I. Introduction

When I sat down to design a course on the Civil War and Technology for undergraduate engineering students at the University of Virginia, I had no inkling of the fascinating pedagogical and instructional questions it would raise. The first hints came when I mentioned my task to some friends and discovered that the topic itself served as a Rorschach test of sorts. One immediately responded by noting that he was surprised to learn that I was interested in weaponry. Another started reeling off titles of books about military tactics, and yet another asserted that he hoped I would give naval technology the attention it deserved. And then there was my friend who thought the entire course should be about the significance of the railroad. I must admit that while I valued all of these comments and suggestions, I had something in mind that was a bit broader. Of course I intended to cover military strategy and the technical developments that were significant in the wartime experience. I also wanted to cover much more. Starting with the broad definition of technology that Arnold Pacey popularized in *The Culture of Technology* (1983), I set out to design a course that would pay attention both to the role of technology in the tumultuous years leading up to the war and to the significance of technology during the conduct of the war. Choosing topics was a priority, but I also wanted to design a course that would help students develop their skills in critical thinking. In addition, the course had to satisfy the general requirements set out in my department’s guidelines for our 200-level courses. Although I have not yet taught this course, I have spent a lot of time planning it. This paper describes my journey.

II. Course Audience and Requirements

Realizing that any course that I designed—no matter how wonderful it happened to be—would be a failure if it did not meet my department’s guidelines for such courses, I started by establishing a general outline of what I needed to do to satisfy departmental requirements. The audience for the course would be undergraduate students in the School of Engineering and Applied Science (SEAS) at the University of Virginia (UVA). Although the course itself would not be a required core course, it would be on a list of electives offered by my department, the Division of Technology, Culture, and Communication (TCC). Besides a required first-year TCC course, and two required fourth-year TCC courses, students in the SEAS at UVA must take one elective course in TCC, usually in the second semester of their second year. All of the semester-long, 200-level TCC courses focus on some aspect of the relationship between technology and culture. In addition to fostering an understanding of the impact of technology on culture, as well as the cultural context of technological development, the courses aim to help students improve their written and oral communications skills. Students, for example, have to write substantial papers.
and give formal oral presentations. Class discussions are encouraged, while mere lecturing is frowned upon. As the official statement of guidelines for the TCC 200-level courses notes, “The dual emphasis on subject matter and communications skills encourages student awareness, on one hand, of the humanistic concerns in engineering and, on the other, of the importance of clear, sensitive discussions in writing and speaking.” Both emphases “reflect a concern with the interactions of a professional engineer and society” and “both aim toward the same goal: the creation of thoughtful and articulate engineers” (TCC101/2XX Committee 1997).

III. Instructional and Pedagogical Aims

Having considered the guidelines for TCC 200-level courses, I had a strong general sense of what needed to be done in the course. I wanted to focus on the interplay between technology and culture in the mid-nineteenth-century United States, while helping the students sharpen their reading, writing, speaking, and analytical skills. In addition, I had some very specific goals. First, I wanted to add to the students’ knowledge of a very significant period in the history of the United States. My experience teaching undergraduates, especially in the past ten years, has taught me that although a majority of the students would have taken a high school-level survey course in United States history, and a few would have advanced placement credit in United States history, most would have little sense of the complexities of the nineteenth century. Some, in fact, might not even remember when the Civil War occurred, while others would have been so indoctrinated by a high school teacher’s one-sided views of the Civil War that they would find it difficult to fathom multiple causes, much less a broad picture that included an evaluation of technological developments. I knew that students coming into the course with different levels of preparation would need help in developing the skills necessary to delve into some significant historical scholarship. I wanted the course to challenge the simplistic view that history is merely a straightforward accounting of events and dates, and I also wanted to encourage analysis.

