AC 2008-2041: DEVELOPING A WRITING IN THE DISCIPLINES PROGRAM IN AN ENGINEERING TECHNOLOGY COLLEGE

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Developing a Writing in the Disciplines Program in an Engineering Technology College

Abstract

Faculty members from the Humanities, Media and Cultural Studies Department at the University of Cincinnati's College of Applied Science have long worked with students on their projects in Senior Design Capstone courses. However, both co-op employers and faculty have expressed concern over the quality of student writing. The autumn 2006 American Board of Engineering Technology (ABET) site visit underscored the importance of developing new approaches to foster clear and cogent writing in the technical disciplines. This paper outlines the writing faculty's response to these concerns and how they collaborated with faculty members in the engineering technology departments to develop an integrated program of mid-level writing instruction in the technical disciplines. A multi-faceted program emerged: collaboration among writing faculty and technical faculty; development of interdisciplinary writing instruction in mid-level technical courses; the utilization of grading rubrics to enhance the importance of writing and communication skills in technical courses; the formation of a discourse community; and the creation of e-portfolios to enhance reflection and illuminate connections among the students' technical and Humanities courses.

Introduction

This paper describes how the College of Applied Science writing faculty joined forces with engineering technology faculty to research innovative practices in the teaching of writing in the disciplines. That writing instruction is most effective when given by writing faculty is a common view in the engineering field; separate faculty members hold different responsibilities, but the effect of a united front is a strong one.[1] From the examination of other colleges' experiences, it was clear that the writing faculty would work best teaching alongside the engineering faculty in a shared classroom. This paper explores the relationship between the writing faculty and the engineering faculty from the beginning of their team-teaching experiences. As an example, the paper discusses how the Humanities department and the Electrical and Computer Engineering Technology (ECET) department joined forces to create a mid-level capstone course with a heavy emphasis on writing and communication skills. Also, the Mechanical Engineering Technology (MET) department, together with the Humanities department, provided students with more writing instruction during their mid-level courses. Working within the framework of already-established mid-level major courses, faculty jointly created more-detailed assignment sheets for a sophomore-level Mechanisms course and responded to junior-level lab reports for Fluid Mechanics. Ultimately, each faculty member involved in the writing-in-the-disciplines initiative created a personal e-portfolio in order to better understand how students use e-portfolios to reflect and make connections throughout their education. Students react positively to diverse faculty members agreeing on the importance of writing for a successful future, especially if this agreement is evident throughout the entirety of students' engineering education.[2]

The paper also outlines how college faculty developed "The Sixty Percent Solution: A Communication Reality Check." The innovative interdisciplinary course was taught by nine college faculty from a variety of disciplines: Engineering Technology, Architecture, Business, Construction Science, English, and Computer Science. It explored the idea that technology, community service, entrepreneurship, and oral and written presentations lend strength to each other. Working in groups, students investigated the needs of a community, assembled information, developed and implemented technological projects, prepared business plans, presented their products to a professional audience, and wrote a final report. Sixty-percent of the grading rubric, depicted later in this paper, depended on interdisciplinary communication, oral presentations and report development, emphasizing the importance of writing and oral and visual communication as a vital study and tool for effective application of technology. Each of these findings, presented as sections throughout the paper, had a part in creating a mid-level, writing-in-the-disciplines program at the University of Cincinnati's College of Applied Science.

The sections include:
- Building Relationships: Making Interdisciplinary Connections
- "September Institute": Trading Hats for a Week
- A Multi-pronged Approach: Mid-level Writing in and Across the Disciplines
- Integrating E-portfolios: Enhancing Reflection
- Conclusion: Determining Load and Future Roles

Building Relationships: Making Interdisciplinary Connections

In any university setting, it is critical for faculty from each department to understand how each other's fields fit into the larger picture of students' education. Though this concept is often overlooked, with departments tending to isolate themselves within a college, understanding the relationship varying disciplines have with one another is necessary to better foster students' academic and professional development. When members of the faculty are able to show how their knowledge fits other contexts or situations that students experience, it becomes possible for students to make interdisciplinary connections.   The ABET accreditation visit to the College of Applied Science in 2006 drew attention to the fact that writing faculty and faculty from the engineering disciplines needed more than just an understanding of the relationship: they needed practical solutions to help students make these interdisciplinary connections. When teaching writing in an engineering technology college, the interaction between engineering and writing faculty is essential.[3] Though Humanities faculty were already working with specific departments, such as MET and Chemical Technology, on assignments such as oral presentations and research reports, this temporary relationship needed to be formalized. The writing faculty were not receiving course load for their work in the disciplines and found it overwhelming to give the amount of time and energy that was truly needed to make a difference.

