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Writing Intensive in the Industrial Engineering Classroom

During the mid-1980s, the writing-across-the-curriculum movement reached Davenport, Iowa and St. Ambrose University. As to why SAU adopted its WAC program, stories vary. Anecdotally, a local industrial firm, a firm that had been a strong financial supporter of the institution, hired one of our recent graduates who failed to demonstrate the level of writing competence the company expected of its white-color employees. The company CEO approached the SAU President and asked about what could be done to address the situation. As possible as that story may be, equally likely is that an English department faculty member heard his colleagues from a variety of disciplines comment that student writing was weaker than they expected, and they hoped that the English department could come up with a way to “fix” the problem.

Initially a junior-level exit essay was used for several years in the hope that the students would take upon themselves the responsibility to develop the writing skill expected of college graduates. As other institutions from across the country have experienced, the writing test hurdle did little to help students take more personal responsibility for their writing ability. The faculty then agreed to take a more proactive approach to improve student writing.

The failure of the exit-exam caused the St. Ambrose faculty to study its situation and options, and resulted in a faculty created a writing-across-the-curriculum program seeking 1) to foster increased content learning through writing and 2) to improve

discipline-specific student writing competence. Students were to complete at least two Writing Intensive (WI) courses after one semester of Written Communication (ENGL 101). The WI courses were to be divided between lower and upper division courses with the upper division course to be in the student's major area.

The faculty approved a set of course guidelines in February 1989, which were applied to all WI courses regardless of department. As can be seen, one underlying concern was that all WIs were to produce a minimum quantity of formal writing in the belief that this formal writing would best move the students toward successfully accomplishing the two goals of the WAC program. The five guidelines state:

1. The teacher assigns four formal papers of at least four pages. These four papers are supplemented with a variety of other kinds of writing (for example, rough drafts, journals, exercises in class).
2. The teacher spends 20 to 25% of class time on writing. For example, students write in journals to summarize ideas and initiate discussion, perform prewriting exercises, analyze and discuss papers, collaborate on group projects.
3. The teacher responds in writing to student writing, but is not the only respondent; for example, students read each other's work and comment on it.
4. The teacher builds into writing assignments the necessity of revision, emphasizing that almost all writing is rewriting.
5. The teacher recognizes the importance of qualities generic to all good writing, but also attends to the conventions of writing in the particular discipline and develops strategies for teaching those conventions.

Ideally, faculty members worked with the Director of Writing to prepare and bring forward to the Educational Policies Committee course proposals that would keep to the spirit of the guidelines and satisfy the needs of the courses and the programs in which they were to be taught. While the guidelines were quite narrow, their application could be and were altered to best serve the needs of our students and their programs of study.

An ideal case in point of this flexible application of guidelines is in one course in the Industrial Engineering program, “Problem Solving with Microcomputers” (IE 290).

IE290 has three main learning objectives: 1) to understand the types of problems that industrial engineers address and how to use the microcomputer and software to help solve these problems; 2) to learn to use a variety of software tools including word processing, spreadsheets, programming, E-mail, computer-aided design, project management; 3) to improve student writing. The syllabus for IE290 can be viewed at <http://web.sau.edu/rjerz/Ambrose/IE290/ie290.htm>. IE290 became WI many years ago and is one of three WI courses within the IE curriculum. A popular perception is that engineers are known to have strong computational ability but weak writing ability. It is our belief that engineers should possess both good computational and writing skills upon graduation; therefore, traditional IE students at St. Ambrose take four WI courses and two composition courses (Written Communication and Technical Writing), and may end up taking several other WI courses as they fulfill general education requirements. Several other IE courses contain writing assignments but are not structured to meet the WI guidelines.

In IE290, students must write one research paper and approximately six laboratory reports. The research report writing spans the entire semester, whereas the laboratory reports are completed within a week after the lab. The student selects a research topic from the professor’s recommended list or they may propose their own topic. Two textbooks A Writer's Reference by Dianna Hacker and Manual for Report Writing in Engineering Design from the Michigan Technological University (1992) support the writing assignments. The first book is a general-reference writing guide that

is also required in English 101. The second book was the result of a special NSF project Improving Writing in Engineering Design Courses, written by faculty from Michigan Tech and other institutions nationwide. The textbook contains, in brief, all the information that engineers need to write discipline acceptable reports.

The research report is the major vehicle used to meet the WI guidelines. It must be 20 to 30 pages in length and follow the Michigan Tech textbook guidelines. When students learn about this writing assignment, they nearly die on the spot. After the teacher explains that the page count includes a title page, abstract, table of contents, references, figures and tables, and is double-spaced, the students' minds are put somewhat at ease.

The research paper theme centers on an industrial engineering technology and how this technology will change in the future as computer technologies improve. To discuss the future of a technology, its scope and current application need discussion. Although students may structure the report sections as they believe best, the recommended structure is that the report contains the following major sections: Introduction, Current Technology, Future Technology, and Conclusion. Additional requirements are an abstract, a table of contents, and references.

The [IE 290] teacher created a Microsoft Word template to help students structure the report and follow the writing guidelines. The students can download this template at http://web.sau.edu/rjerz/Ambrose/IE290/rjResearch_Paper_Template.dot. The first microcomputer laboratory application concentrates on using advanced features of Microsoft Word. During this laboratory (usually two weeks) the students learn many advanced features of Word, including formatting features, the use of headings, templates,

automatic table of contents, styles, grammar and spelling checker, endnotes and footnotes. The report template becomes the solution to mastering many of these advanced word processing features. The fact that many juniors and seniors continue to use the template in later courses validates the effort to create it.

Another method used to make the research project progress is requiring the student to turn the paper in four times during the semester. The first submittal must address the “Introduction” of the technology. The teacher reviews the reports and makes suggestions for improvements for this section. It is expected that the student improve the Introduction at the second submittal. The second submittal must complete the “Current Technology” section; the third submittal the “Future Technology” section; and the last submittal the “Conclusion” section and complete report. Along the way, students continue to work on the abstract and references sections. This process provides an iterative writing environment that is part of the WI guideline.

Breaking down the entire report into sections emphasizes that arduous tasks can be made easier by dividing them into more manageable, smaller tasks. This structure also allows the teacher to review report progress in class and to provide a teacher perspective on each industrial engineering topic. Sometimes a laboratory exercise will center on one student-selected research topic such as computer-aided design.

At the end of the third phase of the research reports, students must make a copy of their report and give it to a classmate for peer review. The classmate’s comments are returned to the author and a copy is given to the teacher. This exercise emphasizes the peer review guideline of WI courses.

One other means of support for this writing assignment involves a session at the university library. Students learn to use the available library resources, mostly concentrating on database searches. This exercise becomes most important when students must compose the “Future Technology” section with information gathered from recent journal articles.

As mentioned earlier, students must complete a number of laboratory exercises throughout the semester. When a lab is completed, the student must submit a one to two page report summarizing what was learned. These papers are much less structured than the research report and provide writing variety. Students do continue to learn some engineering report writing elements, such as proper insertion of figures, margins, and font selection. These papers also give the teacher additional insight to each student’s writing ability.

All students complete the research reports and do quite well. Overall, students express high satisfaction with the course. The most common complaint, especially from first year I.E. students, is the quantity of required writing. Students enjoy exposure to a fair amount of software products and appear to gain an appreciation of the industrial engineering discipline, problems that industrial engineers address, and how software tools can aid. Several examples of student’s report can be viewed at http://web.sau.edu/rjerz/Ambrose/IE290/student_examples.htm