

Reflections on Pedagogy and University Education: Williams College Teaching Sabbatical

Introduction

Williams College is an elite undergraduate college in rural Northwestern Massachusetts with 2000 students. My responsibility at Williams in the Fall of 2014 was primarily to organize and teach Microbiology (BIO315) with its associated labs. In addition, I participated in the discussions regarding the recently reorganized BIO101 laboratory course and observed those labs.

BIO315 attracted 12 students and was scheduled three times per week for 50 minutes; the lab was a single 3 hour session for half the students at a time. Therefore my teaching hours were 9 hours per week (I taught this course alone). The class was primarily made up of Juniors with a few Seniors (3rd and 4th year students) and included mostly biology or pre-med students though students with other majors were also represented. The prerequisites for this course were 3 courses in biology (equivalent of 22,5 hp).

BIO101 is a large class of approximately 200 students (both science majors and non-majors) and the lab was taught in 8 sections. The lab was recently redesigned using an inquiry based pedagogy and I participated in discussions about the success/failure of the aspects of the approach as well as sitting in on multiple lab sessions and speaking with teaching assistants and students.

Williams College is a 'classic' liberal arts college with a long tradition of educating the whole person rather than training students for a defined career choice. As such, distribution requirements are significant. Science majors must take 3 courses (22.5 hp) in humanities and 3 courses in social sciences as well as two courses designated as being writing intensive, one including quantitative reasoning and one fulfilling a diversity requirement. Furthermore, students could graduate with a major in biology, for example, with approximately 1 years' worth of biology courses (67,5 hp), though related topics (chemistry, mathematics, etc.) will be required as well. In addition, prerequisites for many 300 level courses (3rd year) are rather minimal in comparison to a typical Swedish university allowing students who are majoring in other topics to more easily take advanced courses.

In addition to teaching my course at Williams, I participated in faculty meetings, biology department meetings, science education meetings and twice weekly new employee discussions. On average I spent 3-5 hours per week in these activities and many of the reflections below stem from these activities.

Preparation

I visited Williams in April to meet with faculty members, secure housing and generally be introduced to the environment. This was essential in gathering information to make my stay in the Fall successful. I was made to feel very welcome and practical matters were arranged very easily thanks to the department head and dean of the college. In mid-August I returned to Williams to begin preparation for

my course. Because I had a lab course and was responsible for all the preparation of practical materials this was the bare minimum of time needed before my class began on Sept 4. In retrospect I would have done better to arrive earlier.

The course I was going to teach was equivalent to BIO275 that I teach at Gothenburg University so much of the lecture/classroom material had been prepared before I came to Williams. However, it was difficult to get a clear sense of the level of the students and their background knowledge before I began teaching and got to know the students myself. Before the course began I was told repeatedly that 'Williams students are the best and can handle more than any typical student I might be used to'. That may be true but did not really help me plan my course! I'll discuss more about this below. In the end, I ended up changing most of what I had planned as I got to know the students. This created a very intense work schedule for me.

Students

The student population at Williams was significantly different from the student population here in Sweden in several key areas. (I should note here that I am generalizing from my own experience and discussions with other faculty).

First, the students were very homogeneous compared to GU. At GU, in the 3rd year and Master's program I have a large percentage of non-Swedish students and the students from Sweden can be from many different universities and backgrounds. As such their background knowledge, English skills, laboratory skills and study skills vary dramatically. In addition, since GU does has a very minimal screening process for applicants to university, our students come with a wide variation in skills and abilities from high school (gymnasium). In other words, a typical class at GU generally has at least two populations of students as evidenced by assessment scores: a population whose grades will average around the G/VG border (80% in my courses) and another group whose scores are much, much lower (at or below the failing limit). I see students at GU who unfortunately are unprepared for their courses: with motivation, hard work and guidance they can catch up though that is not as common as one would like. Because of the extreme competition for admissions at Williams this issue simply does not exist. The admitted students are certainly capable of doing the coursework and have been very successful in the high school studies. The effect of this selection may be reflected in the very high rate of graduation at Williams (>90% of starting students will complete their degree). The effect of this homogeneity, as a teacher, is that all of my time was focused on a similar population group rather than needing to split my time between the 'good' students and the 'bad' students who have very different needs. Higher criteria for acceptance to the university in Sweden would be a huge benefit, in my opinion, to allow us to focus on prepared students. It would also signal to prospective students that they may need to study at a high school level (comvux or basår) further before entering university. Although university is tuition free in Sweden,

studying in a program when not prepared is wasteful both in terms of the student's time and the loans they may take out for living expenses.

