IOWA STATE UNIVERSITY
Genetics, Development & Cell Biology-LAS

Honors Project Presentation
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Undergraduate Perceptions of Scientific Literature: Assessment of a Project-based Intervention in an Introductory Biology Course

Introduction

Information Literacy (IL) is the ability to effectively locate, evaluate, and synthesize information to enhance one's knowledge[1]. Studies show that there is a discrepancy between students' perception of their ability to locate credible scientific sources, and their actual ability to do so[2]. Science faculty view information literacy as important feature of undergraduate research experiences[3].In addition, students perceived IL to be a "product" rather than a process and information seeking stops when the answer is found[4]. Undergraduate students experience IL in a "complex, multi-tiered way" that many studies do not take into account leading to an "inappropriate pedagogic strategy"[5]. As a result, significant efforts have been made to facilitate the development of these skills in students in advanced biology courses[6,7,8] but to a lesser extent in introductory courses[9].

Incorporating approaches to foster the development of these skills earlier on within the undergraduate curriculum is essential, since consistent engagement in the practice of these skills is not only an important aspect of training students to become scientists, but also to be informed consumers of scientific information. To improve learning, an understanding of student perspectives is necessary to provide faculty with the tools necessary to enhance student IL[5]. Thus the first step in developing these skills is knowledge about students' perceptions of the type, quality, and source of information they are seeking. In this study, we assessed the impact of a semester-long project, designed to address this need, on the ability of students to categorize sources of scientific information.

Methods

Figure 1. Timeline for team project and data collection.

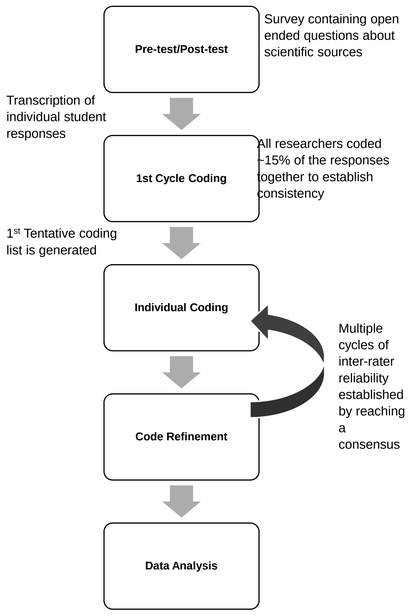

Figure 2. Flowchart of pre- and post-data collection analysis. We used qualitative coding methods to analyze the data and identify themes that emerge.

Results

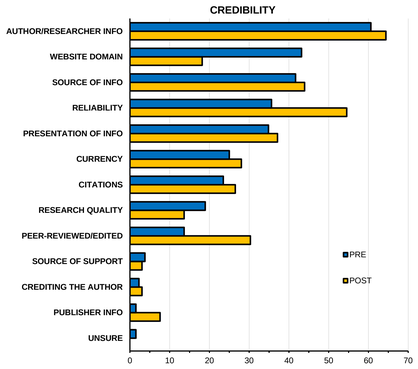

Figure 3. Code frequency for student responses to the question "What is the credibility of a resource? What factors would you consider when assessing the credibility of a scientific source?" Values expressed as percentages. n=132.

- Students recognized that the process of peer-review was important for assigning credibility to a source (16.7% increase).
- At the end of the semester there was an 18.9% increase in the number of students recognizing trustworthiness as being important to the credibility of a source.
- There was no change (<4%) in codes pertaining to the qualifications of the author, where the information is published, and how the information was presented.

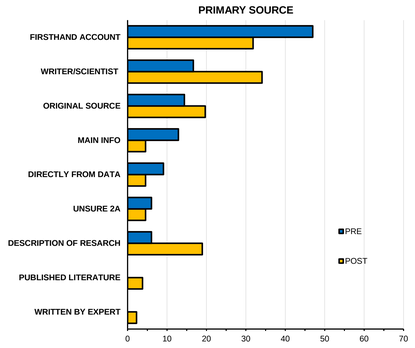

Figure 4. Code frequency for student responses to the question "What is a primary source (PS)?" Values expressed as percentages. n=132.

- There was a 12.9% increase in student identification of primary sources as being descriptions of studies performed by scientists.
- Students were more successful in identifying PS as being written by the scientists who conducted the research (17.4% increase).

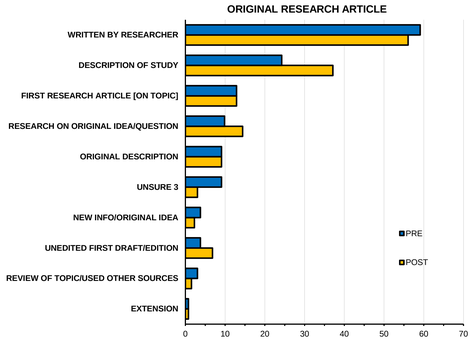

Figure 5. Code frequency for student responses to the question "What is an original research article (ORA)?" Values expressed as percentages. n=132.

- Students were able to describe original research articles as including at least one of the following components from the process of inquiry based science: hypothesis, methods, experiments, results as seen from the 12.9% increase.

Results

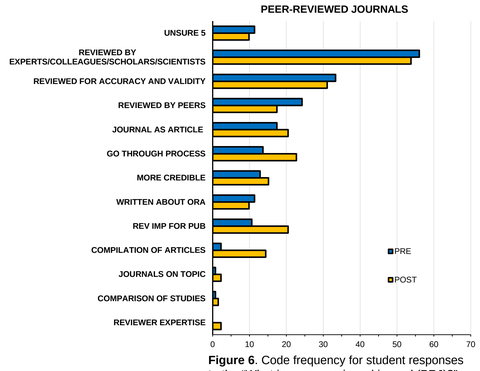

Figure 6. Code frequency for student responses to the "What is a peer-reviewed journal (PRJ)?" Values expressed as percentages. n=132.

- Students (>50%) recognize that PRJ are reviewed by scientists and other professionals in their respective field.
- Students developed the conception that PRJs are a compilation of articles by the end of the semester.
- There is an increase of ~9% in the students' understanding of the peer review process and its importance for publication.
- Students think of Wikipedia as a noncredible source of scientific information because any user, regardless of their level of expertise, may edit the content contained within a Wikipedia article. This perception persisted over the course of the semester.
- Students are able to identify that a review article is related an ORA, but they are unable to describe a review article as a synthesis of current research in a field.

Discussions and Future Directions

- Our results highlight the significance of project-based interventions in enhancing student understanding of the function of published scientific literature, specifically ORA and PRJ, as result of the scientific process.
- Our analysis confirms the need to provide continued training in the development of information literacy skills throughout the biology curriculum.
- In the future we will include student grades and year to compare pre- and post-data sets for data triangulation purposes.
- We would also like to assess the role of the project in the the development of scientific literacy skills as an extension of our current findings.

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