I started, as previously noted, with Arnold Pacey’s broad definition of technology. This definition holds that technology is not merely technique (knowledge, skill, tools, machines, chemicals, liveware, etc.), but also includes cultural aspects (goals, values and ethical codes, ideas about progress, awareness and creativity, etc.) and organizational aspects (economic and industrial activity, professional activity, relations between users and consumers, etc.) (Pacey 1983). Pacey draws a triangle to illustrate the relationship of the three aspects. Focusing only on one corner, the technical aspect, leads to a very limited view of technology. In contrast, when a person adopts Pacey’s broader definition, it is impossible to view the work of engineering and science in a vacuum; there are always cultural and organizational aspects that are just as important as the technique itself. Thus, for example, the computer is not merely the machine (technical aspect) that sits on the desk. As a technology, it changes people’s basic assumptions about their goals and values (cultural aspects), and it also alters power relationships (organizational aspects).

At the risk of employing a word that is greatly overused these days, it is safe to say that this definition of technology provides a significant new paradigm for understanding technology, as well as its context and consequences. Thus, when I speak of a course on the Civil War and technology, I do not merely want to talk about such things as guns, military tactics, industrial
output, or transportation. Rather, I wish to include the cultural and organizational context for the
development of such techniques, as well as the cultural and organizational consequences of their employment. Significantly, I also want to broaden the subject matter to include a study of the way that beliefs about technology differed in the North and South, and how these views fueled both the push toward war and the conduct of the war. Moving to this broader view of technology is not easy, since most historians who have studied the Civil War have tended to use the narrower definition that equates technique or technical artifact with technology. Even James M. McPherson, a very respected Civil War historian who is known for broadening Civil War history to include its non-military aspects, projects such a viewpoint when he writes that “we lack a systematic analysis of Civil War tactics that integrates such factors as technology, terrain, weather, and leadership and tracks tactical evolutions over the four years of conflict” (McPherson 1998).

Broadening the view of technology challenges students to see that every technical decision related to the Civil War grew out of some cultural and organizational context and had cultural and organizational ramifications. Use of the broad definition also provides a marvelous environment for the development of students’ critical thinking skills, another goal of the proposed course. Critical thinking is defined as “a rational response to questions that cannot be answered definitively and for which all the relevant information may not be available.” It is “an investigation whose purpose is to explore a situation, phenomenon, question, or problem to arrive at a hypothesis or conclusion about it that integrates all available information and that can therefore be convincingly justified” (Kurfiss 1988). Study after study has shown that undergraduate students are seriously deficient in their ability to think critically (Belenky et al. 1986; Bloom 1987; Keeley et al. 1982; King et al.1983). Although senior engineering students are better able to marshal evidence than entering students, many still believe that judgment is a matter of “individual idiosyncracies” rather than the critical evaluation of different points of view (Welfel 1982).

Students preparing for careers in science or engineering need to learn how “to draw sound inferences from observations, critically analyze and evaluate previous research, and generate new questions or experiments” (Kurfiss 1988). A course that focuses on various cultural and organizational aspects of Civil War technology can help develop critical thinking skills that will be valuable in many professional contexts.

IV. Course Content

Recognizing that I wanted to focus on technology, broadly conceived, and encourage critical thinking was a big step in my planning process. Still, however, the Civil War and technology is such a broad topic that I could not possibly include every aspect in a one-semester course. The next challenge was to narrow my focus and pick substantial but accessible topics for consideration in the course. My own scholarly interest in the Civil War grows out of my work on the role of nineteenth-century evangelicalism in creating a political and cultural environment that fostered abolition reform efforts, especially the benevolent work of the evangelical American Missionary Association in Southern freedmen camps during and just after the war (Click 1999). A number of historians have stressed that Northern evangelicalism had a powerful
influence that extended beyond its immediate membership in providing the moral basis for emancipation (Howard 1990; Johnson 1993). Northern evangelicals, who were well educated and well connected to those in power, not only believed in a literal millennium, as prophesied in the Book of Revelations, but had concluded that it was imminent. They thought that technological progress was an important marker of spiritual progress, and marveled at the development of such things as steam power and the railroad. They thought, however, that the “sin of slavery” had led to technological stagnation in the South and was holding the nation back from its final movement toward millennial bliss. Prior to the war, these evangelicals persisted in agitating for abolition because it was a sin that was impeding technological development. Then, from the first shot at Fort Sumter, Northern evangelicals were in the forefront of those who believed that the Civil War was about emancipation, rather than Union. Convinced that it was not possible to have what they called a “purified Union” without first having emancipation, they worked hard to convince fellow Northerners of the importance of fighting the war to abolish slavery and regenerate the South (James 1862). My course, then, will definitely include a unit that focuses on technology, evangelicalism, and the formation of the Northern outlook.

