

Examples of Active Learning

Rachel Teasdale
California State University Chico
(Comprehensive Univ)

Intro course: 100-120 students, lecture theaters
Lab sections taught by TAs
Some undergraduate SA



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Challenges- Time & Space

1. Time in semester:

Triage the syllabus- what do they need to know to accomplish course learning goals? (omit the rest)

2. Time per class period:

Move some content to pre-class work (flip?)-

- Use videos (Google: Geoscience Videos Youtube McConnell)
- Pre class readings (USGS Fact Sheets, compilations)
- (NO TEXTBOOK!)



Geoscience Videos: <https://www.youtube.com/watch?v=Pih-dbA-AOA>
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3. Time to create/prepare lessons

- Go to workshop with dedicated work time (!!!)
- Use pre-prepared materials (InTeGrate, Teach the Earth, NSF & more!)

- **PLAN**
- **START SMALL (Manageable!)**

A collage of educational resource cards and a central text box. The cards include:

- Living on the Edge: Building resilient societies on active plate margins** (College Level: [13-14] Introductory Level)
- Water: Science and Society** (Sustainability Topics: Water & Watersheds, Grade Level: College Level [13-14] Introductory Level, College Level [13-14])
- Changing Biosphere** (Sustainability Topics: Ecosystems, Biodiversity, Grade Level: High School [9-12], College Level [13-14] Introductory Level)
- Environmental Justice and Freshwater Resources**
- Earth & Environment Classroom Resources** (This collection of lessons and web resources is aimed at classroom teachers, their students, and student families. It includes links to Climate and Energy Educational Resources, Consortium for Ocean Science Exploration and Engagement, Earth and Moon Viewer, The EnvirLink Network, and Geography4kids.)
- GLOBE Learning Activities** (Resource: Educators, Students (K-12))

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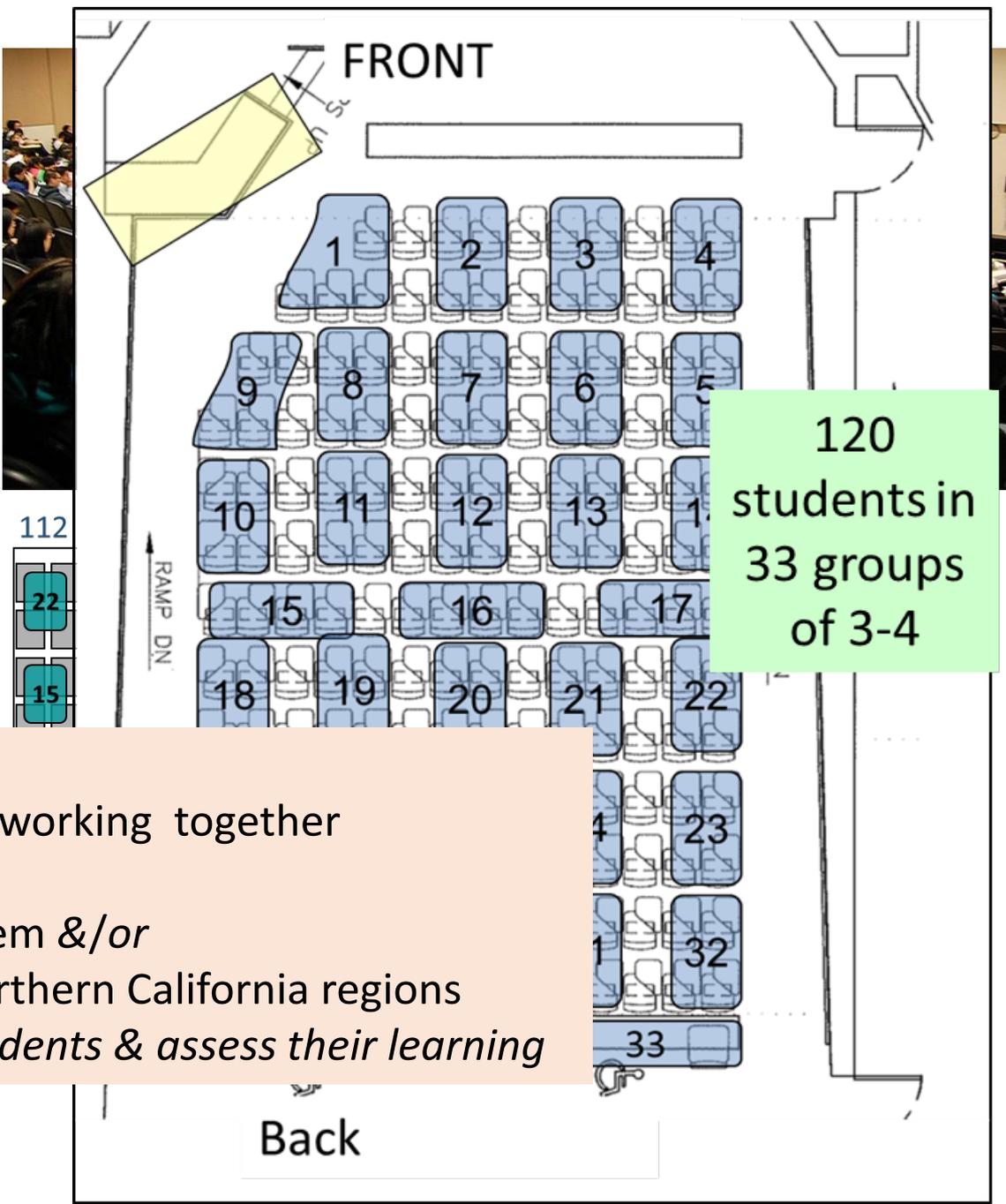
Challenges- Time & Space