The primary problems were that the collaboration as described was not sustainable and the roles and expectations were not clear. The members of the writing faculty, in addition to teaching a full load, were creating presentations and lectures for the classes in the disciplines; these same instructors attended the engineering classes on a regular basis throughout the

quarters. In addition, many of the technical faculty participants turned to the writing faculty to help assess student writing and presentations. Further, students would also send electronic copies of their work to the writing faculty, who would then review the writing using Microsoft Track Changes. "Flexible tutoring," as this practice was called, required a substantial investment of time and energy from the writing faculty. It became common practice for students to utilize flexible tutoring only at high-demand times, such as at midterm or the end of the quarter, and usually within days of the assignment's due date. This practice severely limited the effect of flexible tutoring and blurred the role of the writing faculty, who were starting to be seen as last-minute-editors rather than as mentors guiding students through the whole writing process. Without true "roles" in the technical courses, it was difficult to ascertain boundaries, limitations, and achievements; both the faculty and the students suffered. The few official and defined partnerships were in Senior Design courses. Though the collaboration among the writing and the engineering faculty proved helpful, this instruction came at a time when many of the students had "given up" on learning how to write effectively. Graduating seniors saw it as a means to an end – successful completion of their final projects. While there is no doubt that the graduating seniors rediscovered the importance of clear and cogent writing for success in their careers, this late emphasis on writing competency was less beneficial to the college: the lessons learned were not likely to trickle down to lower-level courses. In order for writing instruction to be truly beneficial, a better approach is needed: one that stresses and prioritizes the role of writing throughout a student's education and across all disciplinary boundaries.

More notably, research suggests that, commonly in the field of engineering, students were not making the connections among their writing and engineering courses, and thus did not regard writing in their engineering courses as "important."[4] In order to underscore these connections for the students, a junior-level capstone course was introduced in the Electrical and Computer Engineering Technology (ECET) department, with at least half of the graded weight coming from humanities components.[5] The major project for this junior capstone was designed to weave together all of the concepts learned in the first two years of the engineering program (including both humanities and engineering courses). Assignments included an annotated bibliography, a proposal, an oral presentation, and a project poster board.[5] By strengthening this relationship and introducing a writing component into the engineering courses from an early onset, it is believed that the students' attitudes about and relationships with their own writing will improve, as has been suggested by the results of other studies.[6]

Putting a heavy emphasis on humanities components in technical courses proved to be successful and was adopted in other mid-level courses. In order to make the writing and humanities components of these "technical" courses more substantial, and to increase their significance, at least in the eyes of the students, the final grade for a team-taught Honors Entrepreneurship course was determined by a 60/40 split: 60% of the students' grade was determined by the papers, presentations, and e-portfolio components while 40% was determined by their technical projects, as illustrated in Table 1.[7] The justification for this approach was clear – students within an engineering technology curriculum are *expected* to be good at the technical components. The real challenge is to perfect their communication and writing skills. By bringing writing and technical faculty together as equals in the classroom and utilizing the "sixty percent solution," students were forced to take the development of

communication skills more seriously. Team teaching further enhanced the power of faculty collaboration, which in turn developed these critical skills in students of every discipline.

