Fusing Communication and Writing Skills in the 21st Century's IT/IS Curricula

Michelle (Xiang) Liu
xliu@marymount.edu

Diane Murphy
dmurphy@marymount.edu

Information Technology and Management Science Department
Marymount University
Arlington, Virginia 22207, USA

Abstract

Written and oral communication has been listed as the top explicitly requested skill by employers for a long time. Despite pressure from industry, the gap still exists between the expectations and average written and oral communication skills of current information technology/information systems graduates. This paper addresses the above issues and discusses incorporating written communication requirements into today's information technology curriculum. Drawing from the nation-wide university initiative of "Writing Across the Curriculum" (WAC) in the 1980s, our university's "Writing Intensive (WI)" course requirements are reviewed. The paper covers the rationale and strategy used to convert three existing courses in our Information Technology (IT) program into WI courses to meet university writing requirements. Furthermore, the paper discusses faculty preparation, and some lessons learned. The study gives pragmatic guidance for educators in the information technology discipline who want to enhance the writing and communication skills of their students.

Keywords: writing across the curriculum, IS/IT curricula, writing intensive, communication and writing skills

1. INTRODUCTION

Surprisingly, as early as a century ago, many engineering industry representatives recognized that the graduates they were hiring lacked writing skills. In response to a survey, employers wrote that they believed that recruits "did not have adequate English skills to perform their work" (Kynell, 1995, p91). Ninety years later, based on a survey conducted by the National Society of Professional Engineers in 1991, the same issue still haunted the industry. In this survey, practitioners from the engineering and technology fields called for educators to provide "more instructions in written and oral communications" (Landis 1995). Also in a recent study (Carter, 2011), the authors examined employment advertisements for software engineers from fifty companies on the website Monster.com. Written communication was listed as the top explicitly requested skill by employers pointing to the importance of writing skills today.

The problem however is not just in engineering or in technical fields such as computer science (CS), information technology (IT), and information systems (IS). In 2006, the Conference Board and the Partnership for 21st Century Skills reported on a survey of some 400 employers in the United States (The Conference

Board, 2006). The survey set out to identify how these employers viewed new entrants into the workplace. They reported that over a quarter (26.1%) of the new entrants were seriously deficient in writing in English and in written communication such as writing memos, letters and complex technical reports. Writing was one of the important applied skills mentioned, along with critical thinking, problem solving, oral communication and teamwork.

Academic organizations like the Association of Computing Machinery (ACM), Computing Sciences Accreditation Board (CSAB), and ABET (formerly the Accreditation Board for Engineering and Technology) have updated their requirements to emphasize the importance of written skills (Dugan & Polanski, 2006). In addition, the topic of teaching writing in information technology/systems classes has continued to draw attention from educators in the discipline (Gersting & Young, 2001; Hoffman, Dansdill, & Herscovici, 2006). This paper aims to address some of the issues and discuss how to incorporate written communication requirements into the IT/IS curriculum. The paper provides pragmatic guidance for educators to enhance their students' writing skills as they enter the competitive workplace.

Drawing from the nation-wide university initiative of "Writing Across the Curriculum" (WAC) in the 1980s, the authors examined the current implementation of WAC in various universities, including their university's "Writing Intensive (WI)" course requirements. The authors discuss the strategy to convert existing courses to WI as well as some lessons learned by teaching these WI courses.

2. WRITING ACROSS THE CURRICULUM

It has long been realized that writing needs practice. As a response to undergraduate students' lack of writing proficiency throughout the university curriculum, WAC programs emerged in the 1980s. Many universities, large and small, now offer these programs and they generally recognize the following tenets for writing as:

- It is the responsibility of the entire academic community with variability among disciplines;
- Instruction must be continuous during all four years of undergraduate education;
- The process must be understood by faculty in all disciplines, particularly as it relates to the workplace;
- It promotes learning and other 21st century skills (critical thinking, oral presentation, and teamwork) (Warner, 2008).

Many universities make extensive resources available to support college writing programs. One of the most prominent programs is the Purdue Owl Project (owl.english.purdue.edu), a comprehensive guide to writing. They offer over 200 free resources to support student writing and their resources are widely recommended by other universities, including our own.

