Abstract

Student engagement in real-world applications of course material is a critical component of the learning process. We recently developed a novel course on high-throughput (HT) approaches in molecular biology (including DNA sequencing, small molecule synthesis, automated microscopy, and drug screening), and strove to include relevant analysis of data from primary literature in each class session in the form of inquiry-based case studies. There are currently very few publicly available educational case studies that address authentic HT approaches using real data. To address this need, we developed four case studies for use in the course, and also required the graduate students enrolled in the course to each develop one HT case study. In addition, we have received NSF funding to create the High-throughput Discovery Science & Inquiry-based Case Studies for Today’s Students (HITS) Research Coordination Network to allow groups of researchers and college instructors across the country to jointly produce and share authentic HT case studies. We discuss the design and implementation of case studies in our course. We believe well-designed case studies focusing on HT approaches and using novel data sets empower students to learn current approaches and exercise quantitative reasoning in data analyses, thereby fueling student success.

Case Studies Used in the Course

Throughout the course, the instructors provided four case studies of HT in action using recent high-profile publications. This exposed the students to real-world examples, allowed the students to practice scientific literacy, and prepared them for creating case studies of their own.

Evidence of Learning

Figure 5: Analysis of data from pre/post-surveys of students taking the High-Throughput Discovery course in Spring 2017. Survey questions are listed on the right.

Conclusions

- Case studies are one tool to assist student learning of complex, technical material.
- We are looking to fill a gap in available case studies involving high-throughput methodology to allow students to work directly with HT data to discover new things.
- Students can contribute by generating case studies as part of the course implementation.

Related References

1) National Center for Case Study Teaching in Science, University at Buffalo. http://sciencecases.lib.buffalo.edu/cs/