The second observation about the students at Williams is also largely a result of the admissions policy. The students are generally highly motivated to succeed, they take on more and more work, and are overachievers. This has benefits and problems especially in how the college works with these students. On the plus side, the students will work very hard in their courses and are very motivated to be the best in their field. I have never experienced a class that was so consistently well prepared for class! On the negative side though is that this comes at a cost: the students were obviously incredibly stressed. This observation is borne out by studies from health services at Williams and other elite colleges: 25% of the students seek out psychological services, primarily for stress related problems each year (Psychological Services Office; American College Health Assessment). The misuse of stimulants or cognitive enhancing drugs like Adderall (used to treat ADHD) is also clearly related to this with studies showing as many as 1 in 5 students in US Colleges use this drug to increase focus and stay awake (e.g., Benson, et al, Clin. Child Fam. Psychol. Rev. 2015). The rising cases of honor code violations in recent years (*personal communication*) may also be caused from this stress.

Why are the students so stressed? This is clearly not only a Williams College trend, but seen at many top level Colleges and Universities. There are certainly societal pressures on the students: an uncertain job market, for example. However, I think this may be made worse at Williams (and probably other elite schools) in several ways. First, I think it likely to be a selected trait by the admissions process. Based on discussions with admissions officers, students are selected both for having high test scores/grades but also for having something 'extra'. That may be an athletic or musical skill or starting a company in high school. In other words, students are selected to be overachievers (and prone to overextending themselves). A second way things may be made worse is that the students are inundated by statements that 'they are the best', 'they are the elite', etc. which means that they see themselves as needing to live up to that message. Finally, they are stressed because the teachers put more and more work on them. I heard multiple faculty members comment that 'you can throw as much as you want at them and they can handle it'. A student said he asked a faculty member 'why do you give us so much work to do in such a short amount of time?' and was told 'Because once you work this hard at Williams, all your future work will seem easy'.

For good or ill, all of this has pedagogical consequences. I usually have very strict deadlines for my assignments with measured 'punishments' for late assignments. However, after realizing how stressed my students were, I was very lenient with giving extensions on assignments. To be honest, I did not want the responsibility of pushing a student over the edge!

The second consequence is more serious. The students in my course were very good at reading literature and distilling out the main points quickly. Much better than many of my students at GU. However,

they tended to have a very surface level understanding of the scientific approach. They did not tend to go deeply into how an experiment was done and had minimal knowledge of experimental design. For example, one of the assignments I used at Williams was identical to one I use at GU. Both student groups had difficulties with the assignment but the problems were reversed. The first part of the assignment was a task asking for conceptual and reasoning skills, the second essentially required reading comprehension of a research paper. At GU, my students have no problem with the first part but find the second part difficult. At Williams, it was reversed. I found the same on my midterm exam. Questions required higher level reasoning and deeper learning were surprisingly difficult for many of the Williams students. In fact, on the midterm course evaluation I received the comment that the exam was too hard and unfair because I asked for experimental design which they had never been taught. This comment and my own observations led me to change some aspects of the rest of the course to give them in class activities that forced the students to go stepwise through experiments and train them in experimental design in the context of the subject matter.

Again it should be noted that I am generalizing. Not all students had this lack of deep learning but overall there was a disconnect between the students' very advanced knowledge of the overall subject and their limited deeper understanding of experimental design and data analysis. Given the very high quality of the students at Williams, I found this rather surprising. I think this is in large part because the students have very limited time to devote to any given assignment and because this surface learning is encouraged by the pedagogical and assessment approaches commonly used (both at Williams and in high school).

Pedagogy

I am very involved in pedagogical development at the level of both my department and the faculty at GU and was very interested in examining this aspect at Williams. Since I work at a university department and faculty which is very research oriented, there is often a general lack of interest in pedagogy amongst my peers. In stark contrast, pedagogy was a common topic of conversation at Williams, both formally and informally. Broadly speaking, the Williams teaching philosophy can be summarized by the quote from a former US president about an early Williams College president 'the ideal college is one with Mark Hopkins on one end of a log and a student on the other' (http://wso.williams.edu/wiki/index.php/Mark_Hopkins). One can interpret this many ways, but most faculty seem to interpret this as the best teaching is done one on one with a student in a minimalist environment. The faculty prides themselves on their close, almost familial, relationships with their students and this is encouraged by the college (e.g., funding for informal dinners, coffee, etc. with the students is easily obtained).

