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The role of personal relevance in developing biological information literacy



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COURSE CODE: BIOL13100

COURSE TITLE: Development, Structure, and

Function of Organisms

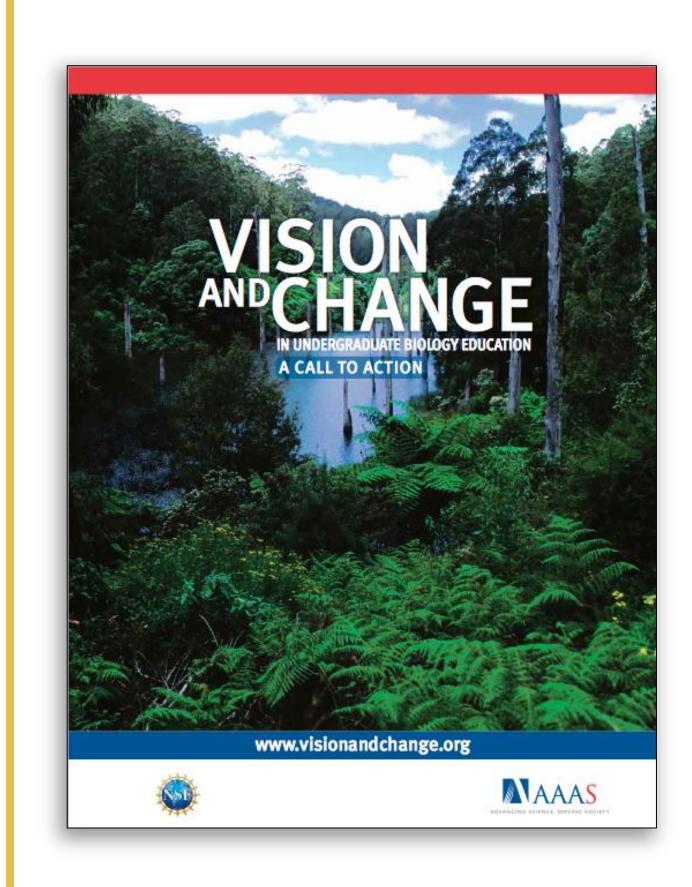
INSTRUCTOR: Dr. Nancy Pelaez

Course Learning Objectives:

In addition to traditional objectives covering the Physical and Chemical Basis of Life, The Molecular Basis of Regulation, Plant Biology, Animal Biology, and Experimental Biology, this course also covers:

- 1. Exploring biological information sources to answer a personal question
- 2. Developing a personal strategy to find information needed for a biological problem (skill)
- 3. Modifying strategies for finding information by reflecting and then deciding how to improve a strategy
- 4. Reflecting on the quality of biological information you find and evaluate how useful it is for your question
- 5. Finding and interpreting biological examples to illustrate what you have learned to a specific audience
- 6. Using biological information to respond to ideas presented by others or biological issues of social relevance

