Monographs in Engineering Education Excellence

Edward Ernst, University of South Carolina, Monographs Editor

Assessing Writing Instruction in a Sophomore Engineering Course:
Iterations of Integrating Writing from 1995-1999
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Preface

Monographs in Engineering Education Excellence is a series of publications dealing with innovations in engineering education introduced at the University of South Carolina, with the support of the Gateway Engineering Education Coalition. The series seeks to make the information and ideas in the reports more accessible to engineering educators. It is hoped that other institutions will find the reports useful and adaptable to their own educational mission.

The *Monographs in Engineering Education Excellence* series includes a variety of genres—theses, dissertations, and technical reports, but all have the common objective of rethinking, reshaping, and revitalizing engineering education missions. This monograph, *Assessing Writing Instruction in a Sophomore Engineering Course: Iterations of Integrating Writing from 1995-1999,* is a dissertation written by Deanna Elizabeth Ramey in partial fulfillment of the requirements for the Doctor of Philosophy degree in English, with a specialization in Rhetoric and Composition. While she pursued her Ph.D., Dr. Ramey was a writing consultant in the Electrical and Computer Engineering Department's Writing Center, a Gateway-supported project that has since been institutionalized as the Professional Communications Center of the University of South Carolina College of Engineering and Information Technology.

Ramey's work makes a significant contribution to the research pertaining to teaching and assessing written and oral communications skills in undergraduate engineering education. Drawing on her research within the ECE Writing Center, Ramey identifies important characteristics that distinguish discipline-specific writing centers from the traditional humanities-based writing center and account for the success of the former in teaching professional discourse in an engineering environment. These features include the integration of writing instruction into engineering courses, involvement of writing instructors in grading and evaluating students' writing, and using a curriculum-driven pedagogy to teach engineering students how to write. These traits, as Ramey's study demonstrates, developed in direct response to the culture and expectations of engineering education.

In this important work, Ramey traces the evolution of the ECE Writing Center into a pedagogical unit that responds directly to the instructional needs of engineering students as they learn to communicate as emerging professionals. Each stage in that evolution was the result of continuing collaborative assessment by engineering and writing center faculty and teaching assistants, as well as the ECE students themselves. Ramey's study demonstrates the effective use of discourse analysis as a means to evaluate improvement in student writing as an outcome of instruction and well-planned active learning experiences.

The Gateway Coalition takes pleasure in making Ramey's dissertation more readily available to engineering colleges, as we are convinced that it is a model deserving replication and wider use.

Edward Ernst, Monographs Editor

Chapter 1
Introduction: The Electrical and Computer Engineering Department (ECE) Writing Center – A New Horizon

In the past decade or so, discipline-specific writing centers have proliferated on college campuses. At the University of South Carolina, for example, in addition to the university-wide Writing Center run by the English Department, there is a Center for Business Communication in the College of Business Administration and a Professional Communications Center in the College of Engineering. From the Writing Center Task Force, established in 1995 by Associate Provost Donald Greiner, came the planning that resulted in the development of the discipline-specific writing center in the ECE Department.

ECE Writing Center

In the fall of 1995, the Electrical and Computer Engineering (ECE) Department opened a satellite writing center in its department.[1] The ECE Writing Center was the result of collaboration among faculty in the ECE Department, Composition and Rhetoric faculty in the English Department, and the Director of the University Writing Center. A team, consisting of the Acting Director of the University Writing Center, Jennie Ariail; a professor in Composition and Rhetoric, Dr. Nancy Thompson; and a professor from ECE, Dr. Robert Pettus, was formed. The team met several times to establish the ECE Department's goals and needs for its own writing center satellite and to discuss the feasibility of staffing such a center. Dr. Elisabeth Alford was recruited to write a grant proposal outlining the clear set of goals for the three-year pilot writing center. The team submitted a proposal to the National Science Foundation (through the Gateway Coalition) for funding.[2] The team received a planning grant for that summer and created a model for the pilot version of the center, to start in the fall 1995.

During the planning phase the team focused on creating a program centered on the ECE curriculum laboratory sequence. Initially, the ECE Writing Center would serve only ECE students and faculty in two capacities: 1) in the traditional writing center model of working with individual students or groups on their writing assignments and 2) by developing and implementing writing instruction specifically for the EECE 201 lab course. The sophomore lab course, EECE 201, Tools and Techniques for Electrical and Computer Engineers, is the first engineering lab course that students take in a five-lab sequence in the ECE Department. EECE 201 allows students to practice the circuit techniques and theories that they learn in EECE 221, Circuits I. Dr. Jerry Hudgins, the Acting Chair of the ECE Department, describes the ECE curriculum:

> The ECE Department at USC has two structured 124-credit-hour programs (semester system) for Electrical Engineering (EE) and Computer Engineering (CE) that integrate five stand-alone laboratory courses (3 credit-hours each) throughout both curricula. The laboratory sequence terminates with a team-structured project in the senior year. The five required laboratory courses are quite strongly integrated into both the EE and CE curricula and strong threads exist throughout the curricula, as shown in Figure 1. All of the labs are based on fundamental electronics principles. (FIE paper 4/16/99)

Figure 1 shows the sequence of labs that ECE students take alongside the theory courses that correspond to the labs. On the far left side is the sequence of math courses that both Electrical and Computer Engineering majors are required to take. Within the section labeled "ECE CORE COURSES" are the Electronics Thread (far left) and the Software Thread (far right) which represent the theory instruction for the Electrical and Computer Engineering majors, respectively. In the center are the five stand-alone laboratory courses that are strongly integrated into both curricula. All of the labs center around fundamental electronics principles, and EECE 201 is the first of these core laboratories.
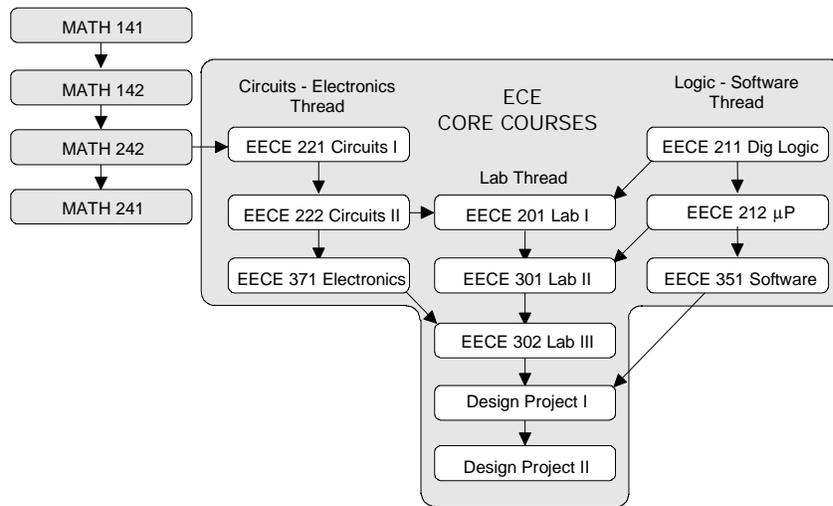

Figure 1. ECE core showing the laboratory and curriculum threads

The EECE 201 lab course meets on Mondays for a two-hour recitation, of which one hour is designated for writing instruction. Then students meet in one of four lab sections that meet Tuesday through Friday from 3:30 -- 6:30 p.m. to perform the lab.

Dr. Elisabeth Alford, who holds a Ph.D. in composition and rhetoric, was hired as a part-time consultant for the ECE center. With a staff of two graduate students from Composition and Rhetoric, Dr. Alford worked with the ECE professor teaching the 201 course as they collected examples of student lab reports. Writing Center staff and the professor also developed prototypes of several handouts that explained how to write certain sections of a lab report (i.e. abstracts, introductions, conclusions, etc.).

Since fall 1995, the ECE Writing Center has worked closely with the ECE faculty and graduate teaching assistants who teach EECE 201. One of the course objectives is to provide students with the instruction and opportunities to practice and learn several forms of engineering communication. In fall 1995, students were required to write one lab report for each week of lab, totaling 12 lab reports during a semester. Over the four-year period of Writing Center involvement in 201, several of the formal lab reports have been modified into writing assignments like technical memos and progress reports, and an oral presentation has been added. These new

genres provide ECE students chances to practice forms of engineering communication that they are more likely to encounter in jobs than the lab report. Several students specifically referred to these assignments as helpful or beneficial to them in the course evaluations. They wrote, for instance, of oral presentations, "These are given quite often for upper management, clients, etc." and of the technical memo, "This was important because colleagues and supervisors need these often during team projects" (EECE 201 Survey, spring 1999). Students whom I interviewed uniformly appreciated the assignments (in particular the technical memos and the oral presentation) that most closely resembled work they had done in former jobs like co-ops and internships.

The ECE Writing Center has established a successful and productive relationship with the EECE 201 sophomore lab course because of the close ties among the faculty and administration who lead the course and the Writing Center staff. This relationship is strengthened by the ECE Department's commitment to increasing the communications skills of their graduates. The ECE Writing Center is a manifestation of this commitment to training its engineering students to write and speak professionally before they graduate. The Writing Center works with all ECE students on any writing or communications assignments they have, but the core involvement is in the EECE 201 lab course which reaches all ECE students as a requirement. While the Writing Center is still seeking the ideal model for incorporating communications instruction into the 201 course, its reflective evaluation and close communication with both students and faculty in 201 has resulted in a significant presence of communications instruction in the ECE lab curriculum.

This integration of writing into the engineering curriculum is a high priority for the USC College of Engineering. The College will be evaluated for re-accreditation in 2000 by the national accreditation organization, the Accreditation Board of Engineering and Technology (ABET) Committee, and the four College departments have implemented various initiatives in order to meet the ABET 2000 Criteria. The ECE Writing Center was established to integrate writing instruction into the 201 lab course as an ECE Departmental attempt to address one of the ABET accreditation goals, demonstrating integration of communications and writing instruction into the existing curriculum. Since 1995, the ECE Writing Center has used several different methods of introducing writing instruction into the 201 course. These methods have included voluntary writing groups, mandatory groups, studio groups (see Grego and Thompson), individual consultations, and hiring a technical writing teaching assistant to grade the writing portion of lab reports. In the spring 1999 semester, the Writing Center staff provided the writing instruction in the course and graded the writing content, including the form and style, of the lab reports.

Overview of the Project

This dissertation will be an evaluation of the writing instruction provided to the EECE 201 lab course since the 1995 inception of the ECE Writing Center culminating in a study of the spring 1999 model and recommendations for future involvement in the 201 course. The evaluation will combine both formative and summative characteristics as defined by Janice M. Lauer and J. William Asher in Composition Research: Empirical Designs. The summative perspective will be the study's assessment of the overall impact(s) of integrating writing into the 201 course. I will rely on methodological triangulation to assess the course itself, as well as to

evaluate the Writing Center's involvement in 201. The three forms of data that I gathered consist of program documentation, field notes, and interviews. The methodology and data will be discussed further in the Research Methodologies chapter, chapter 3, of the dissertation. The formative perspective will be used to refine and improve the integration of writing instruction based on the observations and data gathered in the spring 1999 semester. By combining both formative and summative evaluation, I hope to provide information that is valuable to programs outside the USC College of Engineering in addition to helping our own program development.

Research Questions for this Study

This project is part of a larger body of scholarship that already exists, projects that examine the ECE Writing Center's history and work in the ECE Department. Chris Fosen's thesis, Composition and Engineering Education: Learning to Teach Writing in Engineering, provides a thorough discussion of both the Writing Across the Curriculum (WAC) and Writing in the Disciplines (WID) movements. Fosen then presents his observations as a writing instructor in a senior-level engineering lab course in the context of WAC and WID. Deborah Dyck also writes about her experiences as a writing instructor in an engineering lab in her thesis, Teaching Engineering Writing: Using Reflective Practice to Shape Engineering Writing Pedagogy. Dyck, who worked with the EECE 201 course, discussed the problems with hiring English Department graduate students to teach in fields like engineering. She also provides a thorough description of the writing instruction in the EECE 201 course from spring 1996 to spring 1997. And Kristin Walker gives a detailed analysis of EECE 201 lab reports, applying principles of genre theory to 4 students' lab reports in her 1997 dissertation, Assessing Students' Genre Knowledge in an Engineering Writing Center: An Analysis of Sophomore Lab Reports in Electrical and Computer Engineering. Walker's work also includes a thorough history of the formation of the ECE Writing Center, including a plan of the physical layout of the Center.

One of Walker's research questions was "How does students' writing (lab reports) reveal their generic knowledge (or lack of it) about writing in engineering?" I expand on the connection she draws between students' writing and students' performances in engineering by examining the Writing Center's responses to student writing in the 201 course over a period of four years. Several areas I examine in this project are:

1. What methods of writing instruction best incorporate composition pedagogy into the EECE 201 course?[3]
2. What factors influence the degree to which writing instruction is integrated into the 201 course?
3. In assessing these methods, how can the ECE Writing Center and the ECE Department best collaborate to achieve true integration of writing instruction in the course?
4. Did the presence of Writing Center TAs on the 201 syllabus as instructors and as graders of the writing portions of the labs noticeably impact students' perceptions of the Writing Center instruction in the spring 1999 semester?
5. What implications for composition pedagogy, in particular for the Writing in the Disciplines movement, can be drawn from this study?

The ECE Writing Center and the Future of Writing in the Disciplines

The ECE Writing Center represents a new kind of writing center: the disciplinary writing center. Consequently, such a writing center requires new paradigms and strategies for teaching writing and for working with student (and faculty) writers. This project provides an overview of traditional writing center theory and practices and then describes how such theories must be modified in a discipline-specific environment like the ECE Department.

Engineering writing has rhetorical purposes and strategies that differ greatly from the rhetorical aims of Freshman English courses (which represent most of the writing instruction that many engineering students get at the university level). Engineering rhetoric values clarity, quantitative data, and conciseness, while simultaneously requiring students to repeat key information in multiple sections of lab reports and oral presentations. Engineering rhetoric is form-driven; the lab report is a fairly static format (although it has many variations depending on what a company or business has decided to emphasize). So, teaching form is a key part of teaching writing to engineering students.

The ECE Writing Center did not introduce writing assignments into the EECE 201 course. The Writing Center brought the **teaching of writing** into the course. Now students have opportunities to learn why the lab report format exists, who will be likely to read certain sections of the report in business situations, and how language/writing choices affect the presentation of their **engineering** material.

The ECE Writing Center is a model for integrating writing instruction into a discipline, like engineering, that values writing but needs help teaching writing to its students. The writing instruction provided by the Writing Center allows composition and rhetoric students and experts to interact with engineering students and experts in a mutually productive relationship. The compositionists learn about how engineers communicate and what types of information and writing are valued by engineers. The engineers learn more about audience needs and writer responsibilities (ethics), and get chances to practice writing in an environment where they receive instruction and feedback on their writing, not just on their data.

Overview of the Study

Since 1995, the ECE Writing Center staff and the engineering professors and TAs who teach the 201 course have met at the end of each semester to evaluate the effectiveness of the writing instruction and to modify the writing assignments as necessary. This dissertation will examine how Writing Center staff and engineering faculty and instructors have continually monitored the writing instruction in the course, and each pedagogical iteration will be described. This first chapter provides an overview of the scholarship already documenting the ECE Writing Center project and the history of the Writing Center. Chapter 2 includes a literature review and a general discussion of Writing in the Disciplines theories and how they apply to the ECE Writing Center. In Chapter 3, I outline the methodology used for the observations I made in the spring 1999 semester and describe the methodologies in the research study design. Chapter 4 describes the initial model of writing instruction that the Writing Center used and chronicles each subsequent semester's changes to the writing instruction in the course. This chapter contains information from Writing Center files on the 201 course, interviews with engineering faculty and the Writing Center staff and director, and my own observations. Chapter 5 centers on the spring 1999 model of writing instruction in the 201 course, which included a radical change

for the Writing Center staff -- the introduction of grading into the Writing Center. Chapter 6 includes a background discussion of scholarship that addresses the controversy of bifurcating grades and contains my evaluation of the writing program and the recommendations made for future Writing Center involvement in EECE 201. And Chapter 7 contains conclusions about this writing in the disciplines effort and answers, I hope, some of the questions I have raised about our writing center and about Writing in the Disciplines pedagogy.

End Notes

[1] Kristin Walker gives a detailed description of the architecture and floor plan of the ECE Writing Center in her 1997 dissertation, <u>Assessing Students' Genre Knowledge in an Engineering Writing Center: An Analysis of Sophomore Lab Reports in Electrical and Computer Engineering.</u>

[2] The USC College of Engineering belongs to a seven-school coalition of universities, the Gateway Coalition. Members include the Ohio State University, Drexel University, Polytechnic University, New Jersey Institute of Technology, and the Cooper Union.

[3] Deciding which methods of writing instruction are the most effective for incorporating composition pedagogy into EECE 201 involves assessment of outcomes. These outcomes and assessment strategies are outlined in chapter 3 of this project.

Chapter 2
Literature Review: A History of WAC and WID

One of the research questions that I will explore in this project is the idea that discipline-specific writing centers work under vastly different conditions from the more traditional humanities-based writing centers. Therefore, discipline-specific writing centers must adapt, sometimes radically adapt, traditional writing center theory to fit the needs of other disciplines. Furthermore, if writing centers are moving toward creating and fostering a presence as discipline specific centers, the field of traditional writing center theory will have to re-think its policies and views of appropriate writing center activities. This chapter of the project presents a historical overview of writing centers beginning with traditional writing center theory and continuing through a discussion of scholarship that focuses on the Writing Across the Curriculum (WAC) and Writing in the Disciplines (WID) movements.

These sources suggest the historical context within which the ECE Writing Center was founded. Many of the guiding principles for establishing the ECE Writing Center are directly linked to this writing center theory. Likewise, the ECE Writing Center was strongly influenced by WAC and WID principles due to its disciplinary focus. However, as will become evident by the end of this chapter, the ECE Writing Center is a new territory for writing centers, a space that will require new and innovative pedagogies and theories that will provide the next frontier for writing center scholarship and research. The last section of the chapter will provide several examples of how the ECE Writing Center, as a model of the new discipline-specific writing centers, has reacted to and differed from traditional writing center, WAC, and WID scholarship. The summaries and discussion in this chapter also establish the foundation on which I based the methodological choices for this study presented in chapter 3.

An Overview of Some Writing Center Theory

Christina Murphy and Joe Law provide an overview of writing centers in their opening essay to Landmark Essays on Writing Centers. They point out that writing centers have been on university campuses since the 1930s and have metamorphosed several times over their seventy-year history. The initial model of the writing center was focused on product-oriented methods, and remediation became closely linked to the writing center image. In the 1950s, writing centers on many university campuses were called writing clinics or writing laboratories. These clinics (a name which invokes of course the presence of disease or sickness) were "remedial agencies for removing students' deficiencies in composition" (Moore 3). Moore's 1950 College English essay is filled with what Mike Rose calls "medical-remedial language" (536)[1]. Moore repeatedly relies on words like "diagnosis," "treatment," and "procedure" to describe the relationship between writing clinics and students struggling to write in a college environment.

In the 1970s and 80s, writing centers shifted from an emphasis on product to one on process. Emphases on collaborative learning and social construction characterize this phase of writing center history. Much writing center theory of this phase also focuses on peer tutoring (Murphy xii-xiii). Writing centers in the 1990s are moving toward interdisciplinary emphases as WAC and WID programs emerge in more universities and as many disciplines seek to incorporate writing instruction into their disciplinary curricula. This movement is so new that there is not much

scholarship to document this new phase of writing center development. However, the University of Florida has a thriving communications center that focuses its instruction on specific courses and their demands for communication. Several universities at the 1999 Workshop on Engineering Writing and Professional Communications Centers, hosted by the University of Florida, expressed their intentions to develop discipline sponsored and focused writing centers within the next year. The following discussion positions the traditional humanities-based writing center within the context of writing center theory

Most writing centers are humanities-based, run by and under the authority of English Departments. Therefore, much of the theory and scholarship about writing centers is focused on issues that concern the English department discourse community and its leaders. These writing centers often serve entire campus populations, a factor that has powerful effects on the scholarship that is produced by these centers. The tutors or consultants who work in such centers usually take a generalist approach to their consultations. There is an alternate model in which the center hires tutors in certain fields to work with specific courses or majors, but this model is not predominant. As a result of this generalist approach, much writing center theory prioritizes knowledge about the writing process over knowledge about specific courses or subjects.

This generalist focus is present throughout Stephen North's "The Idea of a Writing Center." In his 1984 article, North emphasized that the writing center's most important work is to focus on the writer, rather than solely on the text. He states, "In a writing center, the object is to make sure that writers, and not necessarily their texts, are what get changed by instruction. . . .In axiom form it goes like this: our job is to produce better writers, not better writing" (76). He continues, saying, "In short, we are not here to serve, supplement, back up, complement, reinforce, or otherwise be defined by any external curriculum" (79). Thus, writing centers and the tutors or consultants who staff them are focused on the writing process rather than on teaching curriculum-specific products (like lab reports or technical memos).

North's presentation of the split between teaching process or teaching product is, of course, over-simplified because he is engaged in defining the role of the writing center. In the early 1980s, writing centers were emerging as an instructional force on many campuses, but, as North points out, even many English department colleagues did not know exactly what writing centers were supposed to do. If the North view of writing centers as curriculum-independent and process oriented actually produces better writers, then writing centers are, in fact, serving external curricula by positively changing the student writers who use the writing centers to help them in their curriculum-driven majors. So there is some symbiosis between curricula and writing centers even if that makes North uncomfortable.

North tries to communicate what happens in such a writing center. He begins by defining what he believes is the perception of many people about writing centers: "In their minds, clearly, writers fall into three fairly distinct groups: the talented, the average, and the others; and the Writing Center's only logical *raison d'etre* must be to handle those others -- those. . .with 'special problems'" (Murphy 73). These categories contribute to the lingering image of the writing center as a fix-it shop. North's frustration with this label is poignant because it is his English department colleagues who persist in the notion of writing centers as band-aid dispensers for grammar wounds. North's struggle to articulate just what writing centers do and are is his effort to qualify and justify that what writing centers do best (i.e. talking to writers about

writing) is important and should be encouraged and respected. At the end of the essay, he evokes Socrates' marketplace dialectics as the predecessor of the modern day writing center, hoping, by association, to polish the writing center's image (85).

In "A Defense of Dualism: The Writing Center and the Classroom," Dave Healy further advocates the separation of the writing center from curriculum-driven goals. Healy differentiates writing center consultations from the traditional hierarchical interaction between teachers (who have knowledge) and students (who need knowledge). He writes, "Curriculum-based approaches, on the other hand, reinforce that hierarchy by identifying the tutor with the teacher and the classroom -- the traditional seat of knowledge and authority in academe" (180). In this model, the tutor becomes teacher because he/she is closely bound by course content or "curriculum." He also notes that "The TA serves the curriculum by serving the instructor; only indirectly does the TA serve the student. . .Where TAs primarily serve faculty, tutors primarily serve students" (182-83). Presumably, this division of alliances where the TA serves the instructor and the tutor serves the students exists because the TA is associated with grading students' work, while the tutor does not grade. So, in writing center theory, there is a clear emphasis on the role of tutor (or writing consultant) as student advocate. This advocate role entails maintaining a clear division between the writing center and any grading of student work.

Muriel Harris continues to describe the importance of the tutor's role as student advocate in "What's Up and What's In: Trends and Traditions in Writing Centers." Harris writes, "We are committed to individualized instruction, to taking the student out of the group and to looking at her as an individual, as a person with all her uniqueness" (31). Thus, another important aspect of writing center instruction is the personalized approach that many consultations follow wherein tutors and students have one-to-one meetings in which they discuss aspects of the student's work and writing habits that often do not get discussed in class. Harris states, "Committed to working with the whole person, we train ourselves to ask about that particular person's writing processes, about her past history, about her perception of her assignment, about her particular problems, about her questions" (31). Many writing center tutors and consultants' experiences support Harris' idea of working with "the whole person" as the columns and contributions to The Writing Lab Newsletter indicate. Sometimes students will disclose personal information to a tutor (like the demands of a work schedule or having to balance child-care with schoolwork) in a dialogue that may not occur between professors and students in classroom situations.

There are problems with Harris' model, however. For example, even though the writing center tutor does have unique chances to interact with students on a more personal basis than do instructors, such personal disclosures can create ethical situations that tutors and consultants must carefully navigate. If a student discloses information that the tutor feels the instructor should know, is the tutor bound by a writing center client-privilege code?

Marilyn M. Cooper discusses some conflicts in writing center theory in "Really Useful Knowledge: A Cultural Studies Agenda for Writing Centers." Cooper realizes that there is a problem with the perception that writing centers provide a place for students to express themselves freely. She writes,

> Students and tutors who are outside mainstream culture are usually more aware of the way language coerces them, but all students and tutors know how institutions coerce them in writing classes. They know that students in writing classes are offered

and can exercise little or no control over such things as the topic or genre of their papers, the argument structure or organization of their papers, the length of their papers, and the style or register of language in their papers. Students know that in order to get a good grade they must carefully follow assignments that specify these things. (140)

So, even when students come to the writing center, the presence of grades comes with them. The notion that a writing center can be an evaluation-free space is misleading.

