An Investigation of Taiwanese Doctoral Students' Academic Writing at a U.S. University

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Abstract

The United States has always been the top choice of Taiwanese university students who want to study abroad. Consequently, English writing is especially vital for doctoral dissertation; insufficient research deals with academic writing of such students, despite its importance to their success. This paper aims to fill the gap by analyzing the course syllabi as well as interviews with Ph.D. students at a university in New York State. Task analysis and verbal reports of these students yielded significant insights that may contribute to more effective guidance for both academic writing instructors and curriculum developers in Taiwan.

Keywords: Doctoral students, Academic writing, Course syllabi, Writing instructors, Curriculum developers

1. Introduction

The United States has always been the first choice of Taiwanese pursuing graduate study abroad. As of 2006, America was the destination for 44.25% of such students, England second with 25.97%. These figures illustrate dominance of English as their top foreign language (Ministry of Education, 2007). It is generally perceived that capacity to write academic English strongly affects school performance, especially when English is the only medium of instruction. Cooper and Bikowski (2007) point out that "As international students embark on graduate study in American universities, they need to be prepared for the academic writing tasks that their particular departments will require of them" (p.206). Berman and Cheng (2001) also stated that "International students at English-speaking universities have major challenges to overcome in their academic study. English may be one such challenge, especially at the beginning of their academic study, and particularly for non-native speakers (NNS) of English" (p.25). The latter comment was echoed by Mohan and Lo (1985): "It is generally recognized that many second language learners have difficulties with academic writing in English" (p.515). Casanave and Hubbard's (1992) study confirmed "Asians" experiencing more difficulty in academic writing. This large percentage of Taiwanese doctoral candidates in English-speaking countries makes it critical to understand their writing tasks and/or perceptions thereof, yet we have scant information on either their writing context or perspectives of academic writing. Scarcity of knowledge in this area merits careful attention; this paper portrays an overview of Ph.D. students' writing tasks and perceptions of academic writing at the university.

2. Review of Literature

Literature on academic writing covers a wide array of research topics, roughly dividing into four categories and mostly conducted in five locations. Categories include probing academic writing [1] from the faculty perspective (Eblen, 1983; Bridgeman and Carlson, 1984; Casanave and Hubbard, 1992; Zhu, 2004); [2] from a student perspective (Myles et al., 2003; Anderson et al., 2008); [3] analyzing students' assignments via class syllabi or written products (Horowitz,1986; Braine, 1989; Zhu, 2004; Cooper and Bikowski, 2007); and [4] examining relations between graduate students and academic advisors (Belcher, 1994; Dong, 1998; Myles and Cheng, 2003; Anderson, Day & McLaughlin, 2008). Those locations of research included Australia, Canada, England, New Zealand, and America.

In looking specifically at course syllabi, Canseco and Byrd (1989) informed us of course syllabi as "fundamental source of information for students enrolled in those courses. Syllabuses are part of the collection of official documents (p.306)." They stated that a syllabus usually consists of information about course number and name, time and places of class meetings; instructor's name, office number and office hours; course prerequisites, goals, outline

and description; rationale and grading system, assigned textbooks, class schedule and regulations of the instructor and/or the institution.

Canseco and Byrd (1989) examined writing required in graduate business administration from 133 sections of 84 graduate courses in six departments at an American University. Syllabi were analyzed for types of written assignments: examinations, problems, assignments, projects, papers, case studies, reports, and miscellaneous (outlines, surveys, business plans, audits, critiques, evaluations, etc.). Most writing was highly structured and controlled by the instructor. More recently, Zhu (2004) analyzed 95 syllabi and handouts on 242 writing assignments in undergraduate and graduate business courses, identifying several genre: case analyses, article/book reports, business reports, business proposals, design projects, library research, reflection papers, letters or memos, research proposal/papers and miscellaneous (website analysis, on-line surveys, or participatory experiences.