4. Space- lecture theater?
How can we do interactive activities with big groups?

Turn them into a bunch of small groups:
(every day)

My Goal: Every Class Period:

- One activity with students working together
 - with the data &/or
 - on topics relevant to them &/or
 - on topics relevant to northern California regions
 - *I get to interact with students & assess their learning*



Examples of Active Learning: Think Pair Share

Instructor: Asks a question during class

Students: **think** (write in notebook) independently
(on instruction) **pair** with other student to compare answers
(on instruction) **share** with rest of class



Where is the best place to build your dream home?

- Location a, b or c?

Why?

How does the Sacramento River play into political considerations of northern California?



Examples of Active Learning: Think Pair Share

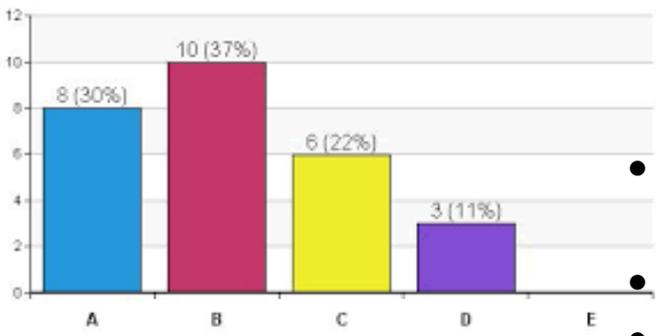
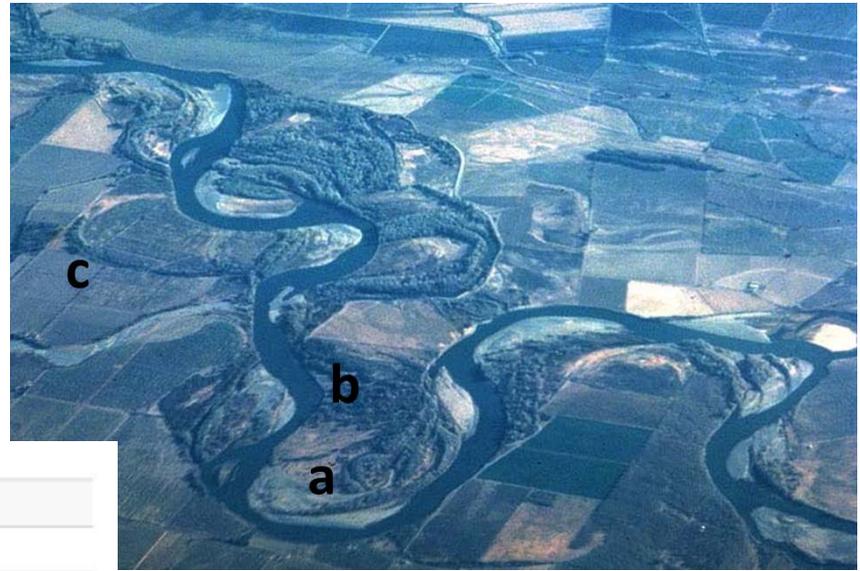
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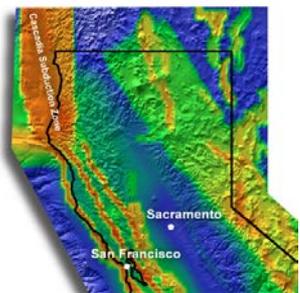
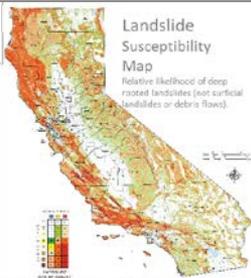
Where is the best place to build your dream home?

