

2012

Learning Interdisciplinary Pedagogies

Alison J. Friedow

University of Nebraska-Lincoln

Erin E. Blankenship

University of Nebraska-Lincoln, erin.blankenship@unl.edu

Jennifer L. Green

University of Nebraska-Lincoln, jgreen@montana.edu

Walter Stroup

University of Nebraska - Lincoln, wstroup1@unl.edu

Follow this and additional works at: <http://digitalcommons.unl.edu/statisticsfacpub>



Part of the [Curriculum and Instruction Commons](#), [Educational Methods Commons](#), [Higher Education Commons](#), [Science and Mathematics Education Commons](#), and the [Statistics and Probability Commons](#)

Friedow, Alison J.; Blankenship, Erin E.; Green, Jennifer L.; and Stroup, Walter, "Learning Interdisciplinary Pedagogies" (2012).

Faculty Publications, Department of Statistics. 26.

<http://digitalcommons.unl.edu/statisticsfacpub/26>

This Article is brought to you for free and open access by the Statistics, Department of at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Faculty Publications, Department of Statistics by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

Learning Interdisciplinary Pedagogies

Alison J. Friedow, Erin E. Blankenship,
Jennifer L. Green, and Walter W. Stroup

University of Nebraska–Lincoln

Advocates of interdisciplinary teaching and learning in higher education suggest that interdisciplinary courses “promise a wide range of desirable educational outcomes for students” (Newell 1994: 35). These outcomes include enhanced affective and cognitive abilities, increased understanding of multiple perspectives, greater appreciation for ambiguity, and superior capacities for creative thinking, among others (35). Despite claims about the possibilities interdisciplinary learning offers, we have few examples of how faculty from different disciplines work together to create interdisciplinary classroom environments where such outcomes can occur. In short, more examples of how faculty from different disciplines actually develop, engage, and revise *interdisciplinary pedagogies* with one another are needed in interdisciplinary scholarship.

Existing literature does offer robust discussions of how individual faculty members understand interdisciplinarity. For example, Lisa Lattuca’s *Creating Interdisciplinarity* (2001) explores the varying and complex perceptions of interdisciplinary teaching and research individual faculty hold. What is needed in addition to this work, however, are examples of how these perceptions may affect the process of interdisciplinary classroom interactions, as faculty who embrace different views of interdisciplinarity collaborate to develop interdisciplinary curricula. In addition, interdisciplinary scholarship offers models for faculty collaboration and team teaching (see, e.g., Amey and Brown 2005; Davis 1997). These models provide useful, practical advice for faculty considering interdisciplinary teaching

projects but often neglect to treat collaborative interdisciplinary teaching as an ongoing *pedagogical* process.

More attention to how interdisciplinary pedagogies are developed and enacted is timely within English studies, as emerging conversations demonstrate a need for a more fully articulated understanding of what it means to be a faculty participant in interdisciplinary classrooms. Rebecca Nowacek (2009) has recently argued that though many of us in English studies are involved in interdisciplinary general education programs or interdisciplinary first-year seminars, the meaning of “interdisciplinary pedagogy” in our discourse remains obscure. Drawing on teacher-scholars who define pedagogy as an ongoing, reflexive, knowledge-making process (Qualley 1997; Kameen 2000; Lee 2000; Gallagher 2002; Stenberg 2005; Salvatori and Donahue 2010), we forward a view of interdisciplinary pedagogy as a complex relational process of *faculty and student learning*. Our conception of interdisciplinary pedagogy, which we illustrate and expand upon throughout this article, maintains the following characteristics:

- It is made possible when institutional citizens — including graduate students — with different disciplinary and subdisciplinary orientations interact with a shared purpose of designing and/or engaging in new teaching and learning experiences.
- It is dependent on the willingness of participants to recognize and reflect on how their respective disciplinary, subdisciplinary, departmental, and personal commitments to teaching and learning influence the process of designing and implementing interdisciplinary curricula. It therefore means a willingness to see moments of difficulty and discomfort that arise in this process not as “failed” pedagogical interactions but as opportunities for productive dialogue and further pedagogical inquiry.
- It requires a willingness on the part of all participants — faculty and students — to inhabit a “learner’s stance” (Qualley 1997: 2), as interdisciplinary interactions ask those involved to re-see our disciplinary identities and pedagogical commitments. Engaging interdisciplinary pedagogy means undertaking an ongoing process of (re)learning to teach — we are never finally finished with this work, but continually *developing* interdisciplinary pedagogies.

This understanding of interdisciplinary pedagogy grows out of our experiences learning to engage interdisciplinary thinking, learning, teaching,

and writing with one another and with students at the University of Nebraska, Lincoln from the summer of 2008 to the summer of 2009; beginning in the summer of 2008, the four of us — three members of the statistics department and one member of the English department — designed, developed, and subsequently co-taught a graduate-level course in statistics pedagogy that emphasized writing. While this course, STAT 892, may not at first seem to fall into the category “interdisciplinary,” as we explain throughout this article, our work planning and teaching this class went well beyond merely “adding” writing to an existing statistics curriculum, an endeavor not typically considered interdisciplinary work. Our course focused not on developing students’ writing or statistics skills per se but instead on the development of what we term “statistical literacy,” a concept and practice that integrates writing and statistical knowledge.

