

Active Learning: A CSTL Workshop

Active Engagement Promotes Learning:
Strategies for Teaching and Learning.

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Case: Power to the People

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MEMORANDUM

FROM: Mayor of Atlanta

TO: All Staff

RE: Atlanta Power

As you may have heard, larger cities in California are once again experiencing rolling blackouts. Until recently I have not considered this problem worth our attention. However, the city of Atlanta is growing rapidly. While we have not reached the size of Los Angeles or San Francisco, we can proudly say Atlanta has grown into a booming metropolis. With that in mind, we must consider the demands of our current and future populations, particularly in the field of power.

If we wish to be able to meet the energy demands of Atlanta as the population grows, we must begin seeking out alternative or additional energy sources as soon as possible. I welcome your comments on the matter.

What is this case about?

- What do you already know?
- What do you need to know?

- Work alone first, writing down one thing you know and one question you have.
- Then, join with 4-5 others to share questions, knowledge.
- Prioritize groups questions for discussion.
- Consider solutions to Atlanta's problem

Reflecting on this Case exercise:

- What did the learners do or use?
- Their prior knowledge
- Shared expertise among group members
- Identified key questions and prioritized
- Brainstormed
- What did the teacher do, use?
- Did not answer content questions
- Did not give lectures
- Managed groups & time
- Organized the work, the debriefing

What is Active Learning?

“Instructional activities in which students are doing things and thinking about what they are doing.”

Research shows that to learn students must:

“read, write, discuss, or be engaged in solving problems.”

Learning is an active endeavor.



From Bonwell and Eison “Active Learning Creating Excitement in the Classroom:
<http://www.ntlf.com/html/lib/bib/91-9dig.htm>

What is Active Learning?

In Active Learning, students:

Use more kinds of thinking than usual

compare, interpret, analyze, create, judge

Reflect/ be aware of one's own learning

What do I already know? What am I not sure about?

Work with others on meaningful problems

sharing ideas and constructing understanding

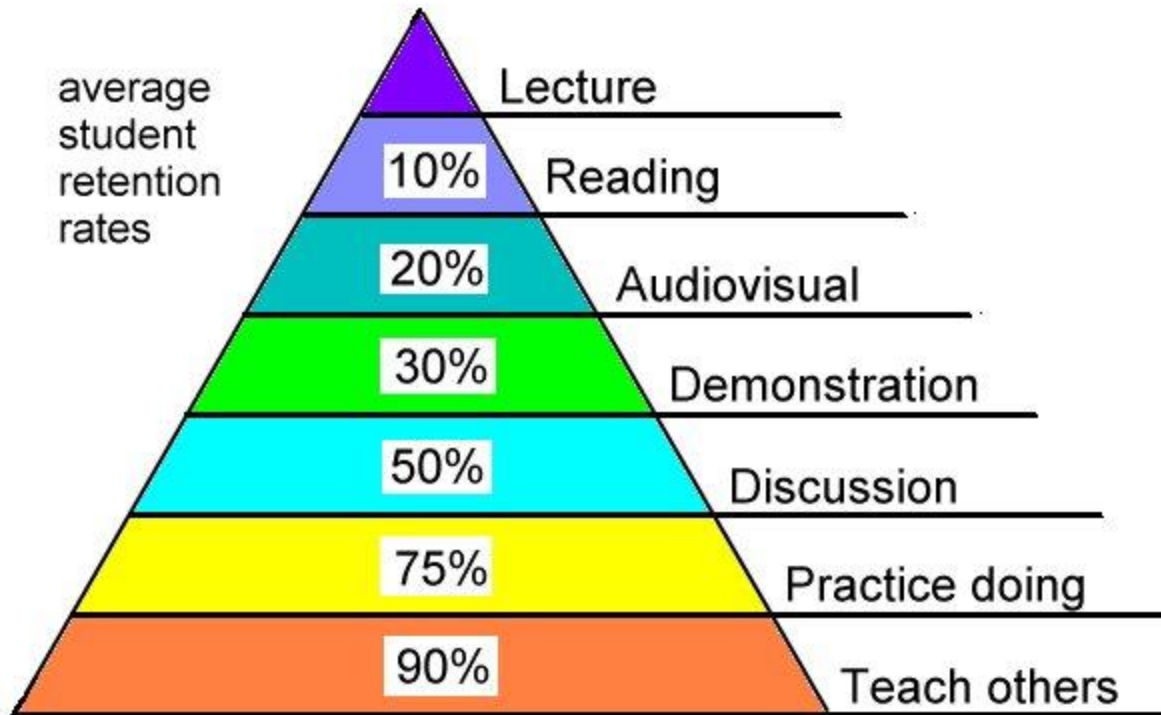
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Work with others on meaningful problems