Goals and Intended Outcomes



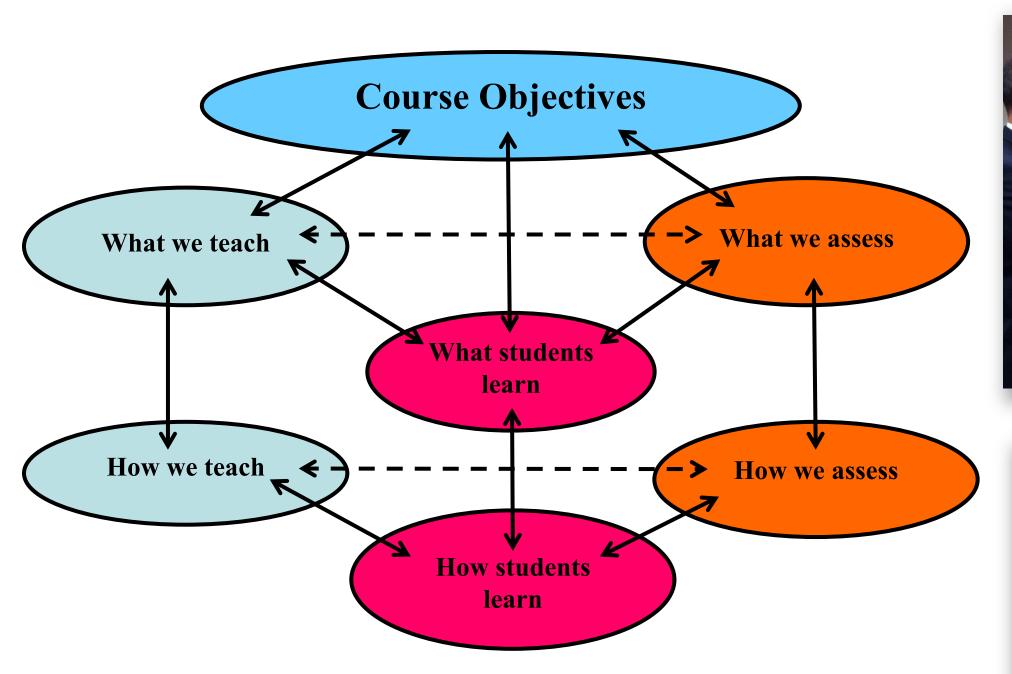
Christine Bruce

introducing the Six

Frames, Aug 2012

- Vision and Change (AAAS, 2011) calls for making undergraduate courses more student-centered and relevant.
- To make the learning in a biology course for firstyear undergraduate students as inclusive as possible for students from a range of backgrounds and interests, we:
 - Introduced the practices that "inform" biology professionals
 - Explicitly addressed the potential for students to inform themselves in a biology course.

Not Just WHAT Students Learn, But HOW Do Our Students Learn Current Biology?



E: Anderson, T.R. (2007). Bridging the Educational Research-Teaching Practice Gap: The assessment. Biochemistry and Molecular Biology Education 35 (6): 471-477.





Weekly Assignments and Reflections Problem Assignment Team A Peer Leader Reflections Team B Peer Leader Student tonic choice.