Cooper continues, writing, "Students and tutors respond -- quite rationally -- by trying to make the papers match as perfectly as possible the specifications of assignments while at the same time -- quite irrationally -- trying to believe that in doing this students are asserting ownership over their texts and learning to write" (140). Cooper's point is valuable in the discussion of writing center theory because student ownership of texts is a central issue for writing centers. Cooper brings to the forefront the truth that students who participate in any writing-for-a-grade exercise lose some of the ownership of their texts. Therefore, writing center theorists, like North, who insist on claiming that students increase their ownership of texts are, at best, naïve in their claims. If Cooper is correct, then students who go to writing centers for help are actively seeking **more** ties to the curriculum-driven assignments they write, contrary to North's vision of the curriculum-free writing center utopia.

Mary Trachsel, in "Nurturant Ethics and Academic Ideals: Convergence in the Writing Center," discusses another important aspect of writing center image and theory: the feminized role of the writing center in the university setting. She writes about the writing center being a "safe place" for students and a maternalized, nurturing sphere in the often-patriarchal university setting. Trachsel states, "If writing center workers do indeed occupy and value an ethos that can be characterized at least in part as 'maternal,' they must question the extent to which their position is institutionally fashioned as a service to patriarchal values and an ethic of competition that excludes the possibility of cooperation and collaborative learning -- a politics of war rather than peace" (41). Muriel Harris extends these sentiments, as do many other writing center community members, and takes pride in the role of the writing center role as an alternative space in the university establishment. Thus, it is the writing center's dissociation with grades and emphasis on privileging student voices that separates the writing center from other areas of university instruction.

Excerpts from a 1998 article in The Writing Lab Newsletter demonstrate how these nurturing ideas are reproduced in writing centers nationwide. In "Evolving pedagogies: Four voices on teacher change and the writing center," four graduate assistants discuss how their work in writing centers has affected their teaching in English department classrooms. One student addresses how the writing center experience of non-directive tutoring helped her to create a feminist classroom where she could "create room for dialogue instead of lecturing monologues" (3). She wanted to create a space where all voices were equal in importance rather than the traditional classroom where the professor lectures and students diligently take notes and may be allowed to ask a few questions at the end of class. In her classroom, and in many composition classrooms across the nation, instructors hold "the assumption that we want students to express their thoughts and explore their own viewpoints instead of mimicking what they think we want to hear" (3). So, both in writing center conferences and in their classrooms, these instructors privilege student voice and opinion over that of the instructor.

These graduate students also emphasized Dave Healy's earlier point about the negativity of a hierarchical relationship between student and writing tutor. Another graduate student writes, "Tutors should try to establish a peer/peer relationship with the students they see, not a teacher/student relationship. Writing center tutoring is -- at least in theory -- supposed to replace the hierarchical model of instruction (high-status teachers passing knowledge down to low-status students) with a collaborative model in which the tutors and students become co-learners" (14). In this approach, the students' ownership of his/her text is emphasized. For these four writing center consultants, the traditional model of peer/peer, non-directive, non-evaluative consultations enhances their views of their teaching in composition classrooms and their research as scholars in a liberal arts environment. The question is whether this kind of consultation works best for the students who seek their help in the writing center.

While many professors and instructors would agree that classrooms should not be places where the students merely parrot responses that they think the professor wants to hear, the leaderless classroom is a utopian idea that is riddled with problems. First, why pay an instructor to "teach" the class if all voices are equal in value and the teacher has nothing else to add? In some cases, there simply must be direction from the instructor or members of the class are not learning material that is crucial to their education. Also, it is risky to place graduate teaching assistants in situations where they compromise their authority as teachers by attempting to have leaderless classrooms. Many college students find this lack of authority confusing, and graduate teaching assistants do not have the experience and university mandate necessary to conduct such a volatile classroom experiment.

In a recent article in <u>The Writing Center Journal</u>, "Real Men Don't Do Writing Centers," Margaret O. Tipper questions the "non-directive style [of writing centers], which has reached the level of icon" (36). Tipper, who teaches at a boys' school, hypothesizes that the feminized "safe space" of writing centers may actually be counter-productive to male students who typically have a more aggressive learning style. In her research, Tipper has discovered that when boys attend a typical non-directive, student-centered writing center session, "the boys do not understand the kind of help they receive when their questions are answered with questions" (37). The male students that Tipper teaches prefer a more directed, assertive consultation session where the writing center consultant is the acknowledged expert who will lead the session. Tipper calls for writing centers to acknowledge that the feminine practices espoused in most writing center theory may well be difficult for male students to accept and states, "rather than trying to change the boys, perhaps we should try changing some of our practices in the Writing Center" (33). Further research should also examine what practices and techniques work best for female students.

The ECE Writing Center was founded on many of the traditional writing center theoretical principles. For example, until the spring 1999 semester, the ECE Writing Center Director and consultants echoed the views of Harris, Healy, Kenneth Bruffee, and others who emphasize the role of the writing center tutor as student advocate. The Writing Center had maintained a clear separation from even peripheral involvement in grading and exerted significant effort to keep the Writing Center a "safe place."[3] However, by spring 1999, the Writing Center was ready to abandon this separation and willingly assumed the role of graders in the EECE 201 course. Several factors led to this change in philosophy. The main influence was a gradual realization

that running a writing center in an engineering department for engineering students required a variety of techniques and approaches that differed from traditional writing center theory. These differences will be explored in more detail in the last section of this chapter and in the study in Chapter 5.

Due to the disciplinary nature of the ECE Writing Center, the Center's goals and involvement with ECE courses and students was necessarily more curriculum-driven than what North recommends. Therefore, WAC and WID theory also exerted significant influence on the ECE Writing Center's decisions about its role in the ECE department. A closer examination of the WAC and WID movements will further inform the discussion of the ECE Writing Center's history in chapter four.

Writing Across the Curriculum (WAC) Theory

The WAC movement is concerned with expanding the teaching of writing from the province of the English department (especially the freshman year courses) to all disciplines that are interested teaching writing within their courses in the diverse university community. David R. Russell traces the WAC movement all the way back to the Bay Area Writing Project in the early 1970s. For Russell, the BAWP is "the most important predecessor of the American WAC movement" (13). The BAWP, sponsored by the University of California at Berkeley and later becoming the National Writing Project (NWP), hosted workshops in which secondary education teachers collaborated and shared successful strategies for teaching writing in their classrooms and practiced writing themselves. While most participants were English teachers, the project focused on writing as part of the learning process and on how writing could be used in an interdisciplinary manner.

Also in the 1970s, the infamous "Why Johnny Can't Write" story in a 1974 *Newsweek* issue sparked national concern that American high school graduates were semi-literate. The National Assessment of Education Progress report on student writing also contributed to the furor. The 1974 NAEP test of student writing, whose results were inconclusive, nevertheless seemed to show that student writing had declined since 1969 (the date of the last test). This crisis set the stage for writing across the curriculum, where writing is a process central to all disciplines, to take hold. At Michigan Technological University, Toby Fulwiler and Art Young created a WAC program that brought writing instruction into technical and scientific courses. Russell notes that "the national interest in literacy made WAC programs frequent beneficiaries of corporate and government funding" (16). And WAC also allowed administrators to address several concerns:

- WAC represented a response to the public's demands for improvement in student writing;
- WAC created opportunities for faculty development;
- WAC provided opportunities for faculty to cross disciplinary boundaries and work together.

James L. Kinneavy has also stressed the importance of WAC for rhetoricians. He says, "Writing across the curriculum may be seen as reasserting the centrality of rhetoric to the humanities tradition, a position it has not occupied since the middle of the eighteenth or the beginning of the nineteenth century. In fact, the ability to write intelligent prose has been the hallmark of the educated person from antiquity to the present" (Landmark 66). Kinneavy divides WAC programs into two categories:

1. The individual subject approach, which includes programs where departments like engineering, business, and chemistry incorporate writing into specific departmental courses.
2. The centralized generic system, which includes programs where writing instruction is centralized in the English department. (66-67)

A combination of the two approaches provides the most chances for successfully maintaining a WAC program, according to Kinneavy. English department involvement is essential, because, otherwise, there is a tacit implication that anyone can teach writing who knows how to write, and Kinneavy is understandably uncomfortable with that slippery slope. However, English departments must have the cooperation and endorsement from other departments, or the program can quickly disintegrate.

Robert Jones and Joseph J. Comprone discuss WAC's future in "Where Do We Go Next in Writing across the Curriculum?" One of the areas that Jones and Comprone describe as a problem is the temporary nature of WAC as evidenced in the tentative relationships between humanities faculty and faculty in other disciplines. These relationships are often forged in the fervor of a WAC workshop but often do not survive past the end of the workshop when faculty disperse to their respective areas of campus. They write, "permanent success in the WAC movement will be established only when writing faculty and those from other disciplines meet half way, creating a curricular and pedagogical dialogue that is based on and reinforced by research" (61). This call for permanence echoes Elizabeth A. Flynn's assertion that humanities and engineering faculty must create permanent collaborative structures in order for their projects to succeed. Comprone and Jones emphasize that more "dialogic interaction" needs to occur between writing faculty and science faculty. This closer relationship would help WAC programs use discipline-specific conventions to help students learn the best ways to communicate in their fields.

Writing in the Disciplines (WID) Theory

Writing in the Disciplines is considered by many programs to be an offshoot of WAC, and there are several university web sites that provide descriptions of and materials for their WID programs. For example, Northern Illinois University provides a comparison/contrast of WAC and WID on its web page:

Premises of Writing Across the Curriculum
1. Writing is a complex activity, and writing problems are numerous and varied. 2. Writing is a process as well as a product.
3. Writing is a learning activity as well as a communications activity.
   Writing helps students learn the content of a field.
   Writing helps students learn the communication patterns within a discourse community.
4. Students learn to write well by writing in localized contexts and by receiving responses from writers within those contexts.

Premises of Writing in the Disciplines
1. Writing is a practice.
2. Writing expectations and performances are discipline specific.

3.Much of what an accomplished writer knows about writing remains tacit.
4.Tacit knowledge is communicated through apprenticeship.
(www.wiu.edu/users/miwrite/wid/widguide.htm 8/2/99)[4]

Most programs consider WID as a part of WAC, not separate from it. WID focuses on the writing done in academic settings other than composition courses. Whereas WAC programs generally seek to export writing into other disciplines, WID programs use the writing opportunities that are already present in many disciplines to anchor the writing instruction.[5] For example, in the ECE department, the writing instruction focuses on lab reports and technical memos, pieces of writing that were central to the lab courses before the Writing Center was established. Martha Thomas, the Director of the USC Center for Business Communication in the Darla Moore School of Business, distinguishes between WAC and WID, stating, "WAC is more process-oriented, where WID is product-oriented" (interview 7/29/99). By this, Thomas means that in WID programs, emphasis is placed on the writing process, but the writing is focused on specific genres of writing (like the business proposal or the engineering lab report).

J. Slevin, K. Fort, and P. O'Connor, in "Programs that Work: Models and Methods for Writing Across the Curriculum," also distinguish between WAC and WID. They state,

> In the former, writing across the curriculum, we look for general practices, common procedures for teaching writing that will work in all sorts of courses; so our attention here will be on generalizations about the writing process, learning, and cognitive growth. The latter concept of writing in the disciplines begins with a different question: when a political scientist, or historian, or philosopher discusses the writing she studies and teaches (e.g. the texts of Locke and Hume) and the scholarly and student writing that intends to say something convincing about those texts, what does she mean by writing? (32)

So, according to these criteria, the ECE Writing Center is a WID program because of its disciplinary focus, its location within the ECE department, and its strong efforts to learn about and teach what it means to write like an engineer.

Anne Herrington discusses concerns about writing specifically within engineering in "Writing in Academic Settings: A Study of the Contexts for Writing in Two College Chemical Engineering Courses." In this article, Herrington calls for research on specific classrooms to build a body of work that examines the successes and failures of WAC and WID efforts. Herrington explores the role that writing plays in introducing students to the social construction of knowledge in their chosen field of study: engineering. She also examines how the instructors of the two engineering courses in the study influence student responses by focusing on the contexts of the writing assignments they give to students. In other words, students' responses to written prompts are strongly linked to the cues and contexts given in the writing assignment, an idea that is not revolutionary to those in composition studies (109). But this information is very new and impressive to professors in technical fields like engineering, where the professors have not studied the importance of context for readers and writers. While Herrington's study may not be replicable in many situations, her conclusions about the social interactions that occur between faculty and students within writing situations is valuable to WID scholarship.

The ECE Writing Center as a Model of the New Direction

So, how does the ECE Writing Center, a discipline-specific (and, therefore, curriculum-driven) writing center fit into writing center theory and the WAC and WID movements? I believe that writing centers like the one in the ECE department are a new frontier for writing center theory. A writing center that is housed in a specific department like Electrical and Computer Engineering is necessarily going to have different foci for instruction and consultations than would a humanities-housed writing center. Specialization is necessary for writing consultants in a discipline-specific center much more so than in a generalist-oriented humanities model. Almost all of the writing that ECE Writing Center consultants see is engineering writing (lab reports, technical memos, Master's theses, faculty papers and proposals).[6]

In my four years at the ECE Writing Center, the fix-it shop image of writing centers that so frustrates North simply has not been a problem. When we first encounter a professor or student who is new to the concept of writing centers, the person often does think that we provide editing and grammar checks. One individual even asked if his students could drop their papers off for us to proofread and then pick up a "fixed" copy later. However, once we explain to them more about writing center theory and methodology, they quickly buy into the idea of the writing center teaching the students (and faculty) <u>methods</u> for improving writing, rather than running spellcheck and inserting commas.

This relatively quick release of the fix-it shop image may be symptomatic of engineers' (even engineering professors') insecurities about their abilities as writers. Many engineering students and faculty who have worked with the Writing Center have been quick to warn consultants about their deficiencies in writing. Yet they are also quick to abandon the idea of a one-stop fix for their writing once a writing center consultant explains how complex the writing process is and that a significant time commitment is necessary to substantially improve someone's writing process. Therefore, these engineers may be more comfortable with the idea that there is no easy answer to address the writing problems that they have struggled with in their writing for many years. This may be tied into the engineering design process whereby engineers go through repeated iterations of designs before they find the right design for their products.

If the ECE Writing Center consultants made statements like North's refusals to associate with external curriculum goals in any way, I imagine most engineering students and faculty would respond, "Then what do you do?" Engineering is a product-driven field, and if you have a glitch in the product (like sentence-level errors in a lab report), you work to fix it quickly. North's comments strike me as disingenuous at best. What engineering writing center consultant could possibly toss out a response such as North's and hope to maintain departmental support and funding? Moreover, North, himself a writing center director and English department professor, is writing from a humanities-based writing center perspective. The ECE Writing Center absolutely must be curriculum-driven, or else why have an engineering writing center at all?

So, is the ECE Writing Center a failure, an anti-writing center, according to North's criteria? No, because North also emphasizes that one of the writing center's most important aspects is that we talk to writers (79). North closes his essay by saying, "If writing centers are going to finally be accepted, surely they must be accepted on their own terms, as places whose primary responsibility, whose only

reason for being, is to talk to writers" (85). And the ECE Writing Center focuses and localizes this talk about writing in engineering in a way that the ECE Department has never seen before. We work with both students and faculty, and we talk to writers who would never go to the Writing Center run by the English Department at USC, if only because it is too far away from the College of Engineering. Proximity is a key to the success of the ECE Writing Center.

Another key to the ECE Writing Center's success supports Muriel Harris' point about how writing centers personalize instruction in ways that often do not occur in the classroom setting. In the ECE Department, many students are balancing full-time or near full-time work with their full course loads. For example, I had a student who repeatedly fell asleep during our writing center group meetings, and when I asked her why she was so tired, she explained that she worked nights at a pancake house, had a full course load, and did her homework in between. I asked her when she slept, and she said she didn't sleep much at all. This information was valuable because I could change our meeting time to a slot when the student was more rested. Yet, I doubt if any of her professors ever knew why she was so tired. So the ECE Writing Center shares this role with more traditional writing centers, but the insight into students' lives is extremely new for the engineering departments.

However, Harris' (and others') emphasis on the non-directive, non-evaluative writing center philosophy simply is not effective in a discipline-specific writing center like the ECE Writing Center. In one important sense, we do remain non-directive: we don't edit or rewrite students' papers for them. We continue to utilize the traditional methods of having students read their work aloud, showing them patterns of errors, discussing structure problems before addressing surface errors, and discussing the writing process with students. But in a highly technical discipline like engineering we cannot hope to establish a peer/peer relationship with engineering students. We are the experts on writing; many engineering students dislike writing. They are the experts in engineering; we know very little about the science and math they work with daily.

Also, as Tipper notes, the feminized style of writing centers may very well be disturbing, if not disruptive, to male students who prefer direct answers rather than evasive questioning.[7] Like Tipper, Linda K. Shamoon and Deborah H. Burns are beginning to explore the possibility that the non-directive, non-evaluative (traditional) writing center methods may not be the most effective forms of consultation. In "A Critique of Pure Tutoring," Shamoon and Burns describe many stories that they have heard from faculty in WAC workshops where the faculty members remembered directive, evaluative tutoring sessions as positive and helpful. Shamoon and Burns describe the traditional writing center approach as "process-based, Socratic, private, a-disciplinary, and nonhierarchical or directive" (137). However, they stress that

> Over and over in the informal reports of our colleagues we find that crucial information about a discipline and about writing is transmitted in ways that are intrusive, directive, and product-oriented, yet these behaviors are not seen as an appropriation of power or voice but instead as an opening up of those aspects of practice which had remained unspoken and opaque. (139)

This comment directly reflects what we encounter in tutoring/consulting sessions in the ECE Writing Center. Students come to us and want to know what they should include in an abstract. To reply, "What do you think you should put in an abstract?"

would be frustrating to many students. The students need, and want, to be directly guided.

Lisa D. Delpit endorses the concept of directive, explicit teaching in "The Silenced Dialogue: Power and Pedagogy in Educating Other People's Children." Delpit is writing about how important it is to discuss rhetorical devices and communication tools openly so that students from different ethnic and socio-economic backgrounds can learn how to communicate in mainstream-accepted forms. But her thesis also applies to students in disciplines like engineering who perceive themselves as poor communicators (whether rightly or wrongly). These students have entered a new discourse community where the conventions and modes of communication are vastly different from the high school and freshman English papers they have written. For example, engineering reports use passive verb constructions and eliminate all direct references to the writer in reports. Many students find it difficult to tell what they did in lab without referring to themselves or to their lab partners. Students need explicit guidance at first, because they are also used to trying to avoid using passive verbs in their high school and freshman English papers.

Delpit writes, "If you are not already a participant in the culture of power, being told explicitly the rules of that culture makes acquiring that power easier" (568). Students who are new to engineering, and who either have or feel they have a shaky background in writing, need directive tutoring. They seek out evaluation and respond quickly to product-oriented examples and techniques. Shamoon and Burns write, "Directive tutoring is based upon the articulation of rhetorical processes in order to make literate disciplinary practice plain enough to be imitated, practiced, mastered, and questioned" (146).

Robert Regal, an engineering TA in the 201 course for the past three semesters, supports Delpit's and Shamoon and Burns' calls for explicit feedback for students. Regal suggests that the writing center should write out the amount of points the student is losing for each mistake that is marked when Writing Center consultants grade the 201 lab reports. He says, "If we [engineers] see the points we're losing, we can fix it. But the problem with English is it's more holistic" (interview 2/24/99). Regal's idea of equating certain mistakes with specific point losses is not how most English teaching assistants grade; he is correct in stating that English is more holistically oriented. But engineering students want the specific feedback that tells them which errors are the most egregious so they can "fix it." Perhaps the answer is not necessarily found in equating points with problems in writing. However, the underlying principle of being specific and directive with students about their writing is part of what Regal calls for and what the ECE Writing Center provides.

Another area of engineering writing that necessitates directive and explicit communication from the Writing Center is engineers' attitudes about writing. It is critical for engineering students to learn that writing (even their "factual" writing) is used to persuade others. Yet many engineering students struggle against this concept of persuasive writing. Charles Bazerman examines the persuasive aspect inherent in scientific writing in <u>Shaping Written Knowledge</u>. He writes, "Persuasion is at the heart of science, not at the unrespectable fringe. An intelligent rhetoric practiced within a serious, experienced, knowledgeable, committed research community is a serious method of truth seeking. The most serious scientific communication is not that which disowns persuasion, but which persuades in the deepest, most compelling manner, thereby sweeping aside more superficial arguments" (321). Students in the EECE 201 class often seemed uncomfortable with the persuasive aspect of their lab

reports. Students seemed to feel that the tables of data and the graphs represented the analysis and that words were not necessary. Yet students need to learn how to communicate results and analysis with words because many of their writing responsibilities as professional engineers will entail writing evaluations and making recommendations. And both of these genres fall under the category of persuasion.

Writing Center Consultants as Instructors

Another important role of the ECE Writing Center is to provide technical writing instruction for engineering students. USC College of Engineering students, as a whole, do not take a technical writing course because their engineering curriculum is too full for them to use Technical Writing even as an elective. In fact, the ECE Writing Center provides all the technical writing instruction these students are getting. Providing engineering students with training and experience in technical writing is important to ensure that the students will be successful communicators in their future careers. According to Gary Blake, "As someone who goes from company to company teaching technical writing, I am often astonished at the number of engineers who tell me that they have never taken a technical writing class. The result of [this inexperience and their resulting] haphazard approach to communication is billions of dollars in lost corporate productivity and profitability each year" (Douglas 28).

Robert Barass, himself an engineer, states, "Writing is part of science but many scientists receive no formal training in the art of writing. There is a certain irony in our teaching scientists and engineers to use instruments and techniques, many of which they will never use in their working lives, and yet not teaching them to write. This is the one thing that they must do every day - as students, and as administrators, executives, scientists, and engineers" (xiii). And David Bloomquist, an engineering professor at the University of Florida, has noted, "As a student, you spend 90% of your time in engineering doing calculations and 10% of your time writing. As a professional on the job, you spend probably 15% of your time working with numbers and 85% of your time writing" (Douglas 37). This is a particularly important point, because engineers rely more on their communications skills than on their engineering work as they move higher on the promotion ladder. As engineer Jerry Harvey notes, "management is where the money is. And with management comes paperwork" (Ramey "Freshman" 7). Thus, it is even more ironic that few engineering students receive training in writing and oral presentation skills after they take their required ENGL 101 and 102 courses.

In Carol Berkenkotter, Thomas N. Huckin, and John Ackerman's article, "Social Context and Socially Constructed Texts: The Initiation of a Graduate Student into a Writing Research Community," the authors trace the changes in a student's writing and style as his writing decisions are molded and shaped over a period of time. They refer to studies by Herrington, North, and others who "suggest that students entering academic disciplines need a specialized literacy that consists of the ability to use discipline-specific rhetorical and linguistic conventions to serve their purposes as writers" (191). We have observed this need to acquire literacy in the ECE Department, especially with the EECE 201 course, because this course is the first lab course for most of the students, and the lab report genre is unfamiliar to them. The ECE Writing Center has been researching the discipline-specific rhetorical and linguistic tools that ECE students need as they enter the lab sequence in EECE 201

since 1995. By involving the Writing Center in the course itself, the ECE Department has taken significant steps towards helping their undergraduates quickly identify the writing conventions of their field. This results in students who assimilate into the ECE culture as communicators more quickly.

Berkenkotter, et al. write, "As language users travel from one community context to another -- . . .from high school to college. . .from college to the work force -- they must master new ways of speaking, reading, and writing, ways that are appropriate within each community" (193). I would also add that students must adapt their ideas about written communication when they move from the English department classroom to the engineering classroom. In engineering, students encounter new ways of organizing information and communicating knowledge. For example, most students are cautioned to avoid repetition of ideas in a typical English 101 or 102 essay. However, engineering students are required (by the conventions of lab report writing) to repeat certain types of information in multiple sections of a lab report. Sometimes the same or similar information appears in the abstract, the introduction, and the conclusion. Students have to overcome the admonitions of past English teachers about avoiding repetition in order to successfully become good writers as engineers.

While Berkenkotter, et al. are writing about a graduate student's initiation into a humanities field of research, many of their observations also apply to the ECE students who take 201. They note that ". . .writers must master both the technique of summarizing and the procedures that will enable them to summarize according to their rhetorical purposes. Learning to use the conventions of the article introduction may well constitute the most difficult part of research writing, especially for novice researchers" (199). In EECE 201, one of the most difficult sections of the lab report for students to master is the abstract, and yet the abstract is one of the most often read (and therefore most influential) sections of the report. The abstract provides a skeleton summary of what is contained in the report. We have found that many students want to write the abstract first because it is located on the title page of the lab report. However, how can they provide a summary of what is in the report when the report has not been written? So, the Writing Center spends some instruction time talking about purposes of abstracts, whom the abstract is written for, and strategies for writing the abstract after the body of the report is written. In this way, the Writing Center teaches the EECE 201 students the conventions of summary that Berkenkotter, et al. present.