The exigency for developing STAT 892 emerged when the Department of Statistics separated from the Department of Math at our university in July 2003 and, in the process, inherited an undergraduate curriculum that faculty members are currently reimagining. In particular, two coauthors of this piece, Walt, then chair of the Department of Statistics, and Erin, professor of statistics, desire to transition the core undergraduate statistics course, STAT 218, from its current state as a “statistical arithmetic course” to a new kind of statistics course, one that emphasizes “statistical literacy.” Alison, a PhD candidate in rhetoric and composition, and Jenny, a PhD candidate in statistics at the time, collaborated with Walt and Erin to begin this process. Through our work together, the four of us came to define “statistical literacy” as the ability to develop, make informed decisions about, and rhetorically communicate statistical thinking for the purpose of solving both academic and civic problems. As we explored this new outcome together, we came to see writing as integral to the concept and practice of statistical literacy. Ultimately, then, the purpose of STAT 892 was to integrate ideas and practices from rhetoric and composition and statistics in order to support graduate teaching assistants (GTAs) in both developing and teaching statistical literacy.

In theorizing interdisciplinary pedagogy throughout the remainder of this piece, we hope to avoid what Shari Stenberg (2005) notes are tendencies in English studies discourse on pedagogy — treating it too abstractly, as a theory devised apart from teaching and learning interactions, or too simplistically, as methods or procedures *devised for* and *applied to* students in a classroom. In attempts to do so, we reflect on and theorize from the local contexts of our work and, in particular, examine the moments of difficulty we experienced in the process of planning and teaching this course. Rather than tell a

celebratory tale of interdisciplinary collaboration, we demonstrate how developing and sustaining our interdisciplinary relationships — both in and outside the course itself — often proved challenging. We have found reflecting together on the discomfort we experienced to be a valuable, knowledge-making process of inquiry. In the end, we suggest that interdisciplinary pedagogy does indeed have the potential to open up exciting opportunities for teaching and learning in higher education. In our experience, interdisciplinary pedagogy sponsored departmental curricular revisions, new institutional forms and forums for conversations about teaching and learning, and new modes of disciplinary inquiry and participation.

Learning Interdisciplinary Pedagogy: Developing Interdisciplinary Relationships

In spring 2008, Walt and Erin, with the support of the coordinator of a newly established writing in the disciplines initiative at the University of Nebraska, Lincoln, applied for a grant to fund a pilot course geared toward supporting GTAs in learning and teaching statistical literacy. Because these faculty members saw a strong connection between writing and the development of this kind of literacy, they hoped to collaborate with members of the English department in the design and implementation of this course. They therefore included funds in the grant application to support Alison, a doctoral candidate from the English department specializing in rhetoric and composition, to join the project. They also included monies to support Jenny, a doctoral candidate in statistics, who was also an experienced instructor in the department. The four of us began to meet together to compose goals and design STAT 892 early in the summer of 2008.

Our first major challenge — one we contend is fundamental to the process of developing interdisciplinary relationships and subsequently interdisciplinary pedagogies — was to begin the process of negotiating our different institutional and disciplinary positions in this new group. Disciplinary differences aside, it is significant that two of our members were graduate students working with a department chair and an established associate professor to design and teach a new graduate-level course. However, from the early planning stages of the project, Walt and Erin viewed Alison and Jenny as equal contributors to the course and, indeed, expected them to bring their perspectives and ideas to the table. They did not, for example, only ask Alison for ideas about the writing aspects of the course, or consult Jenny only for advice about working with new teachers. Instead, from the beginning, they invited both these members of the group to participate in discussions about the overall purpose and goals for the course,

as well as more general conversations about the development of renewed teaching and learning visions in their department.

For Alison, what most complicated the process of collaboration early on was concern about her position as a disciplinary outsider in this project. For example, she was acutely aware that those in other disciplines often view the central work of compositionists — the teaching and learning of writing — as institutional service. Dominant conceptions of disciplines in higher education and composition's unique disciplinary history (including its often unstable locations within institutions) most often situate compositionists as service workers who provide students with necessary academic skills, rather than scholars who make knowledge about writing and learning with students. This ensures the projects compositionists develop that blur disciplinary lines are very rarely viewed — by those in the discipline or by faculty with whom collaboration takes place — as “interdisciplinary” endeavors.

Interestingly, this same devaluation occurs in the statistics discipline. The work of statistical scientists is often viewed, even by those within the profession, as service to the natural and social sciences. Statisticians, like compositionists, are regularly asked to check over the work of colleagues in other disciplines, often in order to ensure analysis techniques are used appropriately. At other times, statisticians are even asked to carry out analyses for researchers. As in composition, statistics courses are expected to provide students with the necessary skills to prepare them for the “real work” in their chosen discipline. As a result, statistics work is often not viewed as interdisciplinary, even when a statistician is a valued member of an interdisciplinary team. As we approached this project, all of us held — to varying degrees — anxieties concerning our disciplinary and subdisciplinary positions. Though we did not articulate these concerns to one another until later on (not, in fact, until we began the process of composing this article), discovering these connections enabled greater understanding of the work we were attempting together. Reflecting back now, we recognize that when we began the project, we each held only very generalized knowledge of one another's disciplinary contexts, and that our interdisciplinary relationships — the foundation of our pedagogical interactions — were greatly enhanced as we learned more about the specifics of one another's disciplinary positions.