- Location a, b or c?
- d = I don't know



- Clickers- instant feedback
- <https://www.polleverywhere.com/>
- <https://www.menti.com/>
- (lots of options!)

Examples of Active Learning: Gallery Walk



Data included:
 Population (Butte County): 225,413
 Elevation (Chico): 204 ft
 Annual rainfall = 26"
Geographic Location:
 Seismic Information: EQ Probability, Liquefaction, Shaking, Tsunami;
 Landslide susceptibility
 Volcanic hazards map
 Fire probability
 Precipitation map
 Flood and Sea level rise maps

1. Chico, CA (Butte County)

As a group:
 Describe the important hazards associated with this location in the spaces below.
 Indicate the degree of importance of hazards in each category (high- medium or low).
 Explain your reasoning for each of the hazard rankings your group provides.

Group	Earthquake-Related (shaking, liquefaction, landslide, tsunami)	Water-Related (floods, sea level rise, tsunami)	Climate-Related (sea level rise, drought, fire)	Volcano-Related (lavas, ash fall, pyroclastic flows, lahar/debris flow)

Students work in groups to examine hazards maps,

- ID hazards for 1st county, rotate
- ID hazards for 2nd county, rotate
- ID hazards for 3rd county, rotate
- Compare hazards in 3 counties

- Make a Geologic Hazards brochure for one county

Boundary: Eruption

- Multiple vs surrounded

Hard Mitigation in this County:

- Mass warni from ash
- Proper materials to wear in order to prevent damage or illness

Related Hazard: flooding

- Increased Flood Side

Hard Mitigation in this County:

- Levee System
- create Drainage
- Alternate Routes

Clim: Drought

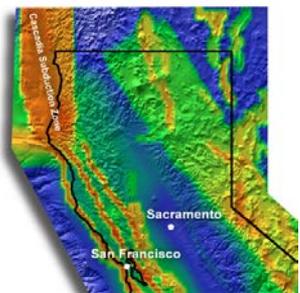
- Farming Water

Hard Mitigation in this County:

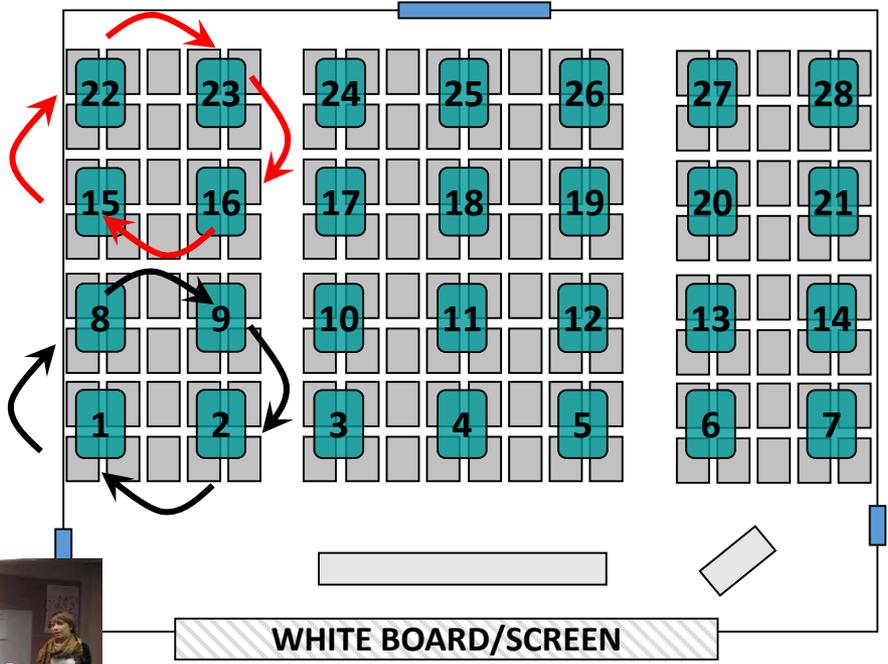
- Drought-resistant crops
- Water Tax
- Use less water
- Monitor area closely