In a similar vein, apart from interviewing graduate students about writing tasks, Cooper and Bikowski (2007) also investigated said tasks by analyzing 200 course syllabi from 20 departments of different disciplines. From 200 course syllabi, they identified 11 types of tasks required by professors: library research papers, reports, articles or book reviews, plans or proposals, summaries, case studies, unstructured writing, journal articles, essays, annotated bibliographies, and miscellaneous.

In New Zealand, academic writing viewed from students' perspective appears in a study by Bitchener and Basturkmen (2006), concerning second language (L2) postgraduate students' perceptions of difficulties encountered in writing the discussion section of their thesis. They interviewed L2 masters students as well as supervisors. Results indicated that compared with supervisors, masters students had a more restricted understanding of the function of writing the result section in discussion. In addition, both supervisors and students had limited shared understanding of characteristics and reasons for difficulties in writing. Supervisors and students had different perceptions of students' writing problems.

Similarly, Green (2007) assessed three undergraduate and two postgraduate international students from Asia about their approaches to essay writing at an Australian university. They asked students about how they wrote a specific essay; what they thought about the goal of academic writing and what they perceived as a good essay. Four issues were uncovered: student perceptions of learning; perception of writing essays; feelings about academic writing; and grasp of academic writing practices. The study also revealed that students honed "cross-cultural" awareness, especially in "learning cultures" as well as "discursive structures" of academic writing in Australia and their countries in Asia.

Despite the proliferation of literature concerning academic writing, Taiwanese doctoral students' writing tasks and perspectives on academic writing have not received adequate attention. Focusing on both humanities/social science and science/technology disciplines, this paper adds to a body of research, analyzing students' course syllabi and interviewing 12 doctoral students from 12 different departments.

3. Method

3.1 Context

This study evaluated twelve Taiwanese doctoral students' course syllabi and their perception of academic writing when studying at a university in New York state enrolling 17,000 students at both undergraduate and graduate level. At the time of this study, the university had roughly 5,000 graduate students; 1,067 overseas Asians formed a plurality of international students on campus. The reason for selecting doctoral students to take part in this study was their need to write a dissertation for the final requirement of their degree. Intending to display a general picture of doctoral students' writing tasks and their perceptions of academic writing at a university, this study deliberately recruited students from several departments. Participants were selected from the list of Taiwanese Students Association (TSA). These seven female and five male doctoral students ranged in age from mid-20s to mid-30s. The time they had been in Ph.D. programs varied from two to six years. Seven of them majored in humanities or social science, five in natural science or technology. Tables 1 and 2 contain general information about interviewees.

(Insert Table 1 and Table 2 here)

The students from the TSA list were called individually in an attempt to obtain the permission to conduct in-person interviews and to obtain copies of relevant syllabi. During telephone conversations, dates and times for interview were scheduled; some were conducted in students' apartments, others at the campus center. With respondents' consent, interviews were audiotaped, and all students willingly donated their course syllabi for analysis: 52 from humanities/social science and 15 from science/technology discipline.

3.2 Interview

Each consisted of two sessions: [1] short introductory conversation about participants' background and attitudes toward their doctoral programs; [2] in-depth, semi-structured interviews lasted 45-60 minutes, conducted in order to elicit their perception of academic writing during study at the university. Interview questions addressed what they thought about academic writing, requirements for their writing, how they went about writing a paper, how they solved their writing difficulties and so on. Questions asked were not in a fixed order, nor were they asked by repeating exact phrasing for each question. They were asked and answered in Chinese, the participants' mother tongue. All interview data was later transcribed into English, with each participant given a pseudonym.

