

# Learning at The University of Minnesota Rochester

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UNIVERSITY OF MINNESOTA | ROCHESTER  
*Driven to Discover<sup>SM</sup>*



Barcelona  
Biomedical  
Research  
Park

# How did I get here?

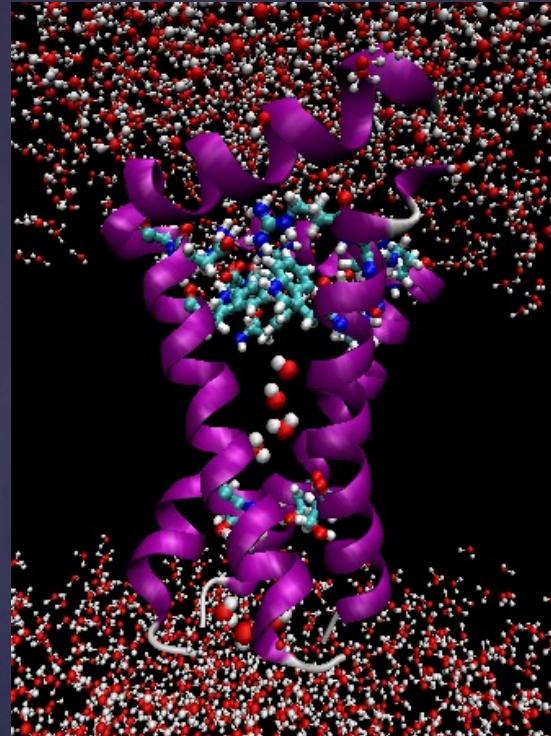
Chemistry

Physics

Molecular Simulations  
of Proteins

Biology

Computational  
Science



My scientific passions...

- How technology can help (or prevent) learning?
- Inspire a passion for learning
  - Failure and Resilience
  - Challenge and Adaptability
  - Disappointment and Persistence
  - Joyful Struggle and Comfortable Confusion