- Reflect on the Case learning exercise
- Sharing with the large group.
 - What were some arguments?
 - How were they justified?
 - Was there diversity among groups?
 - Is that ok?

Why Use Active Learning Strategies?

Learning Pyramid



Source: National Training Laboratories, Bethel, Maine

From http://pegasus.cc.ucf.edu/~tbayston/eme6313/learning_pyramid.jpg

The U.S. science agencies,
and many employers, beg us
to

“Devise and use pedagogy
that develops skills for

- communications,
- teamwork,
- critical thinking and
- lifelong learning in each
student. . .”



Shaping the Future: New Expectations for Undergraduate Education in Science, Mathematics, Engineering and Technology National Science Foundation, 1996. (p. 53)

How People Learn

People construct new knowledge based on what they already know.

“Constructivists assume that all knowledge is constructed from previous knowledge, irrespective of how one is taught. . . “ (p. 11)

Constructing knowledge is already a workplace reality.

Active learning strategies help bring it to classrooms.



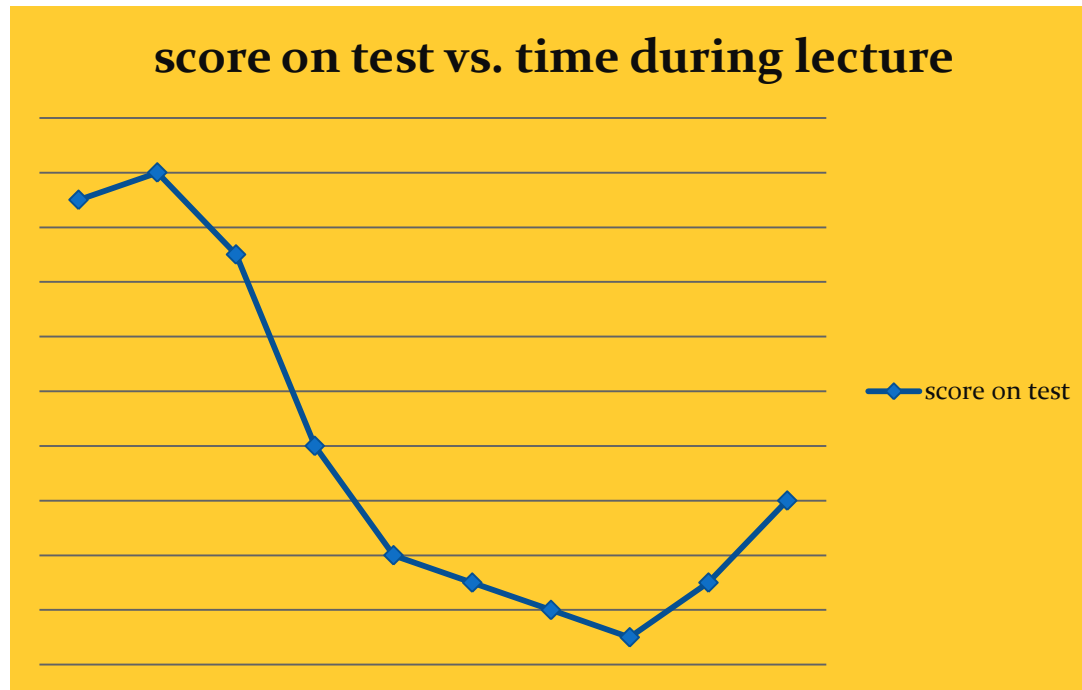
Active Learning Strategies:

One Minute Paper,

Muddiest Point

- On the half sheet of paper you have been given, write down what you think are two important points presented so far (One Minute Paper).
- Also write down an idea that was presented that seems unclear to you right now (Muddiest point)
- I will review these, answer questions immediately

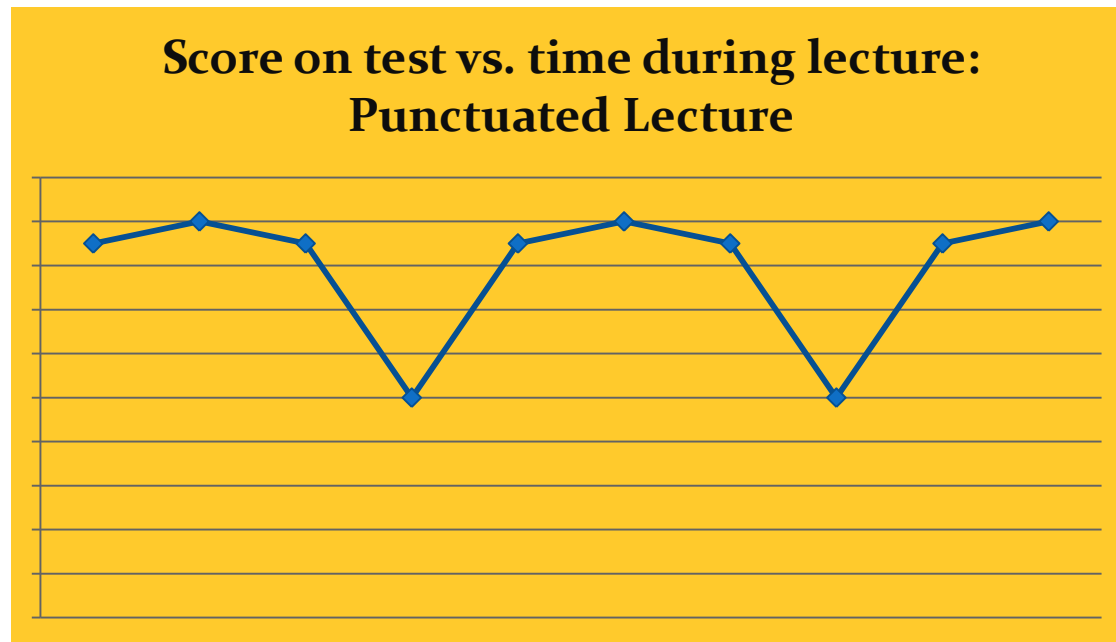
Why Use Active Learning Strategies?



Recall of facts presented during lecture falls off.

Based on: Ruhl, K. L., Hughes, C. A., & Schloss, P. J. (1987, Winter). Using the pause procedure to enhance lecture recall. *Teacher Education and Special Education*, 10, 14-18.

Why Use Active Learning Strategies?



Punctuating lecture increases recall

Based on: Ruhl, K. L., Hughes, C. A., & Schloss, P. J. (1987, Winter). Using the pause procedure to enhance lecture recall. *Teacher Education and Special Education*, 10, 14-18.

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Punctuate lecture every 12-18 min
During pause: students pair, share.
5 courses, 2 semesters

Same topic, no punctuating lecture
No pauses, otherwise the same

Write down main points in 3 min
Mult. Choice test 12 days later

Write down main points in 3 min
Mult. Choice test 12 days later

The results were consistent: Students hearing the lectures while the instructor paused did significantly better on the free recall and the comprehensive test with difference in mean scores between the two groups large enough to make a difference of two letter grades depending upon cutoff points!

Punctuating Lectures: every 15-20 min.

- One minute paper (only do this once every two weeks or so)
- Muddiest point (Can do more often)
- Pause 2 minutes for students to compare and rework notes
- Ask a question that has students use (apply) the ideas you have been teaching
- Clicker questions
- Use a visual aid and ask students to observe, compare, interpret, generate a question
- Do a demonstration
- Change the pace...

