AC 2012-4231: CAN WE TALK? DISCERNING AND ENGAGING DISCOURSE DIFFERENCES ACROSS DISCIPLINES

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Can We Talk? Discerning and Engaging Discourse Differences Across Disciplines

Abstract

Experience with cross-disciplinary programs such as the writing intensive interdisciplinary program/school not named for blind submission and the writing intensive physics course, interdisciplinary course/school not named for blind submission has shown that students reap multiple benefits from the "hands on" integration of liberal arts and science/engineering. In developing and teaching these courses, particular best practices for maximum student and faculty enrichment have become apparent. If faculty genuinely welcome, appreciate, and understand the discourse practices—the very wording and phrasing of course materials and in-class lecture and discussion--and the methods of imparting knowledge and developing skills most familiar to students entering unfamiliar disciplinary territory, students are likely to feel encouraged, rather than inhibited, and engaged, rather than lost, confused, or intimidated. Faculty, as well, benefit from the significant possibilities for enhanced insight and communication that can result when we listen to and try "talking in" one another's disciplinary languages.

We approach this paper's title, "Can We Talk," quite literally, asking about the ways in which "we"—science/engineering faculty and faculty in the liberal arts/composition – can maximize our ability to meaningfully communicate across disciplines to create courses, curricula, projects, and assignments that best serve our students and that facilitate, for us, dynamic professional development. This paper will detail, for example, how a liberal arts/writing teacher's increased fluency with the language used in engineering writing and practice allows her to optimize "writing to learn" interest and performance for her engineering students, *and* allows her to productively engage with and critique the customary language and modes of her own discipline. We will examine how a physics instructor's familiarity with discourse practices and modes familiar to writing oriented, liberal arts curricula and courses allows her to offer liberal arts students an effective entrée into the modes, specifics, and significance of a "hard" science, *and* allows her to enlarge the scope of and audience for her own ongoing professional inquiry and communication. Through an examination of actual assignments and related pedagogical moves from interdisciplinary program/school not named for blind submission and interdisciplinary program/school not named for blind submission, the details and effects of particular discourse practices will be clarified. Attention to current work in applied linguistics and the various language systems, choices, and structures of professional communication will shed light on the significant links among discourse practices, ways of communicating and understanding knowledge, and professional status. Understanding those links can help us appreciate the value of our familiar disciplinary languages and can also bring us to appreciate how, if we only "talk" to students and colleagues in and from our accustomed language, we limit ourselves and our students.

Introduction

University general education requirements and programs in learning across disciplines provide the opportunity for students to experience various modes of intellectual inquiry and multiple analytical perspectives. What are the best practices, though, for maximizing

the enrichment that comes from having students take classes from outside their major? What strategies will bring students in "unfamiliar" academic territory to best understand and appreciate t the ways of communication, analysis and understanding that initially seem so different (and potentially so confusing or intimidating) from their accustomed modes of learning? Are there particular moves faculty can make that will facilitate the most enriching cross-disciplinary learning experience, especially when the distance between fields seems vast?

At the University of X and at X University, faculty have developed course materials that allow students to more immediately and successfully appreciate those cross-disciplinary skills and methods of acquiring and analyzing knowledge that are essential to a university education, but that often seem so much at odds. In an introductory course in physics developed by Dr. X at X University, and in an integrated freshmen composition/freshmen engineering program developed by X and X at the University of X, particular strategies for facilitating students' engagement with unfamiliar fields have been employed with continuing success. Central to the mission and practices of Physics100 at X University and to the English/Freshman Engineering Writing Program (E/FEWP) at University of X is an understanding that students are most likely to successfully learn about and experience unfamiliar subjects and modes of thinking if they can do so from a framework of familiar modes of perception, understanding, and associated "language." This paper will describe how, in particular, strategic language choices in the construction of assignments contributes to an atmosphere and a set of tasks that lower the anxiety and lessen the counterproductive confusion that can otherwise inhibit students' involvement in and appreciation of an unfamiliar field. The paper will also investigate how effective pedagogies for teaching across disciplines require that the faculty involved are fully willing to appreciate and practice discursive modes and methods of understanding and skills building not customary to their core scholarly fields.

