EDC&I 571U: Exploring the Gap Between Science Education and the Practice of Science

Spring 2004  Thursdays 4:30 to 6:50pm  Miller 112A

Prof. Philip Bell
312F Miller Hall
pbell@u.washington.edu
OH: Tues, 3:30 to 5:30 (sign-up on the door)

COURSE OVERVIEW

Every one of us is regularly bombarded with a variety of discrepant images of science, ranging from highly structured and hyper-logical investigations found in classrooms and curricula to whirlwind and immaculate accounts of brilliance associated with scientific breakthroughs as found in movies and books to tales of perseverance, serendipity, and adventure in documentaries of scientific discovery. How do individuals piece together an understanding of the complex nature of science from all of these discrepant images? How have scholars from different intellectual traditions come to understand the complex nature of science? Specific educational questions follow. What are the latent and the desired gaps between science education and our understanding of the nature of science at the beginning of the 21st century? What are the points of confluence we might wish to promote for specific reasons, and how might that be achieved? Specifically, what images of science should we be providing to students in instruction and in their everyday cultural experiences in order to deepen their understanding of the purposes and practices of science given its complex role in our society?

In this seminar we will inquire as a group into the relationship between the purposes and forms of science education and the nature of science. In addition to hearing from natural scientists, we will review a range of conceptual frameworks and perspectives from cognitive psychology, philosophy, anthropology, history, sociology, and linguistics that present specific images of scientific practice, thinking, and influence. We will leverage our collective experience and interests to delve into the educational implications and manifestations of these different images of science — or try to understand their absence from the typical school day (e.g., why is scientific controversy typically absent from the science curriculum?). We will also concern ourselves with issues of epistemology — what images of science are embedded in the range of people’s everyday life experiences and how do they make sense of those discrepant images of science? We will foreground the public’s understanding of the nature and purposes of science in contemporary society and highlight specific research agendas for science education.

CLASS ASSIGNMENTS

1. **Class Participation.** All class members are expected to read the assigned readings and actively participate in the discussions each week.

2. **Volunteer Reading:** You will be asked to read, summarize and lead a brief discussion on any one of the readings listed in the syllabus as “volunteer readings.” In consultation with the instructor, you can also arrange to select a different reading for this purpose.
3. **Small Weekly Assignments:** In addition to our discussions, we’ll spend a bit of time each week actively exploring the gap between science education and the nature of science through small, specific assignments. I’ve listed a number of possible assignments below, but these are things we can map out together as a group in order to best leverage our collective intelligence and to explore issues that emerge from our discussions. Some potential assignment ideas include:
   
a. **Systematic observation of disciplinary scientific activity:** You might attend a departmental lecture somewhere on campus, hang out in online science community, or arrange to visit an active research group. Your role is to carefully observe and describe the activity that takes place in the setting – what is being accomplished, the nature and purpose of epistemic practices, the focus of discussions or individual work, the norms for interaction or data analysis, the interpretation of specific scientific work, etc.).
   
b. **Survey the presence and representation of science in cultural media products:** Here we would document where “science” shows up in the world for specific groups or the citizenry at large by carefully analyzing specific print, video, multimedia, or Internet resources. The focus is on understanding the representation of science in dominant cultural products.
   
c. **Adopt and describe a scientific controversy:** These contentious topics might be historical or contemporary, occurring on the public stage or within specific scientific communities, enduring moral questions related to scientific inquiry or tractable problems that will ultimately be settled, or disciplinary or interdisciplinary.
   
d. **Journal and Bibliography Search:** What existing publications or collections exist that intersect with the themes of the course? These resources will be added to our community blog.
   
e. **Bibliography for Final Paper or Proposal:** Each of you will be asked to compose a final research paper or proposal. This bibliography would be specifically associated with your culminating project.
   
f. **Self-document personal, everyday encounters with “science” over a brief period of time:** How many discrete images of science do we each encounter in our everyday activities? How do we interpret these different images? Such recordings could be interpreted from the perspective of understanding our folk epistemologies. We could each engage in self-documentation and perhaps we can locate and train volunteers to self-document their “science encounters” as well.