Table 1: Interdisciplinary Entrepreneurship Course Rubric[7]

Entrepreneurship through Innovative Interdisciplinary Projects in Technology and Community Service				
Rubrics For Course Objectives				
Performance	1	2	3	4
Course Elements	Unsatisfactory Performance	Acceptable Performance	Good Performance	Targeted Performance
Class Participation 20%	- Student Missed four or more classes/Team meetings or Combination - Student Failed to engage in sharing ideas with team - Student received negative feedback from all other team members	-Student missed less than four Classes/Team Meetings or Combination - Student Participated in M-B test and Profile PS test - Student received positive feedback from another team member	- Student missed less than three Classes/Team Meetings or Combination - Student Participated in Systematic Innovation Workshop - Student received positive feedback from two other team members - Student Summarized the Book "Good to Great"	- Student missed less than two Class/Team Meetings or Combination - Student Demonstrated Effective Team Work - Student received positive feedback from all other team members
Group Participation and Blackboard use 20%	Group Contract is not Posted on Message Board - Group did not post Group Meetings Minutes on BB group Message Board - Group has only a few group files in the file exchange	- Group Message Board is used effectively for communication - Group Minutes Posted Including members roles and what has transpired in meetings - Group Meeting Minutes Include Satisfactory Details of Meetings	- Group Demonstrated use of Problem Solving Techniques - Group Demonstrated application of methods for Brainstorming- like c-map - Group Meetings Minutes Demonstrated Depth of Meetings	- Group Demonstrated effective sharing of resources - Group Demonstrated effective Sharing Innovative Ideas in blog format on Group Message Board - Group Demonstrated effective assembly of written report from entire team on File Exchange
Written Report 30%	- Report Was Poorly Organized - Report with Poor Structure - Report with Spelling and Grammar Problems	- Report Was Clear and Concise - Report was Organized - Report with Strong Structures and No Grammar Problem - Report was Well Referenced	- Report Presented a Strong Thesis for the Technical Problem Report Presented Persuasive Arguments and Recognize Opposing Views Report Demonstrated Interdisciplinary Knowledge Gained - Report Demonstrated Solid Research Base	- Report Demonstrated Strong Community Service - Report Demonstrated Strong Technology base - Report Demonstrated Strong Business plan - Report Demonstrated Relation between Technology/Community Service and Entrepreneurship
Oral Report 30%	- Poorly Organized Presentation - Poor Transition Among Speakers - Poor Quality of Visual Materials	- Clear and Concise Presentation - Smooth Transition of Speakers - Good Quality of Visuals - Smooth Transition of Visuals	Presentation of a Solid Technical Problem Presentation of Convincing Arguments Demonstration of Interdisciplinary Knowledge Gained Demonstration of a level of Innovation	Presentation of a Plan for Community Service Presentation of a Clear Base of Technology Used Presentation of a Vision of Business Plan Demonstration of relationships between Technology, Service, and Entrepreneurship

These interdisciplinary courses, and the rubrics by which they students' efforts are judged, demonstrate that, increasingly, it is becoming important for engineering students, and students in all technical disciplines, to communicate effectively. Charles Bazerman articulates why it is critical for students in the disciplines to master communication skills:

> Interdisciplinary fields that draw on several bodies of knowledge may require greater virtuosity and understanding of the technologies of literature discussion, synthesis, and citation; as well, the ability to analyze the communicative dynamics of different fields may aid both interpretation of the varied literatures and the formulation of arguments for different venues.[8]

At the College of Applied Science, faculty agree that the integration of these humanities

components, co-taught to ensure relevance to the students' major fields of study, will give their students an advantage. Like other colleges that have adopted writing-in-the-disciplines techniques, the students will benefit and the bonds among faculty will strengthen.[9]

"September Institute": Trading Hats for a Week

The success of the development and initiation of the interdisciplinary courses outlined above brought the realization that further collaboration within the College was necessary. After implementing the ECET junior capstone course, positive student feedback reinforced that connections were made between the students' writing and engineering courses. One student stated that "…requiring us to submit abstracts, proposals, annotated bibliographies, etc, allowed us to preview and prepare ourselves for Senior Design. With this, when we are required to prepare such things for our Senior Capstone Project they will be something we have seen before and have had experience with, hopefully making our Senior Capstone experience that much better."[10] Overwhelmingly, the student feedback reiterated this realization, that enhanced writing and communication skills would improve their performance in Senior Design, and ultimately, beyond. Pursuing the theme of writing in the disciplines, faculty members at the College of Applied Science were granted a place at the University of Cincinnati's annual September Institute, a four-day intensive workshop that:

> fosters connections among faculty…[T]he Institute is organized around Learning Communities, teams of six to eight faculty members who work together within a related area. The work begins during the Institute and continues throughout the following academic year as the teams develop workshops, presentations, resource materials, or retreats to explore and research their particular area of interest.[11]

In September 2007, eight faculty members traded realities by sharing their disciplines with each other, "trading hats," so to speak. The four members of the writing faculty built the analog portion of an electrical engineering project, while the four members of the technical faculty (two from Electrical Engineering, one from Chemical Technology and one from Construction Management) examined the writing faculty's approaches to developing assignments and responding to students' work. By trading roles and expanding the alliance between faculty in the disciplines and the writing faculty, the group focused much-needed attention on developing lower-to-mid-level writing intensive courses within the majors.

The combined faculty made several key strides during the Institute. First, the members of writing faculty identified connections between what they teach in first-year composition and what the technical courses will require in subsequent years. A major discussion of creating a discourse community, where the varying disciplines learn to use the same jargon, helped the group to identify similar expectations they each had for their students. Identifying these expectations is key to helping writing faculty members emphasize the importance of writing tasks that technical students might not take seriously. Through developing and engaging in this discourse community, faculty can show students that writing is a "social action."[12] One prime example of how developing a discourse community among the writing and engineering faculty would promote better writing skills surfaced during a collaborative review of assignment sheets

at the Institute. In Technical Writing II (a 300-level writing course), students study and are asked to complete their own *process description*. In Programmable Logic Controllers Lab, a course offering at the mid-level in the ECET department, students are asked to *explain a procedure*. When faculty realized they were asking students to do the same thing, but using different language, they saw how easily students might lose connections in translation. Creating a discourse community that cross references terms such as these allows faculty to use a common language that ensures skills are transferred from one course to another, from one discipline to another. Through the creation of this common language, writing in the disciplines becomes less of an effort; the connections, through language, become clear.

A second key breakthrough discussed in this workshop was that, regardless of what students learn in writing courses, students still need clearly defined expectations in their writing assignments in technical courses. Thus, learning to develop clear and successful assignment sheets became a major goal of the group. In addition, even without assignment sheets, students need to learn how "to interact with the instructor and learn how to gain the information they need to write successfully and accurately."[13] Therefore, the writing faculty stressed to the engineering faculty the importance of having clearly articulated outcomes and expectations for all of their writing assignments.

Finally, each faculty member developed an electronic portfolio during the Institute, in which he/she posted artifacts and reflected on them, modeling student electronic portfolio assignments. The purpose and addition of e-portfolios not only to mid-level writing courses, but to all courses, is discussed later in the paper. The e-portfolios were just one way the College of Applied Science faculty united to create a multi-pronged approach to writing in the disciplines. Before reflection, in the form of e-portfolios, came collaboration, in the form of mid-level writing, both in and across the disciplines.

A Multi-pronged Approach: Mid-level Writing in and Across the Disciplines

When the writing faculty started working with the students in the senior design capstone courses, many of the students had not taken a writing course since the English Composition sequence their first year. This extensive lapse could not be overcome easily in the students' final quarter, as they were busy designing and building senior projects. Clearly more writing instruction was needed during their mid-level courses. Even if students were required to take Technical Writing, which is not required by all majors, it seems that the students did not retain what was learned in order to apply those skills to their senior project report and oral presentation.

Simultaneous with the collaborative efforts between writing and engineering faculty at the College, the University as a whole was moving to adopt a new mid-level writing course. The previous general education requirements mandated that most students take a three-part English sequence. The new requirements would eliminate the 103 course that a typically progressing student would take at the end of their first year and add a course entitled Intermediate Composition that would be taken during a student's second or third year. The hope was to close the same gap that left many college seniors under prepared for the intense writing required to successfully complete their senior projects. The challenge at the College was to

use this opportunity to create a course which would satisfy the general education requirements of the University while at the same time addressing writing concerns specific to its technical programs.