The ECE Writing Center has made the incorporation of technical writing assignments, like oral presentations, progress reports, and technical memos, a priority in the revision of the EECE 201 curriculum to embed additional technical writing instruction in the sophomore lab course. This curriculum revision also allows the Writing Center and the ECE Department to address the concerns of educators/researchers like James R. Kalmbach, who writes about engineering students who don't value their lab report writing experiences because "their reports were written without any meaningful context" (181). As Kalmbach notes, it is vital to give context to writing assignments (even to lab reports) to help students to see the connections between writing and engineering. The Writing Center encourages faculty and students to discuss engineering business situations where students will encounter the types of writing that they do in EECE 201: lab reports, technical memos, oral presentations, and progress reports. This dialogue gives students context and perspective on the role that writing plays in an engineer's career.

By serving as writing instructors and by designing (and sometimes evaluating) the writing assignments, the Writing Center consultants at the ECE Writing Center blur the traditional writing center distinction between peer tutor and evaluator. In the ECE environment, the Writing Center consultants have been integrated into the EECE 201 course and curriculum. This has resulted in a Writing Center that better serves the ECE students but one that is less traditional than many campus writing centers.

Another issue that is central to establishing a discipline-specific writing center is integration into the department or discipline. Trachsel states that "writing centers must take steps to deconstruct the ethical boundaries that confine and isolate writing centers and composition programs within institutional structures that define them as 'other'" (42). This identity as "other" is an issue that the ECE Writing Center has been struggling with for four years. Engineering students, and many faculty, viewed the Writing Center as an outside entity, despite our physical presence in the department. And in the EECE 201 course, the Writing Center has in the past been an "add-on" component of the course, rather than integrated into the course content. However, in the spring 1999 semester, for the first time, the Writing Center staff was an organic part of the 201 course. The Writing Consultants' names were on the syllabus as TAs, Writing Consultants were introduced on the first day of class as TAs, Consultants graded the students' labs, and both the engineering and the Writing Center TAs participated in the full two-hours of recitation. In the past, the Writing Center staff only came to class when the engineering recitation was over, and the engineering staff left the classroom when the Writing Center took over, so there was a visible division between instructors and content.

Conclusions and Implications for the ECE Writing Center

The ECE Writing Center is taking WAC and WID theory and pushing it to the next level. When the disciplinary constraints and genres of engineering meet writing center and WAC theory and methodology, both communities benefit from the interaction. This nexus provides unique opportunities to explore an area of writing center growth that may be the way of the future: the discipline-specific writing center. Thus, the observations that come from this study and the work of Deborah Dyck, Chris Fosen, Tom Bowers, and Kristin Walker, former ECE Writing Center TAs, represent a new body of knowledge within the larger writing center community.

The next chapter contains a detailed description of the methodology used in the study of the EECE 201 students' writing that appears in chapter five. Chapter 3 also serves as a continuation of the discussion of writing center and WAC and WID theory that began here because several of the works that influenced my methodological choices for this study also guided the ECE Writing Center's decisions and policies.

End Notes

[1] Mike Rose, in "The Language of Exclusion: Writing Instruction at the University," notes that the medical-remedial language is still used to describe writers "as suffering from specifiable, locatable defects, deficits, and handicaps that can be localized, circumscribed, and remedied." For Rose, this language of remediation "serves to exclude from the academic community those who are so labeled" (537).

[2] In fact, during the semesters when there was a Technical Writing TA in the EECE 201 course, the Writing Center made sure that she had a separate office so that she would not be seen in the Writing Center grading papers. Writing Center staff were very concerned that 201 students should not associate the Writing Center or the consultants in any way with the grading of their writing.

[3] Deborah Dyck, a former ECE Teaching Assistant, created the lab report template that is still used in EECE 201 today.

[4] Danielle Rowley of the Center for Business Communication at USC has compiled an annotated bibliography of writing center and university web pages that address WAC and WID issues. Martha Thomas, Director of the CBC, can provide copies for interested readers.

[5] Chris Fosen provides a lengthy discussion of the WAC and WID movements and his perceptions of how they affect the writing instruction in the ECE department in his 1997 Master's Thesis, Composition and Engineering Education: Learning to Teach Writing in Engineering.

[6] However, Writing Center consultants will work with students or faculty on any writing assignments and have worked with students on resumes, graduate school application essays, English department papers, etc.

[7] The proportion of male to female students in the ECE Department heavily favors males. In the spring 1999 EECE 201 course, there were 36 students, 25 male and 11 female. So, while scholarship that focuses on the learning of males is somewhat essentialistic and troubling, male students do significantly outnumber female students in the ECE Department and in the College of Engineering at USC. Also, there are no tenure-track female professors in the ECE Department, a statistic that reflects the low numbers of women in the field nationwide.

Chapter 3
Methodology and Influences on the Research Study Design

In this chapter, I present the research methodologies that influenced my project, as well as several research studies that provided models of discourse analysis and ethnography that I echo in my study of the EECE 201 writing instruction. This chapter also includes an overview of the evaluation of the spring 1999 semester writing instruction that constitutes chapter six.

Overview of the Study

This project is a program evaluation of the writing instruction provided by the ECE Writing Center to the EECE 201 sophomore lab course. One part of the study is a summary of iterations of writing instruction that the Writing Center has used in past semesters (i.e. small groups, individual consultations, a Technical Writing TA, etc.), which appears in chapter four. The second part of the study, in chapter five, is an in-depth assessment and evaluation of the spring 1999 model of writing instruction that involved Writing Center TAs grading labs for the first time.[1] The observations from chapter five will be used to make recommendations for further modifications and development of the writing instruction provided in the summer and fall 1999 sections of EECE 201.

In the second part of the study, ten lab reports with the Writing Center TA comments on them were collected from 18 of 36 students in spring 1999. An evaluation of the Writing Center's presentation on oral presentations was also administered and collected. Finally, a course evaluation with several questions about writing instruction and communications was conducted and collected. These reports and evaluations constitute the written data used in the study. I also interviewed three 201 students in the spring 1999 semester, two of the engineering TAs for the spring 1999 course, and the professor of record for 201, Dr. Clint Chandler. The information from these interviews also contributes significantly to the program evaluation.

From the lab reports collected, I used the first lab report because students wrote a draft of that report and had a chance to revise for a better grade. This assignment also gave me the opportunity to gauge how students responded to writing center instruction and the writing center comments on the students' papers. I also used the report on Lab 9, which required students to synthesize the information from three separate exercises that built on each other, labs 7, 8, and 9. Kristin Walker's "Features and Discourse Strategies that Indicate Generic Knowledge about EECE 201 Lab Report Writing," a list of eleven characteristics of writing, to evaluate successful and unsuccessful writing strategies in the students' work provided a model for analyzing lab reports (See Appendix A). I coded the labs in each student's portfolio, using some of the characteristics from Walker's list and additional characteristics that the Writing Center discussed in the spring 1999 in-class instruction (field notes 1/99 - - 4/99). After coding, I looked for patterns or sites where multiple students had similar problems in their writing. For example, many students in the class did not introduce tables and graphs in their labs with any textual remarks. The students simply inserted the graph or chart into their labs as stand-alone data. This lack of introduction or explanation became a topic that the Writing Center discussed in a presentation for the course. Then I compared the areas of student struggle with the topics of Writing Center instruction. I evaluated the student writing trying to analyze the degree of success of the writing instruction that had accompanied that particular

writing assignment. For example, if many of the students exhibited problems organizing the information in progress report format, I tried to connect those problems to possible gaps in the writing instruction about progress reports.

I devised the list of four characteristics used in this study based on the overlap between student problems and the Writing Center's formal writing instruction. The four characteristics used in this study are:

- Presence of purpose statements in the abstract
- Introduction of tables and graphs with sentences to give the readers context
- Use of sub-headings
- Provision of analysis and explanation of events that occurred in the lab (like discrepancies in expected vs. measured data) in sentences as well as in tables.

The interviews that I conducted consisted of open-ended questions designed to elicit evaluations of writing instruction in the class (See Appendix B). The three student participants were asked about specific assignments as well as about the communications instruction in general. All three of the students who volunteered for interviews were from the group of 18 students whose work I graded during the semester. The engineering TAs and Dr. Chandler were asked, based on their perceptions, to evaluate the success of the writing instruction at several points in the semester. More detailed information from the interviews appears in the chapter five presentation of the spring 1999 model.

The assessment of the spring 1999 model of writing instruction is based on the information gathered from these interviews and from the writing samples. Because there is a history of past forms of writing instruction presented in chapter 4, the spring 1999 model can be placed in a larger context of writing instruction and then evaluated as to its success in integrating writing into the 201 course. The implications for integrating writing into a discipline like engineering and for Writing in the Disciplines in general are discussed in the conclusion of the study.

The following discussion of methodology provides an overview of the sources that influenced my methodological choices in the study described in chapter five. The sources range from general overviews of qualitative research techniques and philosophy to specific naturalistic studies of writing in the disciplines projects. The foundation provided by these studies guided my decisions about which aspects of the writing instruction I would evaluate in this project.

Research Studies that Influenced the Project Evaluated in this Study

Dorothy Winsor's article, "Engineering Writing/Writing Engineering" and Elizabeth A. Flynn's "Interaction Across the Curriculum," heavily influenced the development of the ECE Writing Center. While these studies did not overtly influence my research methodologies for the study that appears in chapter 5, Winsor's and Flynn's work greatly impacted the policies and methods used in the ECE Writing Center. As a result, it is important to thoroughly understand which aspects of these studies were the most influential to the Writing Center in order to fully understand how the Writing Center established its presence in the ECE Department and in the EECE 201 course.

In "Interaction Across the Curriculum," Flynn and her co-authors describe a collaboration between faculty in the Humanities and in engineering at Michigan Tech University. Using an "interactional approach," Flynn, et al. combined emphases on

both the social process dimension of learning which involves the active participation of teacher and learners and on the importance of disciplinary knowledge in this learning process (351). Flynn describes the NSF-funded research project she conducted with William Bulleit, a professor in the Department of Civil and Environmental Engineering and Kathryn Remlinger, a graduate student in the Department of Humanities who also participated in the project.

The project, "Improving Writing in Engineering Design Courses," was intended to "produce materials that would be useful in the teaching of engineering design courses across the country" (351). Bulleit, the engineering professor, was interested in finding ways to include meaningful writing exercises in a term-long design project that was highly technical. One of the changes Bulleit made was to add progress memos to the project requirements. He writes, "The progress memo encourages an interactive approach to learning. Students learn to create design reports by communicating the progress they are making as they construct them and by receiving feedback on those constructions rather than by merely internalizing the conventions of those reports" (356). Bulleit also notes that after he began requiring the progress memos the number of unfinished projects dropped to almost zero.

Flynn emphasizes the value of the collaboration between humanities and engineering faculty, groups that often do not work together. However, she also notes problems with the collaboration. She writes, "Often the writing specialists who are charged with developing programs are themselves struggling for status within the academy either because they are untenured or because composition occupies low status in relation to other fields in the academy. Frequently they are women faced with the task of convincing males to adopt new pedagogical approaches. Graduate students working on WAC projects face even greater challenges to their authority" (361). Staff of a project like the ECE Writing Center are likely to experience at least some of these problems, and it is important to be aware of possible pitfalls of collaboration. I will elaborate on my own experience as a graduate student working with engineering faculty in the chapters on the history of the Writing Center and the spring 1999 study.

Flynn ends the article on a note that supports our work in the ECE Writing Center. She writes, "Clearly, though, significant change, especially in the sciences and engineering, will result only from the creation of **permanent structures** that bring writing specialists and faculty from different disciplines together on a regular basis" (emphasis mine) (361). The ECE Writing Center is one attempt to answer Flynn's call for "permanent structures" in which engineering and humanities faculty and students can meet and share views about language and communication.

Dorothy Winsor's work, "Engineering Writing/Writing Engineering," is another case study of an engineer's involvement with writing. Winsor studies the writing habits of an engineer with a Ph.D. in Mechanical Engineering who works as a middle-level manager in a large manufacturing company. She explores the vital connection between science and writing. Winsor observes that engineers are quite Platonic in their views about writing. She notes that scientists and engineers view their primary objectives (both in education and on the job) as working with physical objects, building bridges, drawing schematics, testing circuits. However, all of the results of these "physical" experiments get translated into what? Writing. As Steve Woolgar and Bruno Latour observe, "the objective of lab activity is inscription, the conversion of physical reality into written documents ranging from lists of numbers to published papers" (Winsor 60). Ironically, engineering students in EECE 201 do

much more writing throughout a single semester (7 labs, 3 technical memos, 1 progress report, and 1 oral presentation) than do students in most liberal arts courses.

Winsor notes that "each document must convince other people of its validity in order to be accepted as knowledge. Only documents that do convince others are used" (60). Engineers must also be effective communicators in order to progress in their chosen field. Winsor observes that "For an engineer to be accepted as an engineer, he or she must write and speak in the already-created forms and tongues of engineering. Thus, while it is possible to say that engineers create themselves in texts, it is also possible to say that they are created by the texts available to them" (67). This concept of acceptance into a discourse community is also discussed by Berkenkotter, Huckin, and Ackerman. Finally, Winsor concludes, by reflecting on the strong resistance that many engineers have about viewing themselves as writers, saying, "The engineer differs from the rest of us, perhaps, only in showing greater resistance to knowing that language mediates experience" (68).

The ECE Writing Center has encountered such a resistance from many engineering students who actually believe that engineers do not have to write much in their jobs. Much of this project is an exploration of the various models and methods of writing instruction that the ECE Writing Center has used to overcome this student resistance to writing.

General Methodologies Underlying the Study

This study is grounded in qualitative research methods. Several works provide the background for the methodology that I chose for this project. The theories of Yvonna Lincoln and Egon Guba, presented in their book Naturalistic Inquiry, heavily influenced my study in several ways. First, Lincoln and Guba discuss grounded theory. They write that a naturalistic inquiry relies on grounded theory that emerges from the data rather than an "*a priori*" theory because it is impossible to predict patterns in the data and the direction the study will take before it is complete. They also note that *a priori* theory often imposes constraints on the observer that may taint the neutrality of the observer's position. For example, in this study, I did not choose which characteristics I would look for in student writing before I collected and coded the lab reports. Instead, I waited until I had collected all 10 lab reports from all 18 students, and then I went through the labs until I began to see patterns of both errors and corrections. Therefore, the characteristics that I chose to analyze were not determined by a theory that I held before analyzing the writing samples. I was able to choose the list of four characteristics based on what was actually present in the lab reports, rather than imposing theory onto my analysis of the reports to forcibly create situations that matched my theory. In contrast, grounded theory allows the observer to be more responsive to the situation and to develop theories that match what the data indicates.

As I began the study of the spring 1999 model of Writing Center instruction in EECE 201, I had knowledge of what had and had not worked in past semesters. But I did not try to predict outcomes of Writing Center involvement in the course as we took on the new role of grader. I wanted to be open to explore patterns that would emerge from the data that I collected from the EECE 201 course in the spring 1999 semester rather than limit my observations to criteria that I imposed before the semester began. Still, it must be recognized that no study is theory-less, and no data gathering occurs in a vacuum clear of all preconceived theories. However, grounded theory allows patterns in data to emerge before the hierarchy of theory is applied to

the data. In this study, there is an underlying theory that the Writing Center's work is beneficial to the EECE 201 class and its students. However, the data were gathered and analyzed for patterns without first proposing theories about what would be found in the data. Grounded theory allowed me to apply theory to the data in a manner that is both compatible with and appropriate for the patterns that emerged throughout the semester.

Another characteristic of effective naturalistic studies discussed by Lincoln and Guba is the importance of natural setting. Setting is crucial because "contextual value structures are at least partly determinative of what will be found" (39). This is especially true of this study where I examined writing in an engineering classroom, an environment that is predisposed to resist, sometimes overtly, writing instruction. The Writing Center's setting has traditionally been in the Humanities buildings or department. The ECE Writing Center, however, is housed in the midst of the ECE Department. In fact, we are located beside one of the large computer labs in the College, so we are fairly visible to students as they use the lab. Our accessibility to students, due to our setting, is one of our strongest points of influence in the department. If we were located on the Humanities end of campus, very few engineering students would have the time or the inclination to seek Writing Center help. Proximity is essential to successful integration of writing.[2] We can, as Dr. Elisabeth Alford notes, "conduct ethnography by walking around," which is to say we can participate in hallway and office conversations with engineering professors and students because we are there.

The setting for the EECE 201 course and for this study also included the 201 classroom. Again, student resistance to Writing Center instruction was a factor, because engineering students typically do not encounter writing instruction in their engineering curriculum. The presence of English department graduate students in an engineering classroom was a shock to many students who envisioned their engineering courses as writing-free. Also, this study would not have been possible if I had not had free access to the 201 classroom and a relationship with the students that allowed me to collect their lab reports.

A third characteristic of naturalistic inquiry that Lincoln and Guba describe is idiographic interpretation. They write that naturalistic observers are likely to interpret data in terms of the specific cases they are observing rather than in terms of universal generalizations because interpretations "depend so heavily for their validity on local particulars, including. . . the contextual factors involved, the local mutually shaping factors influencing one another, and the local (as well as investigator) values" (42). In this study, much of what I observed will be of localized value because the study depends on the same characteristics that Lincoln and Guba describe. Every engineering department is different; every professor and every writing center is different. So what I observed and learned about the ECE Writing Center and the EECE 201 course will be localized knowledge. However, I hope to use Writing in the Disciplines scholarship and theory to contextualize some of my observations about this discipline-specific writing center project. Also, many studies have focused on writing in the sciences and provide extensive observations about conventions and genres of scientific writing like Charles Bazerman's <u>Shaping Written Knowledge: The Genre and Activity of the Experimental Article in Science</u>, Thomas Huckin's <u>Genre Knowledge in Disciplinary Communication: Cognition, Culture, Power</u>, and Greg Myers' "Out of the Laboratory and Down to the Bay: Writing in Science and

Technology Studies." However, other than Dorothy Winsor's five- and ten-year studies of engineering students from GMI Institute and their attitudes about writing, there is not much scholarship that examines the unique forms of communication that engineers must learn. This dissertation project will provide valuable information about the concrete details of creating and running a discipline-specific writing center, particularly for engineering departments. My project also builds on the body of scholarship that the ECE Writing Center has inspired. There are already two M.A. theses and one dissertation about the ECE writing initiative, and another M.A. thesis plus this dissertation are in progress.

I also relied on methodological triangulation to increase the reliability and validity of my study. When I use the term "triangulation," it is in the context of Lincoln and Guba's work when they refer to triangulation as "different data collection modes (interview, questionnaire, observation, testing)" for the purpose of "improving the probability that findings and interpretations will be found credible" (305-06). My data were gathered from: (1) program documentation (which consisted of student survey forms; Writing Center handouts and presentation notes; the course description; student lab reports; and Departmental goals and evaluations of the 201 course; (2) field notes from my observation journal; and (3) interviews with faculty and teaching assistants working with the class and in the Writing Center, as well as interviews with students in the course. This triangulation allowed me to draw information from sources at all levels of involvement in the course: administration, faculty, teaching assistants, Writing Center staff, and the 201 students (from both past and present semesters). I also provided case studies of specific units of instruction or individual students' work where a more detailed presentation of information was needed.

In Qualitative Evaluation and Research Methods, Michael Patton observes that program documentation is a paper trail "that the evaluator can follow and use to increase knowledge and understanding about the program" (233). My situation is ideal, because I had ready access to archives of the ECE Writing Center documentation from its inception, as well as an established connection with the faculty and administration involved with the course. These program documents served the dual function that Patton describes of 1) providing information about program design, program decisions, and activities, and 2) highlighting questions to pursue with the more direct methods of interviews and observation (233).

The observation journal contained my notes from the 201 recitation lectures on engineering and writing concepts and Writing Center presentations, notes on meetings with Dr. Alford, Director of the ECE Writing Center, and Tom Bowers, the Writing Center consultant who graded the other half of the class' lab reports, about the direction of the writing instruction, my observations about the course and the Writing Center's involvement this semester. By participant observation, I refer to my roles of teacher and participant in the class. The role of grader was new for me, so I wanted to compare what I observed this semester to the Writing Center's interaction with past 201 classes where we did not participate in the class in a larger role.

Patton notes six main strengths of participant observation in the work of evaluating a program: 1) Direct observation of the program often leads to a better understanding of the program's operational context; 2) Firsthand, direct experience with a program allows the observer's research to be more inductive and discovery oriented; 3) The evaluator's fresh viewpoint can illuminate routine approaches that may be embedded in the program's modus operandi (this will be especially true in this study of the 201 writing instruction); 4) The evaluator can observe things that

participants might not feel comfortable discussing in an interview; 5) A more comprehensive range of perceptions is available because the observer's perceptions can be included with other members of the study; and 6) The observer's involvement in the program strengthens her perceptions and observations because the observer's impressions become part of the data (203-05). These strengths reinforced the validity of the data that I gathered as a participant-observer.

Interviews are the third method of data collection that I used. I interviewed Writing Center staff, the 201 engineering TAs and professor, and the Director of the Writing Program, as well as others to gain insight into the establishment of the writing program and reaction to this semester's new paradigm. I also interviewed three students in the course to gain their insights or further information about some of their survey responses. These interviews provided alternate views of the writing instruction in the class and allowed me to view the Writing Center's involvement in new ways.

Limitations of the Study

Each of these methods alone would have limitations and drawbacks that might seriously impact this study. First, the study is limited by the small number of students who comprised the sample. For this study, eighteen students out of a class of thirty-six were analyzed. This is the number of students whose work I graded, and therefore the sample was limited by my access to students and their work. Studying a larger group of students might change the number or type of characteristics that were affected by the writing instruction. A larger sample of students might also increase the validity of a study of gender and ESL writing characteristics, factors that I did not examine in this study. Also, the fact that I was only able to observe and analyze the writing samples of half of the class is a limitation because the other 18 students in the class may have responded to the writing instruction differently or not at all. And each group of students may have different clusters of writing problems. However, a strength of this study is the access that I had to all of the writing assignments for the group of eighteen students. This allowed me to trace patterns and changes is students' writing throughout the whole semester rather than looking at one or two designated assignments.

Another possible weakness in the study is the potential for bias in my study and findings because I am a member of the community that I am observing. While this is a strength as far as increasing my access to resources, it is also a weakness because my judgment and analysis might be compromised by such an inside perspective. I attempted to curtail this problem by using grounded theory instead of imposing research questions onto the data. However, my status as a Writing Center consultant observing and analyzing the successes and failures of the writing instruction is a problem at some level.

Another weakness of the study is replicability. The parameters for the study in chapter 5 were very flexible, and it would be difficult to replicate parts of the study. For example, in other engineering departments there would be variables such as the presence or absence of a writing center in the department, the types of writing assignments, class size, professor involvement, etc. However, by triangulating the methodological tools used, I attempted to minimize these weaknesses and to reinforce the strengths of each method with the others. Also, as Anne Herrington notes, it is vital to continue research in specific classrooms and departments in order to build a

body of work that critically examines the pros and cons of WAC and WID programs and courses.

However, as much composition and writing center theory demonstrates, lore (teacher or writing center consultant experience) is a valuable learning and teaching tool. While the quantitative data in this study are overshadowed by the qualitative observations, I believe that the research I conducted is viable for the ECE Department's program and has led to improving the writing instruction in EECE 201.

Finally, the interviews that I conducted were valuable, but it would have been better to interview students at several points in the semester so that I could compare their responses and measure any changes. The students filled out a lengthy course evaluation form at the end of the semester, but their responses were anonymous and voluntary, so I could not compare them to the interview responses that I received. Interview responses would strengthen some of my observations; even if students disagreed with me, I would have a clearer idea of the success or failure of the writing instruction from the perspective that really matters – that of the students.

Models of Naturalistic Inquiry within Writing in the Disciplines

My decisions about methods for this study were also influenced by several research studies in the Writing in the Disciplines (WID) movement. Barbara Walvoord and Lucille McCarthy's Thinking and Writing in College: A Naturalistic Study of Students in Four Disciplines, Dorothy Winsor's Writing Like an Engineer, Jack Selzer's "The Composing Processes of an Engineer," and Carol Berkenkotter, Thomas A. Huckin, and John Ackerman's "Social Context and Socially Constructed Texts: The Initiation of a Graduate Student into a Writing Research Community" provided models of research about writing in engineering or about learning writing conventions of specific disciplines. They each contained ideas and methods that I adapted to suit the methods of my study.