Can Engineers and English Teachers Talk? Discourse Practices in the E/FEWP

In the English/Freshman Engineering Writing Program (E/FEWP) at University of X, freshmen engineering students learn about science and engineering, about the social context of the work of scientists and engineers, and about themselves, via intensive, engineering-related writing assignments. The Program was developed by X, an English Department faculty member with 25 years of liberal arts and composition curriculum development and teaching experience, and by X, a School of Engineering faculty member and the Director of University of X's X School of Engineering Freshmen Programs. Both X and X believed that an integrated engineering-writing program, while enabling students to fulfill the University's freshmen composition requirement, would, at the same time, allow students to experience how writing is essential to understanding science and engineering in complex multivalent ways. Inspired by the successful X University writing intensive course, Physics 100, Physics for the Modern World (and on the more advanced X University course Physics 200, Physics for the New Millennium), the E/FEWP requires that students gain expertise in explaining technologies and scientific processes, and also that students explore and take positions on the significance of particular science and engineering tenets, methods, achievements, and applications. University of X English

department faculty continue to develop all E/FEWP assignments, direct student discussion about the assignments, and read, comment on, and grade all student responses to the assignments.

All E/FEWP faculty members have extensive pedagogical experience in curricula and practices across the humanities, and come to the program with particular expertise in composition. As the program began, these composition experts wrote assignments requiring research into and writing about engineering-related topics, but in the language familiar to liberal arts oriented composition knowledge constructs and practices. Assignments asked students to "imagine the possibilities of...." and "position yourself among the current critiques that subvert..." and "consider, perhaps, the multiple paths towards...."[1] It became clear, however, early on in the development and execution of the E/FEWP, that English composition faculty needed to give close attention not just to *what* the students were required to write about, but to *how* the assignments were worded and discussed.

In the early days of University of X's E/FEWP, the English composition faculty teaching with the program were bombarded by very anxious questions by freshman engineers clearly struggling with the concept and practice of drafting a substantial research and analysis paper. With an air of genuine desperation, students were not asking, primarily, "how to" get started or keep going on the assigned paper; rather, students were persistently asking "how much." "How much" writing, the freshmen engineers wanted to know, should a draft contain if there would be an eventual revision? How could "some" of a paper be written, when, later, "all" of the paper would be written (and, really, what was the point of writing "some" when "all" was going to have to happen sooner or later)? "How much" of the draft should be based on research? "How much" of the draft should be quotes? "How much" of the draft should contain analysis? "How many" sections should the paper have? "How much" information should each section contain?

While the composition faculty had extensive experience in fielding students' difficulties with first attempts at meeting the requirements of college-level writing, the quest for "how much" answers seemed particularly intense among the engineering freshmen, and the reality was that though the composition faculty had many years of pedagogical theory and practice under their belts, the particular pedagogies with which this faculty were most familiar and expert did not necessarily provide for the best support or enlightenment for this particular student community. Experienced in a discipline and pedagogy that seeks to empower students through going beyond superficial expectations of formulaic thinking and writing; accustomed to small classes that allowed for regular, dialogic discussions about process-oriented writing and multivalent insight, the E/FEWP's faculty might have "answered" freshman engineering students' questions with discursive forays something like composition theorist and teacher David Bartholomae's explanation of the nature and use of revision: "In the course I teach, I make the moment of possession not the opening moment but a later one, where if the writer is present, that presence can be seen in the work of revision, where the evidence lies in the work directed against writing (that is, against the culture's desire to tell a certain story about the family and girlhood); or against the discourse's desire to hide its origins, its argument, and its seams."[2]

The essence and potential educational impact of Bartholomae's position and methods are significant—rigorous thinking via extensive writing, and ongoing re-thinking via intensive re-writing provides students with a powerful way of seeing of understanding how one can be situated and defined by purportedly "seamless"—that is, overly general and unthinkingly simplified-- cultural stories and expectations. Bartholomae's approach requires of students continual inquiry (informed and practiced by continuing to investigate a story or set of conclusions via writing and revision), thereby empowering them to position themselves (rather than be positioned by established or formulaic norms) within or outside of particular communities, cultures, and expectations. The E/FEWP composition faculty members were (and remain) dedicated to successfully meeting the essence of this composition mission, but how could the faculty best meet such a mission when working with 400 engineering students in sections of 70 with limited in-class discussion time? Could the pedagogical moves used in the small (restricted to 20 students) University of X Arts & Sciences classes, with their regular intensive in-class discussion often centered on texts and questions related to broad cultural inquiry and critique[3] be "applied" to larger cohorts of engineering students with their persistent questions about "how much" of various particular elements a paper should contain? Could the customary composition modes and methods, constructed and articulated towards discursive exploration of ever evolving questions and positions, be successfully brought, nearly wholesale, into an engineering community?