4. Findings

4.1 Course Syllabi

In analyzing students' course syllabi, like Casanave and Hubbard (1992), the researcher and a research assistant first divided syllabi into groups: humanities and social sciences (n=52) and science and technology (n=15). Then they computed the number of assignments required from each course in each department. They also followed the same inductive approach that Horowitz (2004) adopted to identify major types of writing assignments. By repeated comparison and examination, they categorized these from both disciplines. For humanities/social science, 504 assignments were classified into 17 categories: online discussions, practice assignments, presentations, response journals, written reports, papers, projects, quizzes, research proposals, essays, position papers, take home mid-term and final exams, literature review, case studies, book reviews and others. For natural science/technology, 134 assignments were classified into 11 categories: written homework, quizzes, short assignments, exams, programming homework, projects, discussion postings, problem sets, analysis assignments, presentations, papers and book reviews (Tables 3 and 4).

(Insert Table 3 and Table 4 here)

4.1.1 Humanities/Social Science

As demonstrated above, all 504 assignments, except for presentations, required students to do a certain amount of writing. Most frequently required for humanities/social science was weekly online discussion, which asked students to write their responses to assigned reading material. Online discussion differed from response journals: the former written on a computer to generate "talk" on the Blackboard provided by the school computer center, the latter on paper for discussion topics in class. Practice assignments focused on negotiating styles used by each party and methods of resolving conflicts. Papers referred to research papers: i.e., data-focused or analytic-interpretive synthesis, 20-45 pages long. Written reports were about writing on issues related to course topics and integrating course materials. Essays were critical synthetic papers about 8-10 pages in length. Mid-term and final exams were take-home types, usually consisting of essay questions on the assigned readings or classroom discussions; projects referred to writing an evaluation plan, implementing a process or impact evaluation, or analyzing evaluation data and reporting results. Quizzes were given to see if students had reviewed the reading material. Research proposals covered statement of problem, literature review, theory, and research design. Position papers were reflections about a series of debates and were usually five to six pages that included additional references. Literature review focused on integrative review of six to twenty empirical studies in the area of interest. Case studies included assessment, analysis, actions and appreciation of certain research cases. Essays reflected comparative analysis of certain theories and were usually five to eight pages in length. Book review essays included discussions of how course reading informed their opinion of a book under review. Others referred to memos, program descriptions, critiques and so on.

4.1.2 Science/Technology

For doctoral candidates in these fields, except for presentations, written homework was assigned approximately on a weekly basis. Its content was about data analysis, signal processing and machine learning. Programming homework was normally assigned in conjunction with written homework. It was expected that such work should contain accuracy and correctness of solution and clarity of code and comments. The midterm and final exam were either taken in class or at home, mainly about finding solutions for certain problem sets. The latter comprised data analysis or signal processing problems. Short assignments were exercises or problems from textbooks to help review content and prepare for exams. Analytic assignments utilized details of principles, mathematics and tools presented in textbooks to analyze problems. Quizzes gauged their understanding of lectures and readings. Projects referred to design and implementation of certain types of software. Discussion postings meant participating in discussion online and responding to someone else's posting so that discussants learned from each other. Papers referred to writing a short research paper about data collection and analysis techniques.

4.2 Students' Perceptions of Academic Writing

Weston, et al. (2001) state: "A task relevant for any qualitative researcher developing a coding system is to establish parameters for the unit of analysis" (p.391). Since the researcher has created semistructured interview protocols to guide interview questions, after rereading transcripts and notes many times, considering the relation between research questions and analysis, an initial coding system was developed and three major categories identified: importance, requirements, and difficulties of writing. Key notions also emerged while the researcher re-read the data, creating significant subcategories under three major categories (Table 5).

(Insert Table 5 here)

The following, under each major category, first demonstrates the data from humanities and social science majors, then natural science and technology majors.

4.2.1 Importance of Writing

Asked what they thought of writing, students replied uniformly that it is vital. For humanities/social science majors, reasons for such importance were [1] imperative for the department and [2] improving language skills.

4.2.1.1. Mandated

Students in humanities/social science held writing very important, since it was mandated by their departments. Edda asserted that in the social science field, writing was important and that her professors often focused on writing.

Q: Is writing important?

