Guided Primary Literature Discussions as a Tool for Enhancing Conceptual Learning and Primary Data Interpretation in Biochemistry

Jillian Smith, Joshua Maurer, Carolyn Dufault and Regina Frey
Department of Chemistry, Washington University in St. Louis, St. Louis, MO 63130

Abstract

In the fall of 2012, we implemented a study to evaluate if incorporating primary-literature readings and guided-discussion sessions into the first semester of Biochemistry would increase understanding and retention of critical biochemical concepts. Our implementation involved both an optional in-person guided-discussion sessions, led by a Biochemistry Teaching Assistant, and online graded discussion sessions, in which groups of students were responsible for critiquing and analyzing the article. In both cases, a research article from the primary literature relevant to the material being covered in class was discussed. Here, we will present our preliminary assessment of how incorporation of primary literature affected performance on assignments and exams, and influenced attitudes towards science, group learning, and technology in education.

Learning Objectives and Methods

Objective 1: To increase a student’s ability to understand and retain critical biochemical concepts through the use of primary literature readings and guided discussion sessions.

Hypothesis 1: We expect that students who participated in the optional journal club will perform better on exam questions related to the topics and concepts covered in the primary literature paper.

Implementation: There were six optional TA-Led journal clubs, in which the TA would guide small groups of students through experimental designs, data interpretation and scientific significance.

Objective 2: To increase a student’s ability to independently critique and analyze primary literature readings through the use of guided discussion sections.

Hypothesis 2: We expect students that attend the optional primary literature journal clubs will learn how to dissect primary literature journal articles independently.

Implementation: There were three graded online discussion forums, in which all students were responsible for critiquing and analyzing the article’s experimental design, data interpretation and scientific significance.

Survey Questions

A survey was given to each student as part of their first and last homework assignment.

Background information
- Group work experiences
- Course work
- Research experience

Attitudinal information
- Group work
- Enjoyment of science class and literature
- Technology in the classroom
- Career goals

Three Peer-Led Graded Online Discussion Forums

• Primary literature article related to topics from lecture
• All students were randomly assigned to groups of seven
• Students were responsible for all aspects of the discussion
  • Experimental designs
  • Data interpretation
  • Scientific significance
• Students were graded individually (out of 20 pts)
  • Comment quality
  • Participation
  • Completeness of discussion

TA-Led Journal Clubs

Six TA-Led Journal Clubs throughout the semester

• Primary literature article related to topics from lecture
• All students were able to sign-up for a JC the week before
  • 5 different times to choose from
• TA used a handout with questions to spur discussion

Online Graded Discussion Forums

• Students who attended at least one journal club statistically increased their confidence in their ability to interpret primary literature
• Students that attended the journal club did better on exam questions related to that journal club primary literature article topic compared to students that choose not to attend any journal clubs.
• Students that attended at least one journal club did better on the online discussion forum of primary literature. This indicates that students were able to independently critique and analyze primary literature.

Conclusion and Future Work

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