In "The Composing Processes of an Engineer," one of the earliest studies of workplace writing, Jack Selzer discusses a case study that he conducted observing how one engineer, Kenneth E. Nelson, composed and used writing in his job as an engineer/manager in a Chicago design, systems, and sciences firm. Selzer, who teaches technical writing, became interested in this project because he noticed how little research has been done on studying how engineers and scientists plan, arrange, write, and revise on the job. Selzer adapted methods from Janet Emig's The Composing Processes of Twelfth-Graders and Cooper and Odell's Research on Composing. He collected Nelson's notes, outlines, plans, drafts, and revisions of each project. Selzer also devised a set of questions for Nelson to answer before and after each writing session and conducted observations of Nelson at work when he was writing. However, Selzer did not use a protocol analysis because of the awkwardness of the technique in a work situation. He also interviewed Nelson at length about Nelson's ideas about his writing and what Selzer had observed.

Selzer's findings began with how Nelson spent his time in the planning stage of each document. Nelson, a high-level manager with his company, almost always wrote in response to a specific request, so he had a very clear idea of what information needed to be included in each document. Most of the writing that occupied his time were reports and proposals; Nelson spent about 80 percent of his time inventing and arranging the information in these types of documents. Nelson used audience analysis to stimulate his invention processes and then consulted with colleagues in brainstorming sessions where they tried to identify more audience

needs. He also wrote notes on paper until his memory was exhausted and reviewed previously completed documents for each particular client or business to get ideas. Finally, he reviewed his purpose and audience again and eliminated any excess material.

Then, he was ready to write. Nelson arranged his information in a detailed outline and wrote his report as a fleshed out version of the outline. He spent less than 20 percent of his time actually composing the draft. He was also a very linear composer and spent little (less than 5 percent) of his time revising the paper. Most of his editing was superficial (i.e. proofreading for grammar mistakes, substituting a word here and there).

Selzer's conclusions about his study were that, at least for this one engineer, there was more emphasis placed on planning and arranging a document at the expense of time on revision. This finding is interesting because it is the opposite of what is taught in many English Composition and Business Writing courses that place heavy emphasis on revision. Obviously, a study of one person's writing habits is not representative of all engineers. However, this emphasis on planning and arrangement in actual business writing is an area that needs substantial research. Composition teachers may need to rethink the composing processes that they emphasize in classes to more accurately reflect the processes that actually occur in business writing.

Selzer also observed that "The most striking thing about Nelson's composing habits is how closely they approximate the habits of the professional writers and skilled academic writers whose composing processes have been studied by other researchers" (184). Selzer believes that, if Nelson's habits are representative of the writing habits of engineers, "it may in technical writing courses be worth attending to the writing process in much the same way that it is attended to in other courses" (184). By this Selzer means that technical writing teachers would spend significant amounts of class time helping students develop and arrange the content of their writing projects rather than teaching genre after genre with little time in class spent on students' writing processes. This area of research is valuable for students, teachers of writing, and, in particular, the business community, which is clamoring for employees who can communicate effectively.

Selzer's combination of interviews and collection of drafts of Nelson's writing provided a model for the study presented in chapter 5. I collected the drafts of all 10 lab reports from the 18 students whose work I graded in the spring 1999 semester. This portfolio of work for each student provided the opportunity to examine students' progress throughout the entire semester. The interviews with engineering students and the engineering teaching assistants in EECE 201 also contributed valuable insights to how engineering students feel about writing and the writing instruction in particular.

Dorothy Winsor's book, <u>Writing Like an Engineer: A Rhetorical Education</u> shares many characteristics with my study. Winsor also relies on collecting drafts of student work and interviews with students as her primary methods of collecting data for her study. Winsor studied the writing habits of four undergraduate engineering students at GMI Engineering and Management Institute over a five-year period. She followed Chris, Al, Jason, and Ted as they progressed through both college and co-op experiences, and she traces how their perceptions of writing, audience, and persuasion change. Winsor both collected writing samples from the students each year and interviewed the students annually. She also included each student's written response to her draft as part of the final project.

Winsor explores the students' concepts of audience and persuasion in engineering writing contexts, and her foci influenced the questions that I devised for the students interviews conducted in this study. Many of her observations appear to hold true, at least to some degree, in the EECE 201 students' discussions about writing. In the student interviews held in spring 1999, several EECE 201 students mirrored ideas that appeared in the student responses in Winsor's study. For example, Winsor notes that "In navigating through the expectations explicit in common genres, a student is exposed to many of the expectations of the field" (28). As the Writing Center teaches new genres of writing to the EECE 201 students, like progress reports and technical memos, the 201 students mirror this navigation process. One of the 201 students that I interviewed about the writing instruction in 201 stated that she had never heard of or written a progress report before the 201 experience. In 201 she learned how to structure a progress report and under what circumstances progress reports are generally used in engineering. She was pleased to learn this new format and expected to use it in her future engineering career.

Barbara Walvoord and Lucille McCarthy's study, <u>Thinking and Writing in College: A Naturalistic Study of Students in Four Disciplines</u>, provided another example of naturalistic research methods that I modeled. Walvoord and McCarthy studied courses in business, history, human sexuality, and biology. They collected data from many sources: drafts of student papers, finished papers, protocol analysis tapes of students composing drafts, interviews with students, teacher logs, classroom handouts, and Walvoord's notes from her classroom observations. This variety of sources provided me with examples of additional ways to collect data above and beyond working with the students' drafts and interviews. For example, I also collected information from the ECE Writing Center archives of year-end reports, handouts, and student examples that the Writing Center had collected and used in the past. From Walvoord and McCarthy, I also decided to keep an observation journal of the EECE 201 recitations during spring 1999, and this resource allowed me to keep an accurate record of the writing instruction provided during the spring 1999 semester in the 201 recitation. As a result, I was able to compare the students' writing with specific units of writing instruction given by the Writing Center.

Walvoord and McCarthy also note that difficulty or failure in a research study is not necessarily a tragedy. They write, "Learning, in our view, often grows out of the difficulties of struggle and failure. Exploring these positive sorts of difficulties helped us understand how our students learned. But we also focused on those less positive points at which the struggle seemed harder or more time-consuming for students than was necessary, or where the struggle did not produce the learning or the texts the teacher had hoped for" (5). This learning-from-mistakes approach is present throughout the discussion of different iterations of writing instruction in chapters four and five. In the ECE Writing Center, we evaluate the points of struggle each semester and attempt to refocus or redesign our writing instruction accordingly.

All of the research studies summarized in this section provide a foundation of research about how students assimilate writing conventions into their own work in order to enter and succeed in specific discourse communities. Several of the projects investigate how engineering writing or writing in the disciplines require students to learn new strategies for communicating their ideas to other members of their community. Teachers of writing in such discourse communities must also acquire strategies for teaching these novice students how to communicate within the conventions and genres of their chosen field. My project relies on many of the

research methods used by these previous studies, like discourse analysis, interviewing, keeping an observation journal, and collecting drafts of students' papers.

Research Questions for this Study

Kristin Walker, Deborah Dyck, and Chris Fosen have already contributed to a body of scholarship about the Writing Center's work in the USC College of Engineering. Fosen examines how writing is taught and incorporated in EECE 401 and 402, which are senior level lab courses. His work also provides a thorough overview of WID scholarship. Dyck uses reflective practice to frame her observations about her own development as a teacher of writing in engineering. She also investigates differences in writing taught in the English department and writing taught in engineering, both in genre and in purpose. Walker did her dissertation research on the EECE 201 course, where she examined students' lab reports in the context of genre theory. I expand her connection between students' writing and students' performances in engineering by examining the Writing Center's responses to integrating writing in the 201 course over a period of four years. My research questions are:

6. What methods of writing instruction (i.e. small group meetings, lectures, providing models, individual conferences) increase the integration of composition pedagogy into the EECE 201 course?
7. In assessing these methods, how can the ECE Writing Center and the ECE Department best collaborate to achieve true integration of writing instruction in the course?
8. What are the factors that influence the degree to which writing instruction is integrated into the 201 course?
9. Is the grade-splitting format presented and discussed in chapter 5 viable for future semesters? And does the grade-splitting model help or hinder integration of writing into the 201 course?
10. Can implications be drawn from this study that demonstrate that discipline-specific writing centers work under vastly different conditions from humanities-based writing centers, and therefore must radically adapt traditional writing center theory to fit the needs of other disciplines? (Note: This issue is explored in chapter 2, the literature review chapter and will appear again in chapter 5, the study of the spring 1999 semester).

The Design of the Study

For this study, the various methods of writing instruction used in the 201 course since 1995 are identified and described in chapter 4. This effort entailed interviews with the Director and other Writing Center consultants and a review of Writing Center documents such as Gateway Coalition reports and ECE Department year-end reports. In the spring 1999 semester lab reports were collected from 18 of 36 students, including the grader's comments on writing.[3] I received written permission from these students to use their lab reports in this project. Also, student surveys were collected after one unit of instruction, and a final evaluation of the course was administered which contained multiple questions about the writing instruction in the course. I kept a record of the students' grades on the writing portions of their labs using a spreadsheet. I was also able to obtain the students' final lab report grades and their final course grades from the engineering TAs.

I relied upon information gathered from an observation journal that I kept during the spring 1999 semester to make general observations about the successes and failures of units of writing instruction provided by the Writing Center. The journal includes notes from in-class observations and entries in which I reflect on the Writing Center involvement in the course. Another important source of information about the writing instruction is the interviews conducted with three students, the engineering teaching assistants, and the professor of the 201 course. The same set of questions was used for each of the three student interviews in an effort to standardize the subject matter of the interviews. This allowed me to compare and contrast among the students' responses. The list of questions appears in Appendix B. The low number (3 of 18) of students willing to participate in interviews was disappointing, but I felt that it was important for the interviews to be voluntary. The notes from each interview were transcribed immediately after the student left in order to increase the vividness and accuracy of the notes taken.

For the spring 1999 semester, students wrote seven formal lab reports, one progress report, three technical memos, and gave one oral presentation. The first lab report included a draft that the Writing Center evaluated, and then students revised their drafts. I have copies of both the drafts with comments and the revised versions of lab 1. Lab 9 is actually a compilation of three lab reports, labs 7, 8, and 9. I used discourse analysis to measure improvement in students' writing based on four specific characteristics that I chose because they appeared in most successful lab reports. The characteristics are:

- Purpose statements
- Introduction of tables and graphs with sentences to give the readers context
- Use of sub-headings
- Provision of analysis and explanation of events that occurred in the lab (like discrepancies in expected vs. measured data) in sentences as well as in tables.

I used the draft of Lab 1 as a baseline for each student and then measured changes in their writing as evidenced by absence or presence of the four characteristics in the revision of Lab 1 and in each of the nine subsequent labs.

The next chapter contains a history of the different forms of instruction that the ECE Writing Center has implemented since its inception in fall 1995. Each type of instruction is described and evaluated to demonstrate the principles of action research that guide the Writing Center in its program modifications. The historical background is the foundation for the model of writing instruction that occurred in spring 1999, which is described and evaluated in chapter 5.

End Notes

[1] The term "grade-splitting" appears later in this chapter and refers to the procedure used to grade the 201 lab reports in spring 1999. The Writing Center graded the writing and presentation for 40 points and the engineering TAs graded the technical content and computer skills for 60 points. So the grades were split 40/60 and the grading duties were accordingly split.

[2] By "integration of writing" I refer to the teaching and evaluation of writing in the existing ECE engineering curriculum. Most ECE courses already require significant amounts of writing (lab reports, technical memos, PowerPoint presentations, etc.) but few of the courses provide students with instruction on how to write such assignments. The ECE Writing Center has a mandate to work with the instructors and teaching assistants in the EECE 201 course to develop writing instruction and tools for evaluating writing that will serve to increase the emphasis placed on writing in the course.

[3] I collected copies of all ten lab reports, memos, and the oral presentations from all 18 of the students that I worked with as a grader in the spring 1999 semester. I have a folder for each student that includes all of the reports and a signed consent form allowing me to use their work for assessment purposes. This body of work is the largest collection of student writing that the ECE Writing Center has ever had. There are many examples of excellent, good, average, and bad writing that future Writing Center consultants will be able to use as models for future semesters.

Chapter 4
History of the ECE Writing Center: Iterations of Writing Instruction

In this chapter, I present a chronological description of the various models (or iterations) of writing instruction that the ECE Writing Center has implemented with the EECE 201 course since fall 1995 when the Writing Center opened its doors. Each model is described and then evaluated for its strengths and weaknesses. Then each subsequent modification is explored and evaluated. This process continues through the spring 1999 model that is presented and discussed but not evaluated here. This latest model serves as the background for the study of lab reports that appears in the next chapter, and the evaluation of this model appears in for the conclusion of the discussion of the study's results in chapter 5. The descriptions of the writing instruction models are drawn from my own observations, notes from my observation journal kept in spring 1999, interviews with Dr. Elisabeth Alford, ECE Writing Center yearly reports and course evaluations and summaries, and the dissertation and thesis of Dr. Kristin Walker and Deborah Dyck, respectively.

The ECE Writing Center received approval and funding for a pilot writing center project near the end of the summer of 1995. Dr. Elisabeth Alford, a Ph.D. in Composition and Rhetoric from the University of South Carolina, was chosen to direct the Writing Center. She hired two graduate students, both in the Ph.D. program of USC's English department, and the staff of three opened the Writing Center for business in fall 1995. The goals of this pilot writing center were as follows:

> The ECE Writing Center provides discipline-specific writing instruction in a small group format to students enrolled in a sophomore ECE lab course, it systematically assesses student writing to monitor the quality of its instruction, and it conducts continuing research on engineering genres to inform its instruction. In addition to these core services, the ECE Writing Center provides workshops and meetings for ECE faculty and teaching assistants, conducts in-class presentations on writing topics, publishes a newsletter, and consults on the use of writing-to-learn within engineering. (pg. 1 Gateway Year End Report)

The ECE Writing Center also met with students for one-on-one consultations both by appointment and by drop-in, much like traditional writing centers do. Initially, the ECE Writing Center was involved in only the EECE 201 course, Tools and Techniques for Electrical and Computer Engineers. This course is a sophomore-level lab course and is a pre-requisite for all other lab courses in the ECE Department's lab sequence. The Writing Center Director and staff hoped that this initial course connection would lead to other courses and professors in the department incorporating the Writing Center into their courses and assignments wherever possible.

The ECE Writing Center staff entered this engineering discourse community as novices in engineering communication. As Lucille McCarthy states, "Writers, like speakers, must use the communication means considered appropriate by members of particular speech or discourse communities. And the writer's work, at the same time, may affect the norms of the community. As students go from one class to another, they must define and master the rules of use for written discourse in one classroom speech community after another. And their writing can only be evaluated in terms of

that particular community's standards" (127). The ECE Writing Center staff also had to learn the rules of discourse in this new community. Christine Farris and Raymond Smith, in "Writing-Intensive Courses: Tools for Curricular Change," note,

> To accomplish both the *cognitive* (writing to learn) and *rhetorical* (learning to write) goals of WAC programs, English-trained staff often find a need to place themselves inside the other academic disciplines, to learn about their subject matter, about their methods of study, and about what is valued in their writing. Without this immersion in other disciplines, WAC personnel run the risk of imposing their English-based perceptions on another field. (82)

The Writing Center staff spent much of the time in the summer and fall of 1995 gathering samples of student writing, both successful and unsuccessful, and meeting with ECE professors and teaching assistants to discuss what characteristics were present in the lab reports that accounted for success or failure. This dialogue allowed the ECE Writing Center staff to gain an understanding of engineering lab report writing conventions and to create handouts and brief presentations on aspects of lab report writing that posed problems for many students.

The Writing Center's efforts to collect samples of student and faculty writing, assignments and guidelines or grading expectations, and handouts began in 1995 and now the greater part of three large filing cabinet drawers are filled with samples and guidelines for student assignments. As McCarthy points out, "Teachers in the disciplines must then provide student newcomers with assignments and instructional supports which are appropriate for first steps in using the language of their community" (153). The Writing Center draws on the writing samples to provide examples for in-class presentations. Also, many students in the department are aware that this resource is available, and students often come by the Writing Center to examine assignment specifications or past student examples as context for their own work. Writing Center consultants are also available for individual consultations with students or faculty.

The different types of writing instruction provided by the Writing Center in the EECE 201 course since the fall 1995 semester are summarized below.

Fall 1995

The fall 1995 semester was the first semester of Writing Center involvement in the EECE 201 course. In 201, students attended workshop sessions, outside of class time, in the Writing Center every other week.[1] These sessions were voluntary, but students were strongly encouraged to attend by the ECE professor and TA teaching the course. A session followed this general format:

- The consultant began by discussing the week's topic (e.g. organization). Initially, the topics were chosen for their general application to lab report writing rather than tied to specific lab assignments.
- The consultant then invited group members to share their experiences with this topic or with any other aspect of the lab report writing that week. The consultant might also share instructional handouts that related to report writing with the students. These handouts were developed as Writing Center staff collaborated with the 201 faculty and teaching assistants (See

Appendix C).

- Following the group meeting, the consultant wrote a progress report to the professor and teaching assistants explaining what concepts the group covered. These reports also allowed the Writing Center to share concerns that students voiced or trends that the consultant noticed in student papers.

This model relied largely on student self-disclosure of problems, willingness to bring drafts of labs to the group, and on voluntary attendance of the groups. Perhaps not surprisingly, this model failed because busy students often skipped their writing groups, and almost no students chose to share writing problems they were having. At this point in the Writing Center's involvement with EECE 201, students wrote 12 lab reports each semester. The lab assignments were designed and labs were graded by the course professor, Dr. Roger Dougal, and in subsequent semesters by Warren Dixon, a graduate teaching assistant.

An interim report done for the Gateway Coalition in November 1995 indicates that the Writing Center staff felt that the workshop meetings with 201 students were a successful strategy for incorporating writing into the course. However, the goals of the Writing Center conflicted with the reality of motivating engineering students to participate in workshop-type meetings about writing. The report states, "In the workshop sessions, the Writing Center staff asks students about the feedback they have received on 'written communication' portions of graded lab reports, to ensure that students understand the principles involved and know how to avoid similar writing problems in future reports. The workshop approach used in EECE 201 has been adopted as a means of integrating writing instruction into the lab course without interrupting class lecture or lab time" (pg. 1 Interim Report 11/14/95 ECE Writing Resources Project). Of course, what the Writing Center staff realized afterward, both from observations and from the student course evaluations, was that, from a student perspective, the Writing Center was not integrated into the course. Students perceived their meetings with the Writing Center as just more work in a course that was already taking 10-15 hours each week for most students. Consequently, there was a lot of resentment from students about having to come to the Writing Center.

Another weakness of this initial model was the distinct separation of the Writing Center instruction from the engineering course. The only contact students had with the Writing Center was a brief introduction on the first day of class and then students only saw Writing Center consultants at group meetings in the Center. However, many students opted not to attend these meetings since they were not on the syllabus and did not "count" toward their grade. Also, the students who attended the most Writing Center meetings were the better writers in the class; the consultants had very little contact with the poor writers once the students determined that Writing Center meetings were optional. Based on our experience in the ECE Department, it is fairly typical for the over-achievers to seek extra help to perfect their writing, while many students who really need the help either don't have the time or the inclination to use the resources available. Students who are struggling with writing may also be too embarrassed or intimidated to come to the Writing Center. So, this "add writing and stir" model, therefore, did not successfully "integrate" writing into the course at all.

Spring 1996, Fall 1996 and Spring 1997

The Writing Center Director and consultants, the engineering professor and

TAs for the 201 course, and the Chair of the ECE department met at the end of the fall 1995 semester to evaluate the success of the integration of the writing instruction into the course. [2] The term "integration" is used because, prior to the ECE Writing Center's presence in EECE 201 in August 1995, writing was not taught in the course. Writing assignments were 40% of the grade (12 lab reports), but actual instruction about writing only existed in the lab report template that Dr. Dougal gave to students to show them the proper fonts and formats to use in their lab reports. Also, Dr. Dougal would occasionally discuss a writing problem like under-developed abstracts if many students in the class were having the problem. The Writing Center's job was to bring writing instruction into the 201 classroom to help students better understand the lab report assignments and to write stronger lab reports.

Based on the December 1995 discussion, the ECE Writing Center implemented a new model of writing instruction in 1996 through the spring 1997 semesters. The ECE Department hired a Technical Writing graduate assistant to teach the writing component in the 201 course and to grade the writing portion of the lab reports.[3] At this time, the Writing Center director and staff felt strongly that the Writing Center should maintain a strict separation between the Center and any involvement with grading.[4] The Writing Center's identity should be one of a safe place for students to bring pieces of writing where a reader would give them critical feedback in a grade-free zone. This separation from grades was to enhance the consultants' ethos as "student advocates": "If the students perceive that we have influence over their grades, then we become part of 'the system.' Therefore, we try to keep our role as clearly defined as possible - and our role is as the student advocate, to help the students become better communicators" (Ramey, Proceedings 49). Consequently, it was decided that the technical writing TA would not work in the Writing Center but would share an office with the engineering TAs. Thus, the technical writing TA was not officially associated with the Writing Center in any formal way.

I believe that we attempted to create a distance from grading in an effort to define clearly the Writing Center's role as more than the grammar police within the engineering community. Many professors initially thought that they might be able to send students to us so that we would fix their writing (i.e. proofread for grammar mistakes). We understandably felt uncomfortable about "fixing" the writing when we still did not understand the content. Our pedagogical commitment to form AND content framed our vision for our role in the department. However, it is important to note that few students came to our writing center when we had the student advocate, safe place mentality. Only the A-students would come at first, and then they stopped. It seems that it requires more integration than simply being in the writing center in this engineering environment in order to reach students and get them to utilize the writing center resources.

One of the strengths of this model was that the technical writing TA became a liaison for the Writing Center who could strongly support Writing Center advice like the addition of a technical memo assignment to the syllabus. The Writing Center staff strongly endorsed the modification of one of the twelve lab report assignments to a technical memo assignment. Such a change would give the students a chance to explore one of the most common forms of business and engineering communication, the memo. Previously, engineering students only learned one genre of writing in EECE 201, the lab report. The technical writing Teaching Assistant worked with the Writing Center staff to design a context-driven memo assignment for the class, and

she worked with the engineering TAs and professor on creating the evaluation criteria for the new assignment.

However, as with the previous models, this one also had problems. The main limitation of this second model is that graduate teaching assistants who have composition backgrounds and a knowledge of technical fields like engineering are difficult to replace when they graduate. Most composition graduate students at USC already have assistantships in the English Department, so there is not a large pool of available replacements. Furthermore, as the English department tightens enrollment numbers, which happens from time to time, the pool of potential applicants is further reduced. Also, there is the perception that writing and technical content are separate entities that can and should be graded separately. There are numerous pedagogical problems manifested by such a division that will be discussed in further detail later in chapter 5.

Fall 1997

After the technical writing teaching assistants graduated, the Writing Center resumed full responsibility for teaching writing in the 201 course, while the grading of writing reverted back to the engineering TAs. In fall 1997, the Writing Center consultants taught writing in one half of the two-hour recitation. After a brief presentation on the writing topic of the week, the consultants divided the class into groups according to their lab sections. These groups of about 10-15 students per consultant then discussed the week's topic and any other student concerns about writing in the course. However, there were problems with this model too. The following excerpts are from memos from the Writing Center to the engineering TAs in charge of the course at that time. The memos reflect the Writing Center's concerns and suggestions for improving the situation:

> We continue trying to find the most effective way to involve the writing center into EECE 201. The calendar and notes on Lab 8 that you sent us will help. However, we are still having some problems with our present system of teaching writing in recitation and breaking into lab sections for group discussions. We think the students may be having some problems with the system, as well.
>
> First, when the Writing Center presents short, very general lectures on technical writing during recitation, students have difficulty applying the principles to the specific lab report that is due that week. Second, when we break up into lab sections, the groups are so large that students are reluctant to talk about their writing.
>
> Can we consider another arrangement? Since you are now allowing lab partners to take turns writing the reports, could we also allow them to take turns attending the Writing Center group meetings? We would still break up into lab groups each week, but only the students writing reports that week would attend. Now that we have covered the basic elements and formats of lab reports and oral presentations, we feel that recitation time could best be spent in small group consultations. Of course, if some specific problem arises that you feel the entire class needs to hear, we'd be happy to address the issue before the whole group. (Memo from Writing Center, Week of Sept. 29, 1997)[5]

In another memo addressing this same concern, the Writing Center wrote:

Today, we met with Willie, Troy, and Kristen[6] to discuss our involvement with 201. We discussed that the current format of focusing on general technical writing conventions and breaking up into large groups was ineffective. After talking about the role of the Writing Center in this course, everyone agreed upon the following strategies:

- Libby will make a brief presentation on October 27 on coherence, since students are having problems in this area. This discussion will also benefit students as they revise their lab reports.
- From now until the end of the semester, students who wish to meet with consultants after recitation will gather after class. The number of students will determine how many small groups will be formed. Then, the groups can meet to discuss their lab report revisions with a consultant.

After these small group meetings, we will tell Willie, Troy and Kristen who has been attending the small group meetings.