A: Very important!

Q: Why?

A: At least in our social science field it's important… I think the professors focus a lot on writing… it depends on the professors… my professors focus on writing so I wrote a lot of papers… (Edda)

4.2.1.2. Addition

Apart from writing as an imperative for the department, students also stated that writing boosted their language skills. Sofi explained that speaking and writing should be related because when speaking, people usually pay little attention to grammar. Nevertheless, in writing, the content needs to be correct since writing is more formal. Consequently, Sofi claimed that writing in fact helped her to speak English correctly.

Q: Is English writing important?

A: Very important, I think… the important reason is… I think for myself… if your English speaking ability is good at least your written English should be reasonably good… so you can speak well. Because… when you are speaking, the grammar is not clear… but when writing… you can be clear about writing in grammar… or sentence and word usage, in writing… you can make clear about it… when writing… it's more official… So it can help English speaking. (Sofi)

For science majors, writing is used for [1] publishing and [2] helping people understand what you are doing. It is important to note that while science/technology majors did not need to write extensively as course requirements, all of them considered writing crucial.

4.2.1.3 Mandated

Sam, a Computer Science major, thought that despite few writing requirements from his departments, there was a need for him to publish papers in journals.

Q: Is writing important?

A: Writing is very important... but… our department focuses too much on theory… It mainly concerns…how you can use math computation to solve the problem… not your grammar, structure, or organization.

Q: Then why do you still think writing is important?

A: Because… in the end you need to publish, not just… show it to the professors, but also other people… (Sam)

4.2.1.4 Intention

Betty, a Biology major, thought writing important, since she needed to explain to people what she was doing in her field.

Q: Why do you think it important?

A: Just like writing a paper, you just want to let people know what you think… your opinion… you need to use basic grammar… and let people know what you're doing… but to write a good paper, that's another stage.

Q: So you think is important…

A: Because I know… if your writing is not good, it's hard for you to express what you think… and people don't know what you are thinking… then the major point would be all wrong… (Betty)

4.2.2 Requirements of Writing

The proportion and types of writing varied across disciplines. For humanities/social science majors, three subcategories emerged: quantity, types and decision. Science/technology majors showed three subcategories: quantity of writing, types of writing and expectation.

4.2.2.1 Quantity of Writing

For humanities/social science majors, the proportion of writing is greater than that of the science/technology majors. John responded that he needed to write both short (4-5 pages) and long (20-25 pages) papers in the course of a semester.

Q: Do you need to write a lot in your department?

A: We need to write papers every semester… depends on the course… we have a final paper of course… sometimes… we need to write a small paper… or position paper… we need to discuss a lot and critique it… it's just small paper about 4-5 pages…

Q: What is final paper like?

A: About 20-25 pages… that kind of paper… (John)

4.2.2.2 Types of Writing

When asked what types of writing were expected of them, Rita answered that she needed to write a theoretical paper, which required much work.

Q: What do you write about?

A: I took one professor's course… we read the literature review and talked about it… We had two assignments, … One is to analyze one paper… We needed to do deeper analysis on the paper, then find 5 related papers and wrote about 20 or 15 pages of paper, that's a long paper… at that time I realized… why theory and structure were so important… in another course… we had to write a proposal… there's a format for the proposal… and it's different from writing a research paper… (Rita)

4.2.2.3 Decision

When asked to clarify what type of writing was expected of them, Susan expressed that she needed to find her own topic.

Q: What kind of papers do you write mostly?

A: Um… depends on the courses… but most of the time we need to find our own interested topic… and then… combine the content of the class, perhaps the theory… (Susan)

For science/technology majors, three subcategories emerged: quantity of writing, types of writing and expectation.

4.2.2.4 Quantity of Writing

Mary stated that her department did not request much writing. She even exclaimed that with the exception of writing clearly, the language expression was not that important.

Q: Did you do a lot of writing?