In the early and mid 1990s, there was a flurry of papers at SIGCSE Technical Symposia on the topic of writing across the CS curriculum (Falconer & Katz, 1992; Fell, Proulx, & Casey, 1996). These papers present ideas for writing assignments, the need to improve faculty skills to give and grade these assignments, and the need for resources to support student learning in the process. However, since then there have been few papers addressing the practical issues, experiences, or lessons associated with the WAC initiatives in the computing or IT/IS discipline. One of the exceptions is Hoffman, Dansdill, & Herscovicis' study (2006) where the authors discussed WAC in relation to CS. However, the IT/IS discipline is not a static field as it never stops evolving with the dynamic nature of social as well as technological advancement. Therefore, there is a continual need to evaluate where and when writing can be reinforced in the changing curriculum. In many cases, there appears to be a gap between the theory behind the WAC initiatives and actual implementation. Thus, this study focuses on how to transform existing IT/IS courses to be writing intensive, which differentiates this paper from others.

3. THE UNIVERSITY'S WRITING INTENSIVE (WI) REQUIREMENTS

The authors teach in a private liberal arts university, therefore, the students majoring in the IT program not only need to fulfill the requirements of the major, but also the liberal arts core and other university requirements. There has always been a writing component to the liberal arts core (EN 101 Composition I and EN 102 Composition II). Students take a directed self-placement test when they enroll at

the university and according to these test results, either take EN101 or developmental English. Additional writing was assumed to occur in the discipline but there was no formal requirement. In fact, there were no courses in the IT/IS where the EN101 or EN102 requirement was a prerequisite. In 2008, the Liberal Arts Core was modified, which resulted in a university writing intensive (WI) requirement for all undergraduates. It required three designated WI courses, in addition to the existing Liberal Arts Core requirement of the written communication sequence. Each discipline was to include in their program a sophomore, junior and senior course, either in the discipline or as part of the liberal arts core requirements, for example in history, English literature or religion. These courses were to be required of all students graduating at Marymount and should not be transferred in from another institution unless a similar writing requirement could be documented.

For the IT/IS program, keeping in mind the needs of employers and potential accreditation, we decided to modify three existing information technology/systems courses to incorporate the writing-intensive requirements. The IT students are, in general, not high performers in the existing liberal arts core courses. Writing in those disciplines also focuses more on "creative" writing while IT students need to communicate observations and facts such as in a requirements analysis document.

4. CREATING THE WI COURSES

The university required a minimum of 4,000 words (16 pages) of revised writing for each WI course. This could be broken down into multiple pieces. Students are required to refine their thinking, submit drafts and respond to instructor and/or peer feedback. The writing objectives were to be specified separately from the course objectives in the syllabus and the university specified the following student writing outcomes for WI courses (Refer to the website for more details):

- Producing written work appropriate to the discipline through a process that involves drafting and revision based on feedback;
- Developing focused texts that address a specific audience, move effectively between general and detailed, make good use of sources, and engage ideas without distortion;
- Producing texts that show careful attention to fluent sentence structure, grammatical correctness, and proper documentation; and
- Identifying a suitable subject for scholarly inquiry, analyzing appropriate source materials, and supporting a focused argument in a clear and coherent product.

How to get started on this daunting task? To learn more about how other programs were attacking the subject, one of the authors (as the department chair) volunteered to be the school's representative on the Presidential Liberal Arts Core (LAC) Committee, the university-wide committee that reviewed and approved new writing-intensive courses. This provided valuable background information on which courses were selected, how the writing process was implemented, how assignments were selected, and so forth. Understanding this, the department looked at its curriculum and identified the following three courses for conversion to the writing-intensive format:

1. IT210, Software Engineering, a sophomore course covering the entire systems life cycle including requirements definition, a key writing need;
2. IT355, Software Testing, Documentation and Quality Assurance, a junior course that included a variety of written assignments, from a user manual to a testing report with technical writing a major focus of the course;
3. IT489, IT Capstone Project, a senior course that can be satisfied by a research project or a service project, both involving documentation from the project proposal to the final project report.

Some instructions regarding writing for the IT/IS field are common including (Dugan & Polanski, 2006):

- Give assignments a real world context to demonstrate that writing is important in the field;
- Show parallels between the writing process and the software development process; and
- Require revision and conduct peer review of assignments.

These guidelines were used to revise the courses. Initial revisions of these syllabi and corresponding assessments were submitted to the LAC committee for approval. Minor changes were requested as necessary to meet the

requirements. Later in the paper, we focus on the rationale of transforming these IT major courses to meet the WI requirements, while also teaching the content.

5. FACULTY TRAINING

All faculty members, full-time or adjunct, are required to attend a mandatory series of two-part workshops to share best practices before teaching any WI class. Each person attending the training was given a copy of a book on integrating writing in the classroom (Bean, 1996) and asked to bring copies of their approved WI syllabus and at least one proposed assignment. Attendees in each session were from a variety of disciplines allowing faculty to share experiences across the disciplines. Participants also took an online survey about their beliefs and practices about the teaching of writing. The facilitator for the workshop was the university's writing specialist, hired specifically to help the university to implement the WI program.

