

A Comparison of Traditional Science Pedagogy to Active Learning Experiences



Jarrett Broadie
 Graduating Senior in Biology, M.A.T Candidate
 Under the Supervision of: Dr. Leslie S. Jones

Research Focus

People tend to teach the way they were taught
 I would have been very likely to lecture when I start teaching this Fall
 BIOL 4950 E Directed Study - Pedagogy of Inquiry Science

Research Question

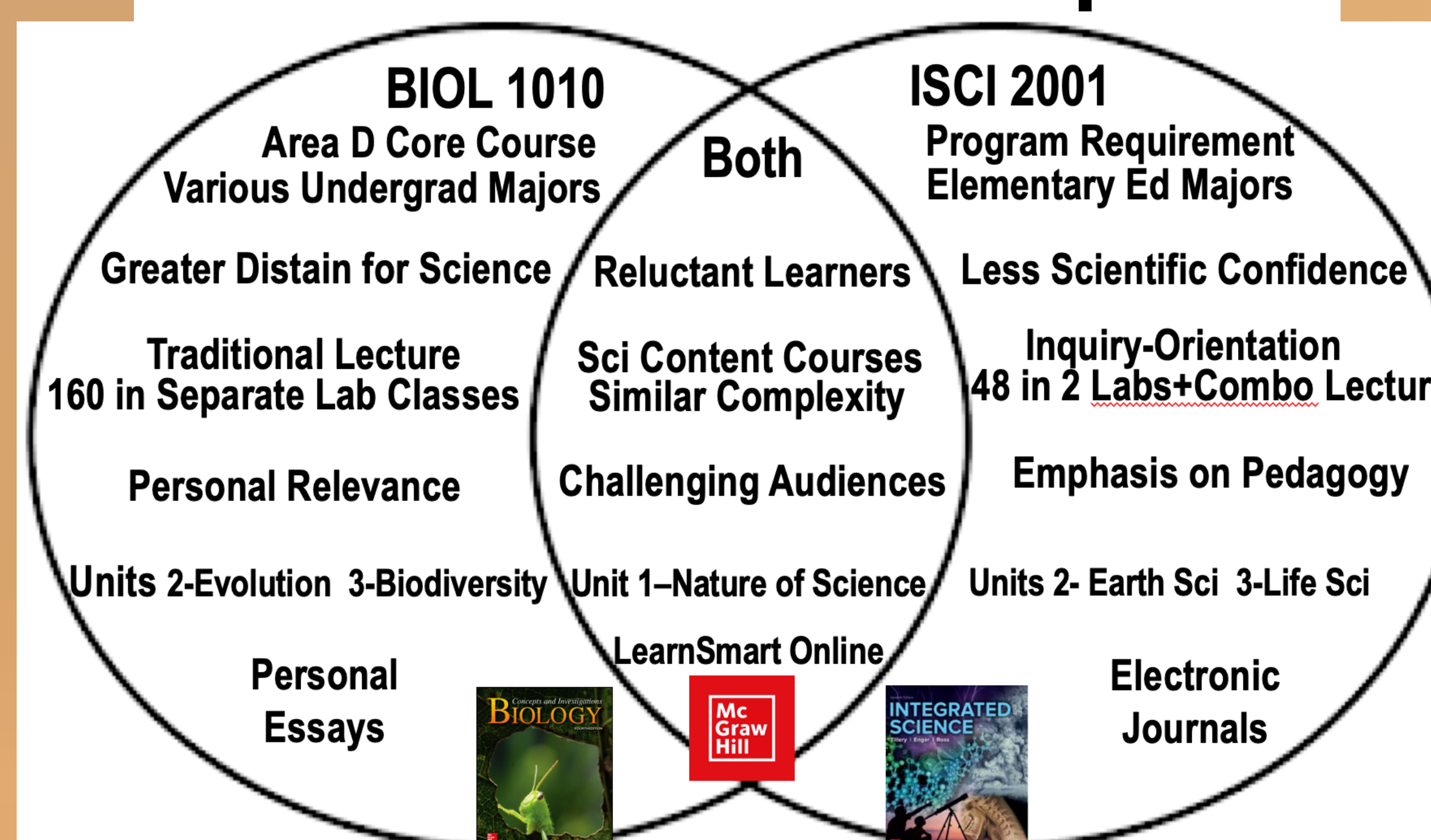
Does the Pedagogical Strategy Impact Student Learning?