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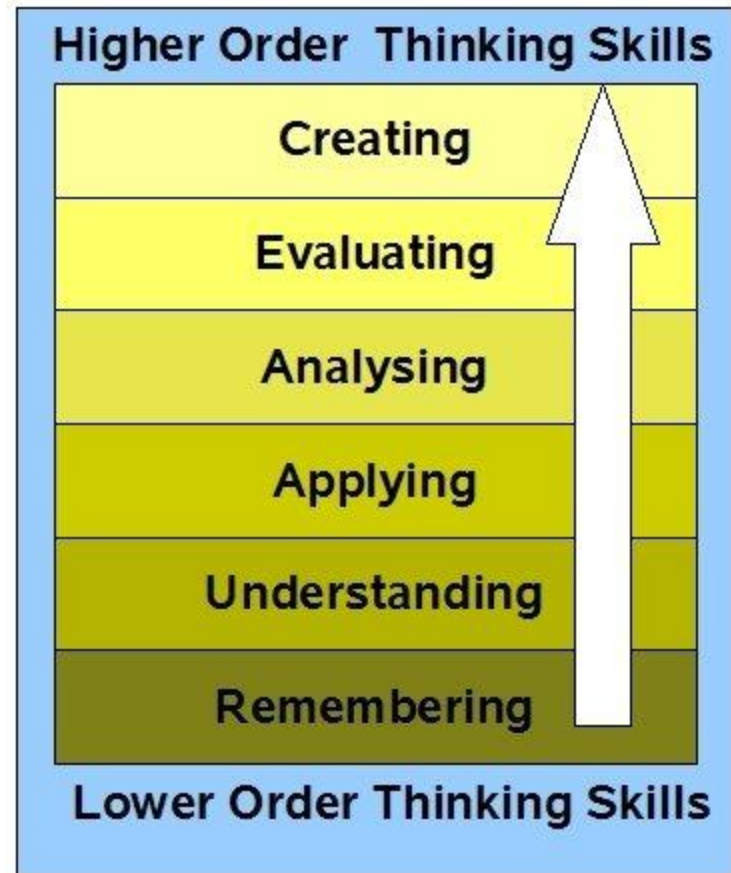
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Use More Kinds of Thinking

Bloom's Taxonomy (updated by Anderson and Krathwohl, 2001) (right) shows a set of thinking skills.



.Anderson, L.W., and D. Krathwohl (Eds.) (2001). A Taxonomy for Learning, Teaching and Assessing: a Revision of Bloom's Taxonomy of Educational Objectives. Longman, New York. Image: http://edorigami.wikispaces.com/file/view/blooms_revised_taxomony.jpg



Footprints

“I’m glad I don’t live on a 200 acre farm like you, Sam!” teased Sue as the two friends hurried into their Biology class.

“Why?” asked Sam, “Weren’t you just complaining about living in your parent’s downtown condo?”

“Well, that’s true,” Sue admitted, “But I was thinking about today’s class assignment on sustainability. I bet you have the biggest footprint in the whole class.”

Much to Sue’s surprise, Sam didn’t look all that concerned. He held out his hand and replied confidently, “I’ll take that bet!”

They headed to the computers to take the quiz.

The Results



Sue



Sam

Go to this website and complete the footprint for you. First, in the U.S., then with the same data, for any other part of the world.


- http://www.myfootprint.org/en/visitor_information/

First, we need a little information from you.

1. What country do you live in?

-- Choose your country here ----- ▾

or on the map:



A world map showing the continents and oceans. The oceans are labeled: ATLANTIC OCEAN, PACIFIC OCEAN (twice), and INDIAN OCEAN.

Use more kinds of thinking than usual

compare, interpret, analyze, create, judge

- What types of thinking were involved in the task for the ecological footprints?