The course that the writing faculty ultimately designed is being piloted in the spring of 2008. One of the original organizational concepts for Intermediate Composition incorporated a thematic approach. In this approach, students will read, research and write focused on an issue that could be examined through the lens of many different disciplines. A proposed assignment for the course is a rhetorical analysis of a discipline-based text. In this analysis, students will examine how a writer in a particular discipline constructs and communicates knowledge. Students will pay particular attention to the use of jargon, discipline-specific terms, organization, and the use of evidence. Another assignment calls on students to synthesize several discipline-based texts *on one topic* and explain major ideas and debates to an audience *outside* that discipline. These assignments and others planned for the course build upon and enhance the writing and reading skills developed in English Composition. They emphasize critical reading and writing, more advanced research and argumentative skills, and rhetorical understanding of discourse as it is used in different disciplines and discourse communities.

Many engineering programs are finding that their students seem unprepared to critically think and communicate. Wheeler and McDonald concur: "Some cannot connect thoughts, cannot construct a sequence of implied consequences, cannot infer."[14] By integrating writing instruction into these mid-level technical classes, students "are then able to use this understanding to transport knowledge across disciplinary boundaries."[14]

Another approach, developed within the disciplines this time, emphasized fostering writing skills in the technical courses. The MET department identified two mid-level courses that require a significant amount of writing: Mechanisms and Fluid Mechanics. Juniors in Fluid Mechanics were expected to write a series of five lab reports during the ten week quarter. Sophomores in the Mechanisms course submitted one project report at the end of the term. Previously the course instructors had been disappointed by the quality of student writing for these assignments. The Humanities instructor who taught Senior Design Communication for the MET students met with the course faculty and began reviewing the course materials and assignment sheets. The Humanities and Mechanisms instructors jointly revised the report assignment sheet to include more specific guidelines and to serve as a model of the report's desired organization, format, and content. This revision process included a review of previous student papers that had successfully fulfilled the assignment goals and those that had been unsuccessful. The report assignment sheet went through several iterations, but in the end both faculty members were pleased with the results and planned to continue revising the assignment sheet after an analysis of student responses and their remaining common deficiencies.

A more multi-pronged approach was taken in the Fluid Mechanics course. The technical and Humanities instructors made it clear that both would be grading the students' assignments. Initially, students were not pleased with the prospect of an "outsider" reviewing their lab reports. Many of the initial reports showed frequent proofreading errors, a lack of attention to detail, poor use of charts and graphs, and an inability to interpret and explain data. After the initial reports were returned, several students questioned the English instructor's feedback,

questioning how a person without a technical background could call their conclusions weak. After the next set of reports was graded, the Humanities instructor was invited into the classroom to address common problems in their reports and to take questions about the comments on their assignments. This move from an outside critic to an actual person in the classroom helped to establish the Humanities instructor's authority and led to important breakthroughs. Students who challenged observations about weak conclusions realized that a conclusion that did not refer back to the paper's stated objectives would be seen as weak by readers within and outside their major. The class ended with several students thanking the instructor and suggesting that they wanted more feedback on the written work they do for their major courses. They also suggested that future students should get this assistance prior to their junior year. Their comments echoed those of many Senior Design Communication students, who in their evaluations praise the instructor's input on their work as invaluable, but lament the fact that this help came so late in their academic career.

Another approach to foster interdisciplinary collaboration and writing instruction throughout the disciplines is depicted in Table 2, developed by a member of the technical faculty in the ECET department.[15] This technical report rubric is used to evaluate reports written in their technical courses. The technical faculty member contacted instructors in the Humanities department, requesting their cooperation in using the rubric to assess their students. In English Composition II, ECET faculty want writing faculty to assess their students' writing ability at the freshman level based on the writing assignment in this course, where students write a report on a topic in their chosen field of study. In Technical and Professional Writing II, students will be assessed by writing faculty on their skills in mid-level writing courses in addition to their ability to work in teams, based on the User Manual assignment. At the end of the quarter, the ECET faculty will collate the data and use it to measure assessment for ABET. This collaboration demonstrates the strong relationships among faculty and a common desire to improve student writing at all levels.