As previously mentioned, one key commitment that arose early in our planning meetings was a vision of writing as integral to the teaching and learning of statistical literacy. We discussed the many connections we saw between the study and practice of writing and the study and practice of

statistics. For example, Walt, Erin, and Jenny saw one primary goal of undergraduate and graduate statistics education as cultivating the ability to make informed decisions with statistical information and to effectively communicate those decisions to multiple audiences — disciplinary and nondisciplinary. Alison saw strong connections between this purpose for statistics and the rhetorical tradition of writing instruction, with its focus on developing strategies for shaping messages for particular audiences and purposes.

While the connections we made between the work of writing and the work of statistics were truly exciting, we also recognized there were significant disconnections, or areas of our respective disciplinary and subdisciplinary work that in fact did not necessarily inform the others in meaningful ways. On the most basic level, our group had to negotiate major differences in the ways our disciplines approach problem solving; the objective, data-driven approach to inquiry common in the discipline of statistics at times caused tension with the humanist approaches to problem solving more common in English studies. Coming together in attempts to work collaboratively forced us each to first acknowledge these disciplinary differences, and subsequently to discuss their benefits and limitations in order to make strategic decisions about how they may or may not inform the course.

We were also cognizant that GTAs might be resistant to our approach to understanding and teaching statistics, and we did not want to promote one unified way to teach, nor did we want GTAs to lay aside their own commitments to teaching and learning in their classrooms. What we wanted (and needed) to do was work together to design a curriculum that enabled us to present our vision of writing as integral to learning and teaching statistical literacy *and* that made room for GTAs to develop their own pedagogies. Our first attempt to articulate our goals for the course to GTAs, and our first attempt at engaging interdisciplinary pedagogy, came in the form of collaborative writing — composing the course syllabus — a task we initially found extremely difficult but ultimately intellectually generative.

Engaging Interdisciplinary Pedagogy: Interdisciplinary Writing

Though we had developed a mutual understanding of the kind of work we wanted the course to do and could articulate this vision among ourselves, the process of representing that work in writing for an audience of GTAs unearthed some of the difficulties involved in interdisciplinary thinking and writing we had not anticipated. We want to “zoom in” here on the process of syllabus writing for an interdisciplinary course, because it is a key activity in any classroom-based interdisciplinary interaction, though one

not often discussed as a *product of* interdisciplinary pedagogy. Though interdisciplinary pedagogy (and pedagogy more generally) is typically discussed as work that happens among teachers and students in a classroom space, we view our course syllabus as a product of interdisciplinary pedagogy — a text that resulted from our process of interdisciplinary thinking, writing, and revising — or from our process of learning with one another. As we began to write and revise the syllabus, we had to negotiate and reflect on the disciplinary, subdisciplinary, and pedagogical orientations and assumptions we each brought to the interaction. While a syllabus is a document that gives students the basic information (workload, schedule, project due dates) they need to be successful in the class, it also does much more. It reveals, though not always explicitly or consciously on the part of the author(s), the disciplinary and subdisciplinary frameworks and the values toward teaching and learning that will likely play out in the work of the course. In our case, the challenging intellectual work of collaboratively composing the syllabus revealed the ways in which our disciplinary assumptions and orientations continued to operate on us and influence our work, even, and perhaps especially, in our attempts to integrate that work.

After discussing together how we might frame the course goals on the syllabus, we decided to begin our syllabus writing process by passing the document back and forth via e-mail. Walt took the first stab at a draft and began with statements that represented his particular disciplinary and personal commitments to the project. He wrote a course description that began by explaining how statistics differed from math and about how important it was for undergraduate students to see the relevance of statistical literacy to their daily lives. Throughout our planning meetings he told a story about an undergraduate statistics course evaluation he had recently read. The student, a self-reported journalism major, commented that at the end of the semester he or she failed to see how the study and practice of statistics was relevant to his or her future coursework, career, and/or daily life. As the chair of the department, the idea of statistics as merely abstract technical procedures, disconnected from other courses and from students' everyday lives, was exactly the kind of perception he hoped to encourage teachers to work against through this course, and he wanted this goal to be clear on the syllabus. In addition, as an established, senior member of his discipline, Walt was interested in forwarding an argument to new graduate students that the concept of statistical literacy should be seen as central to the field.

As for Alison's commitments, as we passed this document back and forth, she remembers being most attuned to and concerned with how

writing was represented on the syllabus. She also made the most suggestions and did the most writing around this “area” of the syllabus. Alison also felt most comfortable critiquing the “writing” parts of the syllabus, claiming her disciplinary area of expertise; despite the group’s collaborative conversations that invited her to weigh in on the entirety of the course, she recalls deferring to the other members’ expertise when the moment came to produce the main text of the syllabus. The other two members of our group, Erin and Jenny, describe the syllabus writing as a “one step forward, two steps back” process, as attempts to articulate our goals in this form often led us back to the drawing board or to conversations about clarifying or revising those goals.