Use More Kinds of Thinking: Key Verbs

Higher Order Thinking Skills (HOTS)

Creating -*design, construct, plan, produce*

Evaluating *hypothesize, critique, experiment*

Analyzing - *Compare, organize, outline, find*

Applying - *Implement, carryout, use*

Understanding - *Interpret, summarize, infer*

Remembering -*recognize, list, identify*

Lower Order Thinking Skills (LOTS)

Using Online Tools for Data Visualization

Objectives:

Interdisciplinarity,
developing questions and hypotheses,
examining relationships among variables,
interpreting data

Worldmapper

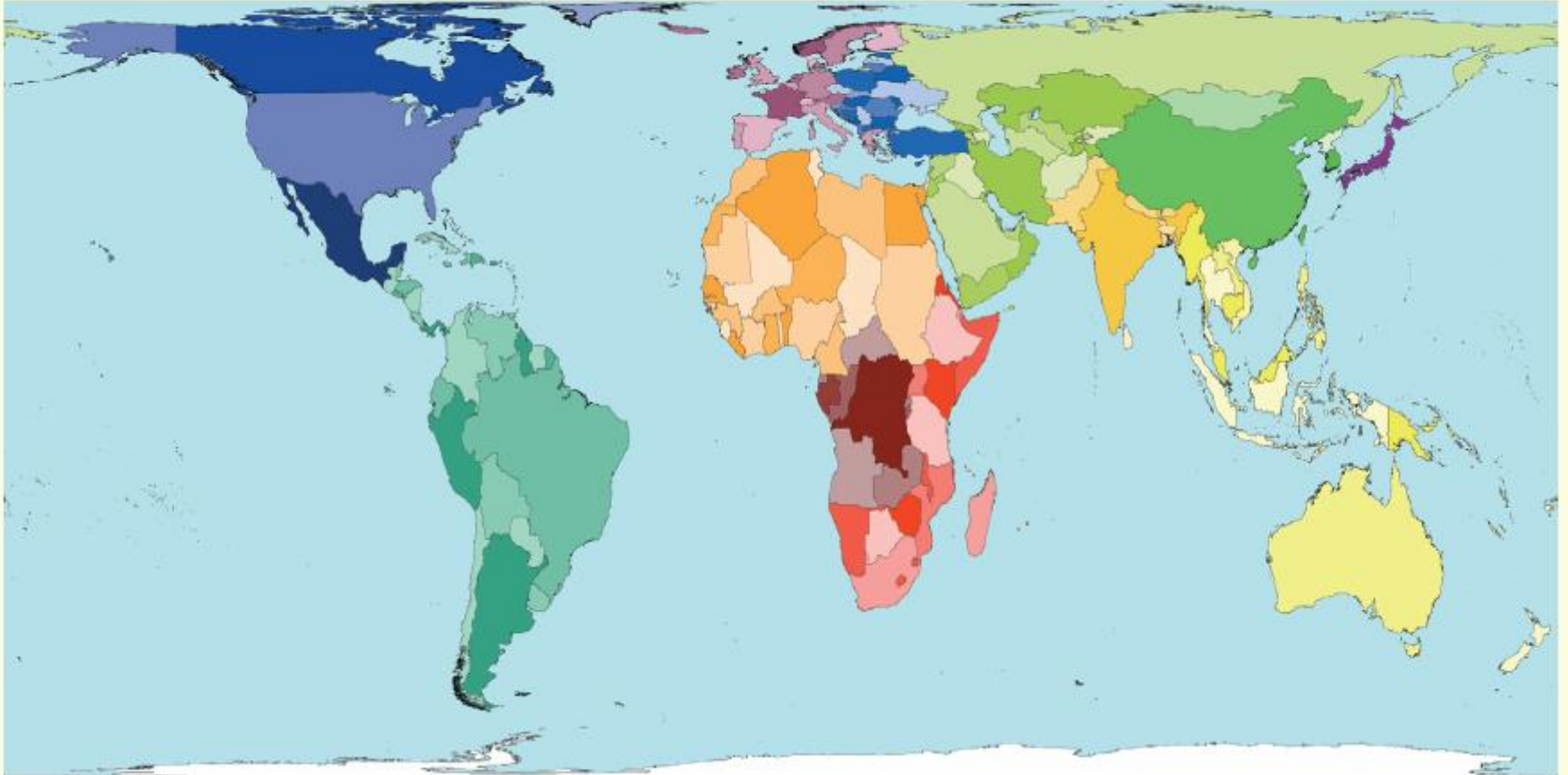
www.Worldmapper.org

Gapminder: A Data Centered View of the World

www.Gapminder.org