A: Not much… it doesn't require much writing, just to be clear, wording is not important…

Q: Can you meet the requirement?

A: I guess so. I can pass. (Mary)

4.2.2.5 Types of Writing:

For the science/technology majors, the types of writing were usually case studies and reports. Chris expressed that instead of writing essays, they wrote only numbers, graphs or formulas with little writing.

Q: Do you have to write an essay or… report?

A: No, we don't write essays… (laugh)… we write only numbers, graphs, or formula these kinds of things.

Q: How many pages in general?

A: If it's the homework… usually if it's not much, it's about two to three pages… (Chris)

4.2.2.6 Expectation

Ian, majoring in Informatics, stated that he could fulfill professors' writing requirements; they mainly read the content of the paper while lowering standards for foreign students.

Q: So you think you can fulfill the professors' requirement…?

A: I think so.

Q: Is it difficult for you… overall in writing?

A: I think it's OK. Because for us… writing is not the most important thing… mainly it's content… the professors know we are foreigners… they would think that our writing is not good… they will look at the idea if there's value, they will give us a grade… they won't use the native speakers standard… it depends on the professors… (Ian)

4.3.1 Difficulties

Perrucci and Hu (1995) pointed out that international students confronted many obstacles during study abroad. Academic challenges like writing difficulties were reflected in these students' responses. Four subcategories emerged from the interview data of humanities/social science discipline: ambiguity of writing instructions from professors, influence from first language, inaccurate grammar usage, and content deficiency. For science/technology majors, grammar poses a problem; lower language proficiency also affected their writing.

4.3.1.1 Writing Instructions

Peter cited ambiguity of writing instructions from professors often resulting in bad grades.

A: The longer paper would be 15 pages… but it's not that good… for example, organization…

Q: Why not?

A: I don't have sense for it…

Q: You mean you don't do well on that?

A: No, I don't know what the professor wants… I can't fulfill the professor's requirements…

I think sometimes he is not clear on what he wants. So you are just checking… It's not easy to know what he wants… (Peter)

4.3.1.2 Language Proficiency

Susan explained that since she was more familiar with using Chinese, writing in English has reduced her ability in writing.

Q: Do you think it difficult to write your homework, in general…?

A: It's ok…but at first it was very painful…

Q: Why? in what respect…?

A: At the beginning… I didn't have confidence… I didn't know what I wrote… Writing in Chinese is so easy… because in fact when we write in English… something gets in between… when writing in English… in fact your ability in writing English has reduced by 50%… plus when the professor asks you to write in a certain way… Format… or content… and that is not what you expect to write… it reduces another 25% of your ability… so your only present 25% capability of writing in English… I feel really bad… (Susan)

4.3.1.3 Grammar Usage

In terms of writing difficulty, Peter admitted he had problems with grammar and tense.

Q: So you don't think there's any problem in your writing?

A: I do have problems, grammar and tense.

Q: Does it influence the writing?

A: I think sometimes it's weird. So I asked my classmates. And they would explain it to me about using grammar and vocabulary… It's not that much, when you write more, you use easy or wrong words… not like the journal… the words are beautiful… (Peter)

4.3.1.4 Content

Cindy had difficulties in writing because of the deficiency of content and the result of this content insufficiency caused the papers to be returned by the professors.

Q: Have you ever experienced any problems in writing?

A: Of course I have problems! I can't write things down… I write very slowly… I spent a lot of time writing…

Q: What's the professor's reason for returning your paper?

A: The professor thought it was not good… the content was not good… I twice… the content problem twice… I think it's still the content… (Cindy)

For the science/technology majors, there were two subcategories that emerged from the data in terms of writing difficulties: grammar usage and language proficiency.

4.3.1.5 Grammatical Usage

For science/technology majors, grammar is still a problem. Ian expressed that although he knew how to write a paper, the structure of writing and the grammar might be wrong, which might confuse the readers.

Q: What do you think about your writing?