The second change in particular will address the problem of poor interaction within the large group meetings. In addition, Willie, Troy, and Kristen agree that voluntary group meetings are more appropriate at this point in the semester.

The Writing Center and the ECE TAs clearly identified weaknesses in this model of instruction. These weaknesses involved lack of student participation and students having difficulty applying abstract principles of writing instruction to the lab report writing that they were expected to do. One problem that the Writing Center had during this semester was a lack of access to student writing samples. Most students did not bring drafts of their lab reports to class, so the Writing Center had to rely on its own manufactured examples of lab report writing to guide and direct the group discussions. At the time, this weakness did not seem crucial. However, after the discussion of the spring 1999 model later in this chapter, it becomes clear that this lack of real examples was a serious drawback. The fall 1997 model did have an important strength: the ECE TAs worked closely with the Writing Center consultants in addressing students' communications needs in the course throughout the semester. The Writing Center's role in 201 remained flexible as both TAs and consultants reflected on what methods best served the 201 students.

Spring 1998 and Fall 1998

The next model incorporated into the course had ECE Writing Center consultants give in-class units of writing instruction throughout the semester but still refrain from grading the lab reports. During these semesters, the ECE professor would lecture for an hour, then turn the class over to the Writing Center for some communications instruction. The Writing Center enacted one major change to the course this semester in the addition of an oral presentation to the course assignments. Students were provided with PowerPoint instruction, and the Writing Center created and gave a presentation on "How to Give Effective Oral Presentations." The Writing Center also worked closely with the engineering instructors in devising a checklist used to evaluate the presentations. This modification of a regular lab report assignment into a chance for students to give and receive feedback on an oral presentation was a major improvement in the area of providing students with the appropriate communications tools and skills needed to excel in engineering communication.

There were still problems with this model of Writing Center involvement, though. One drawback to the model was the further separation between the

engineering instructors and the Writing Center instructors. The Writing Center came into the class after the engineering instruction was over, and the engineering staff left the room when the writing instruction began. Thus the division between engineering and writing was physically manifested by the instructors' behaviors. The students clearly picked up on this separation because their end-of-semester evaluations reflected this concern. One student stated, "The Writing Center needs to communicate with the engineering TAs more so that they do not give conflicting information about how to write the labs." Another wrote, "It was sort of confusing when the Writing Center would tell us one thing and then our TA would say something different."

Transition from Fall 1998 into Spring 1999

The fall 1998 semester was a challenging one for the Writing Center consultants involved in EECE 201. The 201 students were, as a whole, resistant to writing instruction in the course, and the writing consultants struggled to adapt their teaching methods to reach this group of students. However, after each encounter with the class, the writing consultants were left confused, drained, and, at times, resentful of having to "instruct" such a reluctant group of learners.

At the end of this difficult semester, the Writing Center administered an evaluation to assess 201 students' impressions of the writing instruction for the semester. The prompt read:

> The Writing Center would like your suggestions on how we could improve the writing instruction in EECE 201. Your input and feedback is extremely useful as we further attempt to integrate our instruction into the engineering curriculum. And since you as students are the ones most affected by our instruction, your suggestions have a particular resonance.
>
> Your comments do not have to be in the form of an essay and can strictly be a bulleted list. You might consider what worked best for you, what did not work, and what you think the writing instruction in EECE 201 should focus on. Those of you with writing experience in the work environment might also want to consider how the writing in this course can better relate to writing on the job.
>
> Thank you for your cooperation, and we look forward to reading your suggestions. And good luck in your future classes.

Responses were anonymous, and we received 19 evaluations out of a class of 25 students. The following excerpts are representative of the types of feedback students provided. Many students echoed this student's observations that "[a] better working relationship (cooperation) between the writing center and the ECE department would be of benefit:
- Goals, purposes could be better defined
- Criticism would be more clear and constructive."

This student also wrote that "a clearer definition of the writing center role is needed" and "a clearer definition of a student's responsibility toward the writing center is also needed." Most of the 19 responses contained some mention of clarifying, or even strengthening, the role of the writing center in the 201 course. One student recommended "more of a forcible presence in the course (read: part of grade)" and "at least a few mandatory consultations, grade affecting."

The New Spring 1999 Model

In an effort to bridge this division of engineering and writing instruction, the Writing Center instituted another new model of writing instruction in the spring 1999 semester. This model was a modification of the Technical Writing TA model and incorporated many of the student suggestions from the fall 1998 Writing Center questionnaire. In the new model, the engineering professor posted the two Writing Center TAs, Deanna Ramey and Tom Bowers, on the syllabus as well as the four engineering TAs. The Writing Center TAs provided the writing instruction in the first hour of the recitation, and the engineering staff remained present and attentive. Then, the Writing Center TAs remained in the class while the engineering recitation occurred. It made sense to have the writing instruction come **before** the engineering instruction for two reasons:

- Many students lost the incentive to listen if they received the instructions for the next lab exercise before the Writing Center spoke.
- The Writing Center often discussed aspects of the previous week's lab reports, so if students already had their minds on the next lab, it was difficult to ask them to refocus on last week's work.

Also, the Writing Center TAs graded (for the first time) the writing portion of the labs (40 out of 100 points on each lab). "Writing portion" refers to the parts of the lab that are textual (both content and style) rather than graphical, although the Writing Center did evaluate the effectiveness of document design and whether graphical matter was properly incorporated into the text. This was an unexpected success from the Writing Center's perspective, because our teaching was greatly improved by this increased access to student writing. Since consultants saw all of the students' labs, we had a much greater knowledge of which problems students were encountering in their writing. One of the most important results/benefits of this exposure to students' work was that we could better customize the instruction we provided in the course.

Conclusion

Each of the models of writing instruction have taught the Writing Center and the ECE engineering students and professors involved with the 201 course something about teaching writing in engineering contexts. One main lesson learned is that "integration" requires a much higher level of instructor and departmental commitment than we had previously anticipated. The evaluation sessions that the Writing Center and the EECE 201 professor and department Chair conduct at the end of each semester are vital to the success of the course and of the Writing Center's continued improvement of the communications instruction for the course. One of the main hindrances of all the models attempted so far is the transient nature of a graduate student staff. The connections established between Writing Center consultants and the engineering professor and TAs who teach EECE 201 have to be created with new staff members as people graduate and leave the university. This reconnection effort necessarily impacts the fluidity of both the integration and the instruction itself.

In the next chapter I will further discuss the spring 1999 model of writing instruction within the context of the study that was conducted measuring the improvement of student writing in lab reports over the course of the semester. The results of that study provide the basis for the program evaluation that appears in chapter 6.

End Notes

[1] These workshop sessions were in addition to their attendance of a two-hour recitation and three-hour lab session each week. Furthermore, most students indicated that they spent from 6-12 hours each week writing up their lab reports. Thus, most students were spending at least 11 hours each week on their work for 201, which is a three credit hour course. Adding writing center sessions on top of this work, especially when the sessions were not "on the syllabus" became a problem for some students. They felt that the Writing Center sessions were another burden on an already over-burdened schedule.

[2] This model of holding an evaluation session at the end of each semester where TAs, Writing Center consultants, the course professor and the Department Chair meet to evaluate and revise the writing instruction in the EECE 201 course continues to the present. In December 1995, the Writing Center Director was Dr. Elisabeth Alford, the Writing Center consultants were Deanna Ramey and Kris Walker, the EECE 201 professor was Dr. Roger Dougal, the ECE Chair was Dr. Robert Pettus, and the EECE 201 TA was Warren Dixon.

[3] For a detailed description of the program involving the technical writing TA, see the thesis written by Deborah Dyck in 1997, <u>Teaching Engineering Writing: Using Reflective Practice to Shape Engineering Writing Pedagogy</u>. Mya Poe served as the first technical writing TA.

[4] See the works of Muriel Harris, Stephen North, Kenneth Bruffee, and others who provide the theoretical foundation for the writing center attitude about separating writing centers from evaluation of students' written work, especially evaluation that involves grading.

[5] The entire memo is reproduced in Appendix D.

[6] The entire memo is reproduced in Appendix E. Willie Bates was the graduate TA in charge of the course, and Kristen Bearden and Troy Smith were the undergraduate TAs who helped run the 201 lab sections.

Chapter 5
The Spring 1999 Model: A Study of 18 Students' Lab Report Writing

        In this chapter, I present a report of the research based on my experiences as a participant observer during the spring 1999 semester and attempt to document and evaluate the effectiveness of the writing instruction in the EECE 201 lab course. The purpose of this program evaluation and analysis of student lab reports written in the spring 1999 semester is to determine whether the writing instruction provided by the ECE Writing Center had verifiable effects on the writing that students turned in throughout the semester. My hypothesis is that, because the Writing Center TAs were graders in the course, and thus had direct influence on students' grades, the writing instruction they provided was more effective in the spring 1999 semester than in past semesters. The Writing Center TAs were also incorporated as members of the teaching staff for the course rather than added-on as in the past. In addition, the fact that the Writing Center TAs graded each lab report for writing assured that they had the chance to see exactly what students were producing in writing, so the writing instruction was more customized than it had ever been before.

        Because I was a grader in the course, I had access to all ten lab reports for eighteen of the thirty-six students (half of the class). The other half of the class received grades and comments on their writing from Tom Bowers, the other Writing Center consultant working with the 201 class. The unique access to student papers allowed me to monitor select students' writing throughout the semester and to use specific characteristics for comparison of the students' success in writing along various points of the semester's work. I chose to analyze students' drafts of Lab 1, their revisions of Lab 1 after they had received Writing Center TA comments and a Writing Center in-class presentation and discussion about writing lab reports in engineering, and Lab 9, which is a three-lab compilation of work that is the final lab assignment. I chose these points of comparison because each assignment was closely tied to a unit of Writing Center instruction. Therefore, these assignments should reflect the influence (if any) of Writing Center instruction on students' writing.

        The characteristics that were used as evaluands are:
- purpose statements in abstracts
- introduction of tables and graphs with sentences or phrases to give the readers context for the data
- use of sub-headings (especially sub-headings different from the ones present in the lab instructions)
- provision of sentences of analysis and explanation of observations and discrepancies in data that occurred in the lab.

These characteristics represent the most common errors that students make in writing lab reports. The absence of any or all of these four characteristics in a student's writing, indicates a serious problem with communicating as an engineer in the 201 course. These characteristics were also chosen because they are the main points that the Writing Center consultants emphasized throughout the spring 1999 semester instruction. This allows me to compare the absence or presence of these characteristics in student writing with the writing instruction units presented by the Writing Center. In each case, the Writing Center either gave a presentation devoted to the concept (as in the case of purpose statements in abstracts and providing analysis

in sentence format) or mentioned the concept in multiple class meetings (as in the cases of introducing tables and graphs with sentences and using sub-headings).

I will provide a detailed discussion of each of the four characteristics, including a description of how each was taught to students in the course. Then I will analyze sections of student labs to show that the labs and memos demonstrate improvement in the four areas, improvement that correlates with Writing Center instruction. The chapter will conclude with a discussion and evaluation of the spring 1999 method of writing instruction, including an analysis of the problems encountered in implementing a split-grade system. But first, I must provide some background information about how the Writing Center taught the lab report format before the spring 1999 semester. This background is necessary because it shows how the spring 1999 model of instruction affected (and improved) the Writing Center's instruction, in addition to affecting student work.

Pre-Spring 1999 Writing Center Instruction on 201 Lab Report Format

Before spring 1999, the Writing Center approached the "How to Write a Lab Report" unit in the following manner. Since many 201 students had not received any formal instruction on the genre of lab report writing before they got to 201, the Writing Center focused much of its instruction on the lab report format. Writing Center staff created a presentation after consulting with the 201 instructors and TAs about what areas presented problems for students. Formatting and organization were the areas where students initially had the most problems. The following figures are recreations of some of the overhead slides that the Writing Center used to present information on how to write the 201 lab report.

Analysis

- Analyze the results.
    - ❖ What is your interpretation of the data?
    - ❖ What questions do they answer?
    - ❖ What principle do they illustrate?
    - ❖ What hypothesis do they support?
- Refer in text to data on which analysis is based.

Conclusion
- Restate purpose of the investigation.   - Summarize results (compare results with theory or purpose).   - Summarize significance of the investigation and results.

Figure 2. Slides from ECE Writing Center presentation on Lab Report Format

This lecture was usually presented on the second meeting of the course before the students had done Lab 1.[1] Therefore, students had not even drafted a lab report at the time of the Writing Center instruction.

As you can see from the slides in Figure 2, the instruction centered on fairly abstract and general ideas of what to include in each section of the report. Statements like "Summarize the significance of the investigation and results" are fairly abstract concepts for students to grasp, especially when they haven't even done the lab yet. Barbara Walvoord and Lucille McCarthy discuss the problems that students often have with assimilating abstract knowledge into their work. They state, "Present procedural knowledge procedurally. In all four classes, we found that verbal descriptions of a process, whether presented in class or in a textbook, were difficult for students to translate into action. Further, students often treated procedural knowledge about how to do something as declarative knowledge to be summarized, not used to guide a process" (238).

When the Writing Center relied on the abstract presentation of lab report format, many students did poorly on their first labs, even though the Writing Center's presentation was extensive with handouts and overhead transparencies on how to format lab reports and how to structure information in a lab report. Much as Walvoord and McCarthy observed, the presentation was too abstract for the students. That is why the draft of Lab 1 assignment is so much more productive, because students have tried to write a lab report **before** they receive the instruction so the students have a model of their own processes to work with when they do receive the help. The students need to go through the **process** of writing up their observations before they can focus on the formatting, organizational and language constraints. The presentation was also lacking examples from real lab reports that students might connect with their own writing.

Productive Adaptation of Writing Center Instruction on Lab Report Format
In spring 1999, the Writing Center used drafts of lab reports productively for the first time in EECE 201. In several semesters prior to spring 1999, the Writing Center asked students to bring drafts of their lab reports to class to discuss in the small writing groups. Most students either did not bring drafts or did not want to participate in a discussion of their drafts. However, in spring 1999, the Writing Center and the engineering TAs required students to turn in a full draft of their first lab report. The penalty for not having a draft was a zero on the entire assignment. The Writing Center received drafts from all students and Writing Center TAs then

commented on the drafts extensively and returned them to students at the next recitation. Students were given a chance to review the comments, and then the Writing Center gave the in-class presentation on how to write a lab report. The new presentation was supplemented with examples from the 201 students' work, anonymous examples of both successful and unsuccessful writing. This led to a productive discussion of report writing strategies.

Figures 3, 4, and 5 represent the modified version of teaching students about conclusions. Students were shown overhead transparencies with the following examples:

Conclusion

In this lab, the oscilloscope, the function generator, the power supply, and the DMM were used in many different facets in order for them to become familiar tools in the lab. From all of the different projects done within the lab, familiarization with the Tri-pack and the oscilloscope became no problem.

Figure 3. A C-level Sample Conclusion from Lab 1

Conclusion
The intent of this lab was to gain working knowledge on the operation of the Tri-pack and oscilloscope. By measuring voltages and current in a simple circuit an understanding of the DMM and voltage source of the Tri-pack was gained. The oscilloscope and function generators of the Tri-pack were used to calibrate the unit and test various settings on the equipment. The steps taken in the lab help gain the knowledge on the workings of the oscilloscope and Tri-pack that will be necessary in future lab experiments.

Figure 4. A B-level Sample Conclusion for Lab 1

Conclusion
Completion of the exercises involving the function generator, the power supply, and the DMM, resulted in a better understanding of the proper uses and techniques involving the laboratory equipment that will be used in following labs. Because this lab was more qualitative than quantitative, the techniques were the major idea to be learned. However, some numerical results were collected that pertain to the proper function of the equipment. A percent error was calculated for each of the tables and is a direct reflection of the precision and accuracy of which the instruments were used. The error ranged from as low as nothing at all to as high as 30 percent. The probable source of error in those cases are human error since the machines function to such a high degree of accuracy. Crossed wires or misread resistor codes probably account for most of that error.

Figure 5. An A-level Sample Conclusion for Lab 1

Whereas in previous semesters, the Writing Center would show the slide in Figure 2 representing what abstract ideas students should include in a conclusion section, in

the modified presentation, the Writing Center was able to show students three different examples of student conclusions written at different levels of achievement. The students were not told what grades the samples had received and the students were asked what grades they would give each conclusion. Figure 5 was deemed an A-level example, Figure 4 a B-level example, and Figure 3 a C-level example by the students. The Writing Center consultants then asked students to generate a list of the purposes that were in the first lab and recorded them on an overhead slide. Students quickly came up with the obvious purpose, the lab objective in the lab manual that read "The objective of this lab is to learn the basic functions of the tri-pack and the oscilloscope." But as we referred back to the abstract examples, students quickly generated three additional purposes. The purposes of Lab 1, according to students, were:

1. Global purpose: to learn the basic functions of the tri-pack and the oscilloscope.
2. To learn color coding of resistors.
3. To work with voltages and currents across elements of the circuit.
4. To gain experience with circuit theories (like KVL and KCL) that they will use in their careers as engineers (spring 1999 transparency).

Then the writing consultants put examples of abstracts on the overhead and asked students to see how many purposes were represented in each. Again, there were C-level, B-level, and A-level examples. The C-level abstract only mentioned the objective from the lab manual. However, the A-level example contained examples of more abstract reasoning like comparing numerical and measured results to gauge the accuracy of circuit theory techniques like KVL and KCL and speculating on causes of percent errors that occurred in the lab.

Immediate Changes in Student Lab Reports

Almost to a person, the revised abstracts and introductions of Lab 1 (spring 1999) were stronger and contained better statements of purpose and more specific details about the lab. I attribute this to the instruction provided by the Writing Center on lab report writing, and that instruction was better than it ever was before because both of the Writing Center consultants had seen all of the students' lab reports before planning what to discuss in class. This gave the consultants a more accurate view of what facets of lab reports needed more emphasis. An unexpected bonus, however, was the availability of excellent student examples of sections of the lab report that consultants were able to reproduce and use to guide the class discussion in productive ways. Real student examples proved to be much more effective than the manufactured examples used in the past.

Results of the New Model

Both writing center consultants for spring 1999 felt that the revised set of lab reports for Lab 1 were some of the best early-semester 201 writing that we had seen in our combined 11 semesters of working with the 201 course. These feelings were reinforced by the engineering TAs who also commented that these labs were stronger than ones they'd seen in previous semesters. In an interview, Robert Regal, an engineering TA in the spring 201 course, reinforced the perception that the writing was stronger due to the Writing Center's new model of instruction. He stated, "The

labs this semester [spring 1999] are more readable and have better sentence structures. I feel that eliminating the separation between the Writing Center and the engineering TAs has really helped. It legitimizes the grade for writing content" (interview 2/24). This observation is important because, while the Writing Center instruction did not focus attention on readability and sentence structure, Regal perceived improvement in these areas anyway. Regal also mentioned the strength of using student examples from lab reports to demonstrate writing concepts. Dr. Clint Chandler, the ECE professor who teaches 201, also noted a demonstrable improvement in student writing early in spring 1999. Chandler particularly noted the positive results from having the draft of Lab 1 assignment, stating, "The students get more feedback earlier in the semester, and that makes a big difference. This is especially true for the people who have no idea what to do in a lab report" (interview 2/26).

Let me provide one example of student improvement through revision from the spring 1999 exercise. Student One was a 201 student whose revised lab was significantly improved from his draft. His abstract on the draft of Lab 1 read:

> This lab involves familiarization with the basic lab equipment: The Tri-Pack and the Oscilloscope. Simple circuits are built, and their responses are measured and recorded using this equipment.

My comments to Student One on the abstract section of the draft were "needs specific details" (like the equipment used, the circuit theories and techniques learned, etc.) and "where are your results?" These comments were supported and strengthened by the in-class discussion conducted by the Writing Center when students received their drafts back with the consultants' comments and suggestions for improvement. Student One's draft version of the abstract matched the C-level abstract that we had looked at in class. He had only the main purpose as stated in the lab objective, and he had included almost no specific details about what had occurred in the lab exercise. If the abstract is supposed to give the reader a clear and detailed preview of what is going to be covered in the lab, Student One's first abstract fails.

Student One revised his abstract to state:

> This introductory lab familiarizes the student with the lab equipment: The DMM, dual power supply, function generator, and oscilloscope. These instruments are used to measure AC and DC voltages and currents in several simple circuits. The results gleaned from these experiments are not as important as the knowledge gained from performing the measurements and knowing why and how the circuits respond. Considering the results, however, the percent errors were very low, from 0.8% up to at most 1.8%. Practice in using these instruments will be important in the future of the lab and in the future of one's career as an engineer.

Clearly, this abstract is more helpful to a reader since Student One is much more specific about what he did in the lab and what equipment he used. He also provides more details about why the lab is important, adding the purpose statement that the practice he gained in this lab will affect his performance in future labs for this course and in his career in engineering. To formulate this purpose requires more synthesis of what he actually did in the lab and what he hoped to learn from the lab that he would be able to use in either future labs or future courses. It is important to note that the

changes/improvements that appear in Student One's revised version correspond to the topics of discussion about lab report writing guided by the Writing Center.

The Study
   During the spring 1999 semester, I collected copies of all lab reports, technical memos, and progress reports written by 18 students in the 201 course (approximately half of the class). The copies also have my grading comments on them. I reviewed the student portfolios in May and June 1999 and developed a list of characteristics that both appeared in the writing samples and in the units of writing instruction given by the Writing Center in spring 1999. I then reviewed the student portfolios, looking for these four characteristics:

- purpose statements in abstracts
- introduction of tables and graphs with sentences or phrases to give the readers context for the data
- use of appropriate sub-headings (especially sub-headings different from the ones present in the lab instructions)
- provision of sentences of analysis and explanation of observations and discrepancies in data that occurred in the lab.

The following is a discussion of each of these four characteristics in more detail. I will provide, in some cases, sections of student writing straight from their lab reports. In other situations, I will summarize the data in tables because the information cannot be reproduced in quotation format (i.e. the case of using subheadings or not).

1. Purpose statements in abstracts:
   The **201 Report Writing Checklist** that the Writing Center gave students to help them organize their writing into sections contains the following suggestions for what to include in an abstract:

Abstract
Does your abstract. . .

- State the **goals/objectives** of the lab assignment?
  HINT: Check your "objective" section at the beginning of each lab assignment in your lab manual.

- Describe briefly the **process** you used to obtain the data?
  (What kind of measurements or calculations did you make?)

- Explain the **results** of your lab.
  (What did you discover?)

Students can find the basic purpose of each lab assignment on the first page of each lab in the lab manual under the heading "Objective." So, minimally, each student should have this one basic purpose statement in her/his abstract. And in the drafts of the first lab assignments, the Writing Center found that most students had regurgitated (in some cases word for word) the lab objective:

Your objective this week is to learn the basic functions of the tri-pack and the oscilloscope. The tri-pack includes:
1. A function generator (signal source)
2. A power supply (voltage source, current source)
3. A digital multimeter that incorporates voltmeter, ammeter, and ohmmeter functions. (<u>Tools and Techniques</u> 1)

The following abstract is Student Two's draft effort, and it closely mirrors the objective statement taken from the lab manual as a purpose statement.

Student Two's Abstract from Draft of Lab 1:

Laboratory number one's purpose is to give one a better understanding of the common tools used in an electronics lab. This better understanding is given by using the digital multimeter to measure current, resistance, and voltage. Then to better the understanding of the oscilloscope the lab gives one a chance to play with all the dials, knobs, and switches on the oscilloscope. Once completed one can see that these instruments can accurately measure all aspects of a circuit (Student Two draft).

My comments on the draft abstract reflect an emphasis on avoiding repetitious language and on the trick of writing results without using first-person or the commonly substituted third-person "one." I wrote:

If you can avoid using "one," it's best to. Some professors in the department hate that. Try rewording your sentences.
I also circled "this better understanding" and "to give one a better understanding" and "to better the understanding" and wrote "repetitive."

But my comments are not the only feedback that this student and the others received on their drafts of Lab 1. It is important that I describe what the Writing Center consultants discussed with the 201 students in the class session in which they handed back the drafts of Lab 1 with comments on them. The consultants gave the students time in class to look over the comments and then held a brief discussion on what students should include in each section of a lab report. Students were given a model that shows proper lab report formatting according to the specifications for EECE 201 (see Appendix F). Then the consultants showed examples of student abstracts and conclusions and asked the students what made each example strong or weak. Students were also asked to generate a list of purposes for Lab 1, and the list was recorded on the overhead (See page 83 of this chapter). Students came to the conclusion that the strongest abstracts and conclusions were the ones that had the most detail, the most specific references to theories applied in the lab, and ones that revealed higher purposes other than the lab objective stated in the manual (field notes 1/25/99).

Here is Student Two's revision after receiving my comments and participating in the in-class discussion on writing lab reports in engineering.

