The one doing is the one learning

Active Learning

Thea Edwards and Brandon Moore

Biological Sciences

tedwards@latech.edu; bmoore@latech.edu

THE NATIONAL ACADEMIES
Advisers to the Nation on Science, Engineering, and Medicine

HHMI
HOWARD HUGHES MEDICAL INSTITUTE

The National Academies
Summer Institutes
on Undergraduate Education

Contact Us

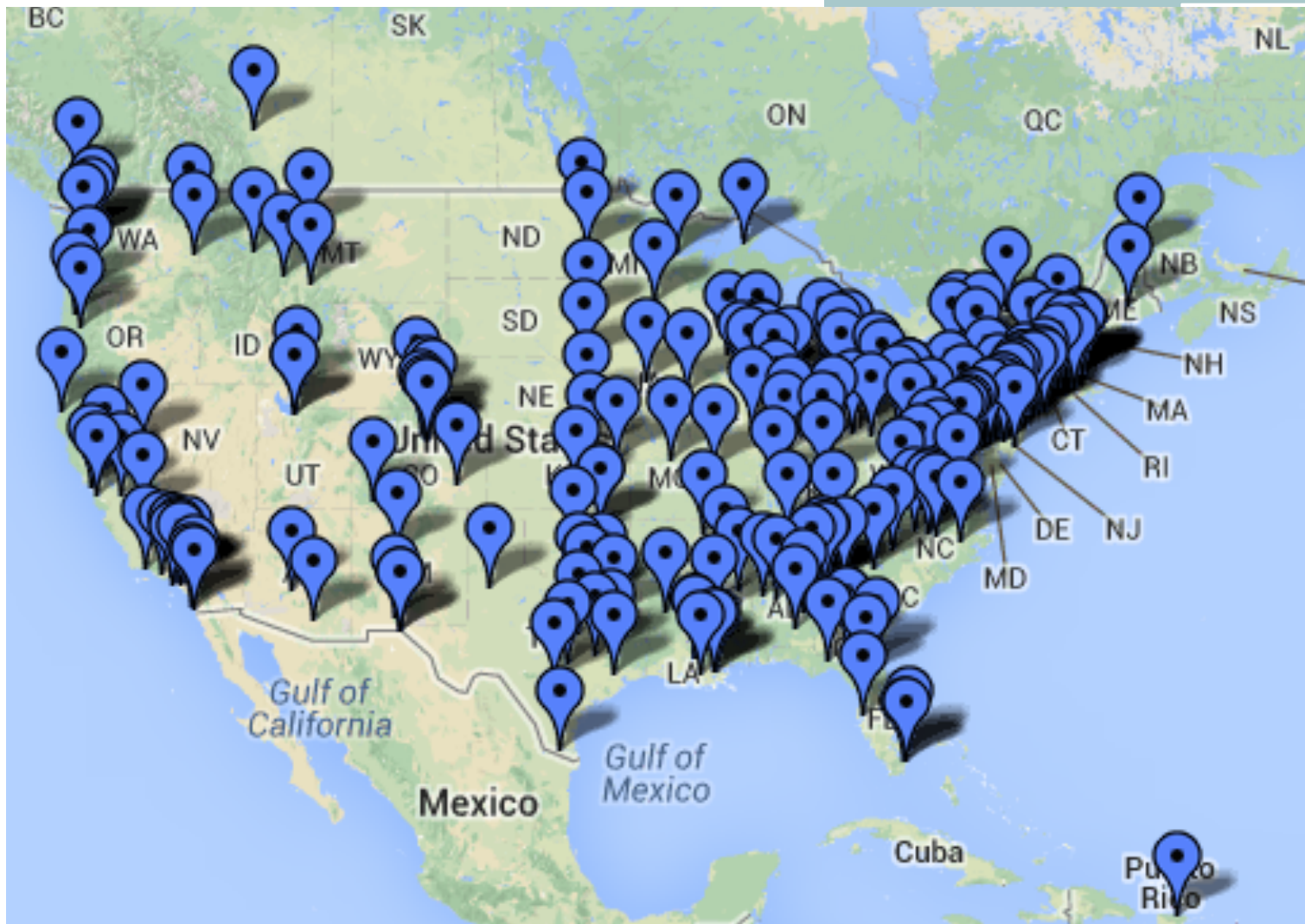Home | Goals & Expectations | Articles [+] | People | Regional Institutes [+]

