

Project-Based Learning in History, Leading to the Humanities Capstone at WPI – David I. Spanagel

As a historian of science teaching at a polytechnic institute, I like to focus on these questions: How has knowledge changed over time? Under what circumstances have the unique actions or belief systems of individual thinkers made a new set of ideas or practices in the sciences suddenly conceivable or even feasible, even though they had not previously been imagined or taken seriously? By exploring such questions, which highlight historical contingency, all students can gain a valuable critical thinking tool that is very different from most forms of quantitative reasoning. Although my students at WPI generally focus the bulk of their undergraduate studies on acquiring technical mastery within a specific field of science or engineering, when I expose them to the richness and complexity of historical sources and analytical interpretation approaches, specifically framed in order to help them gain some sensibility about how change ever happens, I believe they become better equipped to be agents of discovery and innovation in their own careers.

My experience co-teaching Great Problems Seminar first year courses at WPI was what inspired me to bring a project-based learning experience to all of my courses, including those within the history curriculum. Project-based learning turns out to be an especially effective means of inducing technical students to overcome preconceived, secondary-school reinforced expectations that the study of “history” is merely concerned with the accurate recall of lists names and dates. Below, I provide a brief description of some of the activities I have tried at various levels in my history instruction.

In-class small-group activities for larger intermediate-level “lecture courses”

For all my 50 student classes, I build in five 1-hour blocks of class time during the term, which I devote to a series of group discussion activities centered on analyzing the reading assignments in class together. I divide the class up into groups that have no more than 5 members, and I assign a substantial portion of the course grade to the discussion notes students record based on those sessions. All of the discussion write-ups gets posted on the class web site, and all of them are considered “notes” for the sake of my “open notes” exam policy.

Here is my pedagogic reasoning: this small group discussion structure rewards people for doing the reading scrupulously, but also for sharing what they understand, and learning it more deeply by trying to articulate what they think to their classmates, with a lower performance pressure than having to be grilled by the instructor in front of the whole class. This approach amounts to treating “understanding the reading assignments” as a “project” shared among small groups of students; and by doing so, everyone in the room has a good chance to participate actively as learners in at least those five of the class meetings (and my class participation grade – another 10% of the course grade - is heavily weighted to encourage attendance on those five discussion group days in particular). Studying for exams then involves reviewing not only one's own notes, but also examining what other groups of students in the same class thought about the readings as well (which encourages a greater awareness of the need for critical thinking when faced with alternative interpretations).



During those small group discussions, I like to float around and eavesdrop, interrupting only if a group seems confused or "stuck" on a question (I hand everyone a set of guiding questions for every discussion), but otherwise I try not to get too involved in steering any particular group's thinking. I grade the papers that result as if they were "history papers." I seek to provide detailed critical feedback aimed at cultivating good writing, the presentation and appropriate citation of evidence, a sense of logical argument (and in this case, debate between various positions), all of which are factored into the grade. I also insist that the students give individual attributions to their classmates for all the points raised (both to highlight the sense that an actual conversation among different thinkers took place, and to give myself more data regarding who are the more fertile/insightful/sophisticated thinkers and just how energetically individual students are working to interpret the course materials).

How I support the cultivation of a "project-based learning community" feeling in seminar courses

For meetings of courses with fewer than 20 students enrolled (upper-level history topics seminars), I structure each class meeting so that students can take turns performing more active leadership roles which cultivate their own skills as well as supporting each other's learning. The seminar course becomes a learning community, and the subject matter we are investigating together becomes a shared "project" experience. Typically, I do something like this: two "presenters" are lined up in advance to prepare brief reports on distinct scholarly source materials that they have researched ahead of time to supplement the day's required reading assignment. By the time class begins, each of the presenters would have downloaded a pdf of the source that they had found and read carefully, and they give an oral presentation to the class (5-10 minutes). Each presenter subsequently posts the pdf on the course web site's discussion board, and provides both a properly formatted Chicago Style footnote citation and a properly formatted Chicago Style bibliography entry for the source. A 2-3 sentence long annotation also indicates what interesting historical question or issue the source illuminated, and outlines the presenter's thoughts about what was distinctive about the author's research approach or response to this question.

Another pair of students are assigned to serve as a team of "discussion leaders" for each class. They prepare a set of open-ended discussion questions (and perhaps a creative activity idea) with which to guide the class through its analysis of all of the assigned readings for that day. If they so desire, the discussion leaders may be quite creative about how we spend our class time together (a structured debate, a game, some kind of hands-on work activity, etc., might be introduced) – anything is possible, so long as it helps to illuminate the subject matter that we are trying to understand based on that day's assigned readings.

For each seminar meeting, one student (the "scribe") takes responsibility for composing a detailed account of that day's class meeting, based on a comprehensive set of notes taken during class, subsequent critical reflection, and careful reconnections of the information covered during the class to specific pieces of evidence provided in the assigned readings. Another student (the "web crawler") takes responsibility for searching the internet in real time for fact-checking or to find any other useful materials that pertain to the ongoing class discussion. The web crawler keeps

a running record of these valuable URLs, and compiles a curated list of the best sites/most important pieces of information that were found during the class meeting. Assigning these two roles frees everyone else up to fully “present” and actively engaged in the actual seminar discussion. Ordinarily, nobody but the scribe needs to take notes. Nobody but the web crawler is allowed to search the internet (or operate their cell phones/personal electronic devices) during class. The “Scribe Notes” and “Summary URL Evaluation” papers for each class meeting are posted within 70 hours of the class on the course website for all class members to be able to consult and/or review.

Capstone projects

The Humanities and Arts requirement capstone experience (the “inquiry seminar”) provides a particularly excellent setting to bring together my efforts to infuse project-based learning into historical studies at WPI. In my inquiry seminars, I seek to provide a distinct and rich experience of what it is like to belong to an advanced scholarly learning community of historians of science and technology. By treating my students like “fellow investigators of historically interesting questions,” I prepare them to pursue profound research and writing as members of a collegial team, not only for the sake of their HUA requirement capstone projects, but more importantly as preparation for whatever real-world investigations they may join in the future.

For their Humanities and Arts inquiry seminar project’s final product, my students typically collaborate to produce a collection of jointly-written research papers in history, as well as individual critical book reviews. I compile all this work together to resemble a professional journal issue in the history of science and technology. Collaborative historical research and writing helps non-history majors acquire an appreciation for why historical argumentation is necessarily nuanced. A shared process of inquiry (iterating both the question formulation process and analyses of preliminary findings during the research investigation process), takes on a special feel within very small group conversations. Collaboration on the shared “project” encourages students to assemble a plausible answer to a research question even when they lack access to all the evidence one might find desirable, and to formulate a more precise research question if their original one was too vague. Bringing together multiple voices also helps each student to discern shades of gray within their collective interpretations of evidence. A solitary mind can assert prejudgment without question. Another may impose rigidly binary categories onto more complex situations. These are problems I often encounter when advising engineering or science majors doing solo history papers.

As I do in my regular history courses, I shift the focus of investigation for capstone project topics every year. Mentoring authentic student inquiry, focused on genuinely interesting questions, helps to nurture and expand my own research interests. When possible, I try to include hands-on scholarly engagement with actual historical artifacts, or to stimulate a variety of inquiry approaches which may allow students to contribute and integrate specific knowledge they may possess regarding politics, cultures, geography, philosophy, religion, art, and literature together with history, to create a climate of interdisciplinary investigation in which all of us can learn new things.