After an initial review of the writing process, the first session focused on making writing assignments "purposeful, transparent, and engaging" within the discipline and how to respond effectively and efficiently to student writing. Skills learnt from this session included writing clear assignments and how to conference effectively with the student writer. The second session focused on ways to enhance peer review, both in and out of the classroom. The writing specialist facilitated the pooling of ideas for informal writing/revising exercises and links to external resources to support a student's self-help. This session also addressed the special needs of nonnative speakers and students with learning disabilities or poor academic preparation.

After the workshops, participants were surveyed and all participants felt more knowledgeable about the writing process and better prepared to teach the WI courses in their own disciplines. They each revised and refined their class assignments to reflect the integration of specific WI requirements with the content, particularly the draft, review, and final process.

6. THREE CASES

This section includes three cases, each developed around a course being transformed to WI.

Case 1: Software Engineering

IT 210, Software Engineering, is designed to expose students to the entire system life cycle, including requirements analysis, system analysis and design, software development and acquisition, system integration, and system maintenance. It emphasizes that requirements analysis is one of the most important communication channels between software engineers and the clients.

In the course, students are evaluated on the basis of four writing assignments and a comprehensive written project. All the writing assignments are designed to emphasize as well as improve students' writing skills, critical thinking, team communication skills, and professionalism. The four writing assignments and the project involve selection of particular techniques to solve specific problems in the software engineering field. For each, students need to submit a draft document in compliance with the documentation standards dictated by the instructor. All the drafts must be received by the instructor on the due date and the final versions of the assignments are not graded if students do not submit the drafts on time. The draft documents are reviewed by the instructor and by other students in the class. Students must use comments from this review process to prepare the final documentation. The following figure shows the assignments title and length requirements.

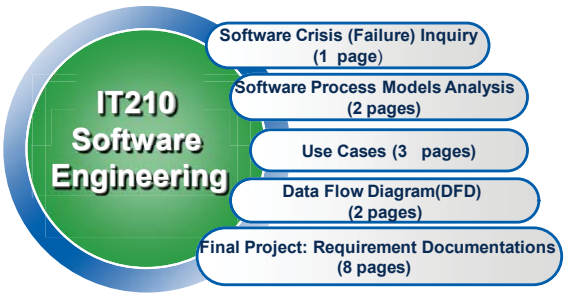

Figure 1 IT210 Writing Assignments

Based on the general advice offered by many researchers, some instructions regarding writing for the computing field are common (Dugan & Polanski, 2006):

- Give assignments a real world context to demonstrate that writing is important in the field;

- Show parallels between the writing process and the software development process, for example, how poor requirements lead to poor software; and
- Require revision and conduct peer review of assignments

To demonstrate that writing is important in industry, the assignments were designed to address real-world scenarios. One sample assignment is shown in Figure 2.

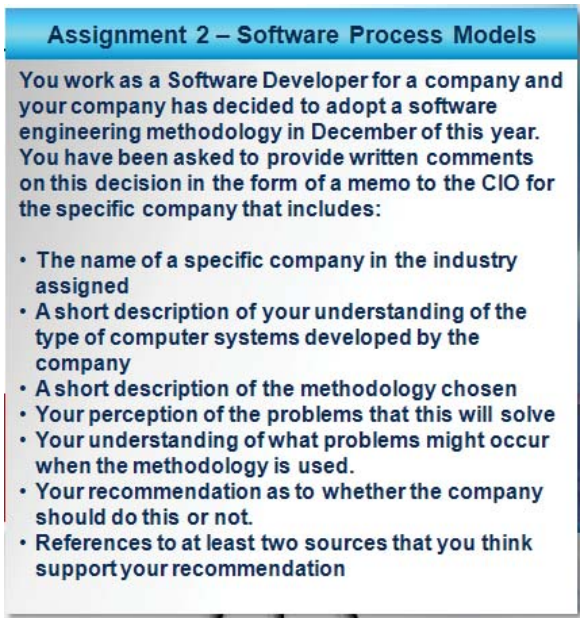

Figure 2 IT210 Sample Writing Assignment

The concept of "peer review" was introduced and the instructor discussed how to perform a good peer review, and led a brief discussion as for why this process is important. The peer review itself was not graded as it is subjective but feedback was given and feedback did improve with practice. Students were given several examples of "constructive criticism" and encouraged to examine their peer's writings critically as well as collegiately. Each student's writing work, with the identity removed, was assigned to two reviewer students as a group. The two reviewers discussed pros and cons for the assigned work and wrote their feedback together. All the peer-review process was implemented through discussion boards on the Blackboard system.