Objective: Tools for Visualizing Data

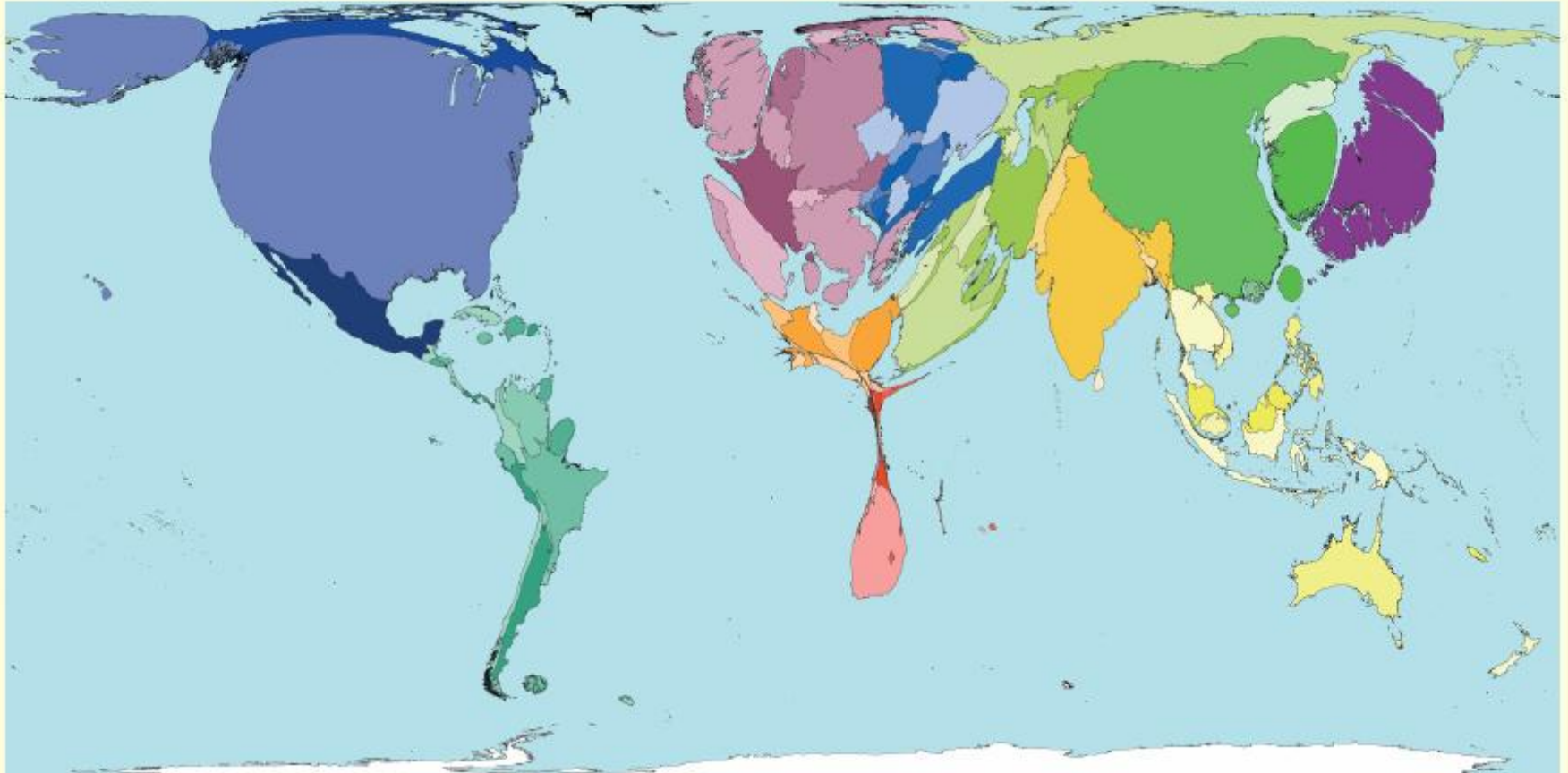
Land Area



www.worldmapper.org

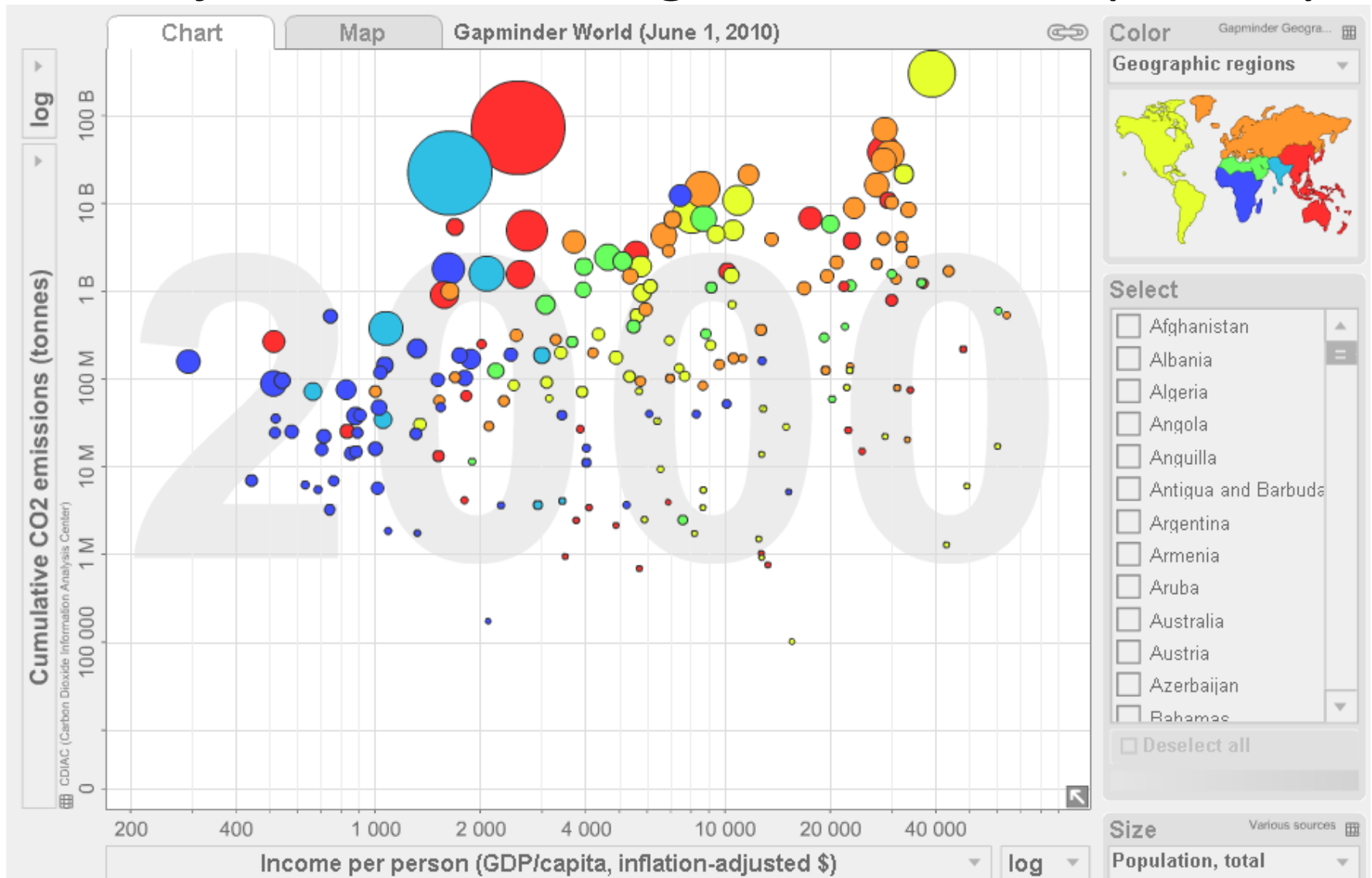
Total Carbon emissions by country

Carbon Emissions 2000

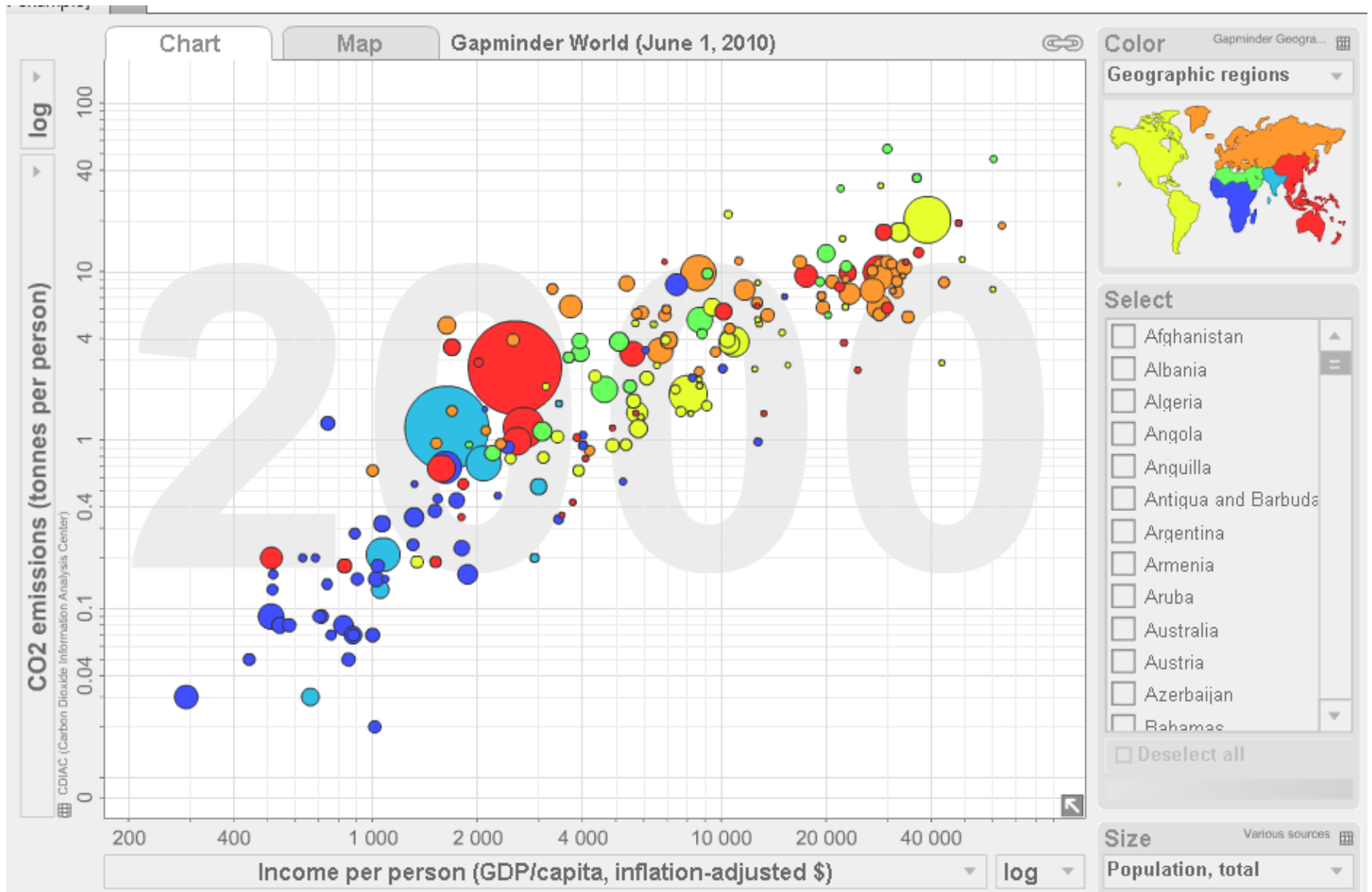


www.worldmapper.org

Objective: Visualizing Data, Interdisciplinarity



www.gapminder.org



Can a graph be a case?

- www.gapminder.org
- Click on “health and wealth of nations”
- What learning objectives could we achieve with this tool?
- What types of thinking are we asking for?

There are many ways to engage students in Active Learning

Teach so that students:

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