**Come explore new models of instruction
for the undergraduate classroom.**
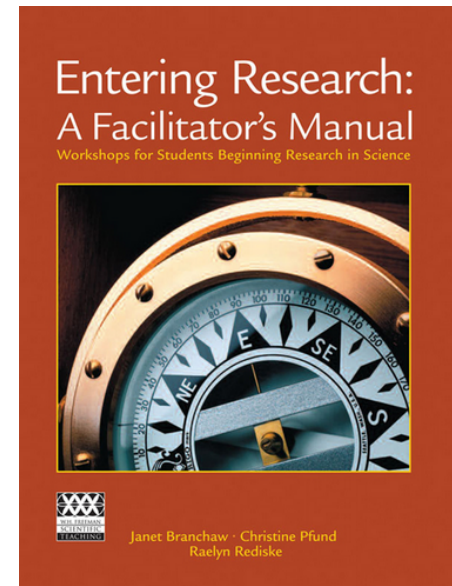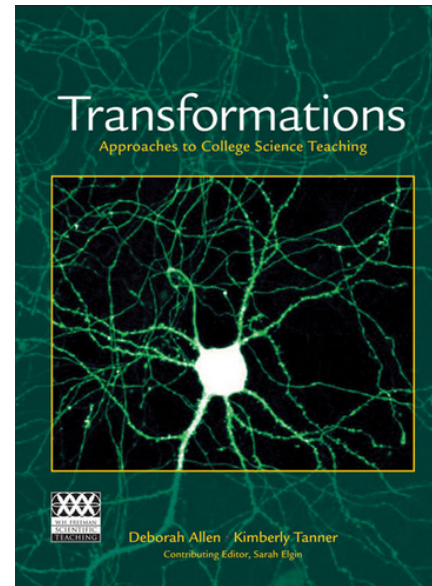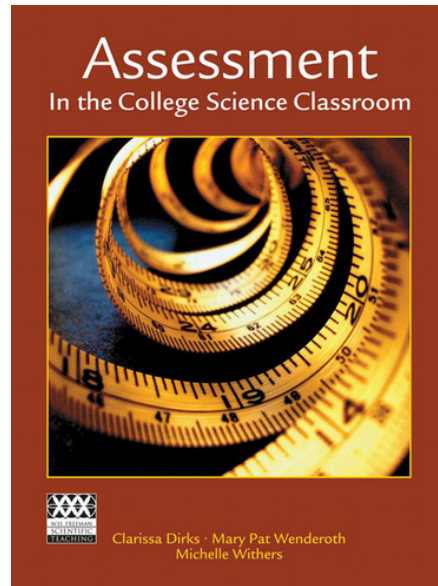
http://www.academiessummerinstitute.org/
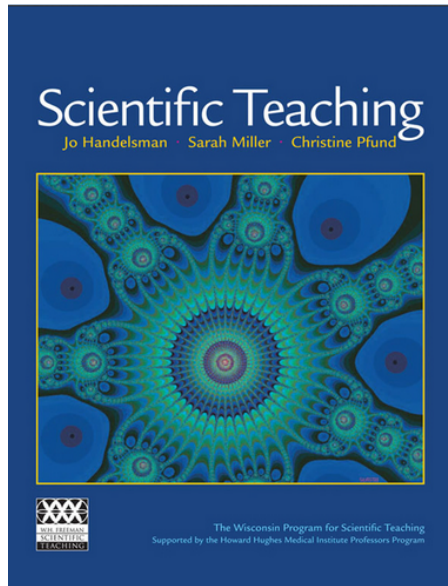
Lead by Michelle Withers, West Virginia Univ.

Summer Institutes Map of Participating Institutions, 2004-2012

For free desk copies:
http://www.whfreeman.com/catalog/discipline/Biology/ScientificTeachingSeries

Order the following (best to worst) for maximizing 24 hour retention

discussion
students teach
watch demonstration
listen to lecture
read
watch audiovisual
practice

Order the following from best to worst method for maximizing 24 hour retention

1. students teach
2. practice
3. discussion
4. watch demonstration
5. watch audiovisual
6. read
7. listen to lecture

What do you already know about active learning?

- Group discussions
- Student presentations
- Clicker questions

AFTER TWO WEEKS WE TEND TO REMEMBER ...

10% of what we read — READING

20% of what we hear — HEARING WORDS

30% of what we see — LOOKING AT PICTURES

WATCHING A MOVIE/VIDEOTAPE

50% of what we see and hear — LOOKING AT AN EXHIBIT / WATCHING A DEMONSTRATION / SEEING IT DONE ON LOCATION

70% of what we say — PARTICIPATING IN A DISCUSSION / GIVING A TALK

90% of what we say and do — DOING A DRAMATIC PRESENTATION / SIMULATING THE REAL EXPERIENCE / DOING THE REAL THING

PASSIVE

ACTIVE

Adapted from: Edgar Dale *Audio-Visual Methods in Teaching*, Holt, Rinehart and Winston.

Goals of Active Learning

- Higher retention of course subject matter.
- Mastery - ability to apply knowledge and skills to novel situations.
- Develop professional skills: communication, team work, research and analysis, decision making.

Core Principles

- Environment maximizes student creativity
  - Open-ended assignments with multiple "correct" answers
- Ask, don't tell
  - "What do you need to know to figure that out?"
  - "How will you find the answer?"
- Call on groups, never individuals
- Use iterative processes - building knowledge by responding to previous problems/failure
  - Teacher gives a lot of feedback.

Students teaching students,
teacher guides

- Students construct own knowledge,
- find ways to provide own answers (consulting external sources, not the teacher),
- build on what they already know,
- test hypotheses, generate, analyze, present real data,
- put concepts into own words – writing, presentation, discussion,
- have opportunities to respond to feedback,
- build collaborative skills

The teacher's role

- Establish clear expectations/scaffolding/deadlines

- Be flexible and adjust to student needs

- More depth, less breadth

- Class time for practice and group work

- Assess learning

- Provide feedback

- Encourage: If it is hard it is probably promoting learning even if success is not immediate.

- Resolve disputes

Scaffolding

Problem/Project Based Learning

- All projects, no lecture, no tests

Good Projects

- are big enough to require tackling by teams.
- recognize the contributions of individuals
- inspire a sense of ownership by students
- develop with lots of feedback.

- Teams determined by teacher – 4 is a good number, should be balanced for diversity and student strengths and weaknesses (see survey).

Grading groups

- Part of the grade is individual (80%), part group (20%)
- All members of the team must be able to explain all parts of the project
- Peer evaluation (part of individual grade)

General Cycle of Iterative Projects

1. Project presented.

2. Groups discuss, determine what they already know; what more they need to know; and how to find the information.

3. Members research to build knowledge, then reconvene to discuss.

4. Group integrates new knowledge with existing knowledge and moves forward on project.

5. Cycle of identifying issues, researching, and integrating repeats.

6. Groups present their respective solutions.