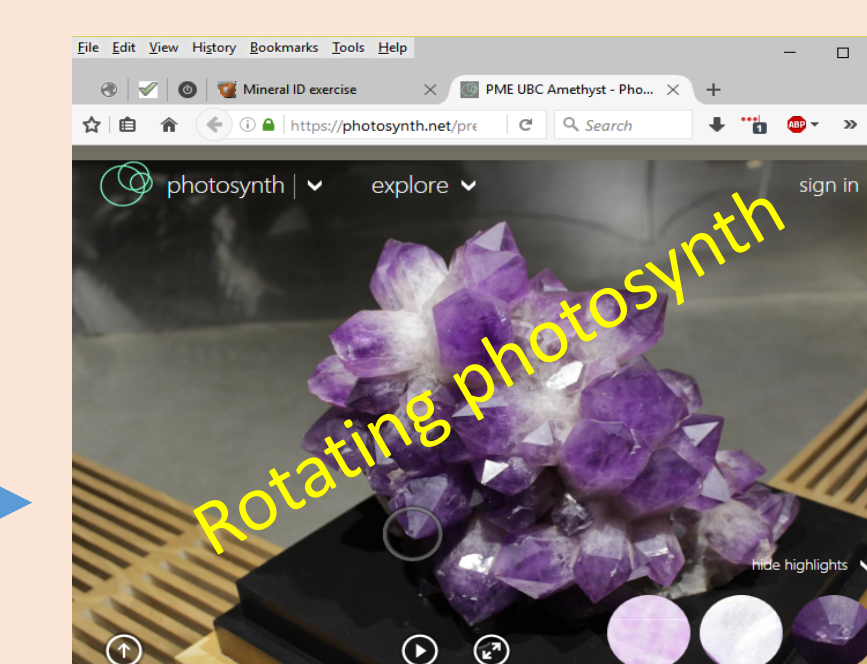
<https://www.eoas.ubc.ca/courses/eosc118/activities/mineralid/mineralid-exercise.htm>

6. Visible Geology: interactive geologic structure analysis and construction.

Developed by UBC PhD candidate Rowan Cockett.



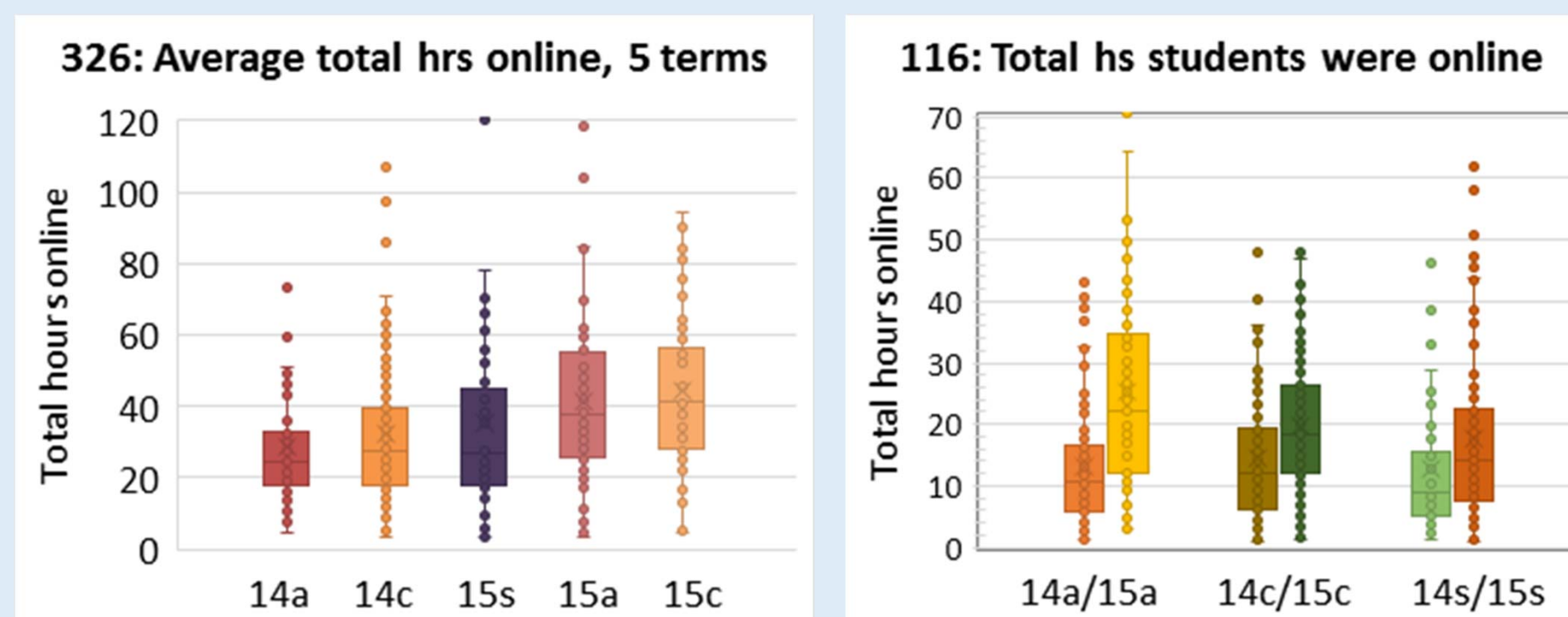
<http://visiblegeology.com/>



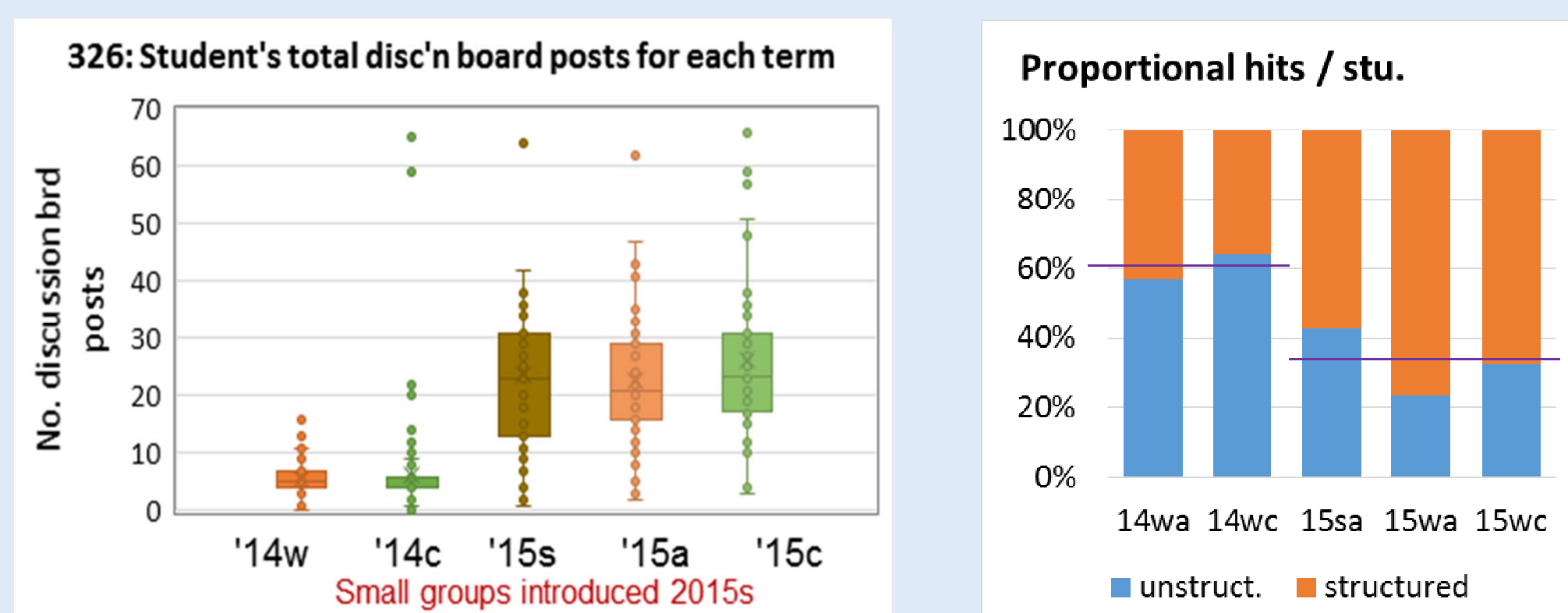
4. Example outcomes

Online behaviors

Students spend more time online – AND – workloads/enthusiasm improves →



Activity (interaction) increases. Mainly in structured discussions.



Feedback from students

Student Learning Experiences Survey in eosc326

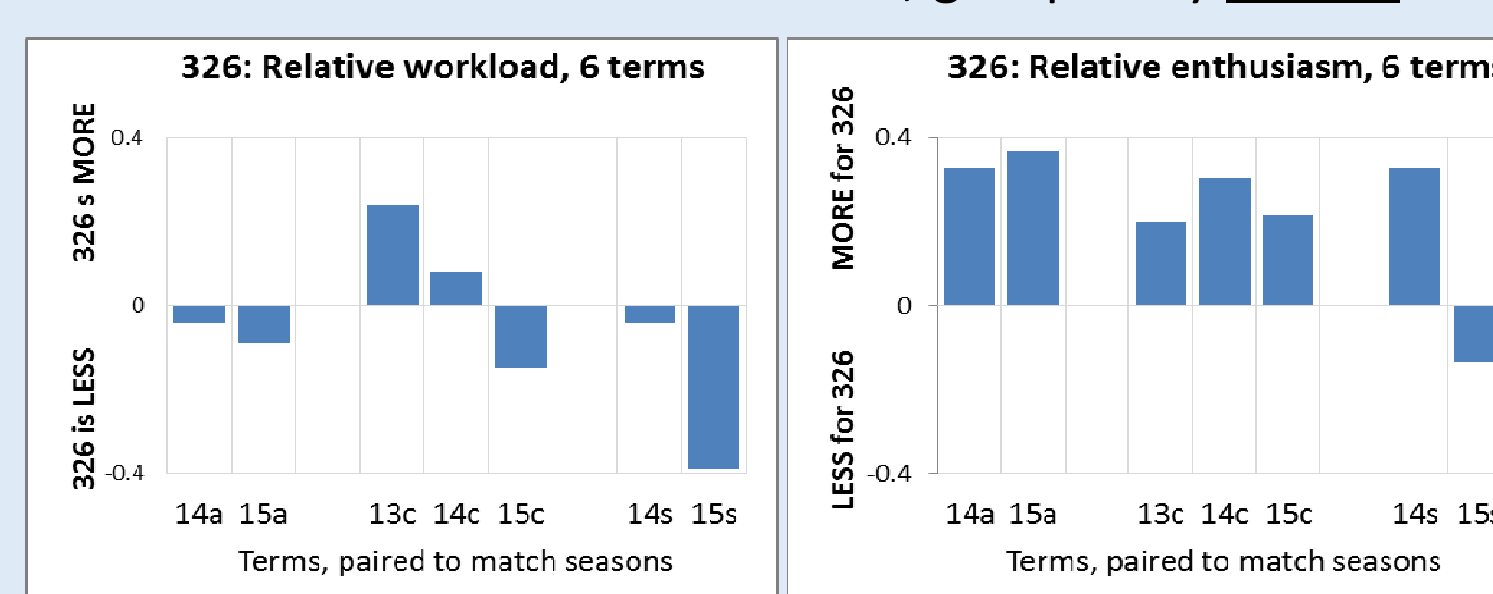
Workloads: - depends on season.
- steadily “less” work.