This vision explains a fairly negative view I observed towards online courses, and online resources in general. The thinking seems to go along the lines that online courses create distance between the faculty and students and that goes against the ethos of Williams College. Oddly though, this extends to online

resources as well. Rather than seeing these resources as a supplement to the already close relationship they strive to have with their students, many faculty seemed to think it threatened this closeness. In part they may be correct. Small colleges such as Williams do have to struggle to offer enough courses and topics to meet the interests of their students and many have suggested shared courses between several small colleges to decrease costs while increasing the range of course subjects. I agree that this would be a loss for Williams. Despite this, however, I think it shortsighted not to incorporate technology into the classrooms to expand student's resources and opportunities. Using, for example, a flipped classroom does not detract from student-teacher interaction but rather increases it by moving 'information transfer' outside of lecture hours and increasing the time available for discussion, feedback and clarifying concepts.

A very useful part of my experience at Williams was my observations and discussions around the BIO101 lab. This is a large course (200 students) including both science majors and non-science majors. Last year, the course administrators decided to alter the lab portion of the course making it 'inquiry based'. Inquiry based labs attempt to move away from the standard 'cookbook' labs that are common in science labs and instead encourage the students to practice experimental design. This was an ambitious change in such a large course that was taught by 6 faculty members (2 in the lecture hall and 4 in lab). It was also ambitious because the lab required the students to begin designing experiments in their very first week in the course which for the majority was their very first week in college.

Each lab was designed along this general scheme over several lab sessions:

- 1) Introduction to topic and a simple experiment using a particular methodology
- 2) Introduction to experimental design and time for students to design their own experiment emphasizing the clear statement of the students' scientific question and hypothesis as well as a detailed protocol for their experiment. A summary of this work was handed in to the teacher for comments and grading.
- 3) Students did their experiment (over one or two lab sessions)
- 4) Students presented their experiment using powerpoint slides to the lab section and answered questions from students and teacher. Students then handed in a formal lab report. Both presentations and lab reports were graded.

Overall, my impression of this format was extremely positive. Students worked in groups of four and I observed several of these groups during the experimental design part of the lab. Students clearly found this work novel and generally difficult but were very engaged in the process and the majority of groups succeeded to designing clear testable hypotheses. The teacher and lab assistant I observed during this process were simply awesome in helping lead the students to clarify their ideas using a Socratic method. To be honest when I first read the lab manual I thought it might be overambitious in that I feared many of the students would find it overwhelming in their first science course at university level but I was

clearly mistaken. Likewise, the student presentations demonstrated that the students had clearly learned the basics of experimental design and data analysis.

There was some discussion about the details of this format in the department and specifically amongst the 6 teachers directly involved in the course. First, was the question of assessment in groups of 4 students. The concern was that not all the students were given the opportunity to practice every aspect of the project. In other words, one student may never do any data analysis whereas another may miss out on writing the introduction to their lab reports. This is a valid point. There are practical limitations in working with such a large class: grading 200 lab reports would become unmanageable. This also has to be balanced against the well-established pedagogic value of students working in peer groups. One answer to this problem would be to include questions related to these lab skills on the general exam for the course. Additionally, this leads me to my only major criticism of the lab and that was that it was run essentially independently of the classroom part of the course. Multiple students commented to me that it felt like they were taking two different courses. It is a shame that the two parts were not more integrated as I think that would add value to both parts of the course.

I should also mention that I ran independent projects in my Microbiology laboratory but since there were only 12 students, they were able to do individual projects, presentations and lab reports. Generally, the students did extremely well and were able to design very interesting projects on a wide range of questions (within a defined framework). This gave me the opportunity to guide each student with respect to experimental design as needed.