# My teaching passions



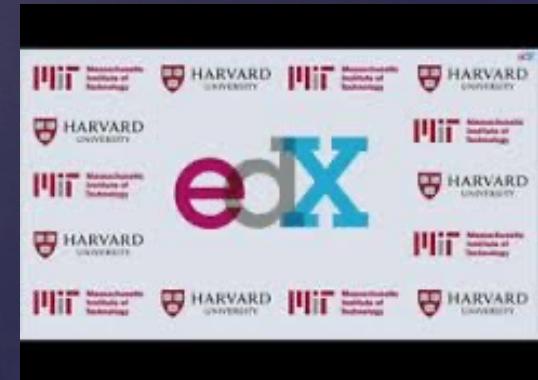
The lecture model is old



## Socrates 5<sup>th</sup> century BC

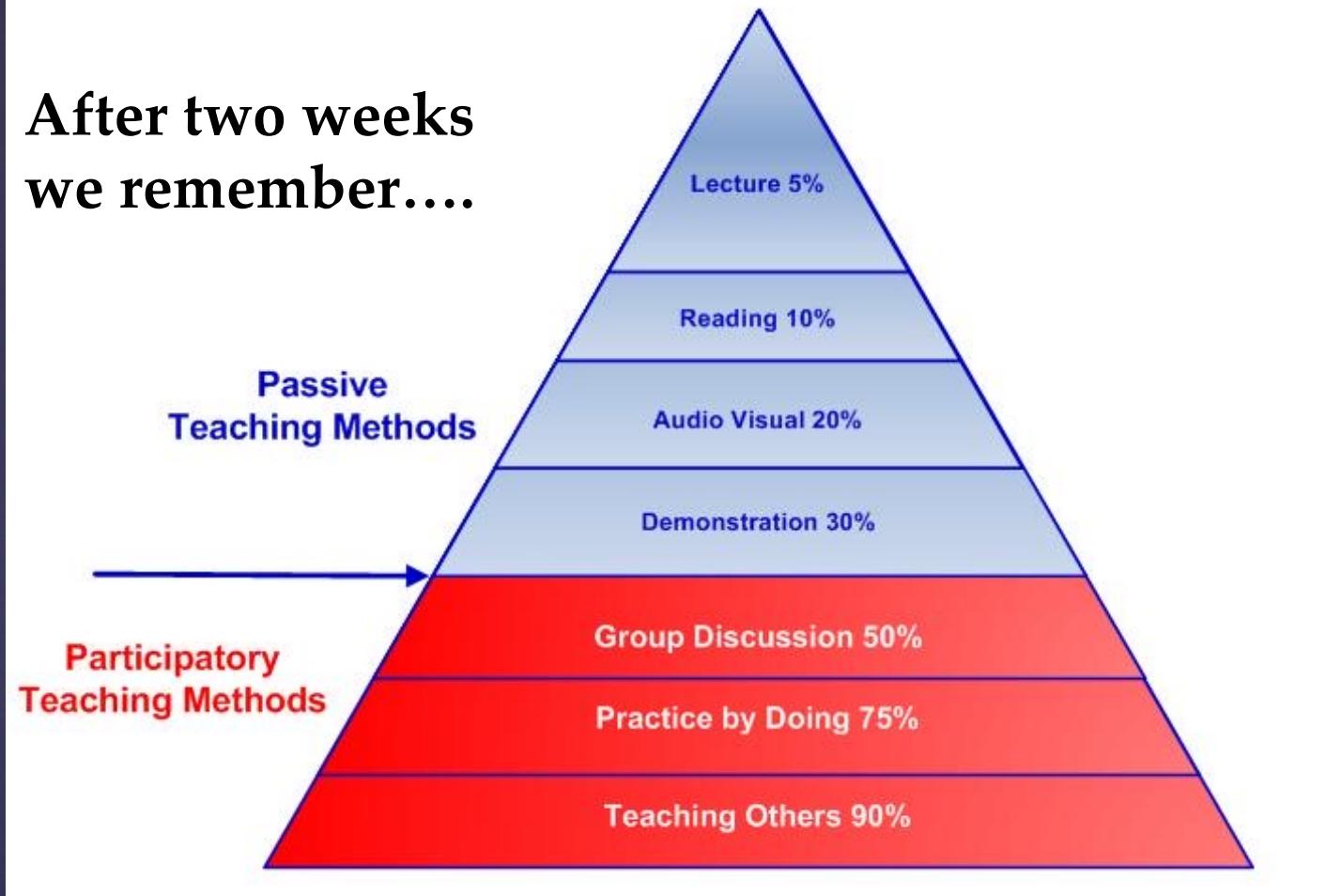
The Socratic method  
is a form of inquiry and discussion between  
individuals, based on asking and answering  
questions to stimulate critical thinking and to  
illuminate ideas

But inquisitive and active  
learning is older



# Why should you go to college?

**After two weeks  
we remember....**



**The Learning Pyramid:  
We need participatory  
methods**

# Flipped classroom



## Traditional Method

Class: First exposition of content

Homework: problem solving

Studying for the exam

End of the course

## Flipped classroom

Watch videos and read textbook

Pre-class exercise

Hard problems in class

Exam

The cycle of learning.  
At what stage does the student need help the most?

# Personalized learning



Watch videos as slow or fast as you want, when and where you want: Your own way.



Ask for help at the JustAsk



Human experience: discuss, defend, justify, apply...



The cycle of learning.  
At what stage does the student need help the most?