Enthusiasm: - roughly unchanged.

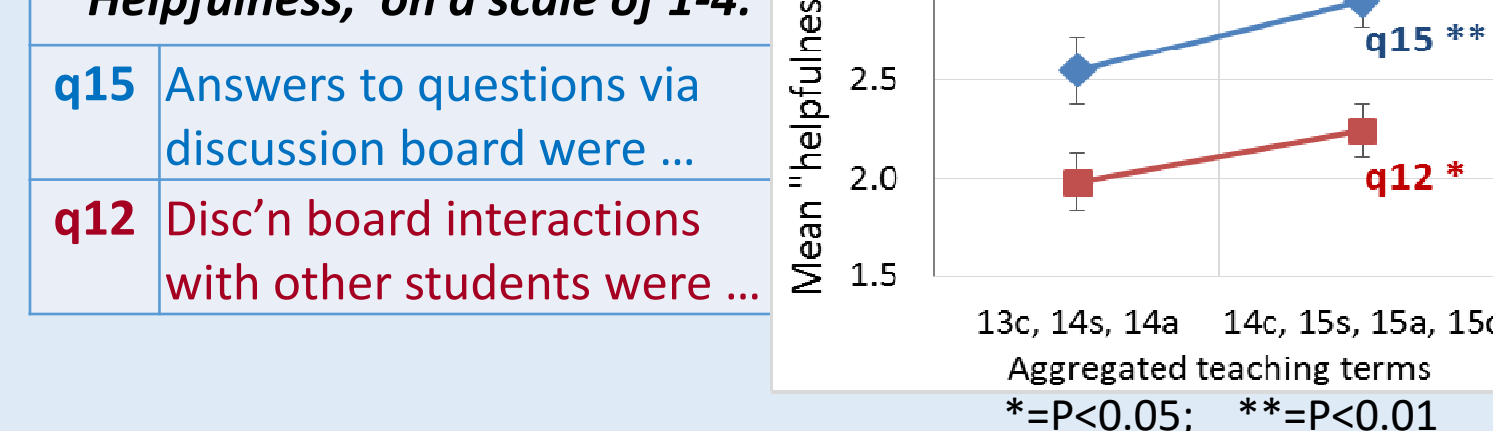
Two opinion questions about benefits of discussion board:

- Both improved significantly after introducing small groups.

Relative workloads & enthusiasm, grouped by season.



Helpfulness, on a scale of 1-4:



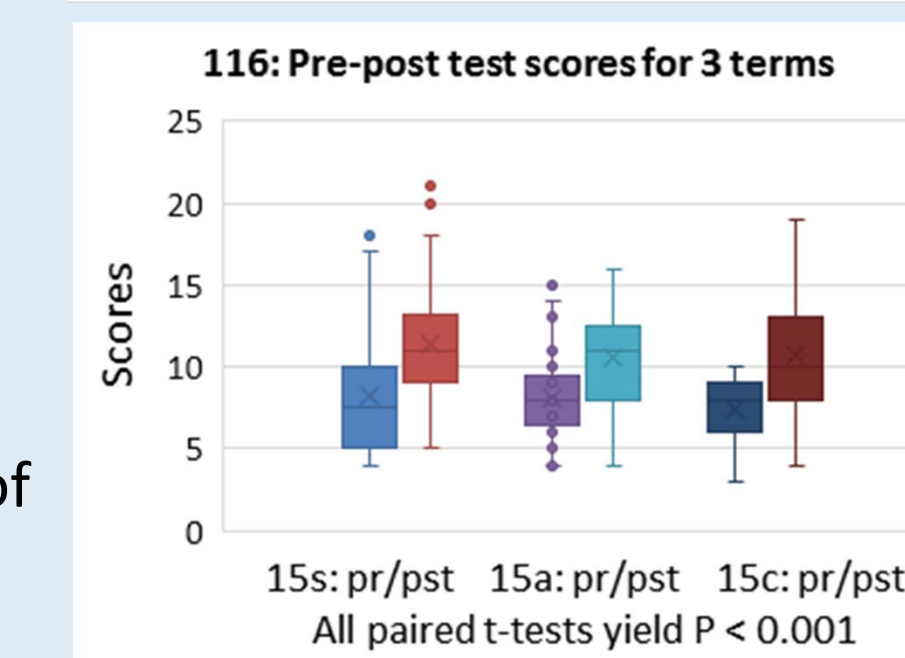
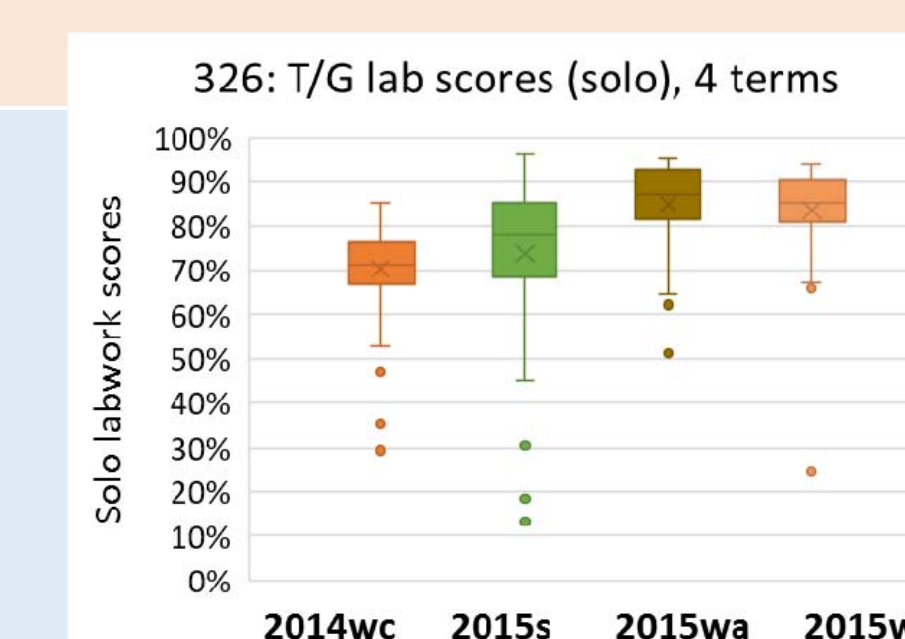
Work and learning

- Solo work lab scores; 4 terms →
- Paired pre-post results; 3 terms. ↘
- “Bloomed” task & test questions.
- Diverse auto-grading question types.

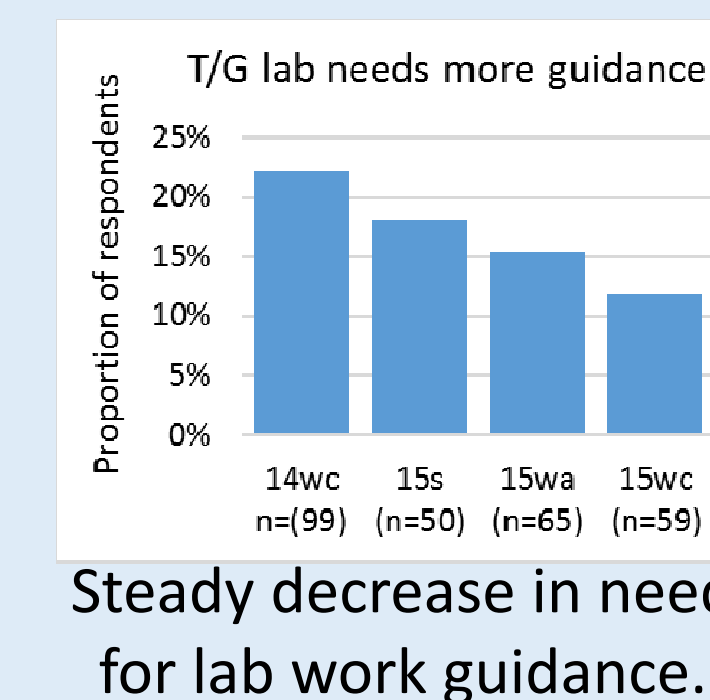
• High level tasks using auto-graded worksheets. Example: “Use data & knowledge to decide if dinosaurs from coastal BC were likely related to Asian or Albertan populations.”

- Sketch examples demonstrate ease of use, consistency, and benefits of solo work followed by group work. ↘

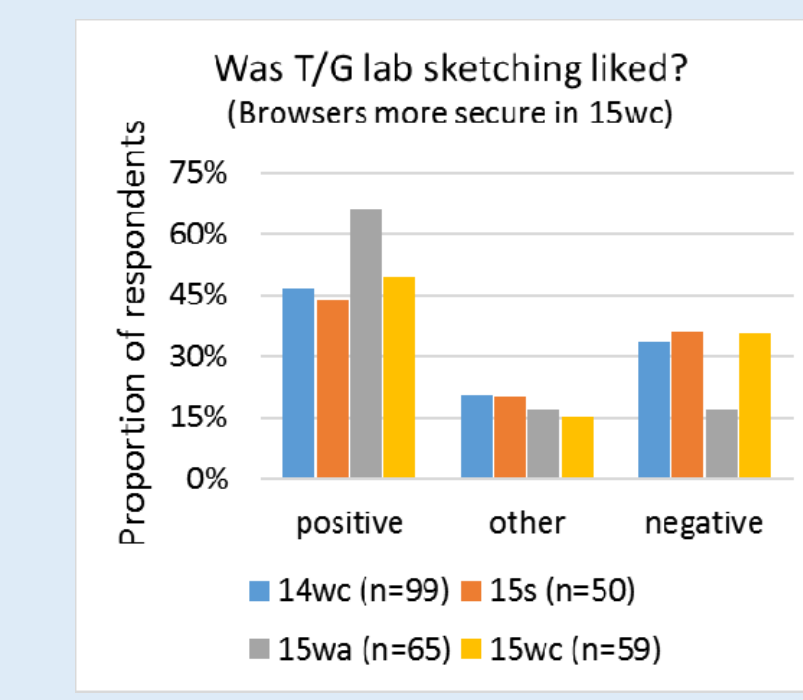
- Solo work varies in correctness and completeness
- Group work revisits tasks + iterates towards correct & complete.