The Swanson School of Engineering Director of the Freshman Programs, seeing the intensity of the engineering students' confusion over their first liberal arts/composition oriented writing assignments, and, most likely, at least intuiting the enormities of the students' despair should the E/FEWP composition faculty start in on a Bartholomaeian excursion through revisionary moments of possession, intervened, with this message to students,

"Think about the draft and the paper in percentages. First, think of the percentages of sections. Your introduction will eventually be about 15 percent of your paper. Your conclusion could be another 15 percent. That leaves you with 70 percent. If you have 3 more sections in your paper, each will logically be between 20 and 25 percent. Now you can see how much information you will need in each area.

This paper requires analysis of research. If each section contains 95 percent research (quotes, paraphrases and summaries), you have no space to insert your own explanations. This 95-percent-research-per-section design will fail. Adjust your section components accordingly.

For the draft, as a whole, write 60 percent of what you will eventually need for optimal outcome in each area. This is why it's called a draft—it is a detailed design, or a mock-up in process. You don't want someone looking at it to say, 'you don't know what you're doing.' But this system creates time to re- inspect, re-test, detect faults, solve for new variables."[4]

Judging by the quick decrease in frantic questions about the means and point of a drafting process, students "got it." The engineer's advice to engineering students about the process of engineering a paper made sense to the students and allowed them to proceed with usefully increased application. The freshmen engineers' papers that resulted from the "percentages" explanation (and similar counsel and descriptions given throughout the draft and revision process) were not less fluent or accomplished than papers typically written for those "regular" composition courses, in which students had the advantage (or so the composition faculty long assumed) of lengthy discussions and verbally complex assignments centered around articulations of ongoing inquiry through processes of writing and re-writing.

The "percentage" advice and similar early experiences in the E/FEWP demonstrated that the composition faculty needed to think carefully about what freshmen students in an engineering community would be more and less likely to "hear" and respond to on the way to accomplishing composition goals. Casting the drafting of a paper in terms of percentages, and in terms of visible components and operable systems was a significant move towards allowing students to proceed with a complex task. While the composition faculty teaching with the E/FEWP could have spent considerable time and energy encouraging students to appreciate and embrace the University of X's composition mission of demonstrable proficiency in "forming questions, exploring problems, and/or critically examining one's own experiences and observations; demonstrating an ability to develop an informed position and to situating one's ideas in relation to the ideas of others,"[5] what the engineering students, familiar with quantification, components, and optimal systems, perhaps needed first was a way to envision a working design within which such activity could be begun and continued.

Many liberal arts/composition instructors who have advanced the significant work of introducing students to the powerful possibilities of "negotiat[ing] the ways they are figured in relationship to the official forms of knowledge valued in the academy...be[ing] prepared to write themselves out of a rhetorical situation in which their roles are already prepared, where they are figured as simple-minded or not-yet-ready-for serious discussion"[6] would be—it is not an much of an exaggeration to say—horrified at a pedagogical practice in a composition curriculum that allows, indeed privileges, an initial discussion about writing a paper via "how to" instructions involving "percentages" and "components." For scholars and teachers well-versed in the methodologies and rewards of a much more peripatetic, discursive mode of approaching the drafting and revision of an essay, the directive, visual, quantitative construct offered by the "percentage" advice could seem, at best, reductive, and at worst, a reification of the paradigms that a good composition curriculum seeks to resist. However, scholarship from fields as diverse as professional writing, corpus studies, applied linguistics, and science education, as well as extensive experience from University of X's E/FEWP and X University's Physics 100 course strongly indicates that valuing the "language"—the customary ways of wording and phrasing and the closely related ways of understanding and analysis—of a given community (rather than dismissing different "languages" as overly complicated or reductively directive) allows for highly successful initial and continuing interaction with that community.

Fluent Writers "Talking" Physics: Discourse Practices in Physics 100

One of the challenges facing Science, Technology, Engineering, and Mathematics (STEM) education is the fact that knowledge and information are growing at an increasingly fast pace. In physics education, teachers have watched as the typical physics textbook has progressively gotten heavier and heavier. In a white paper on learning goals in undergraduate STEM education, Mestre has suggested that "... students in undergraduate STEM courses are being asked to 'learn' an increasing body of knowledge only to forget it shortly after the courses are over. Instructional methods that help students retain and apply major concepts within and across STEM disciplines remain a major challenge in STEM education."[7] Furthermore, science classes are often seen by many students as threatening and intimidating places to be. Tobias has been critical of introductory college science courses and has argued that typical classrooms are "... competitive, selective, intimidating, and designed to winnow out all but the 'top tier' ... there is little attempt to create a sense of 'community' among average students of science."[8] As faculty clinging solely to the modes and practices of established, liberal arts based composition courses are likely to face counterproductive confusion from an engineering community, the modes and practices of a traditional science classroom may, especially for students not already versed in the sciences, present potential barriers that could inhibit learning.

