

Hague Affordable Learning Implementation Grant Report

Background

I applied for the Affordable Learning Implementation Grant to develop a new special topics course Genomes and Health (BIOL 384), which I taught for the first time in the Fall 2025 semester. One of my primary goals was to design a biology course that is accessible to students on a budget. Biology textbooks are usually very expensive. For example, the Ebook version of the textbook in my Microbiology lecture (BIOL 250) costs \$97.95, while the paperback version costs \$207.31. Biology majors are often required to purchase 3-4 textbooks at this price point each semester. Some students purchase used, outdated editions of the textbook in order to save money, but then their information is not up-to-date and the readings don't align with the assignments on my syllabus.

In order to make my new special topics course more accessible, I designed the curriculum so that students can access all the assigned readings through either library resources or publicly available sources. In the first half of the semester, our readings were primarily from the publicly available textbook [An Owner's Guide to the Human Genome](#), written by Stanford professor Jonathan Pritchard. In the second half of the semester, we read and discussed primary literature published in top scientific journals (e.g., *Nature*, *Science*) available online through the library.

Implementation

I decided to cap the course at 20 students so we could focus on small-format round-table discussions of the primary literature. I am happy to report that the class quickly filled with Juniors and Seniors during Fall 2025 registration (although one student dropped in the first week of class). At the start of the semester, I conducted a Kahoot! poll that asked students about what motivated them to take the course this fall. I asked students to rate the following statement on a scale of 1 (strongly disagree) to 5 (strongly agree): "one of the reasons I took this class is because I didn't have to buy a textbook." The question received an average score of 3.1, indicating that affordability factored into most students' decisions to register for the course. Only two students ranked the question as "strongly disagree."

One of my primary concerns implementing the course was that students would struggle reading scientific papers from the primary literature, because the studies contain a lot of complex scientific information. To ameliorate this problem, I assigned a short primer for students to read alongside each piece of primary literature. These primers typically included "News & Views" or related pieces that are published in conjunction with the primary study in journals like *Nature* and *Science*. These popular press pieces are accessible through the library and report on the big-picture significance of each study for a

general audience. In class, we then discussed each study and worked together through the key figures, making sure to identify the important take-home message.

To evaluate how well students comprehended each scientific paper, I conducted a Kahoot! pre/post survey in the class periods that we read and discussed scientific papers from the primary literature. The surveys consisted of two questions: (1) on a scale of 1 (lame) to 10 (groundbreaking), how impactful was this study? and (2) on a scale of 1 (totally lost) to 10 (perfect clarity), how well did you understand this paper? Anonymized poll results were shown to the class in real time. By asking the same questions before and after class, I could gauge students' initial understanding of the paper and then see how opinions changed after our in-class discussions. The results are shown below in Table 1. On average, students self-reported a moderate level (average = 5.41) of reading comprehension at the start of each class, but then comprehension scores improved by an average of 1.53 after our in-class discussions of key figures. Interestingly, post survey impact scores did not move predictably in one direction or another. After some of our discussions, students decided that the paper was less impactful than they initially thought in the pre survey. This gave us a fun opportunity to discuss how and why their perceptions of the paper changed by the end of class.

Areas for improvement and future plans

While the scientific papers were undoubtedly challenging for students, I found that our discussions of key figures in class really helped students to identify the important take-home message. Nonetheless, there were a couple papers that just ended up being too complex (e.g., Gedman et al. 2025). In the future I will replace these papers with different studies that are more approachable for Junior- and Senior-level biology majors. I also plan to develop a "cheat sheet" that students can refer to while they're reading a paper from the primary literature. The cheat sheet will guide students step-by-step through each section of the paper, helping them key in on important details (e.g., who were the study subjects, what genomics technology was used in the study, etc.).

Table 1. Average student scores from pre/post surveys before and after our in-class discussions of primary literature accessed through the library.

Reading	Impact (pre)	Impact (post)	Change in impact score	Comprehension (pre)	Comprehension (post)	Change in comprehension score
Kong et al. 2012 <i>Nature</i>	6.8	6.4	-0.4	4.5	6.8	2.3
Yi et al. 2012 <i>Science</i>	6	6.4	0.4	5.6	7.1	1.5
Novembre et al. 2008 <i>Nature</i>	4.6	4.9	0.3	6.5	7.4	0.9
Zeberg & Pääbo 2020 <i>Nature</i>	7.4	6.8	-0.6	7	8	1
Schizophrenia Working Group 2014 <i>Nature</i>	6.6	6.3	-0.3	4.7	6.3	1.6
Worobey et al. 2016 <i>Nature</i>	7	7.6	0.6	5.1	6.9	1.8
Navin et al. 2011 <i>Nature</i>	7.5	8.3	0.8	4.5	6.1	1.6