T/G lab exercise

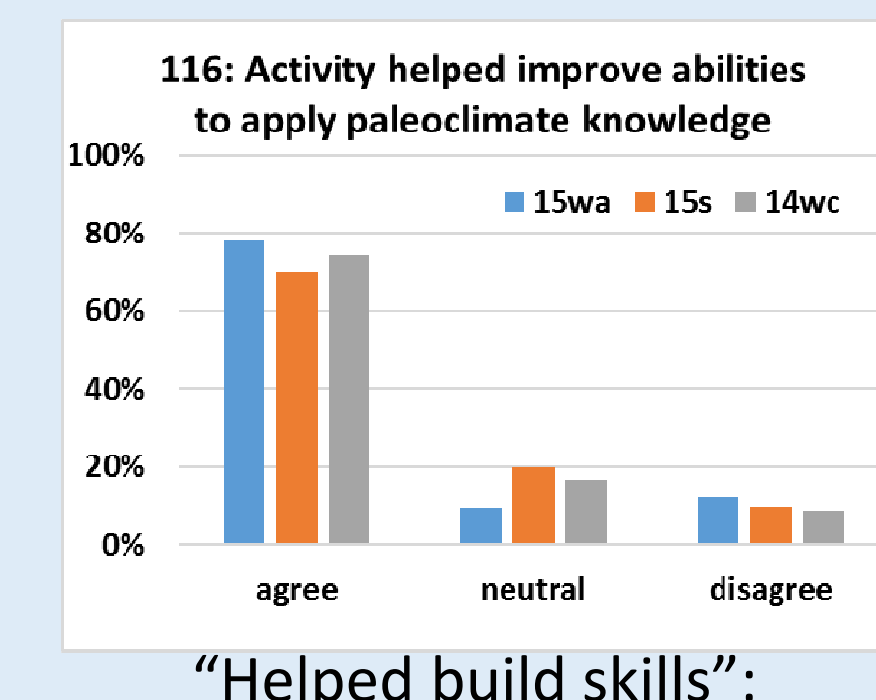


Steady decrease in need for lab work guidance.

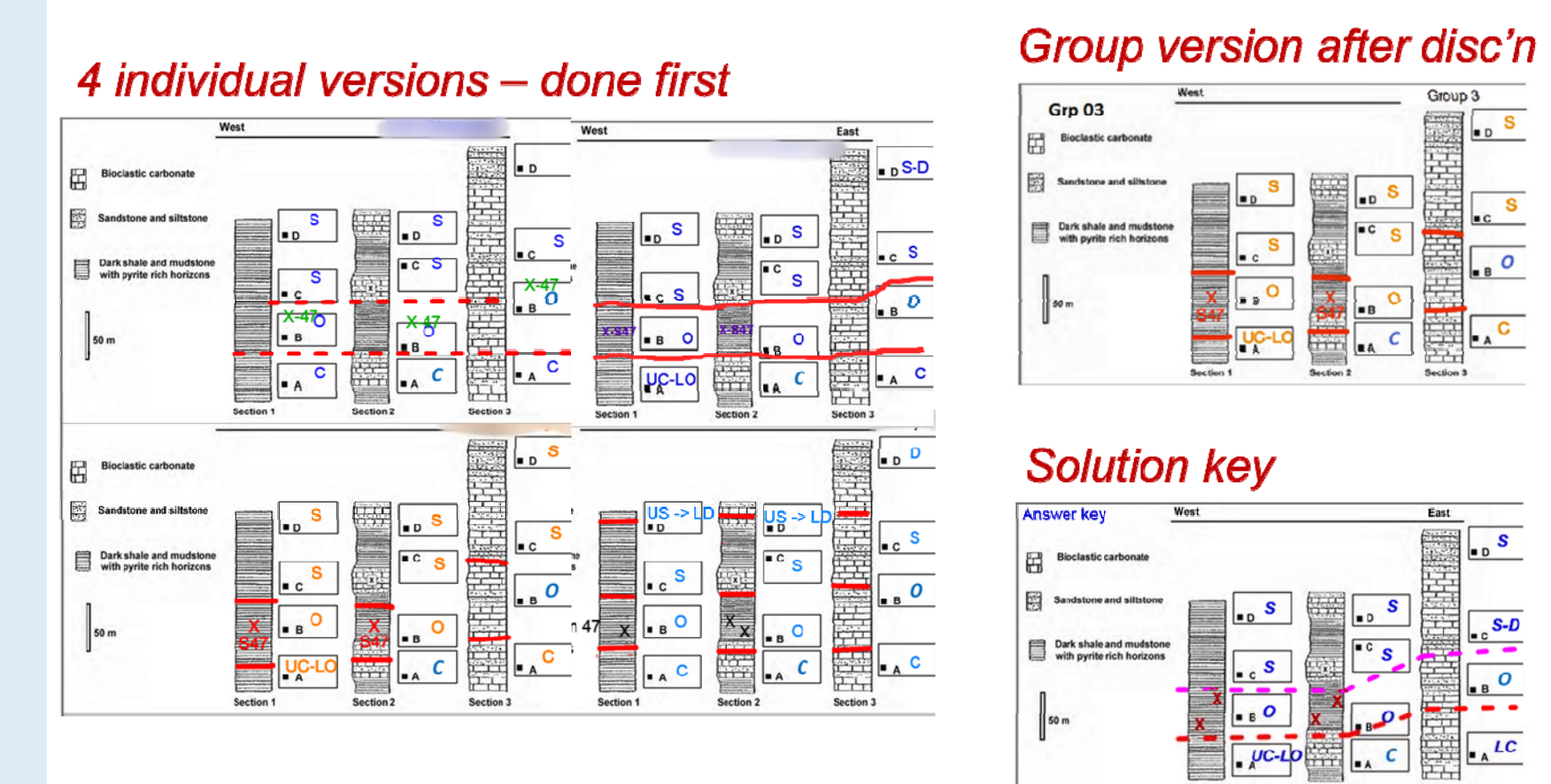


Sketching more “liked” than not.

116 active readings



“Helped build skills”: Consistent in 3 terms.



5. Adapting F2F → DE: lessons learned

General

- Enthusiastic participating instructors are the key to success. In DE, that often means sessionals.
- Learning goals need to drive all innovation.
- Design cycle is slower / more meticulous in DE.
- Non-standard resources are challenging to sustain.
- Getting and using analytics is an unsolved problem.
- DE Instructors need “more” support/doc’n than F2F.

Student - Content

- LMS constrains innovation but supports familiarity.
- Technology is a moving target (eg security of browsers).
- Student buy-in requires:
 - iterative introduction,
 - repeated use. Don't try one-offs,
 - authentic tasks.
- “Low-tech” solutions:
 - worksheets followed by “quiz-based” data entry.
 - questions OTHER than multiple choice.
 - “Blooming” questions enhances auto-graded tasks.

Student - Student

- “Solo motivation” is harder than “social motivation”.
- Group work benefits from sequenced solo-group tasks.
- Scaffold the discussion cycle AND use rubrics.
- Groups of ~8 seem better than ~4.
- Uniform student products focus discussion on thinking.