Student Two's Revised Abstract from Lab 1:

Laboratory one's purpose is to introduce the common tools used in an electronics lab. The uses of the Digital Multimeter (DMM) are demonstrated by measuring many values of current, resistance, and voltage. The oscilloscope is used to measure the period, peak-to-peak voltage, risetime, and falltime of a square wave. Ohm's law, Kirchoff's Current, and voltage Laws (KVL and KCL) illustrate the practical use of the DMM and oscilloscope. Results of the lab verify the theory and render a working knowledge of the equipment.

Notice how the student mentions many more specific types of measurement and theories in the revised abstract. Student Two has also eliminated the repetition of "a better understanding" and replaced it with more concrete language like giving the specific circuit theories used in the lab (KVL, KCL, etc.). The student deleted the sentence that mentioned "a chance to play with all the dials, knobs, and switches on the oscilloscope" and instead, writes that "Ohm's law, Kirchoff's Current, and voltage Laws (KVL and KCL) illustrate the practical use of the DMM and oscilloscope." In the revision, the student also mentions verifying "theory" in the last sentence, a higher order purpose and more abstract than anything mentioned in the draft version of the abstract.

Student Three also focuses on the main purpose of Lab 1 in the draft version of the abstract:

Student Three's Abstract from Draft of Lab 1:

The purpose of this lab was to get familiarize with the equipment and its many aspects. This was done by measuring the resistance of resistors whose resistance was already know and analyzing basic circuit using a DC and AC power supply. From this lab a basic understanding of the equipment was established and KCL and KVL was proven to apply to the circuits.

My comments to this student on draft abstract Lab 1 were:

On the "measuring the resistance of resistors whose resistance" sentence: Read aloud. A lot of r's.
Read aloud slowly, maybe to a partner, and listen for correct verb endings and tenses.

Again, after getting my comments and participating in the in-class discussion on lab report writing and formatting, Student Three revised the abstract for Lab 1 to read as follows:

Student Three's Revision of Abstract Lab 1

There are two main objectives of this lab. The first objective is to learn the basic operations of the components in the laboratory Tri-pack. The Tri-pack includes a function generator, a power supply and a digital multimeter that incorporates to a voltmeter, an ammeter and an ohmmeter. Measuring the resistance of resistors whose values were already known and calculating the components of a basic circuit using AC and DC power supply did this. The

second objective was to learn the fundamental use of the oscilloscope, with emphasis on interpreting the voltage and time scales properly. This lab also stressed the understanding of voltage waveforms that can be produced by the function generator. This was achieved by making several measurements to test and regenerate our ability to read the oscilloscope. The oscilloscope observes the sweeprate, peak to peak amplitude, risetime, falltime, and time period. From this lab a basic understanding of the equipment was established and Kirchoff's current and Voltage law were proven to apply to the circuits.

In the revised abstract, the student writes, "There are two main objectives in this lab," indicating an awareness that there are multiple purposes and tasks or concepts learned by the student. Student Three also adds concrete details and gives a much more accurate perspective of what occurred in the lab in the revised version of the abstract.

This same student maintained an awareness of the importance of using details and having clear purpose statements in the abstract section of lab reports throughout the semester. By the last lab, Student Three is comfortable with identifying purpose statements that are not even mentioned in the lab manual. For example, the Objective of Lab 9, as stated in the lab manual, is:

> To design a closed loop motor controller using the ua741 as a pulse width modulator.

Student Three goes beyond this purpose and describes three additional purposes to the lab in the abstract for Lab 9:

Student Three's Abstract Lab 9

> There are several objectives of this lab. The first objective was to learn the soldering techniques of making a secure, clean, and smooth connection. Constructing an amplifier circuit allowed the opportunity to employ soldering techniques. The second objective was to enhance each individual skill in measuring and interpreting frequency response characteristics. Analyzing the amplifier circuit using Pspice (Bode plot) enables the ability of interpreting the frequency response characteristics of an amplifier. By building the exact circuit used on Pspice, it enforces the skills of measuring the frequency response. The third objective was to enhance the understanding of op-amp by demonstrating a saturated region application, while using the op-amp as a comparator to generate pulse width modulation (PWM). The last objective is to design a closed loop motor controller using the ua741 as a pulse width modulator.

The student's attempt to identify additional purposes/objectives beyond the statement provided in the lab manual indicates that Student Three is aware of the importance of showing the audience (the person reading/grading the lab report, in this case) that multiple tasks were accomplished in the lab. This student seems to have assimilated the skills of summarizing project goals and describing what was learned within the limited space of a lab report abstract.

Let me provide one more example of student improvement in abstract writing. In Student Four's abstract for the draft of Lab 1, the student does not even mention the specific pieces of equipment used in the lab.

Student Four's Draft of Lab 1 Abstract

General functions of the oscilloscope and the basic tri-pack are familiarized in this lab. These pieces of equipment are important in the study of electrical and computer engineering. They aide in measurements of different things in circuits. Simple steps were taken in order to learn how to use the equipment. Basic setting up and adjustments were followed in order to obtain measurements of voltage and current for components of a simple circuit. AND Using the equipment helps in the understanding of theoretical circuit analysis.

My comments on the draft to this student were:

Too general. The abstract is not specific to the point of what you did. It tells the general, main purposes or techniques in the lab. Use your subheadings to help: AC, DC, risetime, falltime, KCL, KVL.

And, again, the comments were reinforced by the topics discussed in the recitation, particularly the importance of purpose statements and accurate reflection of what occurred in the lab in the abstract section of the report.

Student Four's Abstract from Revision of Lab 1:

The main purpose of this lab is to become familiar with the equipment used in facilitating circuit analysis. The digital multimeter was used to measure currents and voltages in circuits and actual resistances of resistors. The oscilloscope was used to display waveforms and to aid in the learning of calculating risetime and falltime. Becoming familiar with the color codes of resistors was another objective obtained in this lab. Results of the lab went along with the expected results, thus showing that use of the equipment helps in the understanding of theoretical circuit analysis.

In the revision, Student Four provides the reader with more details that indicate what occurred in the lab project. The student also adds purposes other than the stated lab objective from the manual.

Table 1 below, shows the prevalence of this absence of a developed purpose statement in the abstract section of the lab report. 10 of 18 students showed this problem in their drafts of Lab 1, the first time many of them had written a lab report. Only 2 students still had this problem in Lab 3, and all students had conquered this error by Lab 4 (before the midterm of the semester).

Table 1. Absence or Presence of Purpose Statements in Abstracts

Student Number	Absence of Purpose Statement	Presence of Purpose Statement
Student 1	Draft of Lab 1, Labs 1, 2	Labs 3 -- 10
Student 2	Draft of Lab 1	Labs 1 -- 10
Student 3	Draft of Lab 1, Labs 1--3	Labs 4 --10
Student 4	N/A	Labs 1 -- 10
Student 5	Lab 3	Labs 1--2, 4 -- 10
Student 6	N/A	Labs 1 -- 10
Student 7	N/A	Labs 1 -- 10
Student 8	Draft of Lab 1, Lab 1	Labs 2 -- 10
Student 9	Draft of Lab 1, Lab 1	Labs 2 -- 10
Student 10	N/A	Labs 1 -- 10
Student 11	Draft of Lab 1, Labs 1 -- 3	Labs 4 -- 10
Student 12	N/A	Labs 1 -- 10
Student 13	N/A	Labs 1 -- 10
Student 14	Draft of Lab 1	Labs 1 -- 10
Student 15	N/A	Labs 1 -- 10
Student 16	Draft of Lab 1	Labs 1 -- 10
Student 17	Draft of Lab 1, Lab 1	Lab 2 -- 10
Student 18	Draft of Lab 1, Lab 1	Labs 2 -- 10

Beyond the Abstract: A Case Study

Student Five's draft of Lab 1 contained almost all of the "serious" errors that the Writing Center and the ECE staff considered indicators that a student was really struggling with the conventions of engineering writing, errors that would drastically reduce a 201 student's grade on a lab report. For example, the student used first-person pronouns, imperative verbs (i.e. repeating the lab manual instructions nearly verbatim), and made virtually no reference to tables, figures and graphs in the text of the lab. The last paragraph of the student's introduction reads:

> We begin the lab with proper setup of the DMM. . . We will then make some simple
> D.C. measurements followed by A.C. readings.

The student then writes the Procedure and Analysis section in the lab report manual style:

> Turn power on to Tri-Pack and connect probes to correct jacks on DMM. . . Switch
> DMM to measure resistance by selecting the push-button. Next push both range
> control push-buttons in order to make DMM "auto range." Acquire ten resisters of
> different values and determine the value using the DMM" (Student Five's draft of
> Lab 1).

It is clear that Student Five is struggling with or oblivious to the conventions of lab report writing. The student relies on first person constructions to report the event in the lab even though the handouts provided by the Writing Center and the lab manual warn students **not** to use first person. The student also copies the format of the lab

manual instructions that are familiar and easily available as a reference rather than rewording the instructions to avoid the imperative verb constructions.

This same student's work was vastly different after receiving back the draft with Writing Center comments and hearing the in-class discussion on lab report conventions. The Procedure and Analysis section becomes: "I turned power on to Tri-Pack and connected probes to the correct jacks on DMM to measure resistance. I measured the resistance of ten resisters with different values and recorded them in Table 1" (Student Five revised Lab 1). The student is still struggling with the genre constraints as evidenced by the continued reliance on first person. However, the student has eliminated the imperative verb constructions that were copied from the lab manual, so the language is more original than the language in the draft of the lab.

This student also added a phrase to the revised version of Lab 1 that is noteworthy. Student Five wrote, "The DMM, D.C. Power Supply, and Function Generator are all housed in the same frame *and is affectionately named the Tri-Pack*" [emphasis mine] (revised Lab 1). The inappropriateness of the phrase "is affectionately named" is either ignored or unknown by the student, who has not yet realized that engineering writing is strongly depersonalized and unemotive. The student has not yet been acculturated to write like an engineer. As Dorothy Winsor observes, "genres. . .can encourage or discourage certain kinds of writing. For instance, engineering genres commonly have standard headings that invite writers to include some kinds of information but not others, thus suggesting that some information is valuable and other information is not. . .In navigating through the expectations implicit in common genres, a student is exposed to many of the expectations of the field" (28). In this case, the student is gently warned to avoid language that implies emotion or feeling in engineering lab reports and is told that clarity and factualness are valued above original or personal expression in lab report writing.

2. Introduction of tables, figures, and graphs with references in sentences:

One of the stylistic devices that many EECE 201 students most often struggle with is how to incorporate data like figures and tables into the text of their labs. Frequently, students simply provide the graph or chart and do not refer to the data in their sentences, much less explain what the graph or chart is supposed to depict or "tell" the reader. Dorothy Winsor discusses this "independent data" phenomenon in Writing Like an Engineer: A Rhetorical Education. She observes that all four of the students in her five-year study indicated belief that data were an independent and non-persuasive tool in engineering. She writes, "The presence of data obviates the need for rhetoric" (33) and "What the students had difficulty realizing, however, is that in addition to being part of what makes engineering powerful, data are also part of what makes engineering persuasive. That is, they seemed to believe that data can create knowledge apart from persuasion" (93). Perhaps this is the reason that so many students are comfortable with plunking tables and graphs in the middle of text with no comment on the graphics. The table stands for itself; the figure is what it is.

What we stressed in our Writing Center instruction and comments on students papers is that the reader, especially a busy reader who might be skimming the text, needs cues to point him/her to the important data as quickly as possible. The text, (i.e. the writing), supports the graphics best when the graphics are an organic part of the text. For example, Student Five used successful incorporation strategies from the very first lab of the semester. The student wrote sentences like "The known values of the

resistors and the measured resistances of the resistors are listed in Table 1," and "As the tables indicate, DC measured voltages and currents were minimal as expected" (Student Five Lab 1).

A Case Study

I have reproduced several pages from one student's draft of Lab 1 to demonstrate how problematic a lack of explanation of or reference to tables and figures can be (figure 6). My comments to the student, "Where is your text? Each of these needs text to explain why it is there" appear at the top of the page. Perhaps this student ran out of time and thought that because this was a draft/revision exercise, she would have a chance to add more text later. However, it is clear that a page that includes a figure of a circuit and two tables that represent entirely different sets of calculations needs strong textual cues to guide the reader to the important information on the page.

In the revised version of Lab 1, this student provides the reader with clear cues and references in the text to tables and figures (figure 7). She writes, "Table VI shows a summary of the results" and "The impedance of the capacitor was found by using Equation 4; the values can be seen in Table VII" (Revision of Lab 1). This student quickly responded to the Writing Center's comments about the importance of providing textual references to information in the tables and figures. She retained this awareness throughout the semester, demonstrating an understanding that the audience needed words to guide them to parts of the lab report that she wanted to emphasize like calculations and data results.

In a recent interview with Dorothy Winsor, I asked her how she teaches engineering students the importance of discussing, or at least mentioning, data in the text of reports. She recommends replicating a table that shows complex relationships between items, thus necessitating some discussion or explanation. She puts the table without discussion on the overhead and asks students to speculate about what the data show. Then she puts up some text that explains what the table is supposed to show. This allows students to make the connection between tables of data and the reader's needs for information about the data.

To measure the success of the Writing Center instruction on getting students to discuss data in the text of their lab reports, I examined all of the labs in each student's portfolio and made a table that indicates the presence or absence of such incorporation of tables and graphs.

Table 2. Absence or Presence of Text Incorporating Data

Student Number	Absence of Text Referring to Data	Presence of Text Referring to Data
Student 1	N/A	Labs 1 -- 10
Student 2	N/A	Labs 1 -- 10
Student 3	Labs 2, 3	Labs 1, 4 --10
Student 4	N/A	Labs 1 -- 10
Student 5	Lab 4	Labs 1--3, 5 -- 10
Student 6	N/A	Labs 1 -- 10
Student 7	N/A	Labs 1 -- 10
Student 8	Lab 2	Labs 1, 3 -- 10
Student 9	Lab 1	Labs 2 -- 10
Student 10	Lab 2	Labs 1, 3 -- 10
Student 11	Labs 1 -- 3	Labs 4 -- 10
Student 12	N/A	Labs 1 -- 10
Student 13	N/A	Labs 1 -- 10
Student 14	Draft of Lab 1	Labs 1 -- 10
Student 15	N/A	Labs 1 -- 10
Student 16	Draft of Lab 1	Labs 1 -- 10
Student 17	Lab 2	Lab 1, Labs 3 -- 10
Student 18	Draft of Lab 1, Lab 1	Labs 2 -- 10

As the data from the table indicate, although over half of the study sample had this problem in their early lab reports, no student retained the problem after Lab 4 (the fifth week) of the semester. Also, most of the students who encountered the problem were able to fix the references within one week. The fact that all students in this sample were introducing and discussing tables and graphs in the text of their labs by the end of the semester indicates a successful connection between Writing Center instruction and lab report writing practices of the students.

3. Use of Subheadings

The third characteristic that I used to chart student improvement in lab report writing is the use of subheadings within the prescribed lab report format. Kitty Locker, in Business and Administrative Communication, emphasizes the importance of using headings and subheadings to guide readers through a document. She writes, "Headings enable your reader to see at a glance how the document is organized, to turn quickly to sections of special interest, and to compare and contrast points more easily. Headings also break up the page, making it look less formidable and more interesting" (129). The Writing Center consultants discussed the importance of headings and subheadings with students at several points in the semester using the points that Locker makes and trying to get students to see that busy executives and managers in engineering might really need the guidance of headings and subheadings to help them read documents more efficiently.

A Case Study

Excerpts from one student's lab reports will demonstrate how the absence or presence of clear subheadings is typically manifested in 201 student writing. Figure 8 represents the student's Lab 2 report. The student used no subheadings in the report and merely repeated the major headings that appeared in lab report writing handouts that he received. The only heading that appears on these two sample pages is "Procedure and Analysis." Yet the student is writing about several different topics on these pages: Voltage Divider measurements and analysis; Nodal Analysis; and discrepancies in data. Subheadings would significantly increase the reader's ability to quickly see what the student found and discussed. Lab 2 was turned in after students had received both instructional handouts and an in-class discussion on appropriate lab report formatting, both of which emphasized the importance of subheadings as cues for the reader. This reliance on major headings alone and absence of subheadings was a common error in student writing early in the semester.

By Lab 4, however, this student is producing detailed subheadings that serve to divide large sections, like Measurements and Analysis, into chunks that the reader can easily identify (figure 9). These visual cues allow a reader to scan the page and get a detailed idea of what is contained there. The Writing Center emphasized that this production of subheadings is a facet of writing that students will use often in their future jobs as engineers. And by the end of the semester, almost all of the 201 students used subheadings in their lab reports and technical memos.

Again, I compiled a table to represent how the absence or presence of subheadings occurred in the students' labs that I monitored. Table 3 refers only to subheadings, because all of the students are required to use the standard headings of Abstract, Introduction, Procedure and Analysis, and Conclusion as a part of the lab report format. So, anything above and beyond those four basic major headings indicates a fairly high level of independence and creativity, and perhaps a larger understanding of the importance of giving readers cues. I gave the student credit for having subheadings even if the student merely replicated the subheadings provided in the lab manual, as opposed to creating their own.

Table 3. Absence or Presence of Subheadings

Student Number	Absence of Subheadings	Presence of Subheadings
Student 1	N/A	Labs 1 -- 10
Student 2	N/A	Labs 1 -- 10
Student 3	N/A	Labs 1 --10
Student 4	N/A	Labs 1 -- 10
Student 5	N/A	Labs 1 -- 10
Student 6	Lab 2	Labs 1, 3 -- 10
Student 7	N/A	Labs 1 -- 10
Student 8	Lab 3, 4	Labs 1, 2, 5 -- 10
Student 9	Lab 3	Labs 1, 2, 4 -- 10
Student 10	N/A	Labs 1 -- 10
Student 11	Labs 2, 3, 9	Labs 1, 4 -- 8, 10
Student 12	Labs 2, 3	Labs 1, 4 -- 10
Student 13	N/A	Labs 1 -- 10
Student 14	N/A	Labs 1 -- 10
Student 15	N/A	Labs 1 -- 10
Student 16	Lab 1	Labs 2 -- 10
Student 17	N/A	Labs 1 -- 10
Student 18	N/A	Labs 1 -- 10

The data from the table indicate that, while the problem of the absence of subheadings was not present in most students' work, at least 6 of 18 (or one third) of the students whose papers I graded struggled with the concept on at least one lab report. Furthermore, one student regressed and had no subheadings in Lab 9, even though the student had used subheadings in Labs 4 -- 8. Otherwise, the data indicate that all students were comfortable with the use of subheadings in lab reports by the fifth lab, which supports the claim that the Writing Center instruction on the importance of using subheadings was successful.

4. Providing Sentences of Analysis and Explanation of Observations and Discrepancies in Data

The fourth characteristic used to analyze the success of the Writing Center instruction in EECE 201 is the presence or absence of sentences that analyze or explain what the students observed in the lab, especially if there were discrepancies in the data (i.e. calculated vs. measured results were different). After grading the first lab report in spring 1999, the Writing Center consultants noticed that many students'

lab reports were entirely devoid of sentences that indicated awareness of the importance of discrepancies in data. By this, I mean that students would mention that their measured results did not equal their calculated results, but they would not provide any reasons for the disparity in data, even when the lab manual specifically requested them to do so. For example, in the lab manual instructions for Lab 1, the manual states, "Compare the measured values to the labeled values. If you obtain unstable or inconsistent readings, or suspect errors in your measurement, comment on and analyze the source of error" (Tools and Techniques 3). Yet students frequently wrote sentences like "The calculated values for expected response in the four circuits in this lab differed by no more than 5.4% at most," but they provided no reasons, real or speculative, for the discrepancies.

To address this problem, the Writing Center created overhead transparencies and discussed the concept of analysis with students in class. Figure 10 shows two examples of situations when calculated data did not correspond to measured data in students' work. The Writing Center discussed with students how both of these examples went beyond just mentioning the discrepancy. In each case, the writer hypothesized why the error occurred, or at least commented on the disparity, noting its importance.

Examples of Analysis

Most of the measured values are consistent with the expected values of the resistors except for the first resistor measured. This resistor was off by. . .

The 2% discrepancy seen between the calculated and the measured value for the current through the 10kΩ resistor is an acceptable error. The resistance in the leads of the DMM could cause such an error.

Figure 10. Transparency with Examples of Analysis

Figure 11 shows the list of key words taken directly from the lab instructions that pertain to analysis. The Writing Center asked students to read through the lab instructions and highlight places where they were asked to analyze their data or findings. Then the Writing Center consultants discussed how important it is to explain data to the reader, especially when something unexpected occurs.

Key Terms in Lab Instructions for Analysis

- **Compare** (Part 1: Equipment Familiarization)
- **Comment on** (same)
- **Analyze** (same)
- **Prove, by showing** (Part 1: DC Measurements)
- **Observe and comment on** (Part 2)

Analysis: Discuss your observed results, any discrepancies or errors, possible reasons for errors, possible consequences of errors, expected results vs. actual measured results.

Figure 11. Transparency with Key Analysis Terms

A Case Study

An important part of analysis is explaining discrepancies that occurred in the lab. This gives students an opportunity to think reflectively about why the theory did not work the way it was supposed to or why their calculated (hypothetical) results did not match their measured (actual) results. The following example shows how a student developed an awareness of the importance of including such explanatory analysis in her lab reports during the semester. In the draft of Lab 1, Student five wrote, "The circuit shown in Figure 1 was constructed for the next part of the lab. Instead of using a 9.1K resistor, we used a 10K resistor. The actual resistor values are given in Table II" (draft of Lab 1). Since the lab instructions clearly ask the students to use a 9.1K resistor when they construct the circuit, it was important for this student to explain why she substituted a 10K resistor. I commented on this and asked the student to explain why a different resistor was used.

The revised version of Lab 1 included the following: "The circuit shown in Figure 1 was constructed for the next part of the lab. Instead of using a 9.1K resistor, we used a 10K resistor because a 9.1K resistor could not be located. This did not affect the results" (revision of Lab 1). This new version contains more analysis and is better in two ways. First, the student gave an explanation of why she deviated from the lab instructions and, second, the student addresses a reader's concern that this might affect the results of the lab and states that the results were not affected by the substitution.

This lack of explicit analysis is another example of how engineering students privilege data (factual evidence) over writing. All of the students had data in their labs at these points when the Writing Center was asking for more analysis. The students had diligently recorded the results of their observations in the lab; they just did not comment on the importance of the observations (even when specifically asked to do so). Dorothy Winsor notes about the students she studied for five years, "What the students had difficulty realizing, however, is that in addition to being part of what makes engineering powerful, data are also part of what makes engineering persuasive. That is, they seemed to believe that data can create knowledge apart from persuasion" (32). Perhaps the EECE 201 students are also struggling with the perception that data (the numbers) speak for themselves. If that is the case, then it would almost seem redundant for students to comment on each calculation or discrepancy in numbers. However, the Writing Center tries to teach the students that not all audiences will understand what the numbers "say" as quickly as the students do, so it is better to explain and provide analysis for the reader.

Teaching students to think and analyze throughout the lab process is vital. Yvonne Merrill, at the University of Arizona, notes that engineers in her senior design course differed most from faculty members in one area of their design processes: "Faculty logged their progress and thinking and wrote considerably while performing and problem solving throughout the design process. Students hadn't learned to do that yet, so their analytical, synthetic thinking was slow and their

collaborative work sometimes unproductive because each team member hadn't been mentally processing his or her part of the overall design problem and its solutions. The students waited until meeting with the team to start putting new understandings into words" (WPA listserv 7/9/99). This observation is also applicable to the EECE 201 students, many of whom do not take detailed notes while they are conducting the labs. Therefore, these students may not think about concepts beyond actual calculations until they are writing the lab. At that point, students struggle with new engineering concepts while they also try to communicate in a format (i.e. writing) which they already have been using. Table 4 records the absence or presence of analysis of data in the 18 students' lab reports throughout the semester.

Table 4. Absence or Presence of Analysis and Explanation of Observations

Student Number	Absence of Analysis (in Sentence Form)	Presence of Analysis (in Sentence Form)
Student 1	Draft of Lab 1, Lab 1	Labs 2 -- 10
Student 2	N/A	Labs 1 -- 10
Student 3	N/A	Labs 1 --10
Student 4	Draft of Lab 1	Labs 1 -- 10
Student 5	Lab 2 -- 3	Labs 1, 4 -- 10
Student 6	N/A	Labs 1 -- 10
Student 7	N/A	Labs 1 -- 10
Student 8	N/A	Labs 1 -- 10
Student 9	Draft of Lab 1, Lab 1	Labs 2 -- 10
Student 10	Draft of Lab 1, Lab 2	Labs 1, 3 -- 10
Student 11	Labs 1 – 4, Lab 7	Labs 5, 6, 8 -- 10
Student 12	Draft of Lab 1	Labs 1 -- 10
Student 13	N/A	Labs 1 -- 10
Student 14	Draft of Lab 1	Labs 1 -- 10
Student 15	Draft of Lab 1, Lab 1	Labs 2 -- 10
Student 16	N/A	Labs 1 -- 10
Student 17	N/A	Lab 1 -- 10
Student 18	Draft of Lab 1, Lab 1	Labs 2 -- 10

Almost half, 8 of 18 students, exhibited a lack of explanation or analysis of tables and graphs in their drafts of Lab 1. Again, this is probably due to the students' lack of familiarity with lab report writing conventions and their readers' needs for information and explanation of the graphics. In other words, this is an audience analysis problem. However, after reading Writing Center comments on their labs and participating in Writing Center discussions in class about the importance of giving the reader cues and explanations, most of the 18 students developed strategies for eliminating this problem from their labs. One of the 18 students continued to struggle with this concept through Lab 4 and had a relapse in Lab 7, but the other 17 students had mastered this technique by Lab 4.

