Active and Flipped: Introducing First Semester Biology Students to Scientific Communication

Audience: First Semester Biology Students, Muhlenberg College

Learning Goals:
- Students become familiar with and identify different types of scientific communication and current communication conventions in the Biological Sciences.
- Students identify primary article sections and the purpose of each.
- Activity in lecture: students are presented with examples of primary literature articles, a review article, and a popular press article. In pairs, students are asked to hypothesize a definition of each type of article as well as a definition of the peer-review process. As homework, students are asked to write a definition of each type in their own words, as well as to brainstorm the audience, authors, and advantages/disadvantages of getting information from each source type. In recitation, students are assigned to groups as they walk into class. Each group is assigned to write at least two advantages and two disadvantages and authentications of each type of article on whiteboards. Students generally race around the room and try to write down answers before the other teams. When time is called, the instructor gives over the group’s answers, and each team has to defend their statements. The students then break into different groups and portions of primary articles each group is assigned two sections and has to share with the class what they think the purpose of their section is and what it contains.

Assessment: Formative assessment methods are used throughout lecture and recitation to determine students’ understanding of the material in the moment. Biology majors are assessed at the end of their senior year to determine proficiency in information literacy concepts, including those covered in Biology 1.

2014 Senior Assessment Questions: Percent Who Answered Correctly

- Primary article characteristics: 85%
- Incorporating a primary source into a research paper: 40%
- Photo of a primary research article: 60%
- Citations: reasons for use: 80%

Planning the Information Literacy Sessions

Lecture Activity
- Students bring their own research questions and search for evidence to support them. Students are asked to identify such as primary review or popular. Students view two, but the answer is then given to them.

On Their Own
- Students define primary article, peer-reviewed, review article, and popular source in their own words. Students are then asked to look at several different types of articles and discuss which types of information they would use in their own research and which types of information they would use in different situations. Students are asked to include the types of information in each type of article and its advantages.

Recitation Activity
- Students walk into the recitation room, each student is assigned to one of five articles and has a minimum of 3 minutes to read it. As a class, the article is discussed, and students define which type of article it is and why.

Part 1: The groups work on which articles they would like to read. Students bring one of the articles, and we discuss advantages and disadvantages in getting information from each type of source. Students are then asked to discuss the advantages and disadvantages of getting information from each type of article in the article and how we might use each article in our current research and in the future.

Part 2: Next, groups read a set number of primary literature articles. Each group has a table of information and a list of questions in each article. The tables are helpful in providing a summary of the research question, design, and results. Students are asked to write down their own conclusions in the tables, and we discuss the results.

AUvide Active Learning
- Active learning occurs in both lecture and recitation. Students are asked to identify the different sections of each article and how they contribute to the overall understanding of the information. Students are also asked to discuss the advantages and disadvantages of each type of article and how they might use each type of article in their own research.

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