Set	Assignment	Team A Peer Leader Reflections	Team B Peer Leader Reflections	Student topic choice
1	Content - Compare myosin proteins (molecular motors) and G proteins (regulatory). Get more up-to-date information than what is in your textbook Cite sources using APA.	All students participated but shy; peer leader noticed she talked a lot, plans ice breaker next time. Students have trouble answering one question so she suggests Google Scholar and the Purdue libraries database.	Initially quiet but eventually all students contributed. Biggest problem was using resources to go through the problems. Next time will ask "Why do you think so?" "Where did you find this?"	NA
2	Competency - Focus on the variables in a research study while getting and making sense of information from a primary source. Decode the symbols in figures and interpret graphs.	When discussing the graph, peer leader breaks it down by asking students to explain what each bar means. One student cites examples for a discussion topic. Peer leader encourages students to talk.	Struggle with one particular graph. "Huge sense of success" when all had grappled and understood it. Will try to direct students to respond to each other and not make all comments to the peer leader	NA
3	Content - Get a primary source to find up-to-date information with a phylogenetic tree diagram. Compare a secondary source to the primary source and explain what is wrong with the bio textbook.	Different ways that students view tree diagrams. Students share ideas & thoughts re articles read. Very focused group according to the peer leader	Students able to describe how they looked at the cladograms. Students helped each other understand when approaches differed. Less discussion with and did not read articles deeply.	NA
4	Control Investor Francisco	Test 1	ml	N/ A
4	Social impact - Focus on research relevance and compelling evidence. What do biologists measure? How to convince others that fly research is important?		The quality of student talk was actually pretty good this week. They seem much more comfortable with each other and are becoming closer.	NA
5	Personal relevance - Have a research question that relates to your career goals. Understand an experiment. Use information from class about decoding graphs as a guide to inform yourself. Poster assignment introduced.	Students used Google Scholar to find an article; Peer leader reminds them of previous demo of Purdue libraries resources.	Peer leader reports working hard NOT to answer questions for students. Students sharing different approaches. One student reports greatly looking forward to workshop because they help him better understand the material.	None yet
6	Learning to learn - How to decode the graphs in Takahashi K et al. Plant Physiol. 159:632-641, 2012, about dose-response of H+ATPase phosphorylation to IAA.	Peer leader helped with interpretation of quantitative info. Students find relevant papers to discuss in workshop, but most students skip steps when they need to look up an article. Only one student looked up an article, and she used Google Scholar. Test 2	One strategy to encourage student participation is asking the students to draw out figures or equations on the chalk board to help answer the questions. When they do not understand, suggest they look up parts of the question online Discussed project ideas.	None yet
7	content - Current experimental evidence for Phytochrome mechanisms. Develop a personal strategy to find out about the mechanism of action for a molecule related to a biological problem that is of interest to you.	Mar 20 Students had not chosen a research topic yet. The librarian dropped in to show how to use PubMed and the MeSH headings to find articles about that topic. They talked about starting and ending a search with Google or Google Scholar	Students very interested in workshop topic, "resonated well with their curiosity". Two chose topics.	B. Auditory brain pathway B. Cancer
8	Content and Learning to learn - Present some data from an experimental research paper, and include the full citation for the primary research investigation about a biological mechanism for the topic you choose.	Discussed research topics – more specificity and variety but not many students had started their searching yet. Librarian came to demo using Libraries' database categories, PubMed, MeSH headings for finding full text, "one good article" approach, and using interlibrary loan. All students reported project topics and expect that library info will help find and narrow article selection.	Interpreted biological examples to illustrate what they have learned by using a diagram online to represent the auxin transport system. Discussed differing opinions on how to graph Arabidopsis height. Students very comfortable asking questions & responding to each other.	B. Chinese herbs B. Crohn's disease B. Thalidomide A. Alzheimers A. Oxytocin A. Opiates and Mothers
9	Relational - Design a scientific conference poster about data from biological experiments on a topic that interests you	Watching different animations to help the students remember different processes like using an active pump or just diffusion etc. Following the steps by drawing a picture out was also helpful.	Peer leader able to step back and let students help each other. Students very comfortable asking questions & responding to each other.	A. Gender and Reaction time B. Myostatin
10		Used animations & diagrams from Google. Different methods reviewed for presenting poster information.	Students unfamiliar with kidney but able to eventually draw structure & channel/pump orientation together.	

Peer-Led Team Learning (PLTL)

- Information literacy assignments were added to the weekly problem sets
- Emphasizing the social aspects of learning, students worked together in small groups led by a peer mentor using online or face-to-face meetings.
- Peer leaders (PLs: undergraduates & a grad TA) were recruited and trained
- PLs led weekly small-group sessions to work through problem sets and projects
- Students considered personal and social relevance of biological information through an informed learning approach
- Students explored biological information sources to answer a personal question
- Students developed a personal strategy to find information needed for a biological problem (skill)
- Students modified strategies for finding information by reflecting and then deciding how to improve a strategy

Bruce, C. S., Edwards, S., & Lupton, M. (2006). Six Frames for Information Literacy Education: A conceptual framework for interpreting the relationships between theory and practice. ITALICS (Innovations in Teaching and Learning Information and Computer Science)

Student Benefits from the Six Frames of Informed Learning

- Students develop a personally relevant question that can be answered by engaging biological information.
- Informed learning approaches help students consider personal and social relevance of biological information.
- PLs develop leadership, instructional and observational/listening skills as well as biological expertise and confidence.

Personal accomplishments & 6 Frames					
Frame	Number	Percentage			
Competency	22	46%			
Learning to learn	7	15%			
Personal relevance	8	17%			
Social impact	4	8%			
Content	2	4%			
Undefined	3	6%			

Examples from peer reviews of Group A and Group B posters

- No cure has been found (Social impact)
- Brother has Crohn's Disease (Personal relevance)
- Provides info on how brain interprets auditory signals (Content)
- May lead to therapies (Social impact)

A SYMPOSIUM FOR THE CHANGING CLASSROOM