

## Interdisciplinary Lesson Study: Building Graph Interpretation, Web Evaluation Skills and Enthusiasm

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## Our Process

Two courses targeted for Interdisciplinary Lesson Study:

**Human Biology (BIO132)**  
**Plants and People (BIO141)**

Both are non-majors general-education courses.

## What is Lesson Study?

\* Improving teaching through

- \* Sharing ideas
- \* Observing
- \* Assessing
- \* Revising



## Our Process

Questions developed about plant compounds

- St John's wort
- Ayahuasca
- Marijuana

55-minute time period

24 small groups observed over 7 sections



## Goals for the Lesson

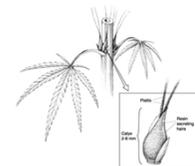
- \* Improve website evaluation skills
- \* Improve graph interpretation skills
- \* Understand the mechanism of drug interaction with neurotransmitters
- \* Generate interest in biology and make it relevant

## SAMPLE QUESTION: WEBSITE EXPLORATION

Look up information on the effects of marijuana (*Cannabis sativa*) on depression. Visit 5 websites and record their names/addresses.

Rank the websites, in order, based on the degree to which the information seems supported by scientific data.

Do they reference professional experts?



### Sample Question: Graph Interpretation

Fluoxetine is Prozac. Fluoxetine also causes serotonin to remain longer in the synaptic cleft.

Based on this graph, is fluoxetine or hyperforin more effective??

Concentration (nM)	Fluoxetine (% of control)	Hyperforin (% of control)
1	~5	~5
10	~15	~10
100	~50	~30
1000	~85	~60
10000	~100	~90
100000	~100	~100

### Results: Student performance

Topic	Pre-quiz	Post-quiz
MAOI mechanism	~0.28	~0.65*
THC	~0.75	~0.95
Marijuana as antidepressant	~0.35	~0.88***
Prozac effect	~0.55	~0.82*

### SAMPLE QUESTION: ANALYTICAL REASONING

3. Ayahuasca is a tea made of several different plants. One such plant is *Banisteriopsis caapi* (*B. caapi*). This plant contains  $\beta$ -carboline alkaloid compounds such as harmine, harmaline and tetrahydroharmine (THH). These compounds are purported to be inhibitors of monoamine oxidase (MAO) enzymes. The chemical structures of harmine and serotonin are shown below. Note that they both have a six-sided ring and a five-sided ring with a nitrogen.

Cc1c2c(c3c1OCC3)nc4cc(OC)ccc42

harmine

NCCc1c2c(c3c1O)nc4ccccc342

serotonin

The monoamine oxidase enzyme destroys serotonin when serotonin binds in the enzyme's active site. Since the shape of the harmine and serotonin molecules are so similar, how do you think harmine is able to block the monoamine oxidase enzyme's destruction activity?

### Results: Student perceptions about learning

This activity helped me learn about...

Topic	Meaningful
Internet sources	~3.0
Disease complexity	~2.9
Nervous system	~2.9
Science process	~2.8

### Results: Student performance

Scores on questions of different types

Question Type	Score
Web exploration	~4.5 (A)
Graph interpretation	~4.3 (AB)
Analysis/Synthesis	~3.8 (B)

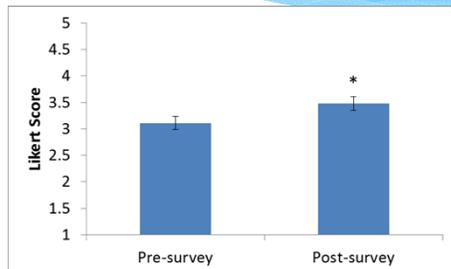
### Results: Student attitudes

If cost were not an option, I would take another course for credit in biology

Survey Type	Score
Pre-survey	~2.8
Post-survey	~3.3*

## Results: Student attitudes

I plan to use the skills I practice in this course in my future coursework or career



## Results: Student comments

- *The activity was very helpful. It cleared up a lot of confusion I had from the lecture in class.*
- *Yes, I know people with depression so it helped me understand it better.*
- *Helpful but time-restrictive.*
- *Overall felt rushed, too many questions, the “big” medical terms are hard to pronounce.*

## Results: Observation

- \* 50% of students worked together in groups
- \* 41% no discussion amongst groups
- \* 68% “surface levels” discussion
- \* 50% difficulty interpreting graphs
- \* 36% working off topic



## Conclusions

- \* Observations of groups raised professors' awareness of small group dynamics
- \* Students spent excessive time on web exploration.
- \* Students had difficulty with critical and analytical thinking.
- \* Overall, the topic was interesting and improved student attitudes.
- \* Implementation needs some improvement.

## Results: Observers Comments

- \* *Difficulty with graphs, bar graphs seem to be easier*
- \* *Time management seems to be an issue*
- \* *No discussion within group until the last summary*
- \* *Overly confident of their incorrect answers*
- \* *Absolutely no problems with website exploration*

## Revisions

- \* Remove web search questions from exercise.
- \* Consider whether to have students work together on each question, or allow them to ‘divide and conquer.’
- \* Add more synthesis questions.



## Parting Thought

- \* Lesson study provides tools to study and improve group dynamics



Can we use the lesson to identify dysfunctional groups earlier in the semester?

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Questions?