With the University of X's E/FEWP, composition faculty members' increasing awareness of the "language" and of science and technology oriented fields such as engineering has led to more effective ways of engaging engineering students in a project of discursively exploring how they position themselves in the disciplines and career choices of engineering and how engineering has impact on society. X University's Physics 100 embraces liberal arts-oriented approaches to understanding and liberal arts-oriented language choices to maximize "non scientists'" understanding of scientific clarity, accountability, precision, and proof.

With an emphasis on Newtonian Mechanics, Physics 100, Physics for the Modern World (PMW) is a foundation-level course within the sciences portion of the General Education core at X University. Many students who enroll in PNM are liberal arts majors and do so to fulfill their General Education requirements for the sciences. The course also has a rigorous laboratory component. Students in this course are encouraged to engage in the learning of physics in many ways. In addition to more traditional homework assignments and laboratory report writing, the course involves "free writing" assignments that allow students more familiar with the modes of thinking and communication customary to liberal arts courses to begin to increase their understanding of the physical with a minimum of intimidating confusion.

The traditional tests and quizzes of a science course curriculum essentially provide an assessment marker *after* a segment of material has been provided in class. While important as a marker for charting progress, these forms of assessment do little to uncover what is actually taking place in the mind of the learner. Astin argues that "A

professor may give what he or she believes to be a stimulating and provocative lecture and yet never really know how much of it was understood by the students, how much of it will be retained, or what other effects it may have had on the students."[9] Astin further argues that while examinations provide faculty members with feedback, "acting on the basis of such feedback is a little like closing the barn door after the horse has escaped."[10]

As can be seen in X University's Physics 100 and in the E/FEWP at University of X, the use of writing in introductory science-oriented courses can be an effective vehicle for allowing students to enhance their critical thinking, self-positioning, and problem-solving skills. For the instructor, inaccuracies and errors in scientific information made within these writing activities can usefully reveal what students are really thinking. Having students describe and explain, through writing, their view of a scientific phenomenon or practice, having them explain how research and lab work reinforces or contradicts their assumptions, models, and understanding gives the instructor insight into the students' conceptual model building that the errors a students makes on a typical multiple choice test cannot. In addition to helping students and faculty understand how any why misperceptions or errors occur, using writing as a central mode of learning and assessment in a physics course facilitates a significant understanding and appreciation, for non-majors, of the workings and importance of physics in the history of ideas and in contemporary society.

The free writing activities of X University's Physics 100 course are formative assessment tools developed and refined over time and practice by Dr. X as an essential component of uncovering what a student is learning while the learning is actually taking place. While such activity is useful to a student from any major, it can be particularly useful in creating a meaningful experience in scientific knowledge for liberal arts students in the science classroom. The language of the free writing assignments can be seen as distinctly more familiar to the liberal arts (as the language of the "percentage" advice is more distinctly familiar scientific fields). Here is an example of a Physics 100 free writing assignment:

"Before we start talking about fluid mechanics, I'd like to see what your thoughts are about a couple of every-day type questions about going to the beach. Wouldn't that be nice right about now? Please respond to these questions without using your textbook or any other resource (and, no "Googling" folks!). Just think about your own personal experiences. Be as complete as you can and as creative as you want to be with these questions. We will discuss these questions in their full physics glory in an upcoming class period.

a. You and a friend are at the beach on a beautiful, sunny day. You slowly walk out into the water. As you do you find there are stones underneath your feet that cause a little bit of pain at first. You find, however, that as you walk further into the water, the stones under your feet don't hurt as much. Why do you think that is? Carefully explain.

b. After a nice swim you and your friend have an opportunity to take a little sailboat ride. As you get onto the sailboat you immediately put life preservers on your back. What is the function of the life preservers? Carefully explain."[11]