Conclusion
The next chapter contains the evaluation of this study and a comprehensive discussion of the strengths and weaknesses of this model. My recommendations for

changes in the Writing Center involvement in EECE 201 in future semesters also appear in chapter 6.

End Notes

[1] Before spring 1999, students did not get to turn in a draft of Lab 1 for comments and then to revise it. That practice began in the spring 1999 semester.

Chapter 6
The Future for the ECE Writing Center:
Recommendations Based on the Study and Program Evaluation

This chapter presents the evaluation of the writing program that I made based on my observations and data gathered in the spring 1999 study. The recommendations that appear at the end of this chapter represent the joint opinions of myself, Tom Bowers, the second ECE Writing Center and 201 consultant, and Dr. Elisabeth Alford, the Director of the ECE Writing Center. We presented these recommendations to Dr. Jerry Hudgins and Dr. Clint Chandler in April 1999, and an agreement was reached that we would implement them in the summer and fall 1999 sessions of EECE 201. This chapter also contains a lengthy discussion of the controversial issue of splitting grades into separate form and content areas and how such a split impacted the Writing Center and the 201 course.

Information about the Pros and Cons of Splitting the Grade in 201

As shown earlier in chapter 5, one of the main changes in the spring 1999 model of Writing Center instruction in 201 was that the Writing Center consultants graded the writing portion of the lab reports. This was a major change in philosophy for the Writing Center: from the ECE Writing Center's first day in 1995, the staff felt very strongly that we should have absolutely no involvement in grading. Our identity should be one of a safe place for students to bring pieces of writing where a reader would give them critical feedback in a grade-free (risk-free) zone. This separation from grades was to enhance our ethos as "student advocate." We believed that "If the students perceive that we have influence over their grades, then we become part of 'the system.' Therefore, we try to keep our role as clearly defined as possible - and our role is as the student advocate, to help the students become better communicators" (Ramey, Proceedings 49).

The Writing Center's original philosophy was also influenced by the ideas that Judy Gill, in "Another Look at WAC and the Writing Center," discusses: a controversy in writing center scholarship. Gill implies that the role of writing center peer tutors should remain clearly distinguished from the role of instructor. She writes of "the concern that consultants will . . . begin to be perceived as teacher stand-ins or authority figures, and that the student-consultant conference will come to resemble a student-teacher conference in which the student is told what to do, what to fix, and how" (171). For Gill, these are urgent concerns, pitfalls to be avoided, and her concerns are representative of much scholarship in the field. Originally, the ECE Writing Center shared Gill's concerns, but in the spring 1999 section of 201 we acted as both teacher and consultant. The Writing Center instruction in EECE 201 is very explicit, because the students are learning a new genre that relies on formulaic modes of expression. And a discipline-specific writing center expands the role of writing center-based instruction beyond the boundaries of traditional writing center theory by providing both instruction and evaluation in a course like EECE 201.

In the spring 1999 semester, the points students received for each lab were broken down in the following manner:

- Correct technical content   40%
- Good writing   30%
- Appropriate use of computer tools   20%

- Good presentation quality   10%

The descriptions of each section of the grade appeared on the syllabus as the following:

Correct technical content score reflects the correctness of your measurements, project outcomes, analysis of data, and interpretations and conclusions drawn from your analysis of the data. Be thorough and complete all requirements specified in the lab notebook. (Graded by an ECE TA).

Good writing (graded by a Writing Center TA) reflects the quality of the writing in your report, including organization, clarity, correctness, presentation style, and appropriate use of technical language. (Note: Misuse of technical terms may lower your grade in both the Technical Content and Written Communications components).

Appropriate use of computer tools reflects your ability to incorporate features other than words into your report. Sixty percent of the available credit for each skill will be awarded for a rudimentary application of the skill. One hundred percent credit will be awarded when the skill results in a polished application. (graded by an ECE TA).

Presentation quality reflects the overall appearance of your report, including margins, paragraph spacing, use of appropriate fonts, appropriate subdivisions, figure captions, equation numbers, etc. (graded by a Writing Center TA).

The 40/60 split of points between writing and technical content is problematic for several reasons. First, composition research and pedagogy emphasize that form and content are inextricably linked. As Mike Rose notes, "Writing seems central to the shaping and directing of certain modes of cognition, is integrally involved in learning, is a means of defining the self and defining reality, is a means of representing and contextualizing information. . .and is an activity that develops over one's lifetime" (Language 533). In other words, if a student is having trouble with the format (i.e. grammar, organization, etc.) of her essay, she will often also have trouble understanding and communicating the complex ideas that she is writing about. Likewise, in engineering, a student whose lab reports are improperly formatted or under-developed, even well into the semester, is often struggling with the technical aspects of the lab too.

So, to split a student's grade between writing and technical content, and furthermore, to have one set of people grade the writing and another group grade the technical material, creates a false (?) dichotomy between communication and knowledge. This dichotomy only serves to widen the gap between compositionists and engineers who are (supposed to be) working together to help students communicate better. Toby Fulwiler writes, "What is said includes how it is said: Don't split grades. . . .For one thing, when something is known or understood well the chances are that a writer will express it well; conversely, a lot of poor writing (wordy, rambling, evasive, digressive, disorganized, over-generalized) results from inadequate knowledge and understanding. For another thing, such grade splitting reinforces the notion that English teachers are rightfully concerned with 'mere expression' and the

other folks with 'true content'" (31). Such a split between expression and content recalls the divisive attempts of Peter Ramus to categorize rhetoric as nothing more than style and delivery. Rhetoricians have resisted and resented Ramus' classifications for many years.

A second problem is the message that such a split communicates to engineering students. In one way, the 40 points for writing is positive because engineering students thrive on quantifiable information. They *want* to know how much of their grade is covered by writing/communications and how much is based on engineering concepts. But do we really want to send the message to students that writing is worth 40% of their labs, which represent 40% of their course grade? Might this not give students a misleading perception of the importance of writing well, no matter how comforting the numbers may be to students who want quantifiable feedback on each mistake in their lab reports?

A third problem, and perhaps the most troubling for me, is the effect splitting the lab grade has had on the Writing Center interaction with the engineering TAs. In the past, Writing Center consultants have conducted paper-grading workshops to help train engineering TAs on responding to student writing. A typical workshop agenda would cover topics like Responding to Student Papers; Using Writing to Learn in Engineering; Developing Effective Writing Assignments. Unfortunately, this semester, with the Writing Center grading writing, all parties involved, including the Writing Center staff, seemed to feel that a calibration workshop, or any TA workshop, was unnecessary. Thus, we lost a valuable opportunity to interact with the engineering TAs in a meaningful way about writing. We also lost one of our best resources for learning more about engineering and what successful engineering students value in written lab reports.

One of the proposed ECE Writing Center goals was to "develop recommended approaches, processes, and materials for teaching engineering graduate assistants the principles of effective written communication, methods for encouraging effective technical writing in lab courses, and methods for responding to student writing" (Gateway proposal, 8/95). If the Writing Center staff tacitly agree with, even encourage, a split in grading between writing and engineering content, it is only logical to assume that the Writing Center would be responsible for evaluating (i.e. grading) the writing. We're the experts on that, right?

All semester long in spring 1999, the Writing Center consultants graded the labs first and then handed them off to the engineering TAs. Consequently, the consultants had no idea of what comments students received on the technical side of their papers. Also, while the Writing Center had an idea of how students were doing on the writing part of their grades, the consultants basically had no conception of how students were doing in the course overall. The engineering TAs tallied up the lab grades *after* they gave the technical points and handed the labs back to students in the weekly lab sections.

There is also an ethical component involved in the spring 1999 model of writing center involvement in the ECE 201 course. For example, is it a strength for the program to maintain this division between writing consultants who grade the writing of reports and engineering teaching assistants and professors who grade only technical content? We, the Writing Center, used to feel that part of our job in engineering was to help train engineering teaching assistants to become more comfortable and confident with grading writing in engineering. After all, these are some of the future engineering professors who we hope will incorporate writing

assignments and instruction into their future courses. If we contribute to their resistance (both active and passive) to grading writing by doing it ourselves, are we losing precious opportunities to teach more engineers about writing processes?

In this case, as a departmental, discipline-specific writing center, I think we should be looking for ways to blur the lines between the disciplines. Splitting grades for students may only serve to make the disciplinary identities of engineering and composition more distinct and rigid.

The following table is a comparison of the pros and cons of having the Writing Center involved in grading the lab reports in EECE 201. Note that while there are more entries in the pros column, some of the cons are extremely important to consider, and might actually be more important than some of the pros. For example, the loss of the opportunity for engineering faculty and teaching assistants to become more comfortable with evaluating student writing and creating writing assignments is a major problem with the spring 1999 model. This problem will be addressed in the recommendations section of this chapter.

Table 5.
Pros and Cons of Writing Center grading in EECE 201
Spring 1999

Pros	Cons
Draft of Lab 1 for students	Lose Writing Center status of "safe place"
WC staff gets a better idea of what the students are writing	Tacit agreement that form and content can be separated - taught **and** graded separately
Better focus for our instruction and customized instruction	Much higher time commitment for WC staff/TAs
Substantial increase in ethos for WC	Less time for WC work with other classes
Substantial increase in power for WC	Loss of opportunity for engineering faculty and teaching assistants to become more involved with students' writing
Possible increase in use of WC of 201 students	
Lessens burden for engineering staff who are extremely uncomfortable with grading writing	
Lessens chance of students claims of mixed messages sent from WC and Engr. TAs	

It is important to examine the reasons for having a split grade, a division between writing content and technical content. One reason might be that in fields like engineering, there is a core belief that it is possible to separate the teaching of writing from the technical content of the discipline. Lee Odell notes that many faculty in

scientific departments still have a formalist perspective on language and frequently want to separate grades for writing (or style) and content. Odell and Judith A. Langer observe, "teachers at all levels may be more comfortable in discussing the content of their disciplines than in identifying the methods of thinking or analytic strategies needed to generate or reflect on that content" (97). Recently there was an intense discussion on the Writing Program Administrators (WPA) list-serve debating the issue of bifurcating grades. Predictably, as compositionists and writing program directors, most of the participants in the discussion strenuously argued against splitting grades.

Elizabeth A. Flynn's experience at Michigan Tech, described in "Interaction Across the Curriculum," supports Odell and Langer's observations. She notes that, in her project, "One of the challenges we faced as the project progressed was dealing with a conception of language on the part of some of the engineering faculty that had positivistic tendencies" (351). The engineers referred to the materials the team was developing as a "template," by which they meant a "plastic plate often used by engineers to form accurate copies of objects or shapes. . . .From their perspective, then, the materials we were creating were a form into which students could pour their content. An important part of this project, therefore, involved encouraging engineering faculty to see learning as an interactive process rather than a mechanistic one" (352).

In composition pedagogy, there is a major resistance to teaching form. Using the disguise of the mantra "Process, not product," composition teachers at universities across the country resist imposing formats like the dreaded five-paragraph theme on their students. In fact, in another recent discussion, the WPA list serve was clogged with responses from writing instructors who despise the very idea of the "par 5 essay." Responses included comments like, " Many more teachers than you would imagine defend the 5-paragraph essay as a necessary step in building to organizational skills. In doing so they are rejecting a holistic approach to writing in favor of an accumulating incremental approach, whether they know it or not. The problem is that good writing works from the rhetorical purpose down, not from word and sentence facts up. The sophistication of this concept, which seems intuitive to those who have studied the nature of writing even a little, is apparently beyond most. The 'rules' of writing should be part of the mopping up operation, not part of the vanguard" (Kemp 6/22/99). And Ed White characterizes the five-paragraph essay as "a dumb package into which ideas (or non-ideas) must be forced." White states that " No matter what an essay test program may say about writing, teachers and workshop leaders very often wind up teaching the formula--even though the test readers themselves know it and laugh at it when it appears. Sometimes a teacher will defend the formula as a way to get students to learn SOMETHING about organization when all else fails" (White 6/22/99)[1].

But in a field like engineering, students are subject to strict constraints about presenting information in a certain manner. Professors and teaching assistants in are obligated to teach students form more so than in fields like English where students may have a bit more flexibility about expression. Maybe composition scholars are so committed to NOT teaching the five paragraph paper that they have trouble understanding that in some disciplines, like engineering, it is acceptable, even necessary, to teach writing and form together. Engineering students need to know where data and results should be placed. The lab report is not a creative exercise; it is a vessel/form into which students are to place what they observed in a lab exercise.

According to the engineering discipline constraints, certain information should only appear in certain areas of the lab report.

If that is the case, then what is wrong with grading their success in mastering the format separately from technical content (i.e. numbers, graphs, and tables) which can stand alone without text? So when Elizabeth Flynn writes that, "some engineering faculty. . . argued that students should be given separate grades for content and form, an indication to us that the idea of writing as a form into which content could be poured had not been eliminated," maybe she is missing the point (361). Maybe, in engineering and other fields that remain form-dependent, students should most definitely be given separate grades for content and form, because a student who masters the format of a lab report might still obtain incorrect data. Or, a student who knows the lab exercise inside and out might still struggle with subheadings and writing an abstract and conclusion about that lab. In some senses, the lab report is exactly what Flynn seems to fear: "a form into which content could be poured." What is wrong with that?

Pedagogical Changes and Revisions

So, one aspect of having a successful writing center program in the ECE Department has been our willingness to teach both content and **form**. Another important factor in the Writing Center's success is the realization that the Writing Center must remain flexible and reflective about the ways we teach writing in engineering. We rely on what Donald A. Schon calls "reflection-in-action," a process that is "central to the 'art' by which practitioners sometimes deal with situations of uncertainty, instability, uniqueness, and value conflict" (50). For example, the Writing Center has repeatedly encountered student resistance to our presence in EECE 201. Sometimes we have been perceived as extra work on already over-burdened students; sometimes we have been viewed as outsiders, illiterates in the technical field of engineering. Even though the Writing Center has not increased the writing component of the course (indeed, by incorporating memos and an oral presentation, we have actually reduced the required writing in the course in terms of the number of pages that students must write), students seem to view the Writing Center instruction as extra work.

The Writing Center has tried to revise both the writing instruction and the writing assignments in 201 to address these student concerns and those of the consultants themselves. As a result, the Writing Center's pedagogy has necessarily remained flexible and reflective.

Evaluation of Instruction During the Spring 1999 Semester

An example of the Writing Center's reflective pedagogy occurred when we gave an in-class presentation on how to give an oral presentation. The Writing Center presentation focused on presentation skills like having a clearly stated purpose, having a defined plan of organization, practicing the presentation, etc. We did show slides from a senior-level engineering student's presentation, but we did not focus attention on those slides. The bulk of our emphasis was on communications skills. I administered the following questionnaire after the Writing Center gave a presentation on oral presentations (See Figure 12).

One of the most valuable pieces of information that I got from the questionnaire responses was that one-third (10 of 30) of the class specifically requested that the Writing Center provide more detailed or more focused information

about the specific type of oral presentation given in EECE 201. As a result of the comments, I asked five students for copies of their 201 oral presentations and the ECE Writing Center now has these on file as resources for our presentations and for students to view. In July 1999, Brooke Rollins, another ECE Writing Center consultant, used the sample student reports in the Writing Center presentation on how to give an oral presentation. The 201 students were engaged by the "real" examples and seemed to find it easier to identify with an engineering-focused presentation.

Directions: Please respond honestly and constructively to the questions below by circling the responses you most agree with and writing brief comments.

1.   On the scale below, please rate the *clarity* of today's instruction on oral presentations.

    1   2   3   4   5
totally unclear   somewhat unclear   mostly clear   very clear   extremely
clear

2.   Overall, how interesting did you find today's session?

  1   2   3   4   5
totally   mostly   somewhat   very   extremely
boring   boring   interesting   interesting   interesting

3.   Overall, how useful was today's session in helping you learn about giving oral presentations?

  1   2   3   4   5
useless   not very useful   somewhat   very useful   extremely useful
                                    useful

4.   What did you find most helpful about today's Writing Center instruction? (Please give one or two specific suggestions.)

5.   How could the class have been improved? (Please give one or two specific suggestions.)

Figure 12. Writing Center Questionnaire about Oral Presentation

The Importance of Flexible Pedagogy: A Case Study

Another example from the spring 1999 semester will further demonstrate the importance of flexible pedagogy in 201. After the Writing Center's third in-class presentation in the 201 recitation, Tom Bowers, Brooke Rollins, and I felt that the students were not responding positively to our lecture-based traditional presentations. The logistics of the 201 classroom were a contributing factor in this situation.

Specifically, the recitation was held in Amoco Hall, a large auditorium that seats upwards of 200 people. EECE 201 students sat in clusters, mostly near the back, making it difficult for a lecturer at the front of the room to make eye contact with much of the class. Walking around the room was also nearly impossible because there is no room to walk between rows, so it is only possible to walk up and down the aisles.

We had a major unit of instruction coming up on how to write technical memos, a new genre for the class. To address the problem of the scattered, and somewhat inattentive, class, we enlisted Dr. Elisabeth Alford and Tom Smith, both of the Professional Communications Center, to help us lead small groups in the class. We had a brief "calibration" session to make sure that all five leaders would cover the same main points. So, we replaced the lecture on technical memos with small group discussions about the genre. Each group had approximately 6 or 7 students. Each leader got a chance to discuss technical memos, make eye contact, ask for names, etc. in a more casual manner than in a regular lecturer situation.

We also asked the students who had any experience with technical memos to raise their hands, and we tried to put one student with experience in each group. That way, we incorporated peer tutoring into our presentation of this new genre. By breaking up the large, scattered class into small, focused groups, we were able to cover substantive information and more students participated in discussion and in question/answer than ever had in the regular lecture format. Perhaps they were less intimidated by the small group format and felt more comfortable voicing concerns.

Rollins had a successful group experience and observed,

> Placed into a group of six, the EECE 201 students seemed much more involved and responsive than they do when scattered around the large lecture hall. I felt I could more easily assess the students' understanding of the subject by focusing on each of them consistently. If a student looked unsure I would elaborate or ask if there were specific questions. Of the six students, two described some of their real world experience with technical memos and supported my claim that this assignment would be applied to their co-ops and careers later on. This kind of student support surprised me because as a whole the 201 class often seems resistant and skeptical.

> I went into the group discussion with a list of things I wanted to ask and explain, complete with the examples I would coordinate with each point. I thought I would need this highly detailed and rigid plan to keep the conversation moving, but the students seemed to ask questions and make comments without too much prodding. They never wandered off the subject and seemed comfortable to stay on task.

> I think their responsiveness can be attributed to a few things that were different today. The small group size, the focus on individuals, and addressing students by their names seemed to compel them to participate more fully (Rollins 2/15).

This example demonstrates how vital it is for the Writing Center to remain willing to change instructional approaches as needed to address the needs (and behaviors) of students in 201. As Joy M. Reid notes in Teaching ESL Writing, "Teachers regularly interpret data such as test scores and student papers, lesson plans and student evaluations, to determine class success and student progress. They modify their behavior based on observational data such as classroom interactions and student feedback, and they will implement the results of this and other research as

they plan curriculum, write sequenced lesson plans, and design activities for their classes" (265). This dynamic relationship between the Writing Center and the 201 course is evident, not only in the classroom practices, but also in the evaluation meetings that are held at the end of each semester. In these meetings, Dr. Jerry Hudgins, Acting Chair of the ECE department, Dr. Clint Chandler, EECE 201 professor of record, the ECE TAs, and the Writing Center Director and consultants gather to critique the writing instruction and student needs and suggestions for the course. The next section includes my notes for the meeting held in May 1999 to evaluate the new model of writing instruction.

Recommendations for Future Writing Center Involvement in EECE 201

In April 1999, Dr. Jerry Hudgins and Dr. Clint Chandler met with Dr. Elisabeth Alford, Tom Bowers, and me to discuss and evaluate the Writing Center involvement in EECE 201 in the spring 1999 semester. I compiled the following recommendations based on my field notes, classroom observations, and discussions with Bowers and Alford. The following is the text of the memo that I presented in the meeting in April 1999.

Based on our self-assessment of the Writing Center's role in the 201 course, I am making the following recommendations for future Writing Center involvement in EECE 201:

- Make the draft and revision of Lab 1 a permanent assignment in the course. As a tool for assessing the students' writing, the draft and revision are valuable because we get a much closer approximation of the level of work that students will produce for the course from looking at a lab report.
- The Writing Center TAs will grade/comment on the writing in Labs 1-3. After that, the ECE TAs will take over responding to the writing and the technical content. This will allow the engineering TAs to continue to learn to become comfortable with grading writing. The Writing Center will continue to provide communications instruction when needed in the recitations throughout the semester.
- The Writing Center TAs and the ECE TAs will hold a joint paper-grading session on Labs 1 and 2. All TAs will be required to attend at least one of the workshops. A representative sample of papers from the class (probably 3-5) will be used. This will provide the TAs a chance to teach each other what is important in both technical and writing areas of the labs. It will also be an avenue for the Writing Center to help train engineering TAs about responding to student writing.
- The Writing Center will invite the engineering TAs to co-present information in the 201 recitation. For example, a Writing Center consultant and one of the ECE TAs might give the presentation on oral presentations. This joint venture would strengthen the ethos of the Writing Center as engineering students see their engineering TAs work beside the Writing Center. Co-presenting would also give the engineering TAs opportunities to become more comfortable with writing and

communications instruction.

This model would address the concerns about dwindling or changing Writing Center personnel in that the demand of grading throughout the semester would be reduced (essentially phased out by the fourth lab). At the same time, the Writing Center would maintain the responsibility of providing the bulk of the writing instruction in the course. Having the engineering TAs grade the writing after the third lab addresses the Writing Center concern that we help engineering TAs become more comfortable with responding to student writing without significantly increasing the burden on the TAs.

Hudgins, Chandler, Alford, Bowers, and I discussed these recommendations and they were adopted as a new model of Writing Center involvement for summer and fall 1999 sessions of EECE 201. The purpose of the recommendations is to reinforce the Writing Center consultants' more integrated role in the course, while also increasing the opportunities for engineering TAs to evaluate and to become comfortable with grading writing. Each of the suggestions is rooted in the theory that the Writing Center consultants and the ECE TAs will both benefit from maximizing the chances to work together and learn from each other while teaching and grading the writing and communications assignments in the EECE 201 course.

Conclusion

My findings, reported here, demonstrate a clear relationship between the units of Writing Center instruction and improvement in student writing (at least in these four areas) when a writing center works from a position of integrating writing instruction into the course. The majority of students showed demonstrable improvement in the areas of

- Purpose statements in abstracts
- Introduction of tables and graphs with sentences or phrases to give the readers context for the data
- Use of sub-headings (especially sub-headings different from the ones present in the lab instructions
- Provision of sentences of analysis and explanation of observations and discrepancies that occurred in the lab.

By collecting a portfolio of all of each student's lab reports for the semester, I was able to distinguish a pattern of common errors that corresponded to units of Writing Center instruction. The draft of Lab 1 assignment also allowed me to establish a baseline for each student's writing ability. I was then able to compare each student's labs throughout the semester to look for patterns within individual portfolios.

To my knowledge, there are very few studies that try to draw such direct connections between writing instruction in the classroom and the written products generated by students who received that instruction. The unique position I held as insider, because I was a participant and an instructor in the EECE 201 course, allowed me to document the connections between writing instruction and student performance.

End Notes

[1] Ed White responded to my request to quote his email about the five-paragraph essay with the following: "Actually, I've been having some second and third thoughts about this issue, as I have been reviewing (of all things) classical rhetoric. Under "arrangement"--one of the five parts of rhetoric--you find a five part pattern: introduction, narration, proof, refutation, and epilogue. Now, this is very different from what is usually meant by the five-paragraph theme: 1) this subject has three parts, 2) one paragraph for each part, 3) I have shown that this subject has three parts. But that five-part organization, corrupted though it is, has some tradition behind it" (7/29/99).