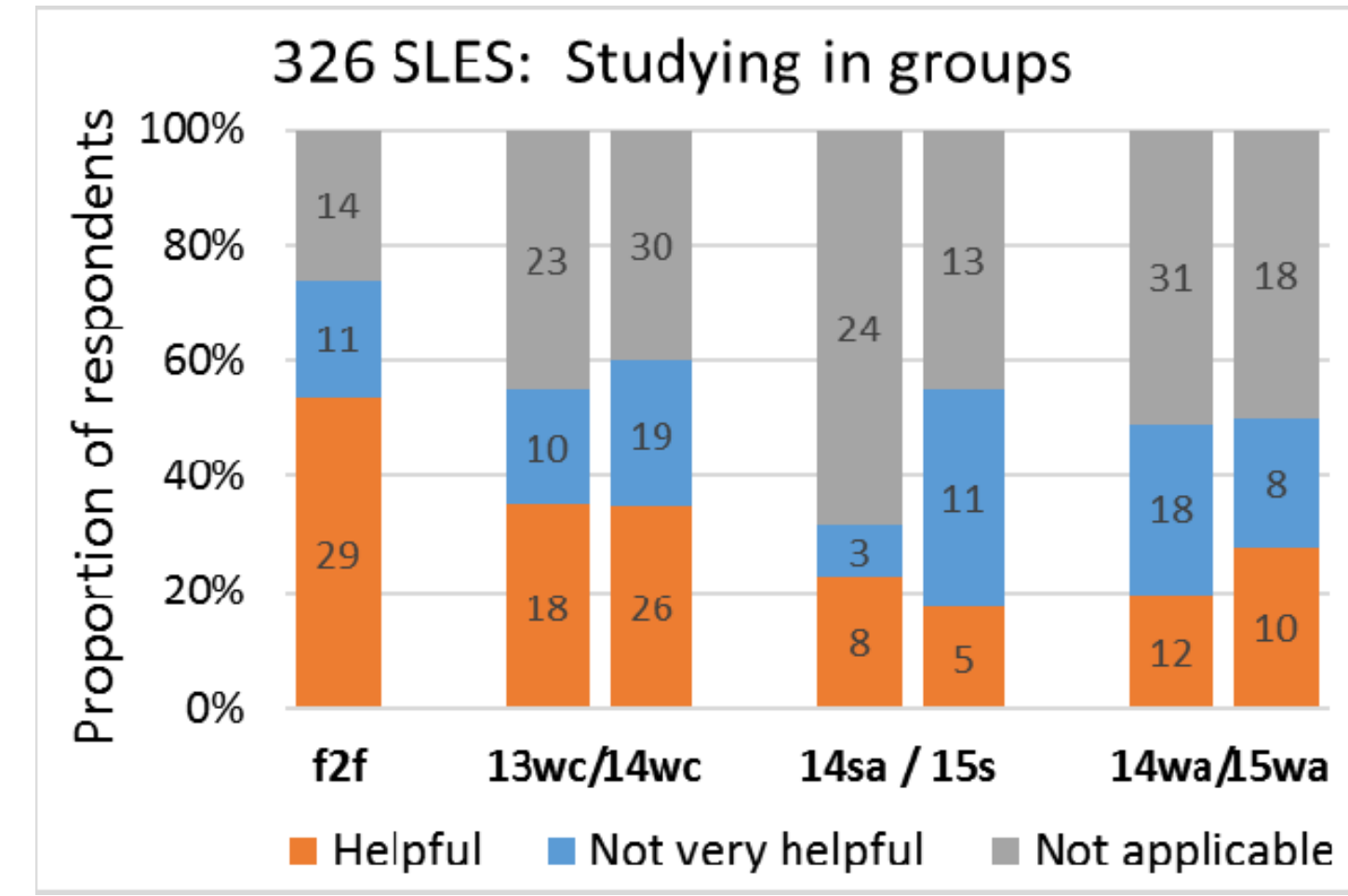
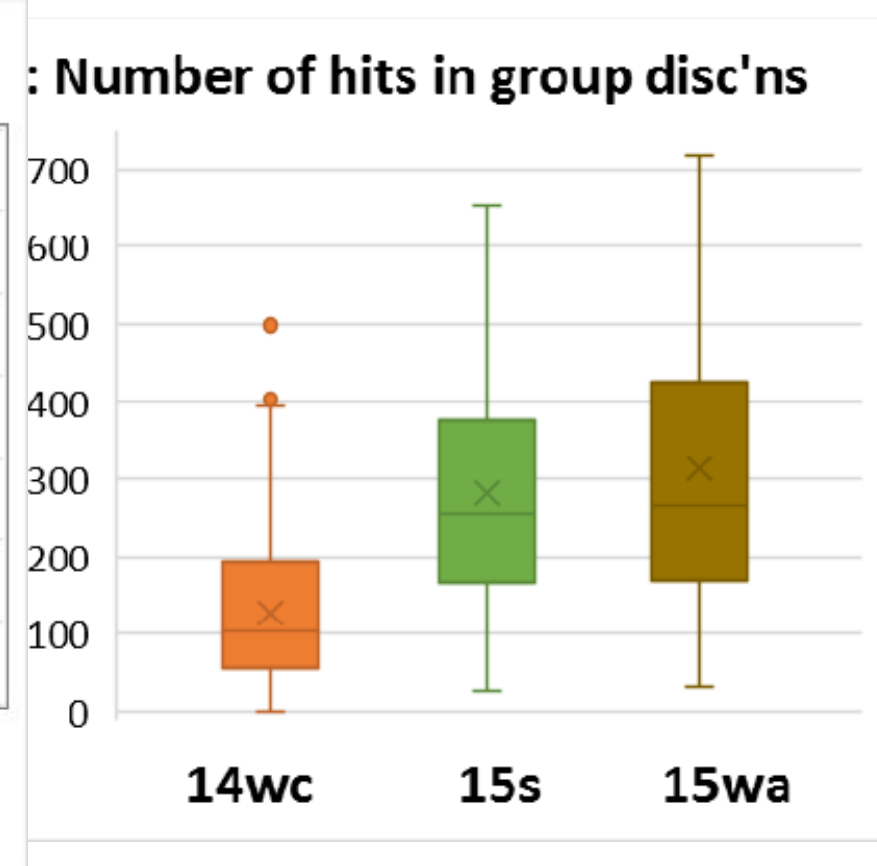
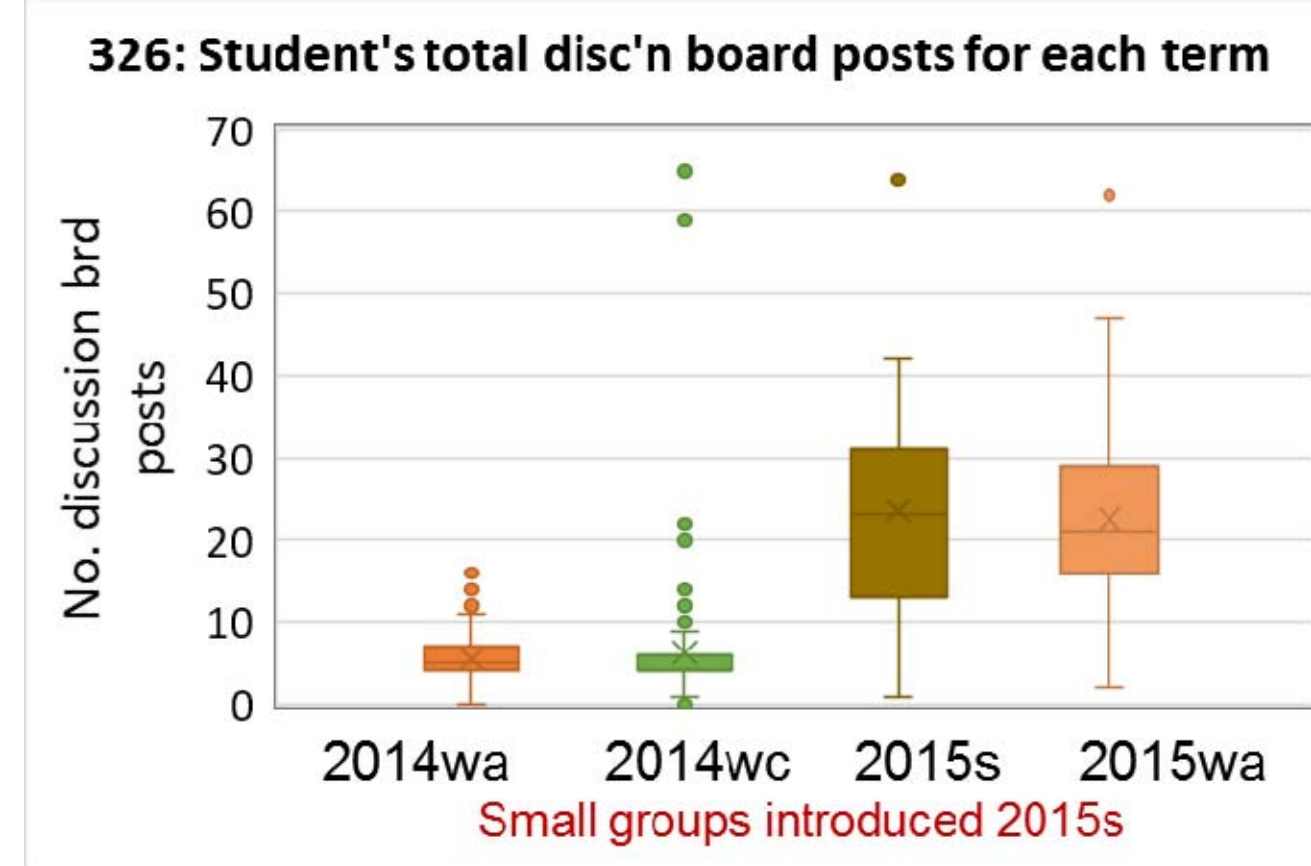
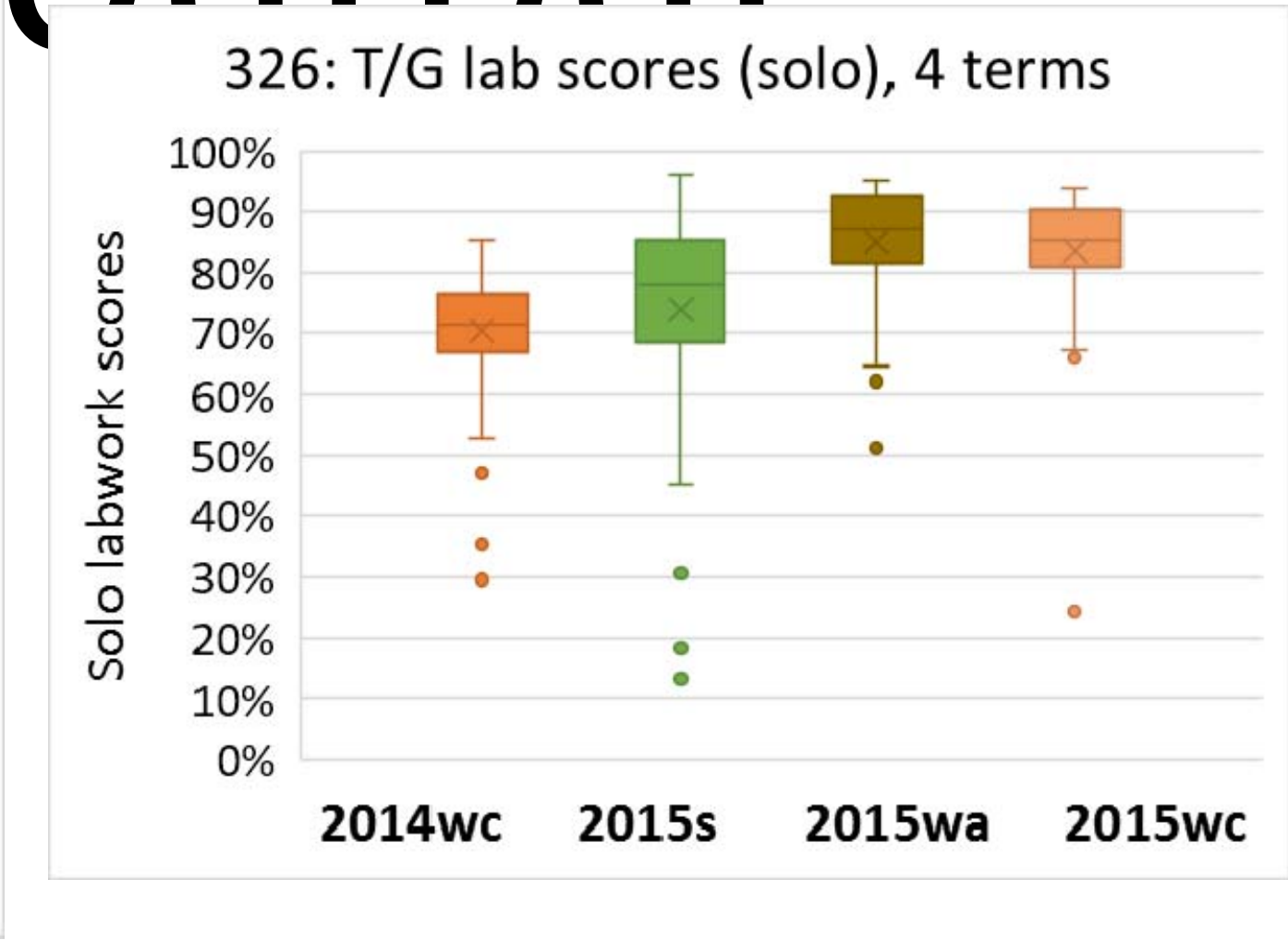