The following is an excerpt of the course description that appears on the final draft of the syllabus. This excerpt describes the work of the course for students and also demonstrates our attempts to articulate the relationship between writing and statistics we hoped to discuss further with GTAs in the course. Throughout these three paragraphs, we now see ourselves struggling to describe the disciplinary, interdisciplinary, and even nondisciplinary uses of statistics and writing the four of us had discussed during the prior months:

Statistics is not math. Statistics uses mathematical tools, but it is not math. A math problem ends when a solution has been found or a theorem has been proved. A statistics problem, if done properly, begins when the arithmetic is done. The entire point of statistics, at least given the objectives of STAT 218 — and most applied statistics courses and statistical consulting — is to make a decision and be able to defend it with appropriate statistical evidence. The target audience for these decisions almost always consists of non-statisticians. In fact, most people who need to use statistics are not statistics majors. To make good decisions, it is essential to learn to translate “stat-speak” into clear non-technical language so that the needed information is communicated accurately. This work is what we will discuss in this course as statistical literacy.

Writing plays a key, but often underappreciated role in learning statistics and statistical literacy. The ability to translate “stat-speak” into clear non-technical language is one of the best indicators that technical concepts in statistics are genuinely understood. Learning how to do this is an effective way to learn — and teach — technical concepts in statistics. One way to do so, and to help students learn is to practice “writing for learning” and you will hear a lot about this throughout the course.

The goals of this course are twofold. The first goal is to teach you how to write in statistics. This is not something you learn in an English class (although you make extensive use of what you did learn in your English classes). Every discipline has its own unique demands and conventions.

You need to write as a part of doing problems in the discipline of statistics to learn these unique aspects. The second goal of this course, and our primary end goal, is to learn writing strategies and how to use them effectively in teaching an introductory statistics course. A by-product of this second goal is the ability to use written communication more effectively in virtually any teaching or consulting activity. (STAT 892 Syllabus)

As we reflect on this document now, we can see that during our process of writing we were still very much trying to sort out our thinking about the relationship between writing and statistics, and in particular how writing might contribute to the development of statistical literacy. In the first paragraph, we were attempting to combat an assumption members of the statistics department felt some first-year statistics graduate students enter the program with — the idea that knowing how to do statistics is equivalent to knowing how to find correct mathematical answers. This assumption is something we wanted to work against in the course, emphasizing that statistics happens after the math is over; statistical literacy means being able to make an informed decision based on the data you have and to convey that decision effectively to multiple audiences.

The second paragraph of the course description attempts to connect writing with this work. This first sentence notes that we view writing as key to the work of statistics, though other members of the discipline may not always view it this way. In fact, we wanted to emphasize that inquiry tools from English and composition and rhetoric more specifically — such as viewing writing as a medium for sense-making rather than only a form in which final thinking is presented — can be a useful way of approaching learning statistical literacy, both for specialists and nonspecialists.

In a very different move, the third paragraph acknowledges and names the differences between writing in English and the discipline of statistics. By acknowledging that “every discipline has its own unique demands and conventions,” we recognize there are meaningful differences in the work we do and distinct conventions specialists in each discipline use and follow for good reasons. As we reflect on our actual work in the course in relation to this paragraph, we find it interesting that we name teaching GTAs to write as experts in the discipline of statistics as a course goal; though this was not actually one of the course goals we decided to pursue, it was a goal named early in the planning process. Part of statistical literacy in our view is the ability to communicate, through writing, reasoned statistical decision making to multiple audiences for multiple purposes, though we did not have time to pursue this goal in the actual course we taught.

As we read this final paragraph of the course description now, we are struck by the multiple, layered goals articulated. We move from acknowledging disciplinary differences and distinctions, to explaining the goal of helping GTAs use writing strategies to facilitate student learning, to the final aim of supporting GTAs in more effectively communicating disciplinary knowledge to nonspecialist audiences themselves. Today, this writing reads to us as an attempt to articulate what was our *thinking-in-process* about how to integrate disciplinary forms of inquiry and knowledge in this course.

Describing “the work” of the course on the syllabus also proved challenging. While the four of us could articulate a vision of the relationship between the study and practice of writing and statistics among ourselves, it was a much more difficult task to write up that thinking in a way that didn’t position statistics “subject matter” as completely separate from the “writing content.” Though we did discuss not wanting to separate these two categories, ultimately, in part because of time constraints, we did end up naming “statistics content” and “writing content” on the syllabus as separate categories:

Statistical Content. This follows the basic outline of the STAT 218 course.

We will try to introduce major topics a couple of weeks before they are scheduled to come up in your class, so you have some discussion of them before you teach them. For more detail, see the approximate schedule below.

Writing Content. We will introduce “writing for learning” tools as we believe, or in some cases have found, them to be useful in helping students learn statistical literacy. Let’s be up front: there will be a lot of trial and error. This is the first time we’ve taught this course, and we are pioneers in this. A lot of other universities are watching what we do in this course to see 1) if the course is a good idea and 2) if so, what works and what we need to think more about. (STAT 892 Syllabus)

Reflecting (both then and now) on how our respective disciplinary, subdisciplinary, departmental, and personal commitments to teaching and learning influenced the process of designing the syllabus is a key part of developing, enacting, and sustaining interdisciplinary pedagogy. In particular, this process exposed us as novices in our attempts to integrate the different disciplinary frameworks we brought to this collaboration. Typically, syllabus writing is a solitary act completed by individual faculty members in the private disciplinary spaces of our offices. Rarely during this process do we have to articulate our learning goals to other faculty members (especially those in different disciplines) or consider how our learning goals and disciplinary material mesh with those of other disciplinary faculty. In

this case, though our goal was to present writing as integral to the study and practice of statistical literacy, through the process of writing the syllabus we fell back to the ways in which we have each been disciplined to understand and discuss both statistics and writing. For example, dominant conceptions frame writing as a skill and thus render the teaching and learning of writing as a practice that serves other “real,” content-full disciplines, such as statistics. Though we didn’t recognize it at the time, these ways of conceiving our disciplinary and subdisciplinary work likely influenced our conceptualization of the work of this course, and thus our description of that work for students.

