A ‘Case’ for Active Learning
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Bard College faculty jointly review the National Center for Case Study Teaching in Science (Buffalo Case Studies)
http://sciencecases.lib.buffalo.edu/cs/collection/

A lot of recent research investigates the value of case studies in promoting active learning in the science classroom. Such cases involve the use of scientific concepts (often based on published data), and engage students with elements such as playacting and dialog, guided analysis of scientific figures, and critical thinking questions for discussion and reflection. Whereas case studies can be effective at many levels and with differing course structures, as with most resources they require custom tailoring by the faculty member using them.

At Bard College (a private, selective liberal arts college in New York’s Hudson River Valley), first-year students are required to participate in a three-week course on the methods of evaluating evidence in science called “Citizen Science.” In the program, faculty members are recruited worldwide from professionally diverse positions—including post doctoral researchers and emeritus faculty. Students work together on three modules that include laboratory experimentation, computer-based modeling, and problem-based learning, and must complete the course during their first academic year at Bard. Because they are not grouped in a Citizen Science classroom according to major or previous science experience, students of all backgrounds make up a class section, which provides richness in perspective and interests. This classroom composition can pose a challenge to providing appropriate level of rigor. Thus case studies provide a platform for challenging students with material that is varied and flexible, at different levels of complexity. Additionally, case studies facilitate group work environments that can enhance student learning, and are especially relevant in groups of students with mixed subject preparedness.

Case studies can be accessed in a number of different ways, including publications in peer-reviewed journals such as the Journal of College Science Teaching, or via web sites, including the Centers for Disease Control (CDC) website (www.cdc.gov/epicasestudies/). These sources do provide case studies in their entirety; however, cases are often published alone, or with only a small number of other case studies for comparison and use. One composite reference is the National Center for Case Study Teaching in Science (NCCST; www.sciencecases.lib.buffalo.edu/cs/), formerly known as the Buffalo Case Studies Collection.

The NCCST resource site, funded by the NSF, is not only a clearinghouse for case studies, but also provides a mechanism for training and support. The NCCST currently offers over 400 faculty-authored cases. These are indexed by subject (i.e., genetics, ecology, medical ethics, journalism, marine science), as well by level. Additional information based on targeted student interaction is also provided, allowing faculty to customize a classroom experience. For example, some cases are designed to stage class debate; in others, students participate in small group Problem Based Learning (PBL), or the reading of primary literature in-between classes is required (often referred to as “interrupted cases”). Some cases, referred to as “clicker cases,” provide prompts and questions especially designed for use with student response systems (clickers). (One example: “I don’t need a flu shot” by William D. Rogers www.sciencecases.lib.buffalo.edu/cs/collection/detail.asp?case_id=474&id=474). Sites usually also provide instructors with guidelines and links to examples that will help them decide on the best approach for the student audience (www.sciencecases.lib.buffalo.edu/cs/collection/method.asp).

The Bard Citizen Science faculty used a number of the NCCST cases to facilitate the classroom experience during the program in 2012. We chose those that fit our focus on
an infectious disease curriculum, as well as cases that were specifically designed for introducing techniques that use evidence to test hypotheses. One effective example was the case “Salem's Secrets,” written by Susan M. Nava-Whitehead and Joan-Beth Gow (www.sciencecases.lib.buffalo.edu/cs/collection/detail.asp?case_id=307&id=307). In the classroom, the students were able to examine data of individuals with symptoms of mass hysteria in Salem, Massachusetts, and the controversies surrounding the Salem Witch Trials. Also effective was a case focused on use of the scientific method in discovering the cause behind Childbed Fever (“Childbed Fever: a Nineteenth Century Mystery” by Christa Colyer). Cases like “Bad Blood: A Case Study of Tuskegee Syphilis Studies” written by Ann W. Foutner, and “Tragic Choices: Autism, Measles, and the MMR Vaccine” by Matthew P. Rowe, were utilized in multiple sections and were adaptable for audiences of various science backgrounds. Case sites provided student material, as well as material (including answer keys) for registered faculty members only. Faculty who were surveyed reported they often used questions posed in a case study as entry points for class discussion, used supplementary primary literature readings to provide concrete examples, and did not necessarily lead the class through all parts of a particular case.

Some faculty found that the dialog in some of the cases to be “stilted” and perhaps a bit too dramatic; however, this may work in a class that enjoys more play acting, or it might be the type of activity/part of the case that can be used as take-home reading. Since cases are fully referenced, there are ways to alter even the dialog to be more suitable for class level. For example, one may alter a conversation to present it as a physician’s patient notes, or have the students come up with scenarios that they find more realistic. In the Citizen Science classroom, non-Science and Science majors alike benefit from these types of engaged writing activities, and they allowed students with various academic strengths to participate fully.

The NCCST is the currently the most comprehensive site providing case studies and support for faculty in the classroom. The website includes links to other case study repositories, links to publications that support the use of case studies in the classroom, a directory of faculty involved in case study writing, and an in-depth look at the role of case studies in student learning. The center also provides training for interested faculty in a face-to-face format during a summer workshop and fall conference, as well as via training videos. As with most education resources, case studies in the classroom are not a “one size fits all activity.” However, the NCCST does deliver the tools and support to allow educators to make the most of an active learning based classroom design.

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