



Introduction

Recent research has encouraged science teachers to incorporate an inquiry-based approach to teaching and learning in the classroom. The purpose of this study was to investigate if guided inquiry increased science literacy in my freshman biology students at Salpointe Catholic High School.

Why is it important to focus on the improvement of science literacy?

"...the main goal of science education is indeed the attainment of scientific literacy" (Wenning, 2007, p. 24)

"...educators have insisted that science education is useful to all students, even those not bound for scientific or technical careers" (Feinstein, 2011, p. 1)

Guided inquiry is most similar to inquiry in research.
 •HS students' lack of skills and background knowledge is a constraint to conducting full inquiry.
 •Solution: scaffolding the inquiry experience and offering structured or guided inquiry activities to build both a skills and knowledge base.
 (Gengarely and Abrams, 2009, p. 82)

Why was guided inquiry chosen as the approach?

Connection to Industry

In both of the companies I worked for, I completed projects by independently working on tasks but was able to get guidance when needed. This is similar to the guided inquiry approach that I used with my students; it allowed my students to be responsible for their own learning while having support when necessary. Integrating this business practice into my teaching is a valuable way to prepare students for the STEM workforce.

Research Questions

What are students' perceptions of guided inquiry learning?

How does using a guided inquiry approach affect students' science literacy?

Guided Inquiry and Science Literacy

"...a foundational understanding of how scientific knowledge is gained, how the scientific enterprise proceeds, and how to distinguish scientific facts from other kinds of information—a collection of skills and knowledge commonly referred to as science literacy."
 (Impey, Buxner, Antonellis, Johnson, & King, 2011, pp. 32-33)

What is science literacy?

What is guided inquiry?

Lab-based: Students must determine how to investigate the problem
 Guided Inquiry in Lab (Materials World Modules, 2015)

Activity-based:

- student-centered; collaborative
- guide students to formulation of their own valid conclusions
- instructor serves as facilitator, observing and periodically addressing individual and classroom-wide needs

(The POGIL Project, 2015)

Investigation

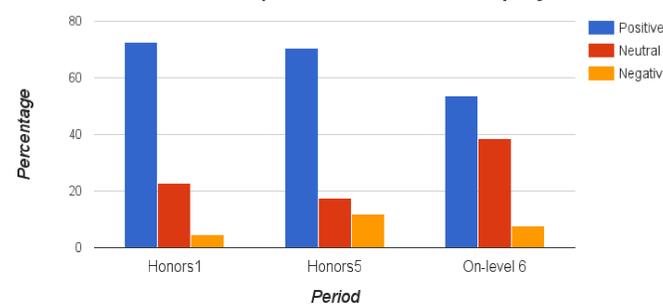
The students in the study were freshman biology students from my two honors biology classes and one on-level biology class at Salpointe Catholic High School in Tucson, AZ. There were 52 students involved in the study.

Data Source 1	Data Source 2	Data Source 3
Guided inquiry perception questionnaire Assessed students' perceptions of guided inquiry learning	Science literacy pre and post assessments Assessed students' scientific inquiry literacy at the start and end of school	Full lab report Assessed understanding of experimental design: Honors: Bean Inquiry On-level: Rock Inquiry

Results and Findings

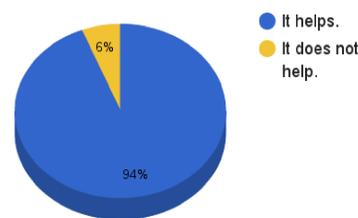
Honors students' initial perception of guided inquiry learning was better than on-level students'.
 (Data Source 1)

Students' Perception about Guided Inquiry



Students reported that guided inquiry helped them learn.
 (Data Source 1)

Guided Inquiry as a Learning Tool



On-level class

It helps.

"The teacher has a chance to help you if you need it." Student A
 "It helps us know what we're doing and keep us on track." Student B

It does not help.

"I think it helps but it is boring." Student C
 "It helps some students learn but it may not help all of them." Student D

Honors classes

It helps.

"I think guided inquiry is a helpful tool in science because it guides students when completing experiments but also allows independent thinking." Student E
 "I think guided inquiry helps us learn because we don't get complete help or no help; we're guided along." Student F

It does not help.

"It is good because it can help people understand science better, not necessarily me, though." Student G

Even students who thought that guided inquiry did not help them improved in their science literacy.
 (Data Sources 1 and 2)

Student D

• The student improved in science literacy as evidenced by a gain of 9% in assessment score.
 • Based from the lab report, the student is almost accomplished in science literacy.

Student C

• The student improved in science literacy as evidenced by a gain of 31% in assessment score.
 • Based from the lab report, the student is developing in science literacy.

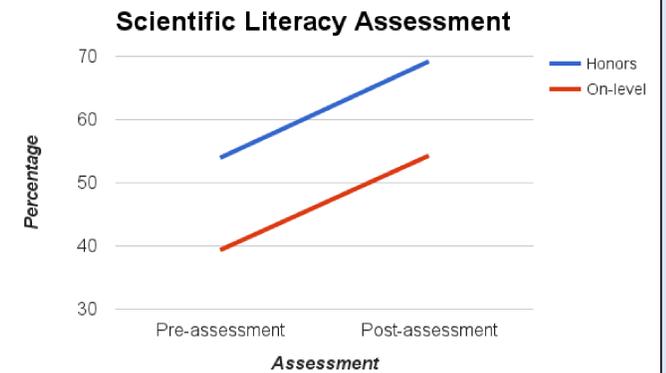
Student G

• The student improved in science literacy as evidenced by a gain of 14% in assessment score.
 • Based from the lab report, the student is accomplished in science literacy.

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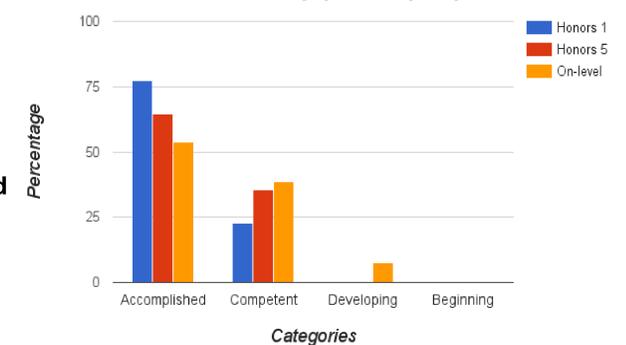
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Guided inquiry significantly ($p < .05$) changed students' science literacy for both honors and on-level students.
 (Data Source 2)



Most students that went through the process of guided inquiry demonstrated scientific literacy.
 (Data Source 3)

Scientific Literacy (Lab Report)



Implication/Future Work

My industry work gave me the opportunity to experience how guided inquiry works in a project-based environment. My action research allowed me to investigate the effectiveness of using a guided inquiry approach to increasing students' literacy. My work showed that using guided inquiry increased the science literacy of my freshman biology students. As a result, I will continue using a guided inquiry approach in my biology classes to give students experience in industry practices. Additional guided inquiry activities and labs will be incorporated into the curriculum. This will help prepare my students for their future careers in industry.

References

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