Overall, these and other course texts we produced together were not ideal; however, they do represent our thinking about the relationship between writing and statistics that we were in the process of grappling with at the time. Looking more closely at the writing we produced further illuminates some of the tensions and challenges that arose from trying to produce knowledge and, more specifically, to write in the midst of the interdisciplinary inquiry in which we were engaged. Rather than viewing these documents as “failed” pedagogical texts, we think they represent key moments in our *process* of engaging interdisciplinary pedagogy, moments that stimulate further inquiry. As Stenberg (2005: 149) notes, “It is often the ‘messes’ of our pedagogical work that require us to articulate our pedagogical goals, visions, and values — and to consider revision.” Here, our “messes” occurred before we even stepped into the classroom, and resulting from our pedagogical interactions with one another in the planning stages of the course. As Anna Neumann (2005: 63) points out, we rarely position faculty members as learners in scholarship. Our process of interdisciplinary collaboration, however, demonstrates that a key feature of engaging interdisciplinary pedagogy is faculty members (and in our case graduate students) working together as learners inside *and outside* the classroom. While things got messy, and the process was at times frustrating, we believe these and other challenges will be present in the process of developing goals and collaborating while designing interdisciplinary curricula. Sustaining interdisciplinary relationships and supporting interdisciplinary pedagogies, therefore, require collective reflection on these challenges, which can (as we’ve experienced through the process of writing this article) lead to revision of the interdisciplinary teaching, thinking, learning, and writing we continue to do together.

Engaging Interdisciplinary Pedagogy: Teaching STAT 892

In the previous two sections we examined moments in our planning process where we were engaged in interdisciplinary pedagogy — or the

process of reflective interdisciplinary learning — with one another in the planning stages of the course. In this section we examine challenging moments we experienced in the actual teaching of STAT 892. Though we had articulated together a vision of writing that was integral to the learning and practice of statistical literacy, enacting that vision, like writing it up on the syllabus, proved difficult. More specifically, inhabiting an interdisciplinary classroom space required us to recognize the institutional positions and disciplinary identities we unconsciously embody in our classrooms and asked us to step outside them.

Our teaching and learning interactions in the university are nearly always greatly influenced by disciplines and disciplinary knowledge. This is obviously the case in the upper-division and graduate courses, such as those Erin and Walt typically teach; nevertheless, even in the first-year writing courses Alison regularly teaches, the curriculum is influenced by current trends in disciplinary research in the study and practice of writing, and the instructor's pedagogy is informed by her research and work in the field. The same is true for the lower-level statistics courses Jenny regularly teaches. Those deemed "experts" in the disciplines, then, most often — consciously or not — use classroom spaces in our institutions to teach/translate disciplinary knowledge to students in their classrooms. In the case of STAT 892, we entered and attempted to use for other purposes an institutional space that is typically shaped overwhelmingly by statistics disciplinary modes of inquiry, writing, and knowledge. In the process, the instructors and the GTAs in the class had to learn to re-see both the classroom space and our positions within it.

Most notably, the four of us realized it was impossible and even unproductive to attempt to inhabit "expert" positions at all times in the course. For example, there were times in class when Alison felt frustrated because she didn't have the language to communicate her thoughts in certain discussions. At times she wondered if she had enough knowledge about statistics in order to be a meaningful participant in class discussions. She also worried how students may have viewed her position and role in the course when she remained silent in class discussions because of real or perceived disciplinary barriers to communication. At the same time, the members of our group from the statistics department experienced moments where they felt uncomfortable with the role of writing in the course. Jenny, for example, felt uncomfortable teaching a course she felt was unfamiliar territory for her. She found herself relying on Alison for suggestions and ideas for the day-to-day work of the course. At the same time we were teaching STAT 892, Erin was attempting to teach statistical literacy in her

undergraduate courses as well. As she faced challenges in those courses, she wondered if she had the authority or expertise to teach statistical literacy and its pedagogy to graduate students.

In the end, each of us discovered that the interdisciplinary work we were doing in the classroom as well as outside of it required us to let go of our familiar “expert” roles and instead embrace what Donna Qualley (1994: 2) terms “learner’s stances.” According to Qualley a “learner’s stance” is a reflexive mindset or approach to teaching and learning, one “that names itself in the here and now, that can explain how it came to be, but remains open to the possibility of further complication and change.” Bringing this habit of mind to interdisciplinary interactions asks us to be reflexive about our own disciplinary values, what Qualley describes as “the act of turning back to discover, examine, and critique [our] own claims and assumptions in response to an encounter with another idea, text, person, or culture” (2). Though such a stance seems to clash with the expert roles instructors are likely more comfortable inhabiting in the classroom, we believe such a stance, which embraces the idea of faculty as learners, is a significant way of engaging successful interdisciplinary pedagogical interactions.