The course will also include a unit on the role of what some historians have termed “regional character” in the creation of the Union and Confederate approaches to warfare. Ever since Grady McWhiney and Perry D. Jamieson offered their theory that the Southerners’ Celtic heritage predisposed them to aggressive, offensive warfare, historians have been debating the significance of cultural differences in the fighting styles of the Union and Confederate armies (McWhiney and Jamieson 1988; Hess 1988; Royster 1991; Mitchell 1993; Gallagher 1997). For the purposes of my course, this debate will offer an opportunity to look at the influence of cultural context on technology.

The course will also include more traditional topics. It will be important, for example, to look at industrial development, agriculture, and preparation for war in the Union and Confederacy (Bacon 1997). It will also be important to study the development of the Union and Confederate armies and navies, and to analyze the significance of the differences in the conduct and outcomes of various battles and the war (Linderman 1987; Reed 1978). Likewise, the course will feature a unit on transportation and the war efforts (Bacon 1997). Although this unit will include the examination of roads, bridges, and river transportation, it will also focus on what one historian has called “the strategic place of the railroads in the Civil War” (Turner 1975).

No course on the Civil War and technology would be complete without units on the development and impact of new weaponry, field fortifications, and military tactics. Joseph T. Glatthaar, who has written a number of significant books about various aspects of the war, has emphasized that “not only were Civil War armies dramatically larger than any the unified nation had ever organized, but technological developments also provided the soldiers with superior weapons.” In particular, Glatthaar points to the percussion cap, the minie ball, and improvements in rifled muskets (Glatthaar 1998). The improvements in weaponry had many impacts, including the development of tactical efforts to lessen the effect of the new weaponry (Hagerman 1988). Many of the consequences were unanticipated, and others highlighted limitations in other areas of technology. Officers, for example, needed to spread their men to lessen the chances of their soldiers being targets, but they still had to rely on old-fashioned battle communication systems.
such as flags and bugles that were developed when soldiers were more closely grouped (McPherson). Thus, looking at weaponry and tactics offers many opportunities to study the cultural and organizational aspects of vital military techniques (Jamieson 1994).

Finally, the course will include a unit on the role of the press and photography. In addition to probing the impact of reporting on the home front, the unit will explore the relationship of the press to war strategy. Historian Eric T. Dean Jr. has postulated that the communications revolution exerted a great effect “on the perceptions, expectations, and the course and outcome of the war” (Dean 1995). Others, most notably Brooks D. Simpson, have disagreed (Simpson 1997). It will be necessary to assess the wide-ranging significance of communications technology in the war effort, as well as its impact on the outcome.

V. Development of Critical Thinking Skills

As outlined, the course units will offer many occasions for reflective and analytical reading assignments, lively classroom discussions, and the improvement of critical thinking. I have already alluded to many questions about which there is no general historical agreement. There are many others. Was the Civil War the last Napoleonic War or the first modern war (Griffith 1989; Hess 1997)? Was there an essentially Northern outlook and an essentially Southern outlook that influenced the creation and application of technical improvements in the two sections of the country? Was the outcome of the war predetermined by the technological differences of the two sections? Debating these and other questions, students will be forced to study alternative viewpoints, come to some critical assessment of their relative weights, and offer justifications for their judgments.

VI. Conclusion

In addition to satisfying departmental requirements, the proposed course should engage students in the study of an interesting topic that highlights the cultural and organizational aspects of technology. The course should also offer many opportunities to develop the students’ skills in critical thinking about technology. Looking at the technology of the Civil War from the point of view of a broader definition of technology should help the students become more aware of the various relationships between society, culture, and technical development. I hope, in fact, that students will become so accustomed to using the broad definition of technology that it will become automatic—-that they will assume that all technical developments lead to impacts in non-technical areas, that it is not always easy to predict these impacts, but that it is incumbent upon them to try to do so.

References


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