A final comment should be made about education at Williams and most American colleges/universities. The students took 4 courses at a time which meant that my course which would be equivalent to 7.5 hp in Europe was spread over approximately 16 weeks instead of the 4,5 weeks it would be at GU. It was very clear that this had huge advantages. Despite the fact that the students had other courses to ‘distract’ them, they also had much more time to assimilate the information. Overall, I was able to cover almost as much information in this 7.5 hp course as I can in a 15 hp course. In an age when concerns are being raised about alternative teaching methods decreasing the quantity of information presented, I think running courses at (at least) half-speed should be considered to balance high quality teaching against the amount of content.

Assessment

A mistake I made when organizing my course was in the way I chose to assign grades. I used a grading scheme that works very well in my courses at GU, but was very problematic at Williams. This was unfortunate as the grading scheme was designed to encourage deeper learning but in fact only stressed and frustrated the Williams students. The scheme I use is that the students accumulate points throughout the course. There are 100 points distributed for all the activities (exams, labs reports, presentations,

active learning classroom activities) and they can get all or some of the allocated points for each assessment. At GU, the students need 80 points to get VG or 60 points for G. It works well in encouraging the students to work throughout the course rather than simply study in the week before the exam and gives them clear feedback on their progress.

At Williams this grading scheme was counterproductive. First, the students did not need much encouragement to do their assignments and secondly, they care very much about their precise grade. Grades are assigned as A+, A, A-, etc to E, with the average grade in a 300 level course being B+ which translates into 90%. Each grade only encompassed 3 or 4 points. In other words, losing just 1 point on a given assignment in my scheme could decrease their grade from A to A- and this was a very big deal. Many of the students plan to attend medical school after their undergraduate program at Williams (in the US, students need a Bachelor's degree before attending medical school) and a very high grade point average (close to perfect) is needed to get into med school. So, essentially, I had set up a scheme where I could not effectively use the grades as a form of feedback, as on average I could only deduct 10 points spread over the 10 or so graded assignments. I also had to be careful to grade such that my average ended up at 90%, instead of 80% as at GU (though I could have weighted it later). So, in summary, this grading scheme stressed both the students and myself and did not prove to be an effective learning tool. In retrospect, I probably would have graded as many others did which was to simply give the more broad A, B, C grades and at the end use that data to give an average precise grade.

I should note also that this student obsession with grades (justified or not) was also a topic of discussion in several of the faculty meetings I attended. There were two concerns. First, Williams wants students to study a broad range of subjects, including courses in topics that may be new to them (and thus may give them a lower grade). Students are generally inhibited in doing this because of their grade point average. One way the college has sought to address this is with limited Pass/Fail options. A second topic of discussion at Williams was grade inflation: grades are increasing at an alarming rate at both Williams and other colleges and universities. To address both these problems, the idea of making all courses Pass/fail has been raised but there is a general fear that this would make their students less attractive to universities for further studies or for employers (i.e., the perception may be that Williams might be an 'easy' school since it doesn't give grades).

First 3: New faculty orientation

After only 4 months at Williams, I feel I know more about the college's culture, policies, teaching philosophies and resources for students and faculty than I did after teaching for 5 or even 10 years at GU. I also met more diverse faculty and had a network of people I could turn to discuss a variety of issues. This is primarily due to the First 3 program and pre-school year orientations.

In the week or so before classes began, a large number of workshops, seminars and social gatherings were offered. Several of the workshops and seminars addressed topics that overlap with the university

education (högskolapedagogik) courses at GU: course design, effective teaching and university policies. In addition, a longer course in course design was offered at a distance over the summer to new faculty. These introductory activities were extremely helpful especially to new faculty with limited teaching experience (personal communication from several participants). A key difference between the courses offered at GU and those at Williams is that these were offered *before* the faculty began teaching whereas most of our faculty take these courses after having taught for several years (before a docent or lektor promotion). Though some courses in pedagogics can be more valuable after some teaching experience when one can reflect on one's practices, having courses before you design your first course seems much more sensible.

During the school year, information and discussion for new faculty continued through First 3 lunches. Twice a week, lunch was organized at the faculty club (buffet style restaurant in the center of campus) where faculty in their first three years of teaching at Williams could join for discussion of various topics. Typically, an administrator or senior faculty member gave a brief (20 min) informal talk about the topic followed by discussion with the participants. The atmosphere was very casual, with faculty with classes that overlapped with the lunch arriving late or early. Examples of topics are in the table below. As you can see the topics ranged from strictly administrative, the culture at Williams and the resources available to faculty and students. A smaller number of topics related to faculty research.