Case 2: Software Testing, Documentation and Quality Assurance

IT355, Software Testing, Documentation, and Quality Assurance, also includes practical experiences with preparing documentation in each phase of the system life cycle. It covers knowledge and skill of software testing, which is much requested by potential employers. The summary is shown in Figure 3.

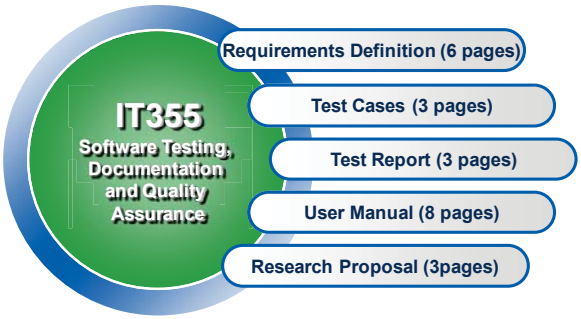

Figure 3 IT 355 Writing Assignments

The first four assignments are based on a simple application built by a graduate assistant: a GPA calculator. Specific errors were built into the software so that students had information to analyze and report. The fifth assignment focused more on the research aspects of writing and students were assigned an advanced topic in software testing (e.g., testing in the cloud) and asked first to do a short literature review. Based on that, they wrote a proposal to a grant-awarding organization to obtain funds for the research. APA format was specified. The instructor used National Science Foundation (NSF) guidelines in reviewing the proposals. All five assignments were subjected to a draft, review and final process. The second assignment, the test cases, was subject to peer review by the students.

There were concerns when first teaching the class as to how the students would perceive writing in a technical class. The writing specialist was asked to attend a class in the first week and independently introduce the university's WI focus. This was extremely useful in setting the tone for the rest of the course. As identified by use of the same writing rubric throughout the course, students definitely improved their writing skills but found it difficult to be critical of each other's work in the peer review process as comments were sparse. However, it is important

to note that these students had not taken IT210 before it became writing intensive.

Case 3: IT489: IT Capstone Course

The assignments for this course are shown in figure 4.

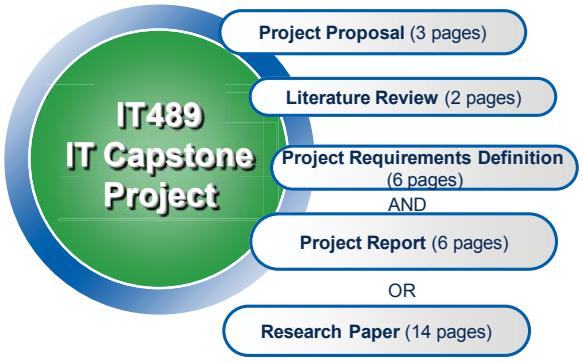

Figure 4 IT 489 Writing Assignments

The IT program requires all students to do both an internship in the field (6 credits) and a final project in their senior year (3 credits). The capstone can either be a project for a client or a research project. In both cases the student is required to develop a number of high-quality documents, following the draft, review and final process used in previous courses. Students are also required to present the results of their work to a panel of faculty and other students. They are encouraged to think of the documents produced as a "portfolio" to be given to potential interviewers during a job interview. Again, the existing students have not yet had the benefit of the other two classes, and we have deferred evaluation until this occurs. However, the students were exposed to literature research. Faculty had to address plagiarism in depth as students tended to cut and paste from these literature sources.

There is no doubt that the use of computers has made academic dishonesty easier (Austin, Baldwin, Li, & Waskett, 2000). The university has a strict policy on academic integrity and all students were required to take a tutorial on the subject. The library staff also held sessions to reinforce originality in writing. Finally, the plagiarism detection tool TurnItIn (see www.turnitin.com) was used to validate their final report.

7. CONCLUSION

Nearly a century after it was first identified as an issue (Kynell, 1995), many IT/IS educators still find it challenging to impart the skill of “writing” in their teaching. In this digital age, our students read more online than ever before. Many lack an understanding that the "creative" elements (for example, good writing and the peer-review process) are independent of the final display media (print or on-line). We believe that educators hold the key to impart the significance of writing to students, whether they intend to go to graduate school or to work in the field. Our experience shows the potential value of teaching students about writing, within the discipline. More data needs to be collected as students cycle through all three courses. It is important that writing is taught as a natural part of the information technology/systems curriculum and students are given multiple opportunities to learn the writing process and to practice and improve. In addition, faculty must be given the training and tools to support this initiative.

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