We will...

1. Understand how we perceive the world differently.
2. Analyze how we learn.
3. Try to understand how the brain may work.
4. List the types of learning styles.
5. What are the challenges we face in our classrooms?
6. List how different ways of teaching and learning may benefit our students.
7. What can we do in the classroom to enhance the learning experience of our students?
Diversity in our classrooms

- Age groups
- Different Life Experiences
- Different levels of preparation
- Different goals
- Socioeconomic background
- Abilities/disabilities
- Ethnicity
- Learning styles

The human brain and the Human Brain Initiative

http://www.humanconnectomeproject.org/data/
BRAIN INITIATIVE

Approximate investment to give scientists the tools they need to get a dynamic picture of the brain and better understand how we think, learn, and remember.

$100 MILLION

$60 MILLION ANNUALLY
THE ALLEN INSTITUTE FOR BRAIN SCIENCE

$30 MILLION ANNUALLY
HOWARD HUGHES MEDICAL INSTITUTE

$4 MILLION ANNUALLY FOR 10 YRS
KAVLI FOUNDATION

$28 MILLION
SALK INSTITUTE FOR BIOLOGICAL STUDIES

GOALS

Understand how brain activity leads to perception, decision making and ultimately action

Develop new imaging technologies and understand how information is stored and processed in neural networks

Provide the knowledge for addressing debilitating diseases and conditions

Produce a sophisticated understanding of the brain, from individual genes to neuronal circuits to behavior
Q 1. What are the challenges we face in our classrooms?

Q 2. How do we solve them?

Building the bridge
LEARNING INVOLVES . . .

1. ENCODING
2. STORAGE
3. RETRIEVAL

. . . three processes of memory.

WE ENCODE USING

(Our Senses!)
**STORAGE**

*Def.*

Filing information away in the brain; putting information in short- or long-term memory

1. **ENCODING**
2. **STORAGE**
3. **RETRIEVAL**

---

**Organize**

- Arrange information in a meaningful way.
- Order information logically, sequentially.
Reinforce and Rehearse

- Make associations
- Make connections

What do I do in my classroom to enhance student learning?

Get to know them better.
How?
By a survey at the beginning of the semester.

Introductory Quiz Spring 2013

Hello BIO Scholars,
Please fill up this survey in the form of a quiz that will give me an idea about navigating through the course and earn you credit points!
Thank you in advance.

* Required

1. You are a ___________ student *
   - High school
   - A 4 year college transfer
   - Bachelor certificate course
   - Pre-Nursing / dental / medicine,
   - Pre Biology major
   - Undecided
   - Other

2. Did you take a biology course before? **
   - Yes
   - No

3. Did you take a chemistry course before? **
   - Yes

The data

1. You are a ___________ student
   - High school 3 4%
   - A 4 year college transfer 36 51%
   - Bachelor certificate course 6 8%
   - Pre-Nursing / dental / medicine 16 15%
   - Pre Biology major 6 8%
   - Undecided 8 7%
   - Other 12 16%

3. Did you take a biology course before? *
   - Yes 38 57%
   - No 25 38%
The VARK Questionnaire

How Do I Learn Best?

Questionnaire version 7.1 [More Information]

Choose the answer which best explains your preference and tick the box next to it. Please tick more than one if a single answer does not match your perception. Leave blank any question that does not apply.

You have finished a competition or test and would like some feedback. You would like to have feedback:

☐ using examples from what you have done.
☐ using a written description of your results.
☐ from somebody who talks it through with you.
☐ using graphs showing what you had achieved.

Do you prefer a teacher or a presenter who uses:

☐ demonstrations, models or practical sessions.
☐ question and answer, talk, group discussion, or guest speakers.
☐ diagrams, charts or graphs.

What do I do with the data?

Design course materials and assessment tools.