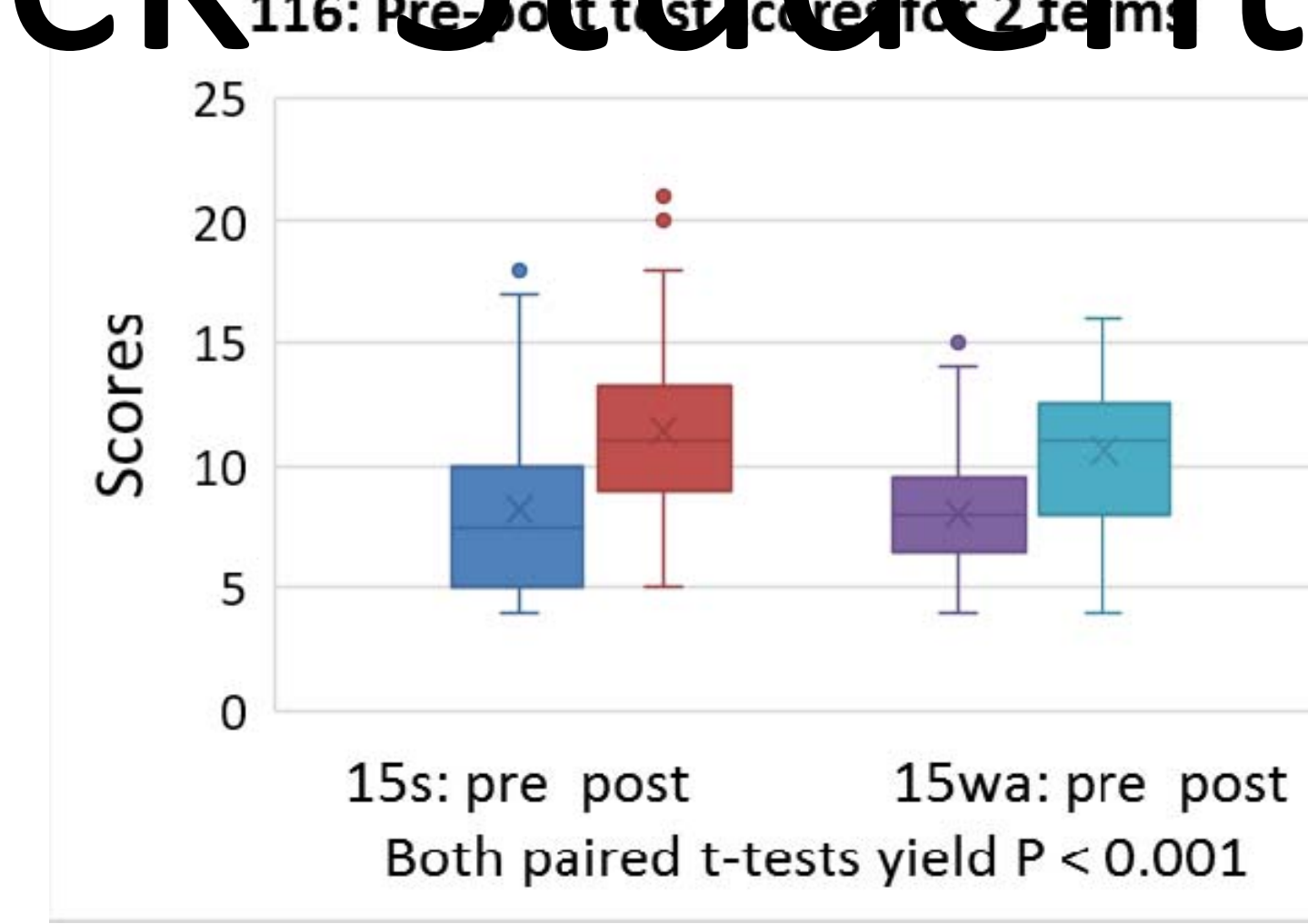
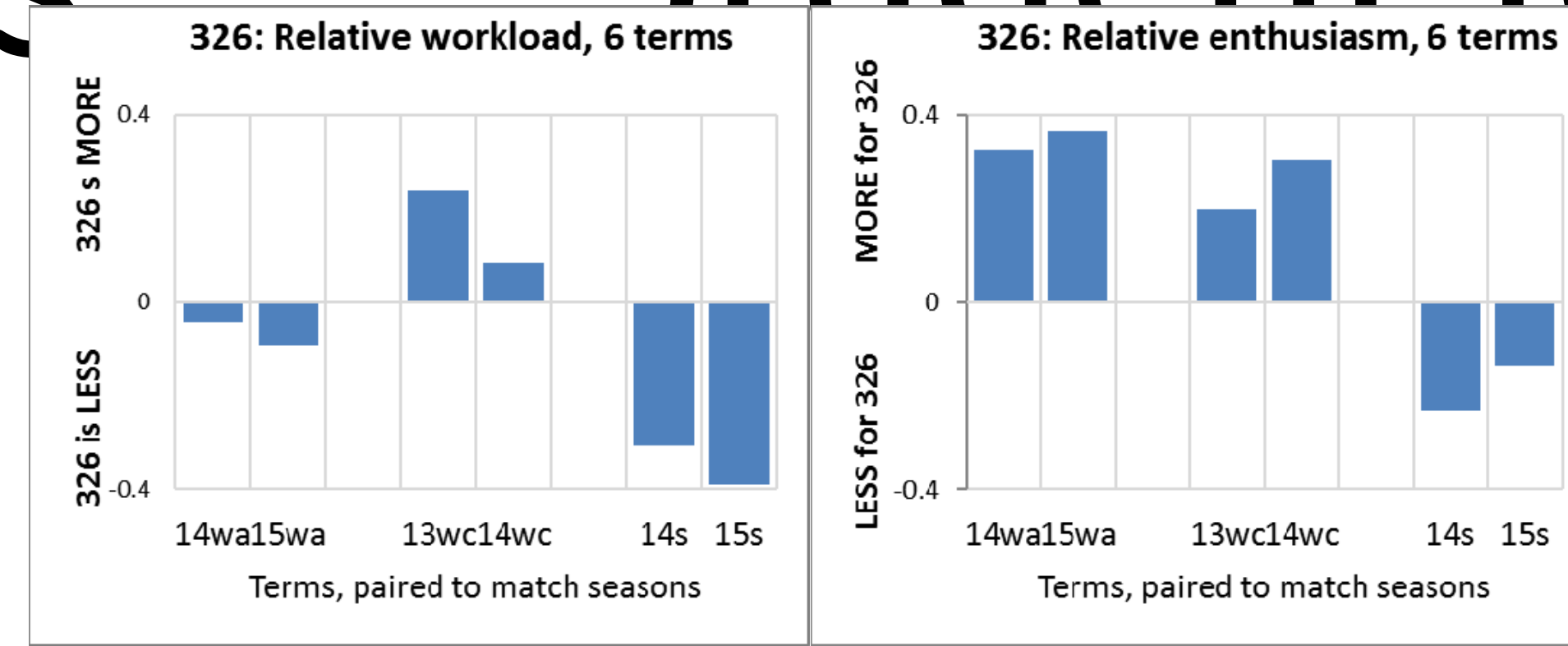
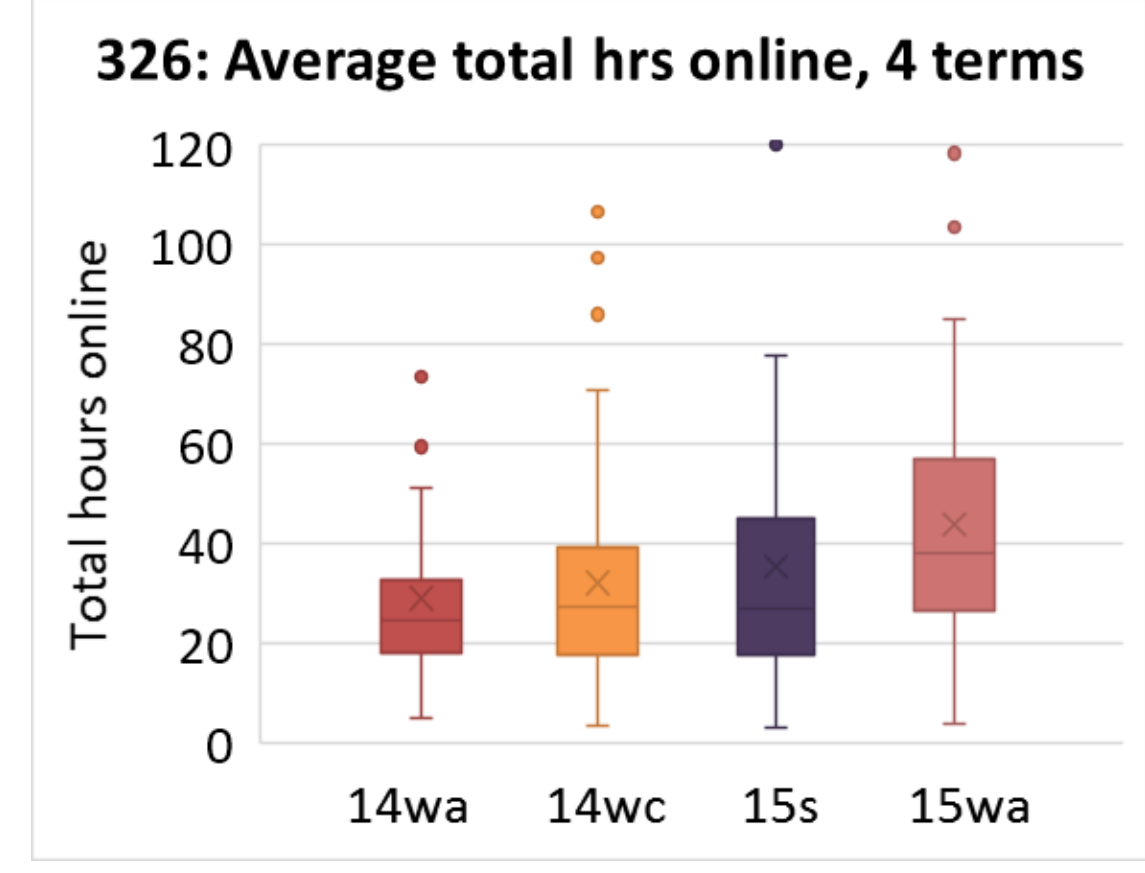
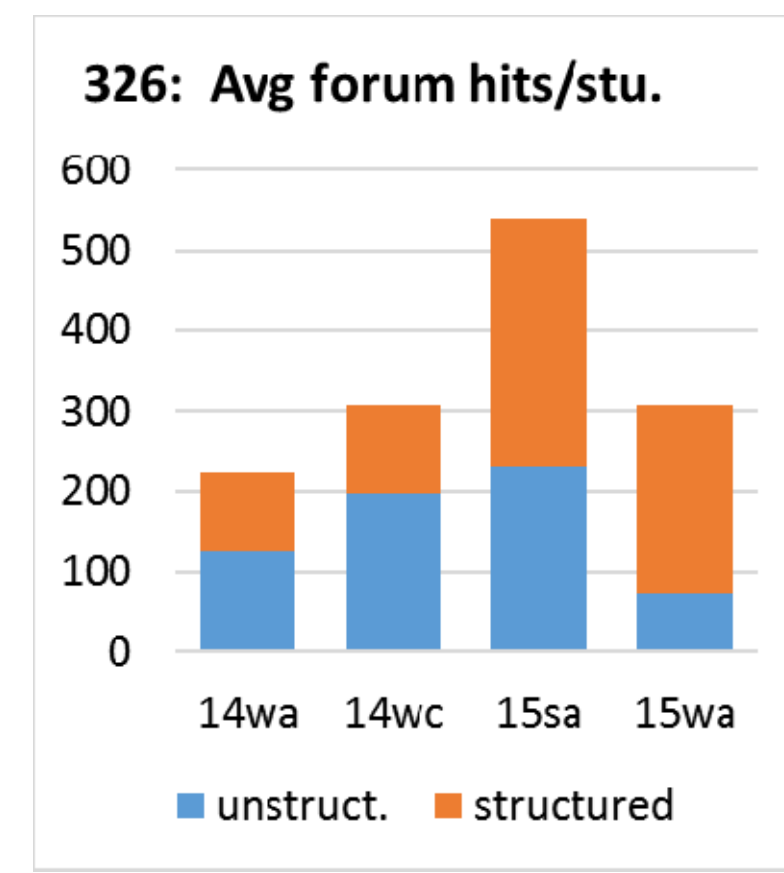
Student - Instructor