Table 2: Technical Report Rubric [15]

CRITERIA	1 Unacceptable	2 Acceptable	3 Good	4 Exemplary	SCORE 1 - 4
Organization ABET-TAC.2.G	The report is poorly organized with some required sections either missing or out of order.	The report has all required sections and the sections are in the correct order. More thought could have been given to creating the subsections.	The report has all the required sections, the sections are all in the correct order, and the sub-sections were well chosen to make the report flow smoothly.	N/A	
Appearance and Formatting of Report ABET-TAC.2.G	Report has an unprofessional appearance with several of the following errors: the cover page is missing or does not have all the required information, sections are missing or out of order, diagrams are poorly produced or not used, and handwritten material is included.	Report has a cover sheet that contains the required information. Formatting of the sections could be improved. Diagrams and graphs are included but more attention should have been given to the placement and the appearance of the graphics.	Report has a professional appearance with properly formatted cover sheet and required sections. Graphics are used effectively.	Report is way above the norm in appearance. Student took the time to make the graphics for the data (tables, graphs, etc.) visually appealing, designed an attractive cover sheet, and paid attention to spacing and section formatting.	
Writing Style ABET-TAC.2.G	Report has several grammatical and/or spelling errors and the sentence structure is immature. Student too often resorts to jargon or clichés.	Report has some grammatical and/or spelling errors but is fairly readable with only a few rough spots. Student rarely resorts to jargon or clichés.	Report has very few grammatical and/or spelling errors. The writing style is mature and sentences flow smoothly and evenly.	Report has no grammatical and/or spelling errors. All sections of the report are very well-written, interesting to read, and technically accurate.	
CRITERIA	1 Unacceptable	2 Acceptable	3 Good	4 Exemplary	SCORE 1 – 4
References ABET-TAC.2.H	Student used a few poorly chosen resources with little relevance to the project and insufficient depth. References are not cited properly.	Student used an acceptable number of applicable resources but demonstrated minimal effort in selecting quality resources. References are properly cited.	Student gathered quality resources from a variety of sources that were useful in completing the project. References are properly cited.	Student demonstrated exceptional effort in researching the technical problem and used a balanced set of relevant, in-depth resources. References are properly cited.	
Technical Content ABET-TAC.2.A	Student does a poor job of describing the technical aspects of the project. Technical terms are used infrequently and/or incorrectly. Very little technical detail is provided on project specifications, the design process, testing and analysis, and the final product design.	Student does an adequate job of describing the technical aspects of the project. Technical terms are used appropriately and accurately. The student should have provided more technical detail on project specifications, the design process, the testing and analysis stage, and the final product design.	Student does a good job of providing technical detail on all aspects of the project. Some of the technical points could have been explained more clearly.	Student does a professional job of presenting the technical details for the project. The explanations were clear, concise, accurate, and designed to be easily understood by the reader.	
				TOTAL SCORE	

Integrating E-portfolios: Enhancing Reflection

One final approach to improving student writing is through the use of e-portfolios in all courses, across all disciplines. The use of e-portfolios can have a dramatic effect on students' writing and critical thinking; as such, it is a concept that should be introduced at the onset of their education. The mid-level writing course is just one of many that would utilize this tool. Research supports the fact that e-portfolios serve many functions in students' lives: "as assessment tools to document the attainment of standards (a positivist model--the assessment portfolio); as digital stories of deep learning (a constructivist model--the learning or process portfolio); and as digital resumes to highlight competence (a showcase model-- the best works/marketing/employment portfolio)."[16] At the College of Applied Science, first-year

students are provided with accounts through LiveText, an e-portfolio program defined as an Accreditation Management System™ that "provides institutions with the most advanced, complete, and user-friendly web-based tools for developing, assessing, and measuring student learning and more. With LiveText's Accreditation Management System, institutions can provide its students, faculty, administration, and stakeholders the best assurance of its commitment to accountability, continuous improvement, and excellence in education."[17]

In the past, the college used its own server space to house student e-portfolios, by means of in-house technology. The technology, however, was cumbersome and students could only work on their e-portfolios on-campus. Any changes had to be uploaded to the server, which was not accessible from a remote location. In addition, there were countless steps just to edit, revise, or add to the e-portfolio; it was not intuitive. Nor was it sustainable. The course that was originally slated to teach the students e-portfolio was eliminated and e-portfolio instruction became, quite often, the responsibility of the writing courses. In addition, students were not being asked to use e-portfolio in other courses, and the enthusiasm for e-portfolio swiftly dwindled. The faculty was, once again, not a united front. Even though e-portfolios are considered cutting-edge technology, if faculty do not see the use of them, neither will the students.