4. **Final Research Paper or Proposal (8-12 pages, double-spaced)**  
   **DUE: 6/7 at noon**
   The final product for this course will be an elaboration (or “fleshing out”) of one of the assignments from this course. You will work with me on the selection and framing this final assignment. You may also elect to draft a research proposal for a specific professional purpose (e.g., scholarship application, dissertation proposal); the proposal must be directly related to the themes of the course. Final course papers are due in my physical mailbox in Miller 312 by June 7th at noon.

**GRADING POLICY**

I expect all assignments to be completed in a timely fashion. All written work will be held to high standards and should conform to rules of proper grammar, usage, punctuation, and
spelling. You should conform to standard APA format unless you have a good argument to do otherwise. Because of time pressures, late papers will not be accepted unless prior written confirmation has been given by the instructor. Assignments will be weighed according to this scheme:

- Class & Blog Participation: 30%
- Small Weekly Assignments: 30%
- Volunteer Reading: 10%
- Final Paper or Proposal: 30%

Please double-space all written work to be turned in and use a 12-pt. font. I would rather not receive email attachments or faxes unless prior arrangements have been made.

REQUIRED COURSE TEXTS (available at the UW Bookstore; also on reserve)


OPTIONAL COURSE TEXTS (available at the UW Bookstore; also on reserve)

<table>
<thead>
<tr>
<th>Week 1, 4/1</th>
<th>Introduction</th>
</tr>
</thead>
</table>
| This session will provide an introduction to the goals and purposes of this course. In this class we will:  
• Preview the main themes and activities of this course.  
• Discuss Dewey’s My Pedagogic Creed |

<table>
<thead>
<tr>
<th>Week 2, 4/8</th>
<th>Framing the gap between science education and the practice of science</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>REQUIRED READINGS</strong></td>
<td></td>
</tr>
<tr>
<td><strong>VOLUNTEER READING</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Week 3, 4/15</th>
<th>Portraying epistemology in the classroom (AERA — NO CLASS)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>REQUIRED READINGS</strong></td>
<td></td>
</tr>
<tr>
<td><strong>VOLUNTEER READING</strong></td>
<td></td>
</tr>
</tbody>
</table>
Week 4, 4/22  Historical and philosophical perspectives

REQUIRED READINGS


VOLUNTEER READINGS


Week 5, 4/29  Sociological perspectives & The disunity of science

REQUIRED READINGS


Week 6, 5/6  Understanding the cultural practices of scientists in labs

REQUIRED READINGS


VOLUNTEER READINGS


**Week 7, 5/13  Images of scientific controversy**

**REQUIRED READINGS**


**VOLUNTEER READINGS**


**Week 8, 5/20  Understanding the images of science held by the public**

**REQUIRED READINGS**


**VOLUNTEER READINGS**

**Week 9, 5/27  Cognitive and linguistic images of science**

**REQUIRED READINGS**

Two of the following:


**VOLUNTEER READINGS**

**Week 10, 6/3  Science as it appears on the public stage**

**REQUIRED READINGS**


**VOLUNTEER READING**


Administrative Notes about Teaching at the University of Washington

If you have any concerns about the course or your instructor, please see the instructor about these concerns as soon as possible. If you are not comfortable talking with the instructor or not satisfied with the response that you receive, you may contact Prof. Sheila Valencia (Chair of C&I), 543-6636, valencia@u.washington.edu.

If you are still not satisfied with the response that you receive, you may contact Prof. Steve Kerr, 543-4940, stkerr@u.washington.edu. For your reference these procedures are posted on the bulletin board just outside Student Services, 206 Miller.

If you would like to request academic accommodations due to a disability, please contact Disabled Student Services, 448 Schmitz, (206) 543-8924 (V/TTY). If you have a letter from Disabled Student Services indicating you have a disability that requires academic accommodations, please present the letter to the Area Secretary to discuss the accommodation you might need for class.