A: In fact, if you have the idea… then you know the direction to write… but for us after all we are foreigners… so… maybe when we wrote… we thought it's good… but after that… the structure might be wrong… the grammar might be wrong… When other people read it… they might think you meant something else… (Ian)

4.3.1.6 Language Proficiency

The science/technology majors also stated that their language ability was not as good as that of English native speakers. This can be found from Betty's responses.

Q: Let's focus on writing…

A: Writing… very important you need …to express what you think in writing, it's difficult… like I am writing here I am still thinking in Chinese…

Q: Really? you've been here for a long time and you still feel the same way?

A: Ya… Sometimes… when you want to switch what you are saying, you are not like Americans… they do it so naturally… they can write the cause and effect… and keep writing it. (Betty)

5. Discussion

This study identified the writing assignments required in doctoral programs in both humanities/social science and science/technology, and investigated students' perspectives on academic writing. Results showed that in analyzing doctoral students' course syllabi, the data indicated that in contrast with students from science/technology discipline, there were more writing variety, writing quantity and quality required from the students of humanities/social science discipline.

With respect to their perspectives on academic writing, the study has shown that academic writing was indeed a challenge. These students regarded academic writing as extremely important, but held different views on the requirements and difficulties of writing. For students in humanities/social science departments, academic writing was imperative for their departments and helped improve their language skills. In terms of the requirements of writing, these students thought that they had large quantity plus different types of writing to deal with, and most of the time they needed to find their favorite topics to write about. In terms of difficulties, these students saw causes as ambiguity of writing instructions from professors, influence from their first language, inaccuracy of grammar usage, and deficiency of content.

Students in science/technology fields all asserted that writing was very important although they had few writing requirements from their departments. For these students, writing was important because they needed to publish and let people understand what they were doing. For the requirements of writing, students commented that they had a small quantity of writing and there were special types of writing such as lab reports, with few words but many numbers, graphs, and formulas. These students also expressed that in reality, they could fulfill professors' writing requirements in that the professors were not demanding mainly because they were international students. With regard to difficulties in writing, these students still thought that they had grammatical problems, whereas lower English proficiency made them incomparable with their native speaker counterparts.

While results have unearthed important findings, several issues remain worthy of discussion. First, it has something to do with the Chinese culture, itself heavily influenced by Confucianism. "Confucian-based education (p.29)" gives rise to the teacher-centered classrooms, and it puts students in a passive role. Rote memorization becomes Chinese

students' way of learning (Lee, 2004). Chinese students thus have scant opportunities to be trained as critical thinkers. Their critical thinking and analytical abilities are not practiced or utilized in class. Hence, when these doctoral students studied in America, they tended to suffer and encountered difficulties in writing analytical papers.

Secondly, most Chinese students are accustomed to sit in class and listen passively to the teacher with an authoritative image. They rely heavily on the teacher who gives instructions to students; their learning goal is to carry out these instructions. For a long time, teachers baby-sit students, making the latter dependent on the former. Thus, in the United States, when these doctoral students were asked to find their favorite topic to write about, they were confused and terrified by the professors' requests.

Thirdly, considering students' responsibilities versus professors' expectations, these doctoral students speculated that professors had lower standards for international students, and would not be as demanding on their papers as those of their counterparts. The presumption of this concept has given an excuse for being irresponsible learners who would not have done his/her utmost to refine the paper. Likewise, some doctoral students had expressed that the professors were not clear about what they were saying in terms of writing instructions. They expected the professors to put the writing requirements with more clarity in written format. Their diffidence and timidity made them too embarrassed to talk to professors in person, which sometimes influenced their academic performance and became the professors' reason for returning the paper.