- Scaling up needs simple student products and rubrics.
- Sketching as alternative to writing to “see” thinking.
- Streamline the feedback process for TAs.
- Give help and feedback via open discussions.

Student online behaviors

Student feedback

Student output

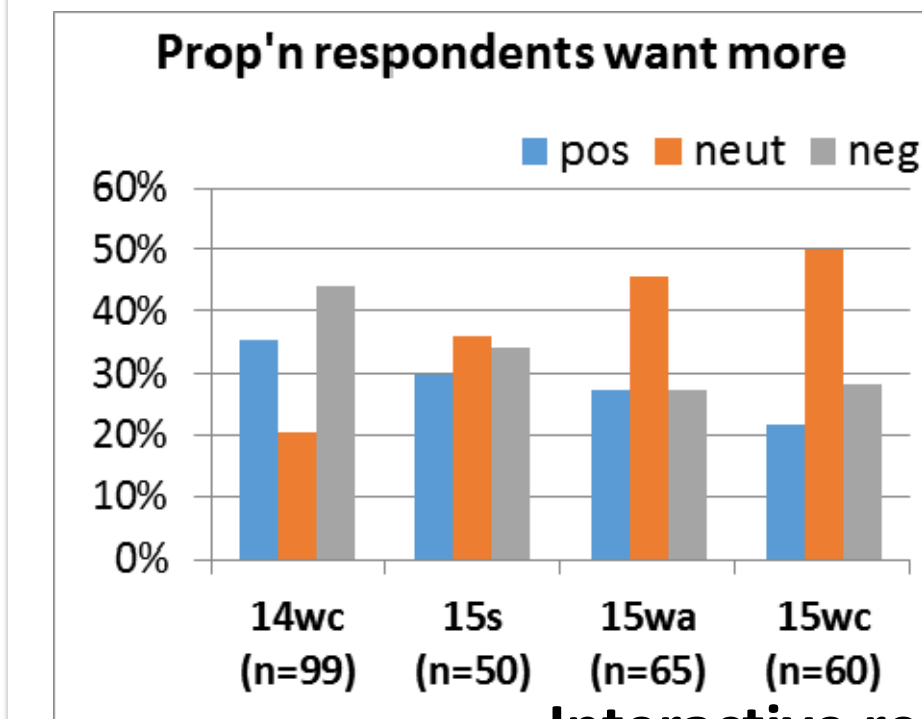
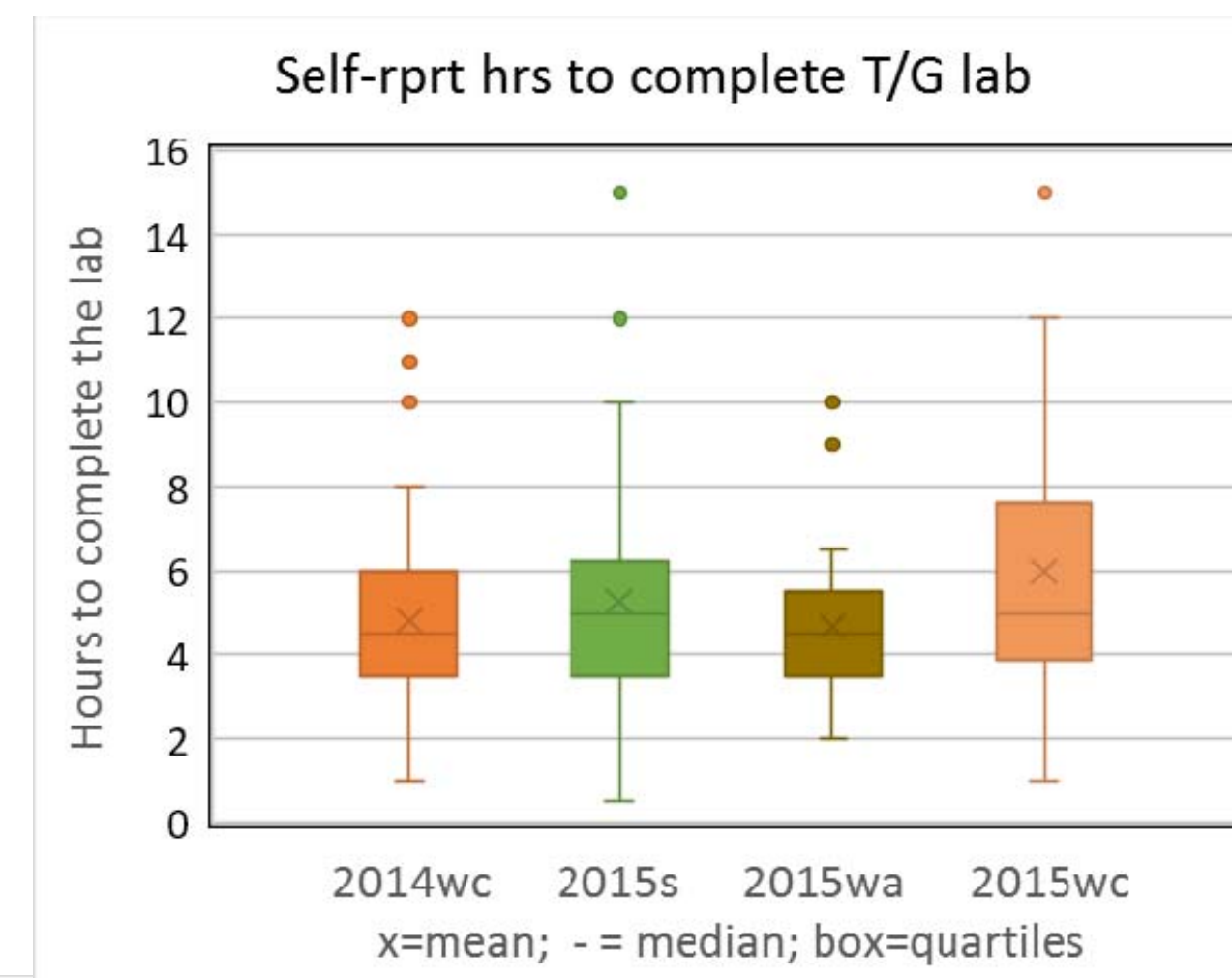
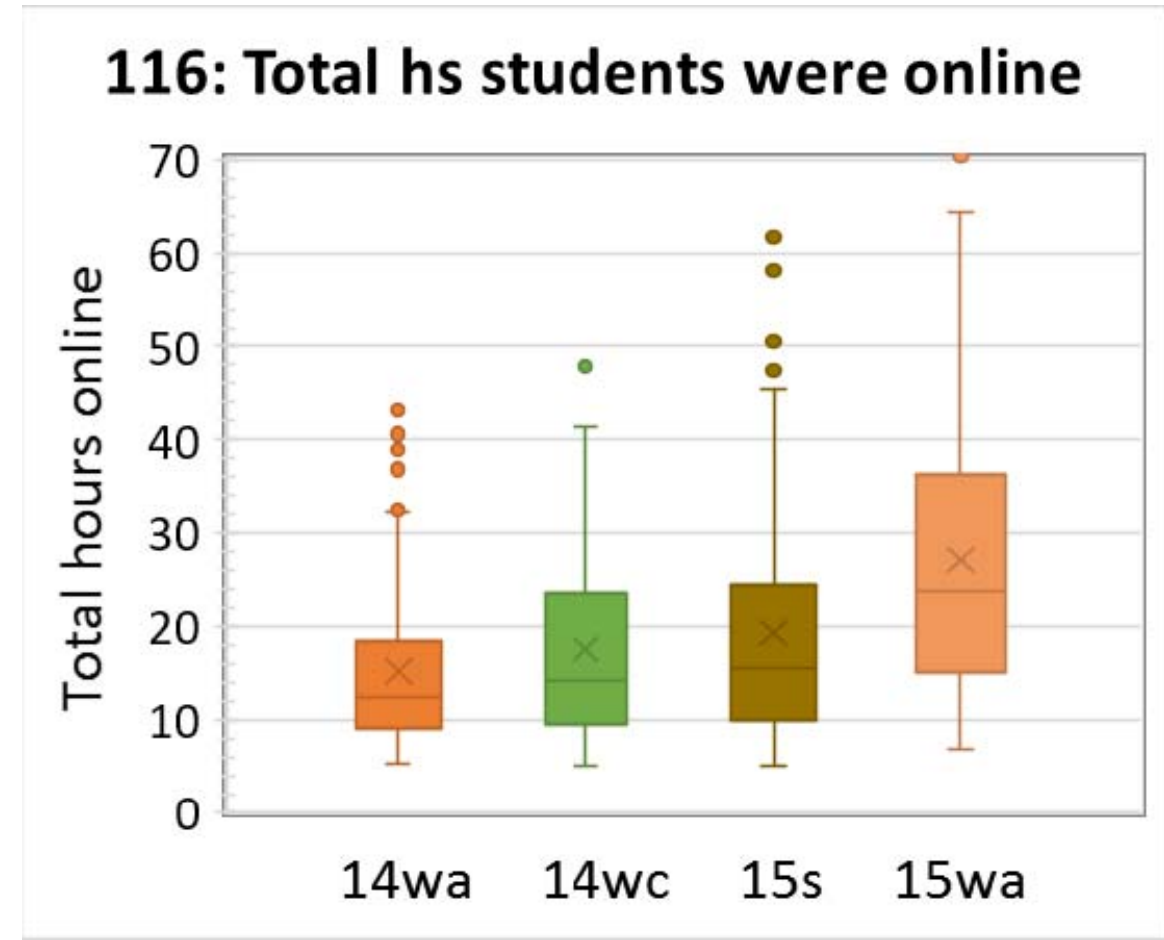
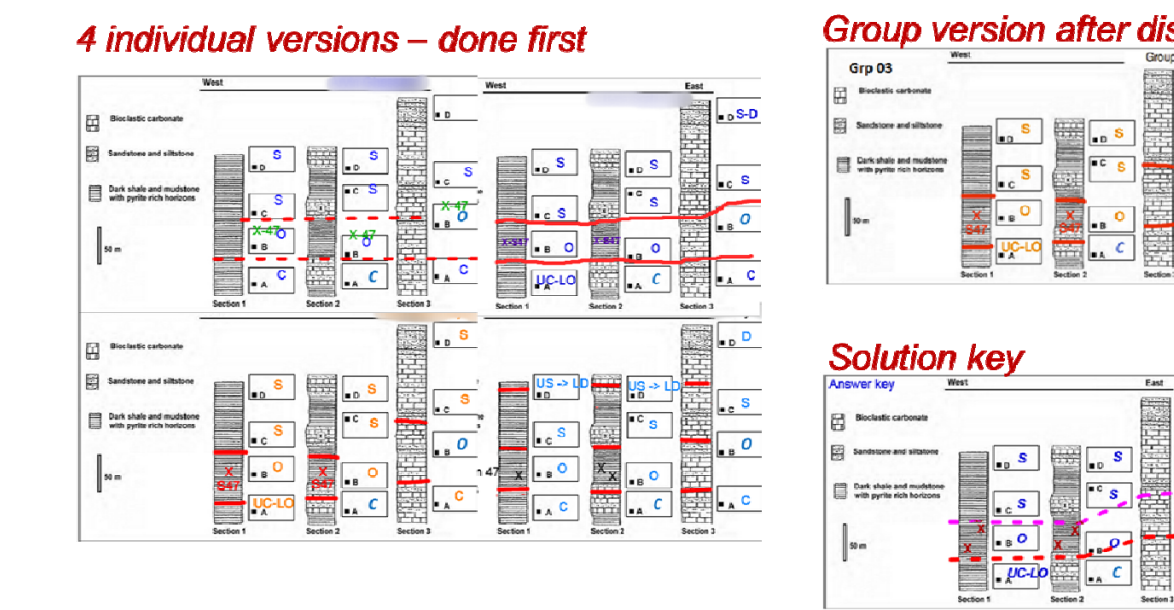