Those already positioned as learners in our course, or the GTAs in the course, also experienced tension between the identities they were accustomed to inhabiting in a graduate-level statistics classroom and the new goals the course asked them to consider. When we taught the course in fall 2008, seven GTAs enrolled; all were pursuing master’s degrees in statistics, and many were also teaching at the college level for the first time. It quickly became clear to us that students were experiencing difficulties navigating the different disciplinary lines they clearly saw acting in the course, despite our attempts to present writing as integral to the process of developing statistical literacy.

In addition to the other readings and projects students completed, we structured several informal assignments designed to give GTAs the opportunity to give us feedback on how they were experiencing the course. We learned the most from the “learning letters” we assigned for the middle and end of the semester, which asked GTAs to reflect on their learning at these two points in the course. It was clear through reading the learning letters that GTAs were struggling to understand the vision of statistical literacy we wanted to forward in the course and subsequently to see how writing connected to this learning goal. It was also clear that GTAs felt the course was asking them to step far outside of the kind of learning experiences to which they were accustomed. This often felt difficult and even frustrating

for these graduate students, who, along with us, were still in the process of understanding this new concept and goal. Here we “zoom in” on GTAs’ articulations of their learning in the course as expressed through the assigned “learning letters.” We believe the kind of learning these narratives demonstrate is precisely the kind of valuable inquiry that interdisciplinary pedagogy can draw out in both faculty and students, because it asks us to wrestle with assumptions about our disciplinary and personal commitments that otherwise often remain unarticulated.

In her end-of-semester learning letter, Kathryn, an experienced high school math teacher, first-year master’s student, and new college instructor, describes her thoughts on STAT 892. She reflects on her own uneasiness with seeing herself as a writer and relates this to her struggle to view writing as connected to the learning and teaching of statistics. Kathryn writes:

My thoughts on this course ... I have taken many education courses in which writing is to be used in your content area. I will have to admit, teaching math, I could not find many ways in which to use writing. I think part of this could be because I have a hard time writing myself. This course has given me ideas that I could use currently teaching STAT 218, but also what I could have used teaching high school math. ... This class, like all writing education classes, pushed me way out of my comfort zone. Working with the other 218 teachers, along with the leaders of the class, helped me step out of that zone. Am I comfortable there? No, but I hope to use these writing techniques next semester ...

I laugh as I finish this assignment. This has taken me 2 hours to write. I’d write a little then have to take a break, because I’m not sure what to say. Again, out of my comfort zone. (2)

Even though our goal was not to present this course as a “writing in the content area of statistics” skills-based course, as this excerpt demonstrates, Kathryn nevertheless experienced the course in this way. Interestingly, she names the course a “writing education” class; while certainly discussing pedagogy was part of the focus of the class, we find it compelling that Kathryn connected the writing aspects of the course with the education or pedagogical component, while presumably the statistical content remains intact. This view of writing/education as something that serves content areas such as math or statistics could reflect Kathryn’s prior training and experiences as a high school content-area teacher. It also perhaps demonstrates our own difficulties in explaining the course in ways that stretched beyond this dominant understanding of the work of writing and the work of statistics.

It also may reflect the dominant ways we (both the instructors and graduate students in the course) have been trained to view disciplinary knowledge — as separate from teaching and learning. As James Slevin (2001: 43) explains, those of us in academia understand a discipline as a “body of knowledge, a field of scholarly investigation, with little or no reference to teaching or educational institutions.” The primary purpose of graduate education is still to learn enough to be able to contribute meaningfully to one’s disciplinary body of knowledge; learning how to engage this body of knowledge with learners in the classroom is ancillary to the primary work of learning the discipline. In some ways, our course challenged the dominant distinction between disciplinary/content knowledge and pedagogy, because we wanted GTAs to see the teaching and learning of statistical literacy as central to the work of the classroom and the discipline.

Though Kathryn does not articulate an understanding of the connections between writing and statistics we hoped to forward in the course, her letter does show she engaged in significant learning. Kathryn repeatedly notes that this course asked her to step out of her comfort zone into a new kind of space, a space that felt, at times, disconcerting. Indeed, Kathryn even lets readers know she experienced discomfort as she composed the learning letter itself. As teachers, we often view the difficulty our students experience with negative connotations, perceiving their struggles as “deficiencies” that need to be overcome. However, because we know Kathryn to be a thoughtful, reflective thinker and teacher, we wonder what possibilities are opened up if we see the difficulty Kathryn experienced here (and perhaps our own difficulties that we have described throughout the piece) as evidence not that we have failed to grasp a concept or solve a problem, but that as learners we are *in process*; the act of learning, seen in this way, is not about gaining or failing to gain a particular kind of knowledge but about being in “healthy tension” with the questions or problems at hand (Jagodzinski 1993). Understood in this way, Kathryn’s letter — a representation of this *learning-in-process* — does significant work.