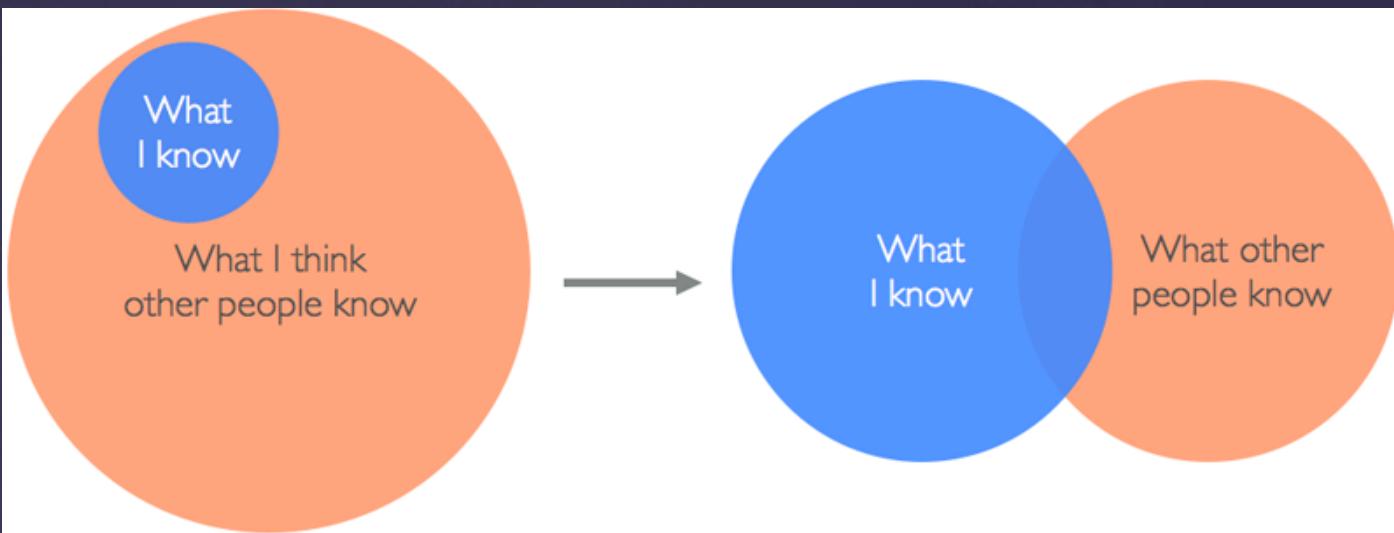
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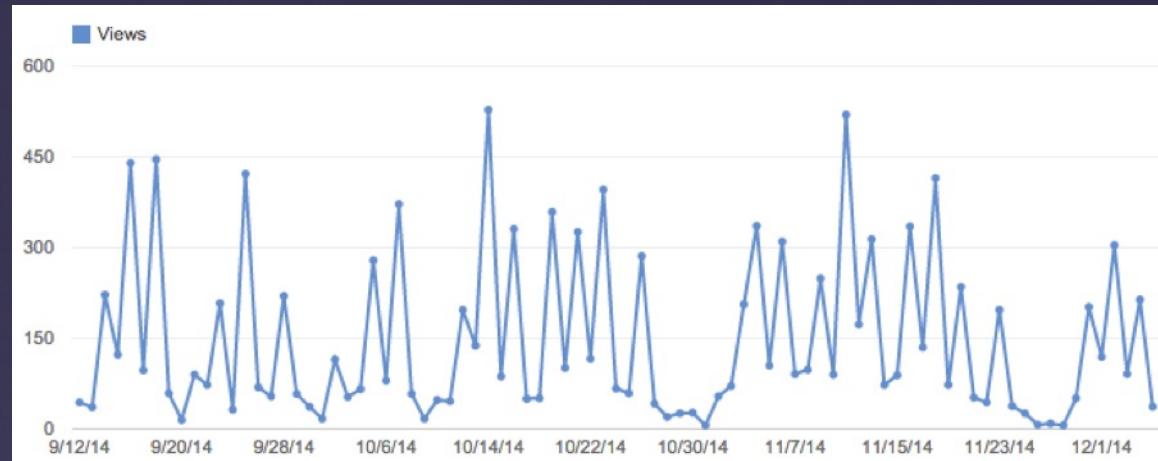


- ¶ Teaching others requires higher order thinking
- ¶ Eliminates the “impostor syndrome”
- ¶ We have students from previous years helping during activities: avoids the “curse of the wise”