Question (helpfulness...)	Mean DE1	Mean DE2	P via Welch 2-sample t-test
q12 Disc'n board interactions with other students were ...	1.98	2.22	0.029 *
q15 Answers to q'ns via disc'n board were ...	2.55	2.89	0.004 **

DE1 = 3 terms before Jan 2015; DE2 = 3 terms after Jan 2015

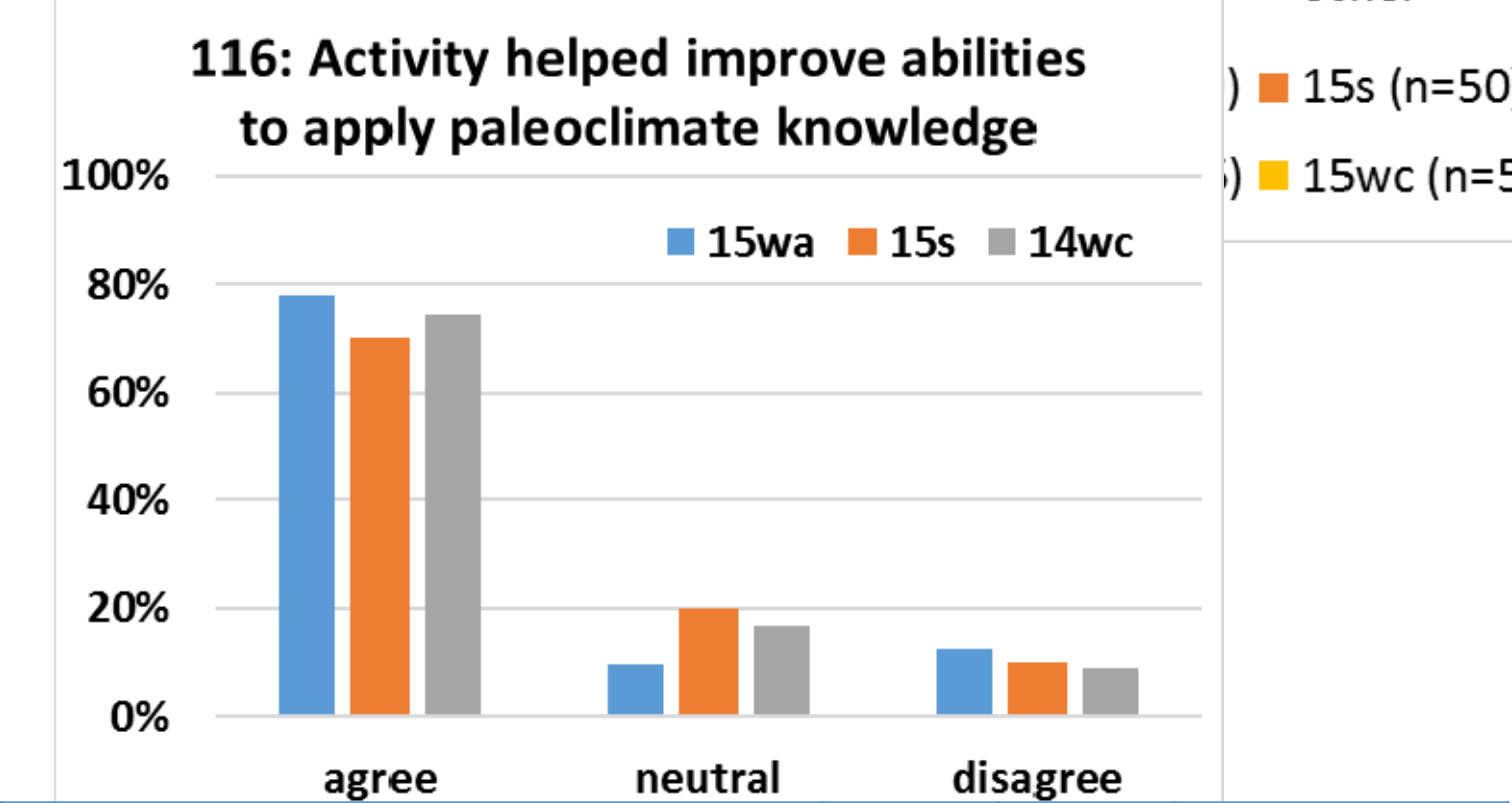
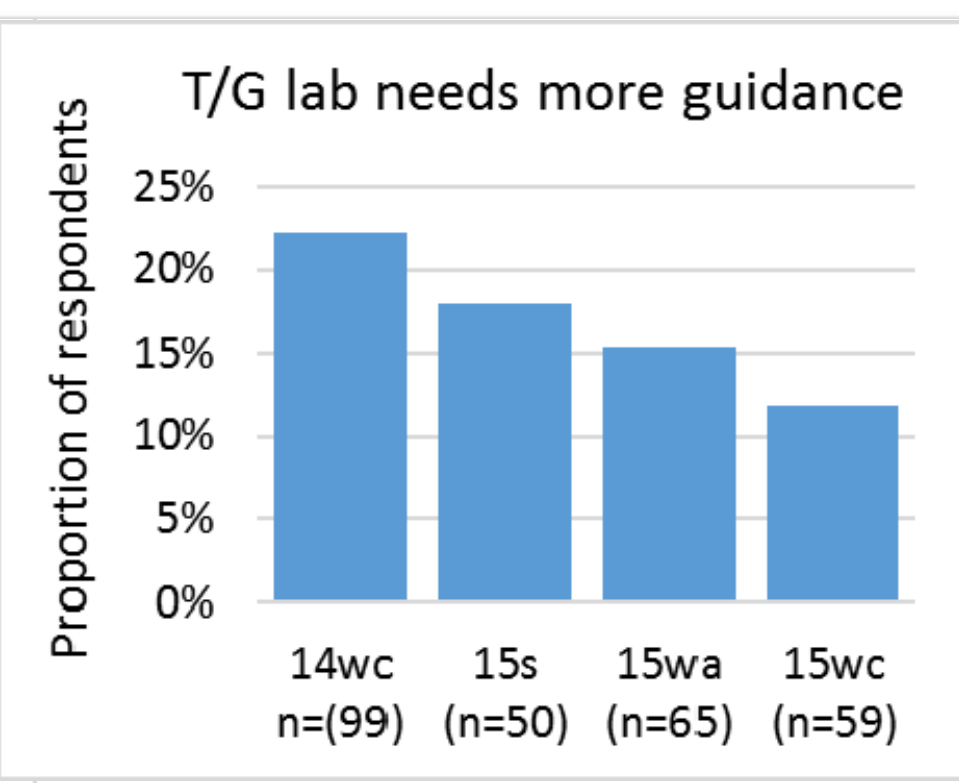
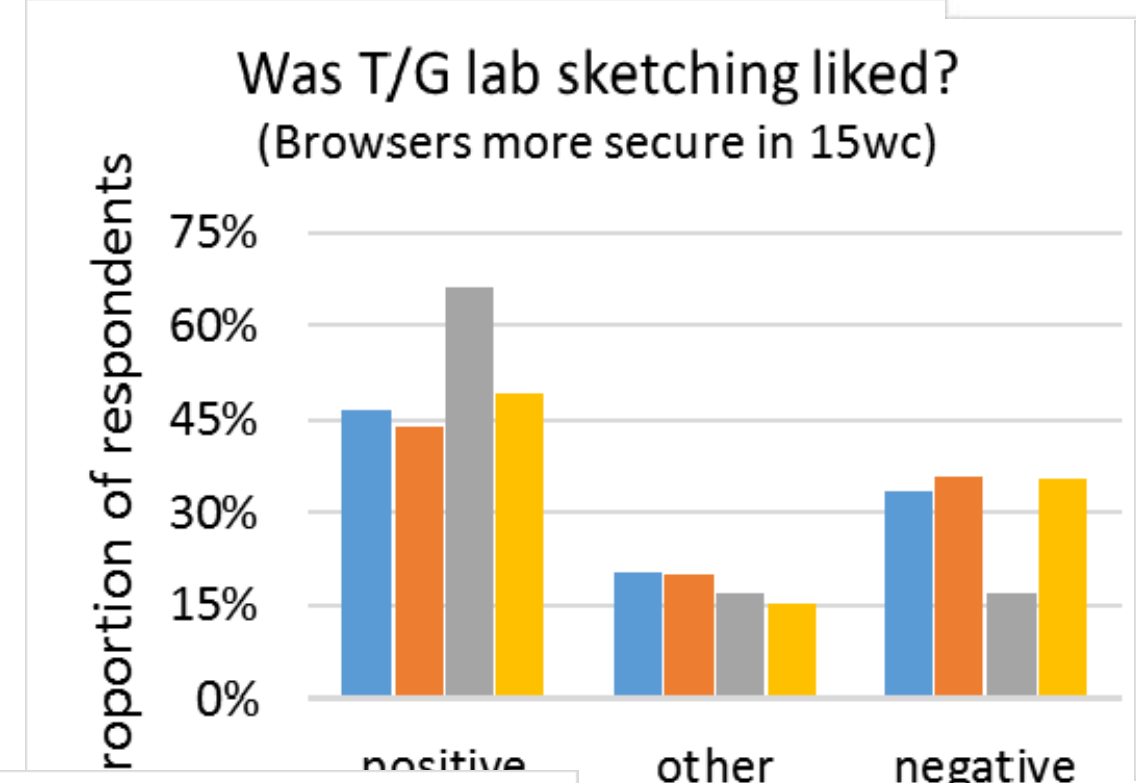
Lab 2 sketch result: eg. from one group