Background

Since 1995, TIMSS (Trends in International Mathematics and Science Study) has highlighted the disappointing performance of U.S. students (<https://nces.ed.gov/timss/>). Science educators have introduced a variety of reforms as they look for better ways to teach. Traditional science education exemplifies the didactic or lecture-based approach to education, leaving students disinterested and unmotivated. Inquiry-Oriented pedagogy was designed with the idea that laboratory exercises, interactives, and hands-on learning tools would be motivational when employed as precursors to the delivery of scientific information.



Instructional Philosophies



Field Notes

Similarities	
BIOL 1010 & ISCI 2001	
<ul style="list-style-type: none"> ▪ Taught for Constructivist Learning ▪ Students Apprehensive about Science ▪ Online LearnSmart prepared students for lecture ▪ Beginning Unit- Nature of Science (but different presentation) ▪ Student Messaging in GroupMe Chat dominated by complaints 	
Differences	
BIOL 1010	ISCI 2001
<ul style="list-style-type: none"> ▪ Strictly Biology Content ▪ Larger Class; 160 students ▪ Lecture Style ▪ Labs by Graduate Teaching Assistants 	<ul style="list-style-type: none"> ▪ Taught to Model Pedagogy ▪ Smaller Class; Easier Collaboration ▪ Inquiry-Oriented; Labs First ▪ Primarily Ed. Majors; not very independent

Methodology

- Comparison of learning experiences of students taking 2 classes (5 Simultaneously, 2 Sequentially)
 - Traditional Lecture: BIOL 1010 Evolution and the Diversity of Life
 - Inquiry-Oriented, Activity-Based Integrated Science: ISCI 2001 Exploring Our Ecosphere
- Both taught by the same professor who is also my research supervisor

Prepandemic

- Personal Observation of Both Classes
- Survey and face-to-face interviews with student



Postpandemic

- Covid-19 Isolation with Email Exchanges and Telephone Conversations
- Analysis of Qualitative Data Using Emergent Theory

Results

Collaborative Learning

worked together to find solutions to common problems
 working with different minds can help achieve your goal efficiently
 more interactive and discussion was readily available
 push towards collaborative effort among students
 allowed me to get close knit with my peers

Combination of Lab & Lecture

When I do the lab first, it makes me learn more
 and it makes me think about it before class
 lab was before lecture instead of how scattered BIOL 1010 labs were
 Working in lab first was confusing sometimes
 but lecture always afterward always cleared things up
 connection between both lab and lecture

More Fun

I had more fun and that's why I got better grades
 so much more fun and easier
 enjoying it because the professor made learning easy
 classwork is more investigative and modern
 make it much more fun and exciting

Discussion

Six of seven students prefer the nontraditional learning experience
 Inquiry orientation improves their experiences by:
 Removing immobile, passive notetaking
 Replacing it with an exploratory perspective and active learning
 Allowing collaboration and interaction with classmates

Conclusion

After conducting this research, even though I understand that this teaching style involves more effort, I am convinced that employing it will make me a much better biology teacher.

References

Robas, Vanesa Rojo, et al. "The Affective Domain in Learning Mathematics According to Students' Gender." Revista Latinoamericana De Investigación En Matemática Educativa, no. 2, 2018, p. 183. Edsdoj EBSCOhost, doi:10.12802/relime.18.2123. Accessed 25 Mar. 2020.
 Savic, Marko, and Mohamad Kashef. "Learning Outcomes in Affective Domain within Contemporary Architectural Curricula." International Journal of Technology & Design Education, vol. 23, no. 4, Nov. 2013, pp. 987-1004doi:10.1007/s10798-013-9238-8.