Finally, the big issue has to do with students' preparation by Taiwanese educators for the rigors of graduate school in English-speaking nations. These students seldom receive the training necessary to become analytical, independent, and responsible learners. For pedagogical implications in the respect of academic writing, the writing instructors as well as curriculum developers in Taiwan need to familiarize themselves with the doctoral students' writing tasks as well as their writing needs in English-speaking countries. This study revealed writing as extremely important for doctoral students, most of whom had difficulties in composing academic papers. Writing instructors should make students read extensively, go to the library more often, help students develop analytical skills in writing, train students to become independent learners and be responsible for their own education. With regard to first language, grammar, and content issues, Bacha and Bahous (2008) point out: "It is also a fact that faculty and students often question the emphasis that we English language teachers place on the language skills in our classrooms and on tasks that often may not be relevant to the students' majors" (p.75). Based on their comments, writing instructors as well as the curriculum developers in Taiwan, or in any non-English-speaking country who wish to prepare students for study in English-speaking countries perhaps should make universities offer more required writing courses with emphasis on a variety of content disciplines so as to successfully equip the students with the skills needed to fulfill English writing tasks from their professors.

In a similar vein, it is suggested that universities with graduate programs should offer more writing courses with a focus on academic writing for international students. Even though international students are diligent and go abroad for further study not only with high English TOEFL score but also rejoice at the prospect of studying abroad, their writing performance still falls short of professors' expectations. In order to solve the international students' writing problems, writing courses should be mandated and offered directly from the department in which the student is enrolled. International students' academic writing will be greatly improved by familiarizing terminology, format and style of the content-disciplined research reports taught by their content professors.

The study was conducted at one university in New York State. The twelve doctoral students' course syllabi were collected and analyzed to investigate their writing context; only fifteen syllabi were gleaned from science/technology majors. Future research should include more course syllabi for analysis to determine if results support the same findings. In addition, different schools and/or departments offer dissimilar courses and require diverse types of writing assignments. Future research should analyze assignments from diverse countries, institutions or programs at either graduate or undergraduate level. More extensive study in the area of Ph.D. students' perceptions of difficulties in academic writing and possible solutions is warranted. What is more, study of professors' reaction to academic writing and feedback on students' papers would augment more insights in this area.

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Table 1. Participants' personal backgrounds (humanities/social science departments)

Participant	gender	age	department	length of time in the Dept
Rita	Female	30s	Reading Education	2 years
Cindy	Female	30s	Curriculum Instruction	6
Edda	Female	30s	Educational Administration	5
Susan	Female	30s	Social Welfare	2
Sofi	Female	20s	Sociology	2
Peter	Male	30s	Public Administration	2
John	Male	30s	Organizational Studies	2

Table 2. Participants' personal backgrounds (science/technology departments)

Participant	gender	age	department	length of time in the Dept
Ian	Male	30s	Informatics	2 years
Chris	Male	30s	Nanoscale Science and Engineering	3
Sam	Male	30s	Computer Science	2
Betty	Female	20s	Biology	2
Mary	Female	20s	Mathematics	2

Table 3. Major types of assignments required (humanities/social science departments)

Types	Numbers	Percentage
On Line Discussions	119	23.6
Practice Assignments	77	15.3
Presentations	58	11.5
Response Journals	41	8.1
Written Reports	39	7.7
Papers	35	6.9
Projects	21	4.2
Quizzes	18	3.6
Research Proposals	18	3.6
Essays	17	3.4
Finals	12	2.4
Position Papers	10	2.0
Mid-terms	10	2.0
Literature Review	9	1.8
Case studies	8	1.6
Book Reviews	6	1.2
Others	6	1.2
Total: 509		100

Table 4. Major types of assignments required from the technology/science departments

Types	Numbers	Percentage
Written Homework	35	24.1
Quizzes	28	19.3
Short Assignments	20	13.8
Exams	19	13.1
Programming Homework	11	7.6
Projects	11	7.6
Discussion Postings	10	6.9
Problem Sets	5	3.4
Analysis Assignments	2	1.4
Presentations	2	1.4
Papers	2	1.4
	Total: 134	100