Monday, 9/8	Introduction; First days
Thursday, 9/11	Negotiating Williams' Cultures
Monday, 9/15	Office Hours
Thursday, 9/18	Academic Resources
Monday, 9/22	Classroom and Team Dynamics
Thursday, 9/25	The Honor Code
Monday, 9/29	Athletics at Williams
Thursday, 10/2	The Writing Workshop
Monday 10/6	Grades, Grading, and Grade Inflation
Thursday, 10/9	Campus Safety & Security
Thursday, 10/16	The Williams Curriculum
Monday, 10/20	Plotting Your Position
Thursday, 10/23	The Dean of Students' Office
Monday, 10/27	Roll Your Own/Suggest a Topic
Thursday, 10/30	The Davis Center
Monday, 11/3	Psychological Services
Thursday, 11/6	Admissions
Monday, 11/10	SCS: History and Goals
Thursday, 11/13	Student Athletes
Monday, 11/17	Balancing Life in and out of the Classroom

These lunches were integral to my experience at Williams. I learned about many aspects of the college and was able to engage in discussions regarding teaching and learning as well as the pros and cons of college policies and culture. In my fifteen years at GU I have not met the administrators involved in admitting students to GU let alone been given the opportunity to discuss or debate the pros and cons of different policies. Additionally, I met other new faculty as well as visiting faculty who had many of the same questions and issues that I had. We were then easily able to meet outside of this more setting to discuss our experience and share ideas.

Although a 'First 3'-like system would be more difficult to arrange at a larger university (like GU), I don't see that it would be impossible and I think the value would be immeasurable. This is especially true in the more research oriented faculties like natural sciences. We already have a number of seminars in, for example, applying for grants and we have the pedagogics courses, but by incorporating these topics into a more informal, regularly scheduled lunch (or fika!), it would give new faculty an opportunity to not only learn new information but also to meet and share experiences and knowledge. Additionally, it would give new faculty a network of resources early in their career at GU. There are many resources at GU that it took me years to discover and I am guessing there are many more that I still don't know about. In the table below I've listed my own vision of what First 3 would look like for Natural sciences on Medicinareberget (my campus). I would envision a mixture of information and discussions on research related topics with teaching topics.

	Speaker	Topic
Week 1		Welcome to GU
Week 2	Dean of Natural Sciences	Goals for the Nat Sciences Faculty
Week 3	Docent committee chair	Pathway to docent
Week 4	PIL representative	Resources for better teaching at GU
Week 5	Grant secretary	Resources for grant applications
Week 6	Librarian	Teaching information skills/resources
Week 7	International Office Rep.	What does the international office do?
Week 8	Studierektor	Grades and policies
Week 9	Experienced supervisor	Supervising PhD students
Etc...		

Goals and Future Directions

Individual

Because I was ‘forced’ to substantially change my course in response to the new environment, I was able to focus on core pedagogical values in a new context. This clarified my views on what is most important in education including the focus on experimental design and conceptual knowledge. I already include this in my courses but will replace some aspects of my course sessions with different activities. I already did develop several activities for the Williams Microbiology course that can be used directly in my next Microbiology course at GU. I also created a twitter account for ‘Microbiology News’ which seemed to be appreciated by the students and I will continue to tweet from this account and incorporate it onto our course web site (www.twitter.com/BIO275). Finally, I designed an inquiry based lab to use at Williams which I think can be modified to use at GU.

I have not mentioned the ASE meetings that I attended at Williams which dealt with advances in science education, but several discussions at these meetings have inspired me to alter one part of the HPE102 (Higher Education in Natural Sciences). In my experience, introduction of the basics of course design from a theoretical pedagogic perspective is often not received well by researchers. However, after listening to a report about how another university did this, I think I can improve that part of the course. I also had time to read more about inquiry based labs in relation to BIO101 and will be able to use some of that material in my course.

Institutional

There are four things I would love to be implemented at Natural Sciences and GU and I will do my best to encourage these through seminars and committees I am involved in.

First is the ‘First 3’ system of new faculty orientation as I described in detail above. Second is to increase the level of inquiry based labs especially in the first year courses. I am a member of our institution’s education advisory committee and teach a small part of the Biology program’s first year so this seems possible. Lastly, on my ‘wish list’ and most unlikely to happen (!) is to increase admission standards and implement parallel courses.

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