# Why group work and peer-review?



## Before Class



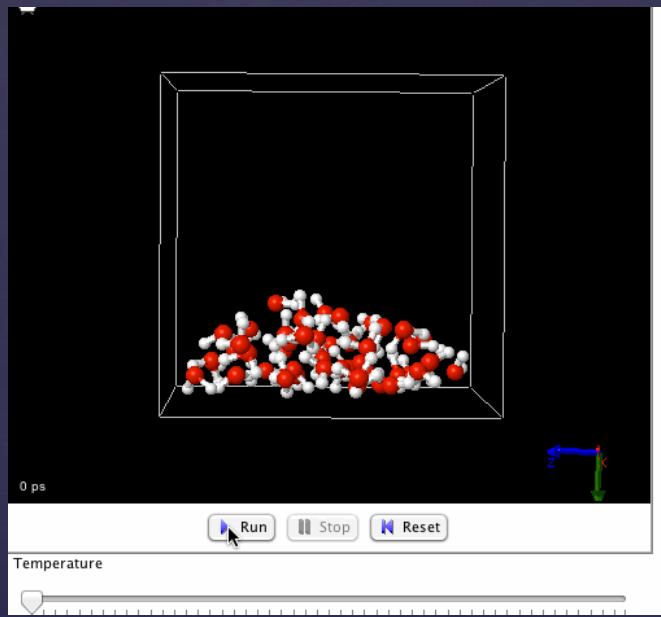
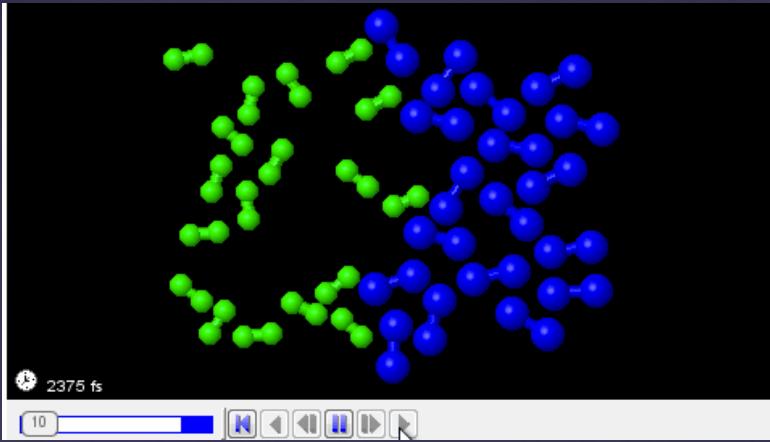
## Class time



# After Class

Finished	December 7 2014 8:00 PM	December 9 2014 10:59 PM	2 days 2 hours	45.45		15	✗ 0.00	✗ 0.00	✗ 0.00	✓ 9.09
Finished	December 9 2014 10:59 PM	December 9 2014 11:10 PM	10 mins 42 secs	50.00		15	✗ -	✗ 0.00	✗ 0.00	✓ 9.09
Finished	December 9 2014 11:11 PM	December 9 2014 11:21 PM	9 mins 38 secs	47.73		17	✗ -	✗ 0.00	✗ 0.00	✓ 9.09
Finished	December 9 2014 11:21 PM	December 9 2014 11:31 PM	9 mins 27 secs	59.09		15	✗ -	✓ 9.09	✗ 0.00	✗ 0.00