- Solo work varies in correctness and completeness
- Group work iterates towards correct & complete interpretation



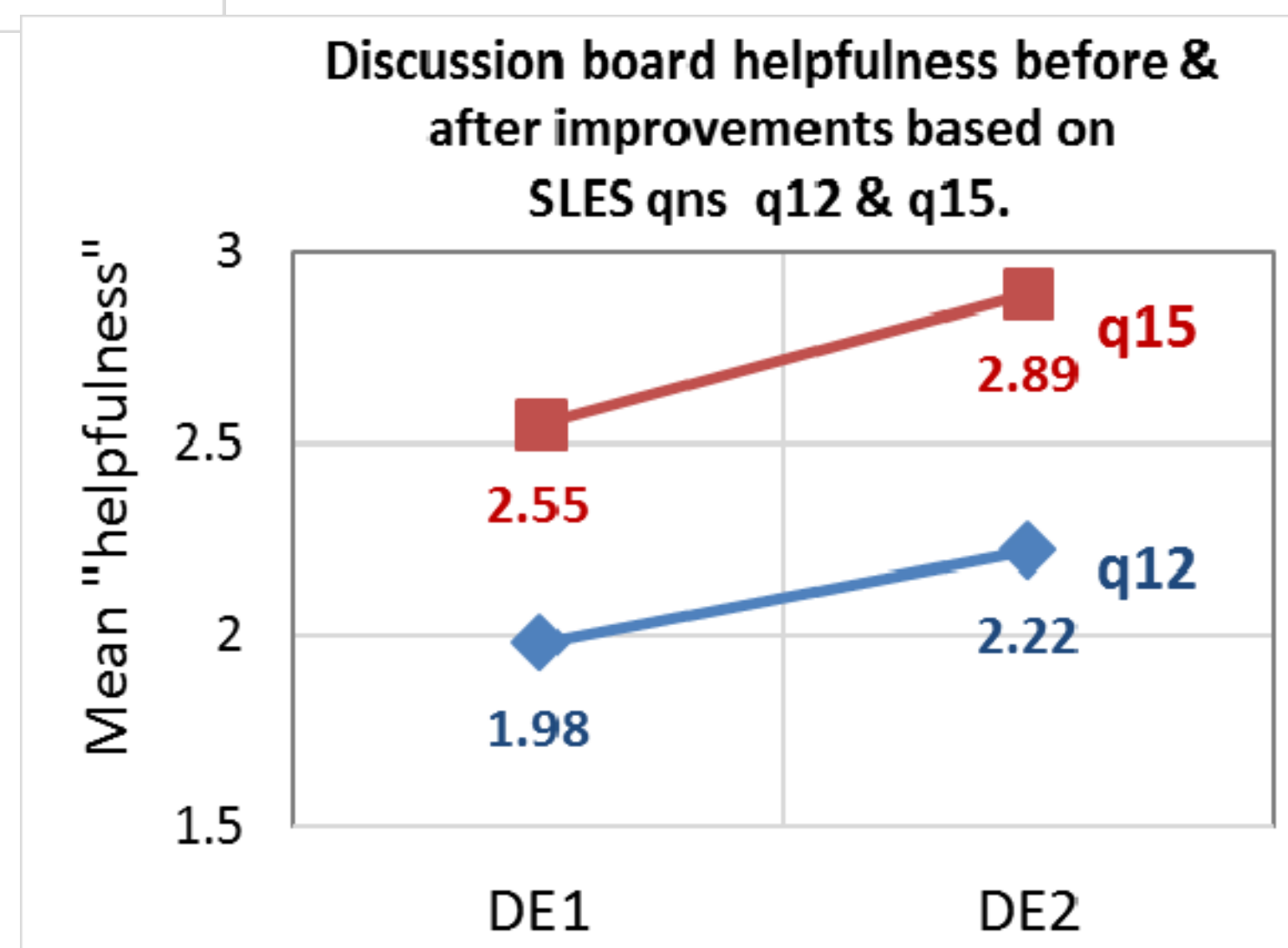
Interactive resources:

- Interactive specimens (326, 118)
- Interactive content (116, 326)
- Sketching (326, 118)
- Visible geology (326, 110)
- Google earth (PME - targeting 118)
- External resources (DB, reading, video, VG, etc) (116, 326, 118, 110)
- Wkshts + Connect quiz.
- Enhanced Connect questioning



Helpfulness, on a scale of 1-4.	Mean DE1	Mean DE2	P via Welch 2-sample t-test
q12 Disc'n board interactions with other students were ...	1.98	2.22	0.029 *
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Helpfulness, on a scale of 1-4.	
q15	Answers to q'ns via disc'n board were ...
q12	Disc'n board interactions with other students were ...

Interactive resources (Student - Content):

- Worksheets followed by Connect 'quiz' as data entry.
- Deploy "first-time" ideas as optional before required.
- Use strategies more than once in a course.
- Uniform deliverables facilitate assessment & peer work.
- Auto-grading for 'data entry' helps scale to large classes.

Peer instruction (Student - Student):

- Start with groups of ~8, and include an intro exercise.
- Coordinating small groups takes practice
- Solo deliverable first (worksheet, 'quiz', sketch, etc.)
- Scaffold the discussion cycle.

Feedback (Student - Instructor)

- Constant vigilance - both TAs and instructors.
- Use 'products' with assessments that are scalable.
- Rubrics.

Evaluating improvements (in DE settings)

- Connect reports and item analysis.
- Sketches easier than writing
- Blooming question sets works but is challenging
- Documentation for instructor transfer is important.

Challenges

- It takes 2-3 iterations to "stabilize" new strategies.
- Connect 'reports' and 'analytics' are arcane!
- Results depend on the term (winter, summer, fall).
- Add more feedback into auto-grading resources.
- How to do non quiz-like auto feedback at UBC ??
- Need more pre-tests, mid-task feedback & "why we do this".
- Browser "security" is a moving target - requires support.
- How to store & maintain resources outside Connect?

Student - Content: the "easiest" enhancement in DE.

- LMS *constrains* innovation but *supports* familiarity
- Technology (eg security of browsers) is a moving target
- Student buy-in requires:
 - iterative introduction
 - repeated use. Don't try one-offs.
 - authentic tasks

"Low-tech" solutions:

- worksheets followed by "quiz-based" data entry
- questions OTHER than multiple choice
- "Blooming" questions enhances auto-graded tasks

Student - Student

- "Solo motivation" is harder than "social motivation"
- Group work benefits from sequenced solo-group tasks
- Scaffold the discussion cycle & use rubrics
- Groups of ~8 seem better than ~4
- Uniformity of product focuses discussion on thinking.

Student - Instructor

- Scaling requires economy of product
- Sketching as alternative to writing to "see" thinking
- Streamlined TA feedback

General

- Video documentation for students AND instructors
- Non-standard resources are a sustainability challenge
- Design cycle is slower in DE because it's asynchronous.
- Getting and using **analytics** is an unsolved problem.
- Learning goals should drive all innovation