- Concept Maps
- Case studies
- Reading and Comprehension
- Video quiz
- Drawing
- Quizzes
- Think Pair Share
- Challenging Statements
- Model Building
- Sequence Questions
- Debates
- Presentations
- Use Computer programs

EXAMS: SUMMATIVE

Concept map

Stuart Little

-走了一只松鼠
-非常喜欢
-不怕冒险
-梦想成为水手
-爱他的父母
-热爱读书
-害怕老鼠
-除了人类

Walks at birth

Only two inches high

Has a sharp nose and a mouse's tail

Washes and brushes his teeth

Pilots the "Wasp" in a stormy pond

Sets up a "nest" with Harriet

Runs away from home

Cares about Margalo

Has fears

Dreams of being a sailor

Loves his parents

Dogs

Snowbell
TOOLS FOR LEARNING

A) Drawing
B) Model Building
C) Reading and Comprehension and
D) Concept maps
E) Challenging statements
F) Videos answer critical questions pertaining to the video
G) Use of computer programs
   1. Publisher generated platforms
   2. Platforms like Concord Consortium to learn biological processes
   3. Virtual Labs: before doing the lab
H) Field trips

I) Presentations
   • Research Paper presentations
   • Case studies: Investigative Case Based Learning
   • Debates
     Why?
     Helps them
     1. to ask questions,
     2. look for answers,
     3. share responsibilities
     4. develop organizational skills
     5. develop team building skills,
     6. hone leadership skills,
     7. helps in developing public speaking
     8. Builds scientific literacy and informed citizenry
J) Summative Exams.
Courses also need to have the balance

<table>
<thead>
<tr>
<th>What needs to be balanced?</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Content vs. Process Learning</td>
</tr>
<tr>
<td>• Passive vs. Active Learning</td>
</tr>
<tr>
<td>• Formative vs. Summative Evaluation</td>
</tr>
</tbody>
</table>

Feedback is what lets us know we have the balance right
Why is process important?

- The knowledge base for disciplines is constantly expanding and changing.
- Memorizing facts and information is not the most important skill in today's world. Facts change, and information is readily available -- what's needed is an understanding of how to get and make sense of the mass of data.
  - [http://www.thirteen.org/edonline/concept2class/inquiry/index.html](http://www.thirteen.org/edonline/concept2class/inquiry/index.html)

From what to how

- The focus of my teaching shifting to more "how we come to know" and less on "what we know"
- This works both on an individual basis and/or as part of a group.
Passive Learning

What is active learning?

• Active learning is simply having students engage in some activity that forces them to think about and comment on the information presented.

Learning is not a spectator sport. Students do not learn much just by sitting in class listening to teachers, memorizing prepackaged assignments, and spitting out answers. They must talk about what they are learning, write about it, relate it to past experiences, apply it to their daily lives. They must make what they learn part of themselves.

Active learning builds Knowledge

- We learn 20 percent of what we both see and hear.
- We learn 80 percent of what we experience actively or practice.

Use of Class Time

- Information Transfer
- Knowledge Building
- Learning Retained

1 hour

½ hour

Lecture Lecture & Activity

Acadia Institute for Teaching and Technology
Use of Class Time

Information Transfer | Knowledge Building | Learning Retained

1 hour

½ hour

Lecture | Lecture & Activity

Evaluations

**Summative** - evaluation of student or instructor regarding their final level of knowledge and/or skill. Typically done using: major tests, exams, term projects and course evaluations.

**Formative** - assessment of a person’s current knowledge and/or skill level with the goal of improving it. Typically done using; quizzes, short papers and surveys.
Criterion-referenced and norm-referenced assessments

- Criterion referenced assessment: candidates are measured against defined (and objective) criteria.
- Criterion referenced assessment: used to establish a person’s competence.
- Norm-referenced assessment is not measured against defined criteria.
- This type of assessment is relative to the student body undertaking the assessment. It is effectively a way of comparing students.

Assessment by students

What worked for you?

Hi Bio Scholars,

This has been a very engaging and educative semester for me as I hope it has been for you. I tried to find out tools which helped you in your learning process. Please complete the following survey. It is worth 5 points which will be added to your finals.

1. What kind of a learner are you? *
   - Please refer to your VARK survey. You can put in more than one choice
     - Visual
     - Audial
     - Kinestetic
     - Multimodal

2. What kind of activities help you with learning? *
   - Please think of the activities we did in class.
     - Listening to lectures and taking notes
     - Doing Labs
     - Discussing the questions with fellow students
     - Doing activities in lab like the size activity or p26 activity
     - Doing the problems on the board as a class
     - Doing review together
     - Finding out why was your answer was incorrect as we did in DNA tech tests
Acknowledgement: Acadia Institute for Teaching and Technology
Thank you!