In 2006, the college piloted the LiveText technology and was granted money to provide every first-year student in 2007 with an account. The student accounts last five-years (and are renewable after that if the student so chooses). The technology is user-friendly, intuitive, and navigable. Many tools available with LiveText support and foster student writing, reflection, and critical thinking.

Perhaps the most practical feature of LiveText is that it is a .com application, meaning it can be accessed from any location at any time with a username and password. Easy access is one of the superior traits of the technology; if it is readily available to students, they are more likely to use it. Next, students have control over their e-portfolios. As stated by Helen Barrett, "While administrators often implement electronic portfolios for the assessment purpose, the students usually view this type of portfolio as something 'done to them' rather than something they WANT to maintain as a lifelong learning tool. A portfolio that is truly a story of learning is OWNED by the learner, structured by the learner, and told in the learner's own VOICE (literally and rhetorically)."[16] With the LiveText platform, students first create their own personal e-portfolio, including pictures, bio, resume, interests, activities, etc. With many students' lives becoming increasingly virtual (Facebook, Myspace, etc.), students are comfortable with this format and want to personalize it. After personalizing it, as Barrett points out, the students are more apt to "own" it.[16] With ownership comes writing, reflection, and critical thinking.

After creating their personal e-portfolios, students create course portfolios using templates created by their instructors. In a sample course portfolio for English 101, students upload assignment sheets, the papers associated with those assignments (known as artifacts on LiveText), and write short reflections about their writing process for each assignment. Students are asked to relate the assignment to other classes or projects they have experienced; elaborate on what they learned and how they will use that knowledge or skill set in the future; and reflect

on their own strengths and weaknesses. Then, after finishing that course portfolio, they link it to their personal portfolio and allow others to view their content.

Viewing access is another advantage of LiveText. Students can grant "access" to certain sections of their e-portfolio by sharing or hiding them. This facet alone makes this technology popular. It not only gives the students a sense of power and control over their e-portfolios (enhancing the ownership potential), but it also teaches the concept of audience to the students. Not everything is appropriate for everyone. Realizing and applying this concept is a critical skill in writing.

Finally, one of the unique features of the LiveText e-portfolio is the ability for the students to share their e-portfolios with their course instructors, who can then "review" and comment upon the students' writing and content. This interaction is priceless, as it is "old school" teaching in a way students are becoming increasingly comfortable – virtually.

The idea of writing in the disciplines, with the e-portfolio, is not limited to obvious writing assignments, such as research papers or lab reports. With e-portfolios, it is easy to assign writing in every class, across every discipline. The e-portfolios allow all faculty to participate in the concept of writing in the disciplines. By asking students to create an e-portfolio, reflect on each class, then make connections *among* the classes, writing in the disciplines will be ongoing.

Conclusion: Determining Load and Future Roles

Although many of these collaborations have proven successful to writing faculty, engineering faculty, and students alike, their sustainability is tentative at best. Most of the ventures described so far have been completely voluntary on the part of writing faculty. Course load has rarely been credited to the writing faculty for their efforts. Collaborative efforts on revising an assignment sheet might amount to several hours, which could easily be credited as part of a faculty member's service to the college. Unfortunately, the ventures that showed the most promise also required the greatest investment of time on the part of writing faculty. Some of these faculty members devoted upwards of fifty hours of commitment each quarter in addition to their full-time teaching course loads. Faculty have willingly extended their services because of their strong belief in the value of interdisciplinary collaboration, but such commitments are likely to wane if a system is not set in place that will establish more official roles and load credit. The College administration is currently reviewing this question of determining course load in such collaborative efforts, and faculty members are hopeful that the development of this writing-in-the-disciplines program proves to be sustainable.

Regardless of load, the future role of writing in the disciplines is clear. The advancements made in student writing, shown through improved confidence, understanding, and connections made in mid-level and senior capstone courses, shows that writing and technical courses are most affective when a common language is used and a common goal is defined. Through the illuminated connections brought about by rubrics assigning at least half (often more) of a courses' graded weight to writing and communication skills, students and faculty alike are responding positively to this multi-pronged approach to writing in the disciplines.

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