Another GTA in the course, Jon, also discussed the challenges he experienced in the class through his final learning letter. In his letter, Jon describes that he felt the course was asking him to learn to perform two distinct roles — the role of a statistics teacher and the role of a writing teacher. Jon also felt some confusion in our attempts to integrate writing and statistics, because he viewed these subjects as distinct. In his final learning letter, Jon thoughtfully reflects on his abilities as a teacher and a writer. He reflects on the connections he sees between his approaches to teaching and

to writing but notes that he has not yet fully explored his potentials as a *writing teacher*:

By taking this class while teaching STAT 218 I have been able to effectively analyze my ability to teach and to write. My assessment of my overall ability as a teacher and ability to write are similar, but my assessment of my ability as a teacher of writing is far different. I take similar approaches to teaching and writing. I begin by addressing the main points of a topic and then return to each point and flesh out the finer points of the topic by providing specific examples. I feel this is an effective method of teaching and writing. The majority of my participation in this class has been geared toward evaluating what the main points of each topic are and how we as teachers can effectively explain and write about these ideas. I feel my participation in group discussions and reading responses in this class exemplify this. As a teacher of writing, I feel my ability is not as pronounced. Also, my attitude toward teaching writing is not nearly as positive or engaged. While my abilities in teaching and writing are equivalent, my desire to teach the subject material effectively is much greater than my desire to teach how to effectively write. (3)

In this letter, Jon is articulate about the connections he sees between his own process of teaching and his process as a writer. However, Jon clearly sees the teaching of statistics and the teaching of writing as two very different activities. Rather than viewing writing as integral to the study and practice of statistics, and therefore writing as a practice and process that facilitates the learning of statistical literacy, Jon sees the two subjects as distinct. Even further, he feels much more responsibility and enthusiasm for teaching statistics content knowledge than for teaching writing. Again, this view Jon holds of writing as something he must teach *in addition to* statistics, rather than as a central part of statistics, was something we hoped the course would help GTAs to question.

Nevertheless, Jon did find ways to engage meaningfully in the course. As he notes, he was a critical participant throughout, often raising important questions and insights on the teaching and learning of statistics. In addition, near the end of his learning letter, Jon lays out a new version of STAT 218 curriculum that he plans to implement next semester. He describes his plan for structuring the course around what he terms "writing modules." Rather than organizing his courses in the order of the topics listed in the textbook most GTAs use, Jon plans to focus the course around four main topics in statistics that correspond with sections of the textbook, and to create a set of focus questions meant to drive students' inquiry in each module. He hopes to incorporate writing in these modules in order to

get a sense of “which types of topics the students find easy to write about and which the students find challenging to write about” in order to gain a better sense of how students understand the material. Despite his view that writing remains separate from statistics, Jon’s inquiry into his curriculum is one compelling example of how GTAs are expanding on ideas presented to them in the course in order to develop their own pedagogies.

Again, like the syllabus and other course texts we produced, we view these students’ articulations of their experiences in the course as evidence that interdisciplinary pedagogy is continually in process as we interact with students and with one another in interdisciplinary classrooms. Analyzing the learning letters GTAs produced helps us realize that interdisciplinary pedagogy is not over or finally figured out once we have articulated the course goals, written the syllabus, and designed course projects; rather, it is an ongoing process of learning engaged and revised with students.

Conclusion: Embracing the “Mess” of Learning, Developing Interdisciplinary Pedagogies

Through our attempts to integrate the disciplinary knowledge each of us, including our students, brought to our interactions, we came to recognize that the success of our pedagogical interactions was dependent on our awareness of and ability to acknowledge and critique the ways these disciplinary discourses and conventions operated on us, both enabling and constraining our attempts at collaborative, interdisciplinary work. At times this kind of interaction felt unsettling — both for us and for students — because it required all of us to sit with dissonance in order to see our disciplinary assumptions differently and to dislocate our stably constructed disciplinary senses of self; importantly, though, working with these challenges is central to creating and sustaining interdisciplinary relationships, and therefore the goal is not to do away with these struggles — this is likely not possible — but to reflect on strategies for negotiating them that open up possibilities for further learning and revision. As Shari Stenberg (2005: 148) notes, “Development . . . requires us to embrace the mess, since growth requires some discomfort.” Indeed, it is this collective, reflective work on the challenges we faced that allows us to grow and learn, and we contend this kind of work is central to the ongoing process of developing interdisciplinary pedagogies.

Though each interdisciplinary interaction will be different depending on the specific contexts of the collaboration, our experiences do suggest ways faculty might approach interdisciplinary teaching and learning experiences. First, engaging interdisciplinary pedagogy requires us

to recognize and reflect on how our disciplinary, subdisciplinary, departmental, and personal commitments to teaching and learning influence our processes of collaboration and curriculum design; this requires participants to be reflective about these values and assumptions. In attempts to do so, faculty can approach such projects as learners rather than experts. Doing so doesn't mean giving up disciplinary or pedagogical commitments, but instead requires us to approach the experience with a mindset open to difference and even to the revision of our beliefs about knowledge and teaching and learning. Faculty preparing to engage in interdisciplinary pedagogy should also expect to encounter difficulties in such collaborations; however, viewing difference as a resource rather than a problem or hindrance to interdisciplinary projects helps us see moments of difficulty not as "failed" pedagogical interactions, but instead as opportunities for productive dialogue, learning, and further disciplinary and pedagogical inquiry.