Table 5. Coding for protocol data

	Humanities/Social science majors	Science/Technology Majors
Importance of writing	1. mandated	1. mandated
	2. addition	2. intention
Requirements of writing	1. quantity of writing	1. quantity of writing
	2. types of writing	2. types of writing
	3. decision	3. expectation
Difficulties of writing	1. writing instructions	1. grammar usage
	2. language proficiency	2. language proficiency
	3. grammar usage	
	4. content	

Appendix A

Distribution of Assignments in Humanities/Social Science Departments

Department	Course Title	Number of Assignments
Reading	1. Seminar in Instructional Technology	4
	2. Analysis of Discourse	4
	3. Literacy As/Is Social Practice	5
	4. Current Research in Literacy	6
	5. Seminar in Literacy	15
	6. Reading in a Second Language	5
	7. Literacy in Society	5
	8. Texts and Teaching in Literacy Learning	17
Curriculum Instruction	1. Seminar in Technology and Education	7
	2. Qualitative Research Field Methods	16
	3. Proseminar in Dissertation and Professional Preparation	7
	4. Foundations of Research in Curriculum and Instruction	15
	5. Principles of Curriculum Development (3)	16
	6. Perspectives on Teaching Composition in the Secondary School	34
	7. Second Language Learning	3
	8. A Sociocognitive View of Instruction	4
	9. Instructional Theory and Practice	3
Educational Administration	1. Comparative and International Educational Policy Studies	15
	2. Introduction to Research Methods in Educational Administration and Policy	13
	3. Analysis for Educational Policy and Leadership	16
	4. The Two-Year College in American Education	8
	5. Advanced Social Analysis	16
	6. Macro Sociology of Education	6
	7. Seminar in Educational Administration and Policy Studies	4
	8. Organization and Leadership in Education	15
	9. Fundamentals of Educational Administration II Social Analysis of Education	4
Social Welfare	1. Advanced Methods of Social Work Research	10
	2. Social Work Practice Theory	17
	3. Research Proseminar	7
	4. Managing Systems in Human Service Organizations	4
	5. Program Evaluation	4

Sociology	1. Sociological Theories I	3
	2. Research methods	3
	3. Women's Studies	16
	4. Race, Gender and Work	8
	5. Sociological Theories II	39
	6. Intermediate Statistics	14
Public Administration	1. Social and Organizational Networks in Public Policy, Management, and Service Delivery: Theory, Methods, and Analysis	6
	2. Research Methods II	6
	3. Data, Models, and Decisions I	15
	4. Advanced Topics in System Dynamics	12
	5. Simulating Dynamic Systems	12
	6. Simulation for Policy Analysis	10
	7. Proseminar in System Dynamics	9
	8. Public Economics and Finance I	6
Organizational Study	1. Human Resource Information Systems	9
	2. Managing Productivity and Quality of Worklife	7
	3. Strategic management	8
	4. Personnel Psychology	7
	5. Seminar in Leadership	5
	6. Bureaucracy and Complex Organization	5
	7. Strategic Leadership and Change Management	4
		Total: 509

Appendix B

Distribution of Assignments by Technology/Science Departments

Department of Assignments	Course Title	Number
Computer Science	1. Bayesian Data Analysis and signal Processing	13
	2. Computer Graphics	21
	3. Computer Communications Networks	12
Biology	1. Biodiversity and Conservation: Theoretical Issues	6
	2. Principles of Bioinformatics	7
	3. Conservation Policy	1
Nanoscale Science and Engineering	1. Quantum Theory of Solids II	10
	2. Quantum Processes in solids and Nanostructures	10
	3. Quantum Processes in solids and Nanostructure II	6
Mathematics	1. Algebra: Doctoral Core I	17
	2. Algebra: Doctoral Core II	7
	3. Real Analysis	4
Informatics	1. Security Policies	11
	2. Information Security Risk Assessment	11
	3. Field Research Methods	9
		Total: 135