Chapter 7
Conclusion: The Future for Disciplinary Writing Centers

Kristin Walker, in her dissertation <u>Assessing Students' Genre Knowledge in an Engineering Writing Center: An Analysis of Sophomore Lab Reports in Electrical and Computer Engineering</u>, calls for a continuing assessment of students' writing throughout each semester of the EECE 201 course. She writes, "The most significant implication that has emerged from this study is that more attention needs to be given to students' acquisition of genre knowledge as it is shown in students' *lab reports* during the course of the semester" (311). The spring 1999 model of Writing Center involvement in EECE 201 answers Walker's call. This method of course-long evaluation of students' work involved the division of grading between writing consultants and engineering teaching assistants. In doing so, a major benefit was realized because the Writing Center was able to provide customized and student-centered writing instruction more so than in any previous semester of Writing Center involvement. This was due to the fact that Writing Center consultants saw all of the writing produced by students in the spring 1999 semester. So, Walker's call for continual assessment of student writing was successfully answered with this new method of instruction.

A disciplinary writing center, like the ECE Writing Center, is ideal for working closely with the instructor, teaching assistants, and students of a large class like EECE 201 to customize writing instruction. In "Revisiting 'The Idea of a Writing Center,'" Stephen North mandates programs where writers and writing center staff know each other and can "get fluent" in talk about writing because of the close relationship. The ECE Writing Center is an ideal example of this concept because our writing instruction is vitally influenced by our relationships with ECE faculty and students. We use examples from student lab reports that we've collected over the years, and the writing instruction that we provide is centered around engineering writing conventions and genres. North also emphasizes the importance of a close involvement between teachers and writing center staff which will "[bring] center and classroom, teaching and tutoring, into [a] tighter orbit" (16). The Writing Center's involvement with the EECE 201 course is a realization of this suggestion because we have brought "center and classroom" together. Thus, the ECE Writing Center, a disciplinary writing center, builds on North's ideas and might serve as a model for implementing some of North's suggestions.

Revisiting the Research Questions
The research questions posed in chapter 1 are addressed in the following section and a discussion of how each question was answered by this study is presented.

1. *What methods of writing instruction best incorporate composition pedagogy into the EECE 201 classroom?*
By far, the most successful writing assignment was the requirement that students turn in a full draft of Lab 1 to the Writing Center for review and comments. The students were given back their drafts with extensive, and directive, comments on their work and were given a week to revise. Both the Writing Center consultants and the engineering TAs saw significant improvement in the revised labs, including

improvement in the writing, not just in the formatting. The course curriculum and time constraints prohibit using drafts on all of the labs, but most students are providing satisfactory work by the second or third lab anyway.

Another tool of composition pedagogy that works well in the 201 course is workshopping. So far, it has been difficult to get students to bring in drafts of their own work after the first lab because the lab runs on four different days, so not all students have written anything when the recitation meets. However, when the Writing Center breaks the students into groups and provides models for discussion, the students actively participate and relate to the instruction. The Writing Center has had more success with this model than with the lecture model, which makes it easier for students to tune out.

A third method of successful writing instruction has been the use of student models for discussion. As mentioned in chapter 5, before spring 1999, the Writing Center used fabricated models to show students examples of engineering, especially 201, writing. This was largely due to the fact that the Writing Center did not have access to students' writing because most students did not want to share their writing attempts in Writing Center group meetings. However, in spring 1999, the Writing Center saw and evaluated all students' labs during the whole semester. This unprecedented exposure to student writing was invaluable because it allowed the Writing Center consultants to see patterns that ran through the class, not just through individual students' writing.

2. **What are the factors that influence the degree to which writing instruction is integrated into the 201 course?**

The collaborative relationship between ECE faculty and TAs and the Writing Center staff is the most vital component of integrating writing instruction into EECE 201. Since well before the Writing Center's involvement with 201 (in 1995), the course was a writing-intensive course. What Writing Center involvement has brought to 201 is writing instruction, deliberately and systematically introducing students to the conventions of engineering writing. Many sophomores entering the 201 course are surprised (and appalled) at the amount of writing expected in this course. More than one student has expressed distaste for writing and a belief that engineering majors would not have to write much. After all, they aren't taking an English course.

This student resistance to writing requires active and vocal support for the writing instruction from the ECE faculty and TAs. It is necessary for engineering students to hear and see their engineering instructors value writing. If the Writing Center is the only part of the teaching team stressing the importance of writing in engineering, true integration will not occur. The students will merely perceive the writing as extra assignments from the English people, the non-engineers. In part, that is why it is important for the Writing Center staff to be involved with the teaching **and** evaluating of the students' writing.

3. **In assessing these methods, how can the ECE Writing Center and the ECE Department best collaborate to achieve true integration of writing instruction in the course?**

As we discovered in the spring 1999 semester, when the ECE TAs grade their sections of the labs separately from the Writing Center consultants, this leads to a breakdown in collaboration between the two teaching staffs. Before the Writing Center staff graded, Writing Center consultants and ECE TAs often met to discuss

areas of concern and instruction in the 201 course. After the Writing Center began grading, collaboration almost ceased, and a valuable connection between engineering educators and writing center specialists was lost. To keep the Writing Center as the experts in writing reinforces the division between writing and engineering. The engineers teaching the course need to model how good engineers write for the students. Otherwise, the students will keep separating writing from engineering.

Furthermore, the ECE faculty who teach this lab course must be committed to the importance of teaching writing in engineering. The faculty can model engineering writing and share engineering experiences with an ethos that Writing Center consultants cannot match. Therefore, ECE faculty who teach the 201 course can influence the integration of writing instruction in the course by doing some of the writing instruction themselves.

Would this eliminate the need for the Writing Center's involvement in EECE 201? No, because there will always be students in 201 who need extra help with their writing, help that the Writing Center is designed to provide. Also, the ECE faculty and TAs could still ask Writing Center consultants to give presentations on any area of written or oral communication in the course. But if students are told that writing is a vital part of being an engineer, then the engineering faculty and TAs need to feel comfortable teaching the students about writing like an engineer.

4. *Did the fact that Writing Center consultants were on the 201 syllabus as instructors and graded the writing portions of the labs noticeably impact students' perceptions of the Writing Center instruction in the spring 1999 semester?*

Of 28 students who filled out an end-of-semester course evaluation, only 2 students expressed dissatisfaction with the grading process for the lab reports. Also, when one student was asked in an interview "How did you feel about having a Writing Center TA grade the writing and an ECE TA grade the technical content," she responded, "It was a good blend. It has been about 3 years since my last English course. It was a great refresher and helped me tighten my skills. You have to be technical AND have the necessary communications skills."

Also, the ECE TAs responded positively to working with the Writing Center consultants on grading the lab reports. In part, this was probably due to their relief at having someone else responsible for finding and commenting on the writing problems in students' lab reports. However, the ECE TAs were also responding to the Writing Center's improvement in customizing the communications instruction for engineering students. Each of the ECE TAs had taken the 201 course in previous semesters when the Writing Center's involvement was still evolving. Both Robert Regal and Dale Goodwine expressed appreciation that the 201 students in the spring 1999 semester were producing better lab reports because of the sharpened Writing Center instruction and involvement in the course. Regal particularly noted the improvement in the class' responses to the Writing Center as consultants used real student examples to teach report writing (Interview 2/24/99).

5. *What implications for composition pedagogy, in particular the WID movement, can be drawn from this study?*

The Writing in the Disciplines movement is still emerging, so it is difficult to chart which direction(s) it may be heading. However, at USC, there is already a Center for Business Communication at the Darla Moore School of Business and the

Professional Communications Center at the College of Engineering. Both of these centers represent one trend in the WID movement: discipline-specific writing centers. There are also developing discipline-specific writing centers or writing programs at The University of Florida, The Cooper Union, and The University of Mississippi.

The ECE Writing Center is even more narrowly focused as it provides writing instruction for one engineering department, and expends much of its resources on one specific course, EECE 201. If centers like the ECE Writing Center become a significant part of writing center development in universities across the nation, composition pedagogy and composition and rhetoric programs will have to respond with research that studies the unique needs of such centers and the unique demands on the composition specialists who staff and run them. Since composition faculty and students are the experts about writing and communication, they will be invited to join with disciplines like engineering, law, business, chemistry, and medicine to teach students in those disciplines how to write like engineers, lawyers, business people, chemists, and doctors. A generalist composition agenda may not be appropriate for such demands, and writing specialists may be required to further specialize in the disciplines that want to collaborate with these writing experts.

Writing center theorists, like Stephen North and Muriel Harris, have led the field in defining what writing centers are and what writing consultants and tutors do. As noted previously, however, these writing centers are usually serving an entire university population and have a generalist perspective toward helping students write better. North even insists on a total separation from curriculum-driven instruction in his version of the writing center identity. The traditional writing center model also endorses "peer" relationships between writing center consultants and students who come to work on their writing. Consultations should be non-directive and more concerned with the writing **process**. As the student's process improves, the student's written products will also get better.

However, in a discipline-specific writing center, writing center consultants often provide writing instruction in classroom settings. This "teaching" position automatically erodes the "peer" relationship between consultants and students. Furthermore, in the ECE Department, writing center consultants encountered a resistance to attempts to conduct non-directive, peer-based writing center consultations. The engineering students specifically asked for directive comments and clearly viewed consultants as experts on writing and themselves as inferior writers. Thus, the traditional writing center paradigm breaks down in the disciplinary writing center model because the demands of the discipline are foregrounded and must be incorporated into the writing center's practices.

Composition theorists who study writing centers, WID programs, and disciplinary rhetoric must be aware of these differences as more disciplinary writing centers are established. These centers offer valuable new frontiers for composition scholars to explore how fields like engineering, business, medicine, and law use writing. The relationships between composition experts and experts in disciplines like engineering can serve to break down barriers between disciplines. Ultimately, such truly interdisciplinary relationships will allow faculty and teaching assistants more and improved opportunities to teach writing to students.

Controversy over Disciplinary Writing

However, there are critics of the movement to teach writing as a function of disciplinary knowledge. In The Culture of Literacy, Wlad Godzich discusses "New Vocationalism," which he defines as "a utilitarian conception of the university which foreshadowed its current transformation into a production site for the new force of production in postindustrial society: knowledge" (1). Godzich perceives that professional schools (like engineering) "want students who can write in *their* fields" (4) "and thus, not surprisingly, the writing programs have set up different tracks for students on the basis of their future vocational orientation" (4). This leads to a "restricted literacy" within which students are not trained to communicate universally, but only within their specific career paths. Godzich writes,

> Whereas one would have expected that a crisis of literacy would have called for a greater appreciation of the multiplicity of functions that language performs, the foremost of which is the ability to code and to transcode experience and to provide cultural directions for its interpretation, handling, and elaboration, one finds a further instrumentalization of language, where the latter is shattered into a multiplicity of autonomous, unrelated languages, with the competence to be acquired restricted to just one of them. It should also be noted that, in this process, any pretense of addressing the needs of so-called disadvantaged student populations has quietly evaporated. (5)

Godzich's fears of "restricted literacy" are unfounded and deconstruct on several levels. First, there is no reason to assume that, because students are taught how to write in certain genres (like lab reports, business proposals, etc.) students will be unable to communicate (or be illiterate) in other literacies. Second, possibly it is easier for students to learn to write in their discipline because: 1) their self-interest is stimulated (i.e. what they learn is going to directly benefit them) and 2) whether fact or myth, they believe they can learn "engineering" writing because it is part of **engineering**, a field in which they excel. Writing, the larger category, is a field which they associate with struggle and failure.

Godzich also mentions that the needs of "so-called disadvantaged student populations" disappear in these programs of restricted literacy. The opposite has been the case in the ECE Writing Center's experience. Dr. Robert Pettus, former Chair of the ECE Department and co-founder of the ECE Writing Center, has referred to the Writing Center as "the place where I send the wounded birds, the ones I know need a little extra attention." Pettus has recognized that often students' writing problems can be tied to external reasons like personal problems or a struggle to master the course content. By sending students to the Writing Center, he allows the students to meet people who work with individuals and who can ask personalized questions that perhaps students would not encounter in interactions with their professors.

Godzich seems to believe that writing can only be taught to students in an English department, where students will learn "the culture of literacy" rather than "specialized literacies." But he is threatened by the new movement toward genre theory and WID and writes that "the old line of defense based on traditional humanities values, mounted by the English faculties in the seventies, is ineffectual against these forces" (5). This underscores Godzich's fear (and many others') of losing the power/control over the thousands of students who"depend" on English departments to teach them how to write and communicate effectively. In some freshman composition courses students are taught/trained to write like the English

majors who are teaching them, in other words like literary critics. The students learn about New Criticism, Feminist Criticism, Deconstruction, etc. While that is valuable knowledge for students to gain, why is that a better model than teaching students who will be engineers to write like engineers? What is wrong with a model where students might actually choose to learn to write, but to write like **engineers** or **lawyers** or **doctors** rather than as **literary critics**?

The Positive and Important Aspects of the Writing Center's Work

One important aspect of having a writing center in a highly technical discipline like engineering is the introduction of composition and rhetoric pedagogy to engineering education. Writing center consultants and directors work with engineering faculty and TAs to revise and develop stronger writing assignments and to articulate evaluation criteria. This helps students produce better writing because they have more context clues and a sense of what their instructors are looking for. Rather than diluting and weakening composition's influence in the university, the infusion of composition theory and pedagogy into disciplines like engineering strengthens and reinforces composition's place as crucial to all students' education.

Also, the interaction and dialogue between writing center staff and engineering graduate students is a valuable addition for these engineers because, in their teaching careers, there is very little training beyond merely imitating what their own professors do in the classroom. For example, at USC, graduate students who teach freshman composition are required to take a course designed to support them as first-time instructors. This class provides student instructors with discussions about pedagogical decisions, information on how to respond to student writing, tips on developing effective writing assignments, etc. TAs in engineering do not receive any of this type of training. Therefore, having the Writing Center work closely with engineering TAs in a model like EECE 201 provides many chances for the engineers to learn more about teaching and evaluating writing.

And the benefits also apply to the Composition/Rhetoric or English Department students who work in the Writing Center. By working in a highly technical field like engineering, Writing Center consultants increase their marketability, both in academia and in business. As the WID movement grows, disciplinary writing centers will become more common, and ECE Writing Center consultants will have valuable job experience in this area. Also, there are many opportunities to publish and to present conference papers in engineering. Writing centers and integrating writing into engineering courses are popular topics at the most prestigious engineering conferences, so the audience for such papers is vast.

Conclusion

Ultimately, the ECE Writing Center is a successful program that has had significant influence on the writing that occurs in EECE 201, and in other ECE courses. The reflective evaluation that 201 instructors and Writing Center consultants use at the end of each semester has served the course and the students well. This reflective and flexible pedagogy has allowed the writing instructors to keep the students' needs at the center of the writing instruction. As a result, after four years, EECE 201 students are getting more feedback on their writing, a greater variety of writing assignments, and more customized writing instruction than ever before. The implications of this study indicate that (at least in spring 1999) the students' writing substantially improved during the semester.

Already, two new ECE Writing Center consultants are working with the EECE 201 course and have modified the writing instruction by adopting more of a consultation mode. Students are required, and it is stated on the syllabus, to attend Writing Center conferences where they get back their labs and discuss the Writing Center's comments one-on-one with the consultant who graded their labs. As this model grows, the Writing Center will continue to use reflective practice and develop new forms of instruction that best meet the needs of the ECE students.

Works Cited

Angelo, Thomas A. and K. Patricia Cross. <u>Classroom Assessment Techniques: A Handbook for College Teachers</u>. 2nd ed. San Francisco: Jossey-Bass Publ., 1993.

Barass, Robert. <u>Scientists Must Write: A Guide to Better Writing for Scientists, Engineers, and Students</u>. London: Chapman and Hall, 1978.

Bartholomae, David. "Inventing the University." Ed. Mike Rose. <u>When A Writer Can't Write</u>. New York: The Guilford Press, 1985. 134-65.

Baum, Eleanor, et al., eds. <u>Engineering Education for a Changing World</u>. American Society for Engineering Education, 1994.

Bazerman, Charles. <u>Shaping Written Knowledge: The Genre and Activity of the Experimental Article in Science</u>. Wisconsin: U of Wisconsin P, 1988.

Berkenkotter, Carol and Thomas Huckin. <u>Genre Knowledge in Disciplinary Communication: Cognition/Culture/Power</u>. Hillsdale, NJ: Lawrence Erlbaum Associates, 1995.

Boquet, Elizabeth H. "'Our Little Secret': A History of Writing Centers, Pre- to Post-Open Admissions." <u>CCC</u> 50.3 (February 1999): 463-82.

Bordogna, et al. "Engineering Education: Innovation through Integration." <u>Journal of Engineering Education</u> 82.1 (1993): 3-8.

Brandt, Deborah. "Accumulating Literacy." <u>College English</u> 57 (1995): 649-68.

CCCC Committee on Assessment. "Writing Assessment: A Position Statement." <u>College Composition and Communication</u> 46 (1995): 430-37.

Chandler, Clint. Personal Interview. 26 Feb. 1999.

Child, Robert. "Tutor-Teachers: An Examination of How Writing Center and Classroom Environments Inform Each Other." <u>The Writing Center: New Directions</u>. Ed. Ray Wallace and Jeanne Simpson. New York: Garland Pub., 1991. 169-83.

Delpit, Lisa. "The Silenced Dialogue: Power and Pedagogy in Educating Other People's Children." <u>Cross-Talk in Comp Theory: A Reader</u>. Ed. Victor Villanueva, Jr. Urbana, Illinois: NCTE, 1997. 565-88.

Douglas, Jane. "Recipe for Success: Writing in the Disciplines." <u>Proceedings of Workshop on Engineering Writing and Professional Communications Centers, Columbia, SC, 20-22 July 1998.</u> Ed. Deanna Ramey. University of South Carolina, College of Engineering, 1998. 33-47.

Dyck, Deborah. "Teaching Engineering Writing: Using Reflective Practice to Shape Engineering Writing Pedagogy." Master's Thesis. University of South Carolina, 1997.

Ernst, Edward. "Workplace Changes and Engineering Education Reform." <u>Proceedings of Frontiers in Education, Salt Lake City, 6-9 November 1996</u>. Ed. Magdy Iskander, et al. Salt Lake City: Institute of Electrical and Electronics Engineers, 1996. 882-85.

Farris, Christine and Raymond Smith. "Writing-Intensive Courses: Tools for Curricular Change." in <u>Writing Across the Curriculum: A Guide to Developing Programs</u>. Ed. Susan H. McLeod and Margot Soven. Newbury Park: SAGE Publications, 1992. 71-86.

Flynn, Elizabeth A., Kathryn Remlinger, and William Bulleit. "Interaction Across the Curriculum." <u>JAC</u> 17.3 (Fall 1997): 343-64.

Fosen, Chris. Master's Thesis. (get title and date)

Gill, Judy. "Another Look at WAC and the Writing Center." The Writing Center Journal 16.2 (Spring 1996): 164-78.

Glesne, Corrine and Alan Peshkin. Becoming Qualitative Researcher: An Introduction. White Plains, NY: Longman, 1992.

George, Melvin, ed. Shaping the Future: New Expectations for Undergraduate Education in Science, Mathematics, Engineering, and Technology. National Science Foundation, 1996.

Godzich, Wlad. The Culture of Literacy. Cambridge, MA: Harvard University Press, 1994.

Grego, Rhonda and Nancy Thompson. "Repositioning Remediation: Renegotiating Composition's Work in the Academy." College Composition and Communication 47 (1996): 62-84.

Harris, Muriel. "What's Up and What's In: Trends and Traditions in Writing Centers." The Writing Center Journal 11.1 (1990): 14-25.

Hawkins, Susan, Mary B. Coney, and Karl-Erik Bystrom. "Incidental Writing in the Engineering Classroom." Journal of Engineering Education (January 1996): 27-33.

Herrington, Anne and Charles Moran, eds. Writing, Teaching, and Learning in the Disciplines. New York: MLA, 1992.

Hudgins, Jerry L. and Nancy Thompson. Interdisciplinary Writing Improvement Program for Undergraduate Engineers. Proposal for Gateway Coalition. August, 1995.

Jacobs, Dale, et al. "Evolving pedagogies: Four voices on teacher change and the writing center." The Writing Lab Newsletter 22.10 (June 1998): 1-9.

Jones, Robert and Joseph J. Comprone. "Where Do We Go Next in Writing across the Curriculum?" CCC 44.1 (Feb. 1993): 59-68.

Kemp, Fred. WPA listserv message. 22 June 1999.

Kinneavy, James L. "Writing Across the Curriculum." ADE Bulletin 76 (1983): 14-21. In Landmark Essays. Finish citation.

Kirsch, Gesa and Patricia Sullivan, eds. Methods and Methodology in Composition Research. Carbondale: S. Illinois U P, 1992.

Kress, Gunther. "Genre as Social Process." Bill Cope and Mary Kalantzis, eds. The Powers of Literacy: A Genre Approach to Teaching Writing. Pittsburgh: University of Pittsburgh Press, 1993. 22-37.

Lauer, Janice M. and J. William Asher. Composition Research : Empirical Designs. New York: Oxford U P: 1988.

Lincoln, Yvonna S. and Egon G. Guba. Naturalistic Inquiry. London: Sage Pub., 1985.

Locker, Kitty O. Business and Administrative Communication. 4th Ed. New York: Irwin/McGraw-Hill, 1997.

Matalene, Carolyn, ed. Worlds of Writing: Teaching and Learning in Discourse Communities of Work. New York: Random House, 1989.

Miller, Carolyn. "Genre as Social Action." Quarterly Journal of Speech 70 (1984): 151-67.

North, Stephen. The Making of Knowledge in Composition. Upper Montclair, NJ: Boynton/Cook, 1987.

---. "The Idea of a Writing Center." College English 46 (1984): 433-46.

---. "Revisiting 'The Idea of a Writing Center.'" The Writing Center Journal 15.1 (Fall 1995): 7-19.

Odell, Lee and Dixie Goswami, eds. Writing in Nonacademic Settings. New York: The Guilford Press, 1985.

Patton, Michael Quinn. Qualitative Evaluation and Research Methods. London: Sage Pub., 1990.

Raines, Helon Howell. "Tutoring and Teaching: Continuum, Dichotomy, or Dialectic?" The Writing Center Journal 14.2 (1994): 150-62.

Ramey, Deanna. "Freshman Composition Students: Encouraging the 'Write' Attitude." Communication Across the Curriculum (April 1990): 6-7.

---. "Building Student Confidence through the Writing Center." Workshop on Engineering Writing and Professional Communications Centers Proceedings. Ed. Thomas G. Smith, et al. Columbia, SC. University of South Carolina, 1997.

Regal, Robert. Personal Interview. 24 Feb. 1999.

Reid, Joy M. Teaching ESL Writing. Englewood Cliffs, NJ: Prentice Hall Regents, 1993.

Rose, Mike. "The Language of Exclusion: Writing Instruction at the University." Cross-Talk in Comp Theory: A Reader. Ed. Victor Villanueva, Jr. Urbana, Illinois: NCTE, 1997. 525-47.

Russell, David R. "Vygotsky, Dewey, and Externalism: Beyond the Student/Discipline Dichotomy." JAC 13.1 (Winter 1993): 173-97.

Schon, Donald A. The Reflective Practitioner: How Professionals Think in Action. United States: Basic Books, 1983.

Selzer, Jack. "The Composing Processes of an Engineer." CCC 34 (May 1983): 178-87.

Selzer, Jack. Understanding Scientific Prose. Madison: University of Wisconsin Press, 1993.

Shamoon, Linda K. and Deborah H. Burns. "A Critique of Pure Tutoring." The Writing Center Journal 15.2 (Spring 1995): 134-51.

Soliday, Mary. "Shifting Roles in Classroom Tutoring: Cultivating the Art of Boundary Crossing." The Writing Center Journal 16.1 (Fall 1995): 59-73.

Thomas, Martha. Interview. 29 July, 1999.

Tindal, Gerald, and Jan Hasbrouck. "Analyzing Student Writing to Develop Instructional Strategies." Learning Disabilities Research and Practice 6 (1991): 237-45.

Tipper, Margaret O. "Real Men Don't Do Writing Centers." The Writing Center Journal 19.2 (Spring/Summer 1999): 33-40.

Traschel, Mary. "Nurturant Ethics"

Vygotsky, L. S. Thought and Language. Cambridge, MA: MIT Press, 1962.

Walker, Kristin. "Assessing Students' Genre Knowledge in an Engineering Writing Center: An Analysis of Sophomore Lab Reports in Electrical and Computer Engineering." Diss. University of South Carolina, 1997.

Walvoord, Barbara, and Lucille McCarthy. Thinking and Writing in College: A Naturalistic Study of Students in Four Disciplines. Urbana: National Council of Teachers of English, 1990.

White, Edward. WPA listserv message. 22 June, 1999 and 29 July, 1999.

Winsor, Dorothy. Writing Like an Engineer: A Rhetorical Education. Mahwah, NJ: Lawrence Erlbaum Associates, 1996.

---. "Engineering Writing/Writing Engineering." <u>CCC</u> 41.1 (Feb. 1990): 58-70.

<u>Writing Center Task Force Report</u>. University of South Carolina, 1996.

Young, Art, and Toby Fulwiler, eds. <u>Writing Across the Disciplines: Research into Practice</u>. Upper Montclair, NJ: Boynton/Cook Publ., 1986.