While we do not wish to present an uncritical celebration of interdisciplinary pedagogy, and we hope our examples complicate such a narrative, we do believe it can offer exciting possibilities for teaching and learning in higher education. For example, despite the challenges we faced, or rather, because of them (if this was easy, it wouldn't be that interesting), the four of us have continued our inquiry together, and this work has enabled new conversations about teaching and learning on the departmental, institutional, and disciplinary levels. On the department level, in addition to developing STAT 892 and thus revising the graduate curriculum, we recently presented this project as part of a lecture series in the statistics department at the University of Nebraska, Lincoln, which was attended by the majority of faculty and graduate students in the department. Through our presentation we informed faculty about our course and its goals, engaged in a critical discussion with others in the department about the course and asked graduate students for feedback on our curriculum. These efforts have paved the way for renewed department-wide conversations about the teaching and learning of undergraduate statistics, graduate education, and GTA development.

On the institutional level, we presented our work around this course to a small group of teachers from various scientific disciplines across campus during a Writing in the Sciences conference at the University of Nebraska, Lincoln. Our presentation initiated new conversations about undergraduate and graduate student learning with faculty from other departments, such as biology, and laid the groundwork for new institutional and potentially new interdisciplinary collaborations.

Finally, we have experienced the process of developing interdisciplinary pedagogies as a means for disciplinary change. Scholarship on interdisciplinary teaching and learning has at times framed interdisciplinary inquiry as something that is undertaken in opposition to disciplinary inquiry. As Peter Weingart (2000) points out, “interdisciplinarity” often carries with it positive connotations of progress, originality, and innovation in these discourses as opposed to traditional disciplinary work, which is discussed as bound, contained, and even restrictive. In our experience, the process of engaging interdisciplinary pedagogy proved to be a theory-producing process, one that gave rise to opportunities for collaborative disciplinary inquiry. This experience enabled us to see interdisciplinary pedagogy as a practice that can enhance disciplinary knowledge, rather than one forged in opposition to it. For example, on a disciplinary level, we were invited to present our work as guest speakers at the 2009 Joint Statistical Meetings conference, the largest statistics conference in the country and the largest gathering of statisticians in North America. Our panel was titled “Stirring the Pot: Radical Ideas in Statistics Education,” and we shared our experience and posed questions about possible future projects to others working in the discipline. We continue to search for ways to share the knowledge we made together with colleagues in English studies; we see this piece as one step toward that goal, and as further evidence of the potential for interdisciplinary pedagogy to sponsor disciplinary knowledge production.

All of these departmental, institutional, and disciplinary projects are the result of collective inquiry into the challenges interdisciplinary pedagogy poses and the collaborative opportunities interdisciplinary pedagogy creates for faculty and students. We remain excited to continue exploring where this inquiry process may take us next.

Acknowledgment — The authors thank Shari Stenberg and the Faculty Leadership for Writing Initiative at the University of Nebraska, Lincoln, for sponsoring this interdisciplinary collaboration.

Works Cited

- Amey, Marilyn, and Dennis Brown. 2005. “Interdisciplinary Collaboration and Academic Work: A Case Study of a University-Community Partnership.” *New Directions for Teaching and Learning* 102: 23–25.
- Davis, James R. 1997. *Interdisciplinary Courses and Team Teaching*. Phoenix, AZ: American Council on Education/Oryx Press.
- Gallagher, Chris. 2002. *Radical Departures: Composition and Progressive Pedagogy*. Urbana, IL: National Council of Teachers of English.

- Jagodzinski, Jan. 1993. "Curriculum as Felt through Six Layers of an Aesthetically Embodied Skin: The Arch-Writing on the Body." In *Understanding Curriculum as Phenomenological and Deconstructed Text*, ed. Bill Reynolds and Bill Pinar, 159–83. New York: Teachers College Press.
- Kameen, Paul. 2000. *Writing/Teaching: Essays Toward a Rhetoric of Pedagogy*. Pittsburgh: University of Pittsburgh Press.
- Lattuca, Lisa. 2001. *Creating Interdisciplinarity: Interdisciplinary Research and Teaching among College and University Faculty*. Nashville, TN: Vanderbilt University Press.
- Lee, Amy. 2000. *Composing Critical Pedagogies: Teaching Writing as Revision*. Urbana, IL: National Council of Teachers of English.
- Neumann, Anna. 2005. "Observations: Taking Seriously the Topic of Learning in Faculty Work and Careers." *New Directions for Teaching and Learning* 102: 63–83.
- Newell, William. 1994. "Designing Interdisciplinary Courses." *New Directions for Teaching and Learning* 58: 35–51.
- Nowacek, Rebecca. 2009. "Why Is Being Interdisciplinary So Very Hard to Do? Thoughts on the Promises and Perils of Interdisciplinary Pedagogy." *College Composition and Communication* 60: 493–516.
- Qualley, Donna. 1997. *Turns of Thought: Teaching Composition as Reflexive Inquiry*. Portsmouth, NH: Boynton/Cook.
- Salvatori, Mariolina Rizzi, and Patricia Donahue. 2010. "Disappearing Acts: The Problem of the Student in Composition Studies." *Pedagogy* 10.1: 25–33.
- Slevin, James. 2001. *Introducing English: Essays in the Intellectual Work of Composition*. Pittsburgh: University of Pittsburgh Press.
- Stenberg, Shari. 2005. *Professing and Pedagogy: Learning the Teaching of English*. Urbana, IL: National Council of Teachers of English.
- Weingart, Peter. 2000. "Interdisciplinarity: The Paradoxical Discourse." In *Practising Interdisciplinarity*, ed. Peter Weingart and Nico Stehr, 25–41. Toronto: University of Toronto Press.