- Slash & Burn old brush
- Houses w/ fire-resistant material

Examples of Active Learning: Gallery Walk



- ID hazards for 1st county, rotate
- ID hazards for 2nd county, rotate
- ID hazards for 3rd county, rotate
- Compare hazards in 3 counties



Modified Gallery Walk- the county posters are passed among groups instead of having students move among stations

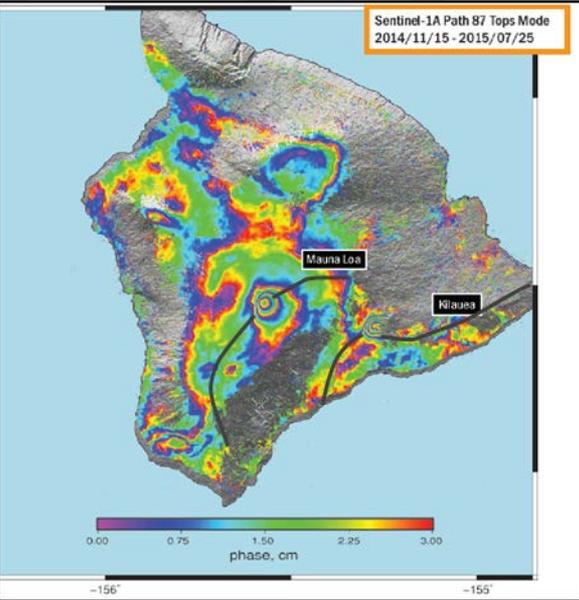
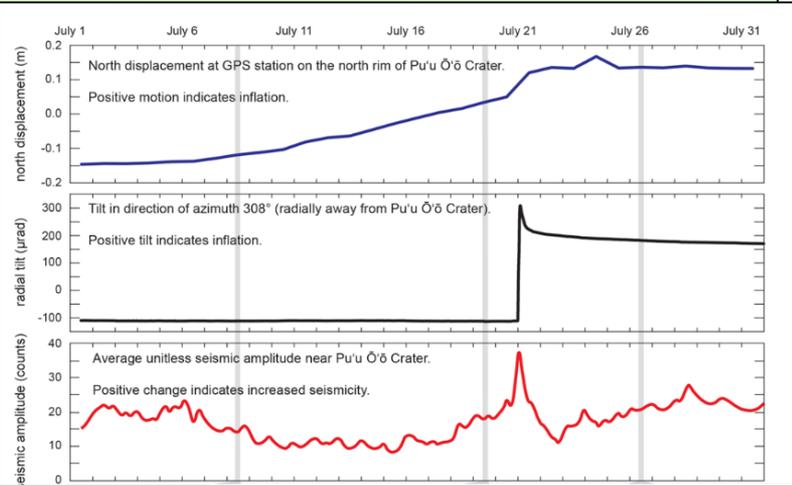
Examples of Active Learning: Jigsaw

Learning Outcome: Students will:

- Use geodetic data from Kilauea volcano to develop an eruption forecast
- Communicate future risks to surrounding communities

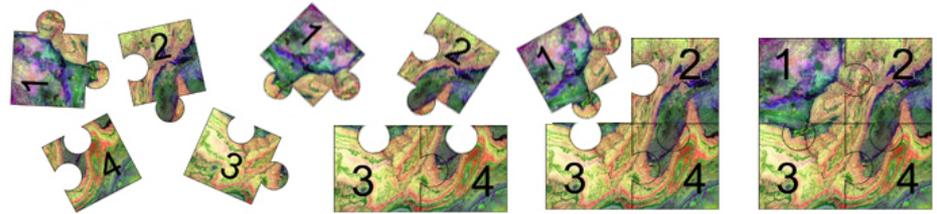
Assessment:
On the exam, students interpret, compare & contrast data sets (tilt, seismic, GPS and InSAR)

Activity: Jigsaw
Phase I: Learn “Expert” topics
Phase II: Mixed groups learn “non-expert” topics & assess eruption potential & alert levels