Note the language and various rhetorical moves of this assignment. The assignment

invites creativity and values a student's own processes of recalling, constructing, and communicating knowledge. There are few directives in terms of the activity required in the assignment (note the difference between the scenarios and questions of this assignment and the "Think about the draft in this quantitative way..." language and tone of the E/FEWP "percentage" advice). The Physics 100 free writing assignment encourages creativity not only by asking for creativity, but by privileging (if the instructor uses such words, they must be at least somewhat acceptable) descriptive modifiers and colloquial terms ("wouldn't that be nice"; "full physics glory"; "beautiful, sunny day"; "little bit of pain"). With an assignment such as this, students encounter language and methods characteristic of liberal arts discourse and learning practices which allows for a beginning examination, without intimidation, humiliation or undue confusion, of constructs and methodologies they don't yet understand. Through the more process-oriented discursive and pedagogical practices familiar to the liberal arts, the physics instructor can see what and how students are learning as they are learning it.

In students' responses to this and other free writing activity in Physics 100, there is no penalty for a scientifically incorrect response. A carefully constructed rubric provides students with guidance as they complete the activity, and the free writing is graded based on the rubric. Students are not penalized for using incorrect or flawed physics logic, however, provided their thoughts are "carefully explained" according to the criteria of the rubric. Thus, through this particular kind of free writing assignment and the feedback and discussion which follows, "non- science" students' knowledge is given voice and value, and gaps or errors in scientific knowledge and constructs are seen as an interesting and significant starting point, rather than as a severe shortcoming, the only remedy for which would be, in a traditional science classroom, trying to make sense of notes from a large lecture and studying from large textbook for a big test.

"People talk the way they talk for a reason":[12] Listening, Hearing, and Learning Across Disciplines"

In a 2009 interview in the *Journal of English Linguistics,* the noted linguist and University of Michigan Professor Richard Bailey (speaking, in part, about the work of the sociolinguist William Labov) states, "... you can learn a lot by listening to people who are deeply rooted in the culture that you don't live in....there's a great deal to be learned if you just, uh, shut up and listen, rather than saying, well, I have these academic credentials and therefore my opinion is the only one that's worth having."[13] Had the E/FEWP composition faculty not listened to the kinds of writing advice offered by the engineering faculty, had the composition faculty invoked their academic credentials as experts in how to teach intellectually rigorous, process-oriented writing, and insisted on employing the familiar and favored dialogics and discursions of the composition and the liberal arts, the E/FEWP faculty, the engineering students, and all the students in all the courses taught by E/FEWP faculty would have missed out on any number of multifaceted learning opportunities. In the physics classroom populated by liberal arts majors, were the physics instructor to dismiss the language and practices of the "soft" fields and rely primarily on traditional STEM modalities of instruction and assessment, students would be very likely to learn less, the instructor would likely not enrich her own understanding of how and

why students are performing poorly or well, and the best *raisons d'être* for general education and cross-disciplinary programs would be defeated. Given what can be lost by the refusal to talk in, listen to, or respect the value of the language of another discipline, it is useful to examine current thinking about what might inform a reluctance to pay serious attention to and employ various disciplinary languages.

In her book *Professional Discourse***,** Britt-Louise Gunnarsson draws on linguistics, cognitive and social psychology, genre studies, pragmatics, and case studies to describe and exemplify how "Professional discourse plays an important role in the construction of knowledge related to the domain, and thus distinguishes them [professionals in a domain] from experts in other fields."[14] Gunnarsson's examination of language choice and communicative practice in the fields of medicine, law, economics, and across various workplaces details how "The social order within the particular workplace is created and recreated in the various communicative situations, i.e. social patterns related to power, dominance, friendship, and group feeling form a part of the communicative order at work."[15]

Gunnarsson's book is a richly expanded version of Bailey's contention that "...people talk the way they talk for a reason, and if you can tease out what the reasons are, you have contributed to scholarship. There's no point to being irritated or making fun of them, because, one, it won't do them any good, and, two, it won't do you any good, either."[16] Gunnarrson's work highlights how the languages spoken within communities—professions, academic disciplines, various workplaces—inform and reflect power and status. She points out the importance of word choice, phrasing, and document format in constructing and communicating knowledge in communally sanctioned ways. Members of a community—for instance, scholars within a discipline—are, Gunnarsson argues, putting themselves at significant risk if they deviate from the familiar language practices. Thus, a composition scholar encountering directives about envisioning a writing project according to a notion of quantification or "percentages" is likely to see such language and the knowledge construct it represents as not just a bit of a different perspective, or as inherently just a little problematic, but as quite dramatically dangerous.