# Using technology for learning



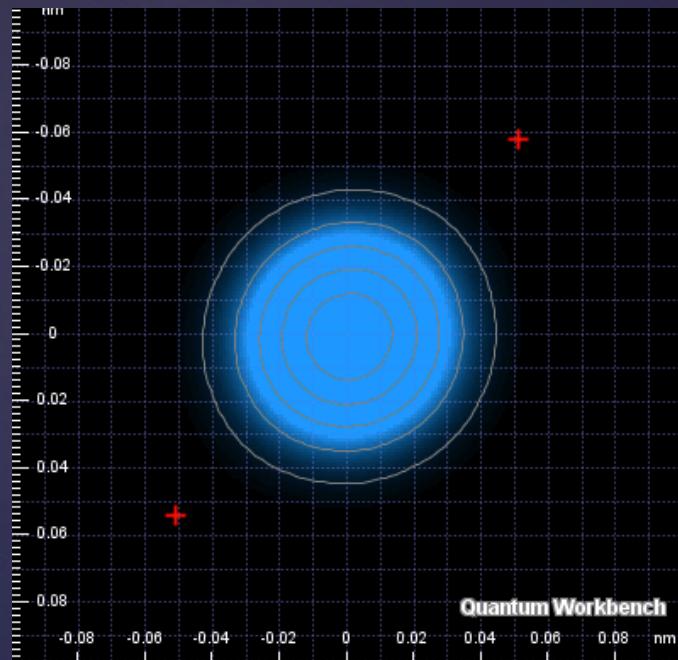
Boiling molecular liquids

<http://chemdata.umr.umn.edu/chem2331/waterphasechange>

## Chemical reactions:

Balance between kinetic and potential energy

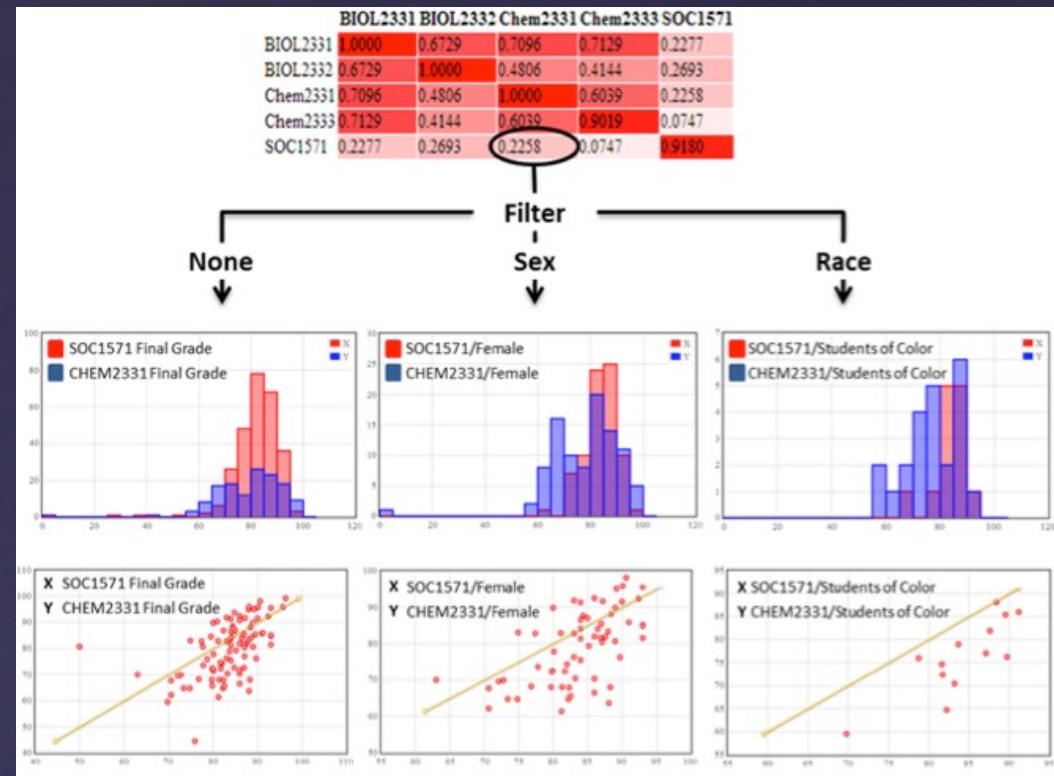
<http://chemdata.umr.umn.edu/chem2331/explosion/>



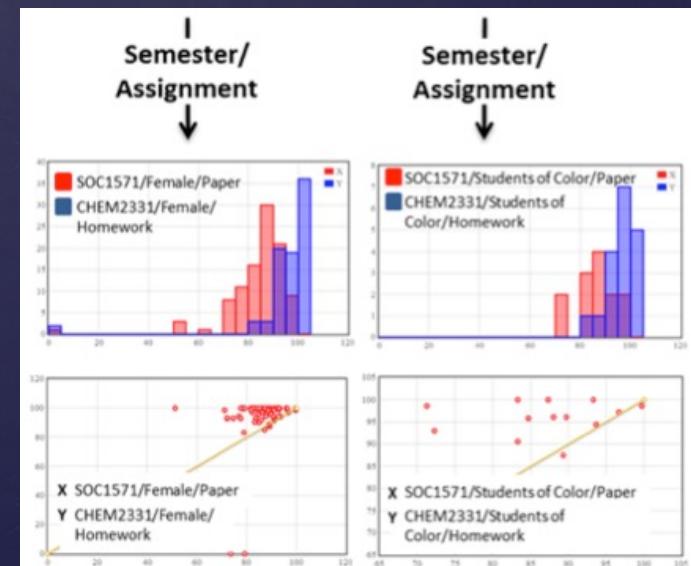
Quantum simulations of electron cloud

<http://chemdata.umr.umn.edu/chem2331/h2/>

# Using technology for learning



# Use of technology to predict outcomes





Joyful Struggle and  
Comfortable Confusion