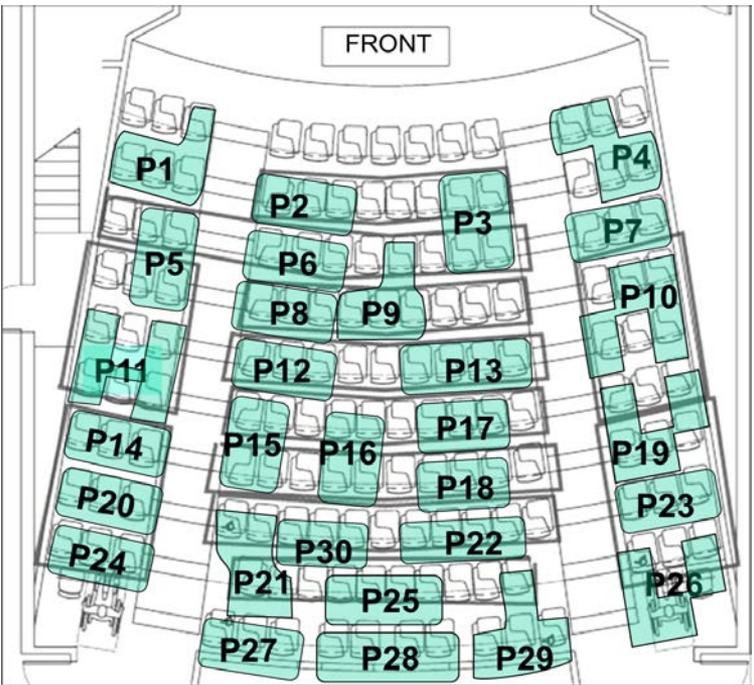


Example: GETSI (ITG) Volcanic Hazards & Communicating Risk Monday Morning Meeting

Examples of Active Learning: Jigsaw



Expert Groups (day 1)



Mixed Groups (day 2)

Seating Today: Go to pod number on the worksheet you completed on Monday (ignore color coding)

HVO Monday Morning Meeting
Interpretation of Volcanic Activity

In your group of interdisciplinary experts, hold a Monday Morning Meeting—each describe and interpret their data. Summarize the data in the table below. First fill in the program area to the leader for each data type and then briefly summarize each.

Data Provider	Type	Issues
Description of data examined for this time period		
Data Provider	GPS	WebCam
Description of data examined for this time period		

All final reports have been posted, as a group develop an interpretation about recent Pdc's (Pdc, using the questions below to guide your discussion. (Each student will own a notebook.)

1) Given the data provided, what are the best data types for examining changes in about the eruption (i.e., minutes to hours)? Why?

In your new group, complete the worksheet:
HVO Monday Morning Meeting: Interpretation (1 per person)
Do NOT leave when done! (raise your hand & I'll give next info)

Align the content and style of learning & assessment activities

Exams: Similar format as class activities

- MC questions (e.g. pre-class quizzes, in class Qs)
- Short Answer: concept maps/sketches

1st day of exam (Individual Exam)

MC + short answer

worth $\frac{3}{4}$ of exam score
taken as individuals

2nd day of exam (Group Exam)

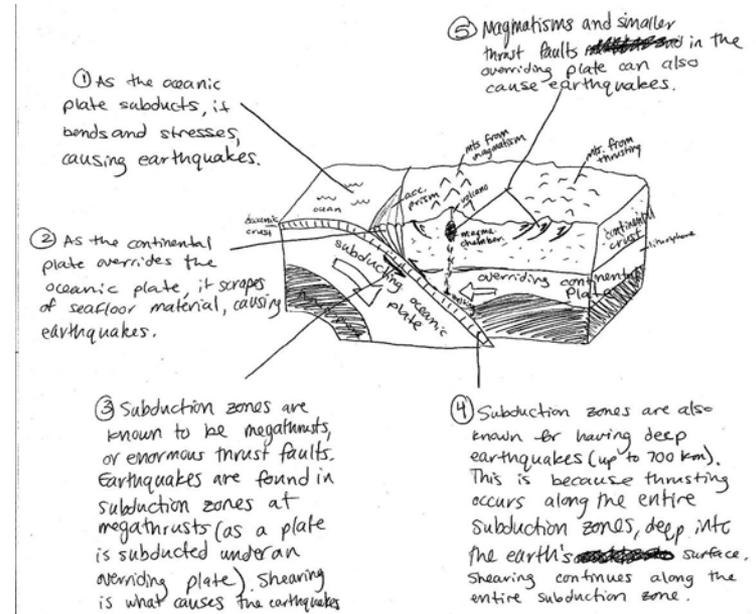
MC only

worth $\frac{1}{4}$ of exam score
(optional, in working group)

Results: 2nd day of exam scores

- Avg score increases by ~5-10 pts
- Max scores increase ~5 pts

Sketch and label the important components of a subduction zone



Align the content and style of learning & assessment activities

Give 'em points for doing what I want them to *do* (learn!)-

- a. Pre-class work (on Bb) 10%
- b. In-class participation in class (stuff they turn in) 10%
- c. Exams 15%, 17%, 18%
- d. Labs 30%