Why might a composition scholar's initial strong impulse be to dismiss a "quantification" scenario as a dangerously reductive pedagogical tool for teaching students about writing? Why is including writing of many kinds in an introductory science course not the norm? Is it the students who are "in danger" when other-than-customary ways of describing and initiating an intellectual project are seriously offered? Or is the danger more accurately located in a scholar's fear that embracing methods from a disparate discipline will, as Bailey might put it, significantly "de-credential" that scholar?

The noted applied linguist Ken Hyland, drawing on extensive corpus work across disciplines, quantifies the occurrences and theorizes on the purposes of certain communicative moves within academic disciplines, investigating "the means by which interaction is achieved in academic argument and how the discoursal preferences of disciplinary communities construct both writers and readers."[17] With the aid of concordance software, Hyland analyses 240 research articles from across 8 disciplines

including fields such as philosophy and sociology and fields such as mechanical and electrical engineering.[18] Hyland's corpus work does not highlight "technical" terminology—he is not watching to see how many times a sociologist uses a term such as ethnomethodology or an electrical engineer refers to pulse-amplitude modulation. Hyland counts and examines the context of words as simple as "might," "perhaps," "clearly," "consider," "must," or "should," and of phrases such as "It is important to understand...." He notes the frequency with which writers in particular disciplines invite reader interaction and connection via such rhetorical moves as questions and personal asides. Hyland finds that "the more discursive 'soft' fields of philosophy, marketing, sociology and applied linguistics, contained the highest proportion of interactional markers [such as questions and personal asides] with some 75 percent more items than the engineering and science papers.[19] "Directives [such as "consider," "note," "must," "should," and "It is important to understand..."], Hyland notes, "were the only interactive feature which occurred more frequently in [the] science and engineering papers."[20]

Work such as Gunnarsson's, Bailey's, and Hyland's shows the importance of understanding and developing a close awareness of the use of language (which inform and reflect how scholars within a discipline tend to think, and how and what scholars in a discipline tend to write) within one's own disciplinary community, and within the different communities from which one's students and cross-disciplinary colleagues come. To maximize intellectual enrichment, scholars and teachers cannot react to differences in discourse practices (and closely related methods of knowing and understanding) with distrust, fear, or dismissal. The discursive practices of engineering/science and the liberal arts/composition are--as Hyland and other applied linguists are increasingly able to specifically and quantitatively show—very different in notable ways. If scholars within disciplines believe, however, that their students will benefit from the intellectual work and practices of other disciplines, it is essential that the scholars' themselves openly and fully appreciate the value of the knowledge and discourse constructs of different disciplines.

ABET requires that engineering students are proficient in skills often obtained by research and writing offered by disciplines other than engineering. The Arts & Sciences programs at University of X, X University, and many other accredited universities require that liberal arts students successfully complete courses from the science disciplines. The experience of programs such as University of X's E/FEWP and of courses such as X University's Physics 100 reinforces theories such Hyland's, Bailey's, and Gunnarsson's: maximum, meaningful success in such cross disciplinary missions will not come from simply imposing one discipline's accustomed knowledge and discourse constructs on another. A composition teacher knows, in general, what "60 percent" means, but until she can understand how important a directive phrase with a clear quantification—"For the draft, write 60 percent of what you will eventually need for optimal outcome in each area"—is for inviting the attention of a particular community of students, she will be losing a valuable opportunity to successfully encourage that community of students to hear and engage the best of her own discipline's language. A physics instructor willing to do something as simple, yet as radical, as using language such as "full physics glory" and "a little bit of pain" in a science course assignment, models for her students, the enriching

possibilities of embracing various ways of learning. To do ourselves and our students the most "good," scholars and teachers must be willing, as Bailey says, to listen "to people who are deeply rooted in the culture that [we] don't live in." To do so, far from besmirching our credentials, is to increase our expertise in how to teach and how to learn.

In Conclusion: Robert Frost, "Choose Something Like a Star"

O Star (the fairest one in sight),
We grant your loftiness the right
To some obscurity of cloud –
It will not do to say of night,
Since dark is what brings out your light.
Some mystery becomes the proud.
But to be wholly taciturn
In your reserve is not allowed.
Say something to us we can learn
By heart and when alone repeat. Say something! And it says "I burn."
But say with what degree of heat.
Talk Fahrenheit, talk Centigrade. Use language we can comprehend.
Tell us what elements you blend....[21]

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