

Contextualizing Cross-Discipline Teaching and Learning Through Engineering Multidisciplinary Projects (EMDPs)

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Introduction

The teaching and learning of highly required workplace technical communication skills (i.e. writing reports; calling for meetings, preparing meeting agendas and taking, writing and editing minutes; writing and sending formal email messages and letters; etc.) out of their relevant contextual settings does not guarantee full student involvement in the learning process and may be futile (Mercer 2006; Yu 2008; Chun 2010). Contextualizing the teaching of these skills opens students' eyes to their appropriate uses in authentic communication situations (Amare and Brammer 2005; Predmore 2005). It is the purpose of this research to report on the procedures the writers have employed in teaching workplace communication skills through engineering multidisciplinary projects. In these projects students are divided into teams, with each team comprising a minimum of three and a maximum of four students from different engineering majors. The students appoint a team leader, choose a research topic/problem in the regional environment that requires input and collaboration from all team members in finding a solution to it. Team members choose the topics, obtain approval of the topics from cooperating engineering faculty and the course instructor, and then prepare detailed research proposals. They receive specialist feedback on their proposals, and based on evidence of requisite detail in their proposals, are allowed to proceed with their research. The execution of the research project requires the use of several technical communication skills such as, internet searches; sending email messages; writing formal letters; meeting with officials, engineering academics and experts, as well as giving oral presentations and submitting written reports. Students' feedback, course assessment surveys and the final exam results point to the success of contextualized teaching and learning as will be shown below.

Context

The activities described in this paper are conducted in an English for Engineering Course taught to the College of Engineering students at the American University of Sharjah in the United Arab Emirates. In this course, engineering students are expected to study and acquire several technical communication skills required for the workplace. As with any other language course, students are taught how to write different technical written communication genres addressed to assumed and imagined readers, which makes the course lack authenticity and deprive the students of the pleasures of writing to a real audience.

Do you mean that is what happened in the past?

Prior to the Spring Semester 2010 the College of Engineering (CEN), acting upon a recommendation made by the Accreditation Board for Engineering and Technology (ABET), designated ENG207: English for Engineering a prerequisite study for engineering students to be undertaken before going for internship and before studying the Senior Project in their final year. This has been in response to employers' and students' complaints that engineering

trainees lack the basic skills needed for communication with co-workers, supervisors and employers. In consequence, a recommendation has been made that engineering students will typically study ENG207 during their third academic year before embarking on their senior design projects and internship. ABET has also made a general and broad recommendation that engineering students from different majors should participate in multidisciplinary engineering projects that require individual input from each of the students in the team. Since this has proved difficult to implement in specialized engineering courses, where students from different majors study separately from others, the most suitable context for this has been the ENG207 class which comprises students from all engineering disciplines and from different cultural and ethnic backgrounds, .

In response, an engineering multidisciplinary project component has been incorporated into ENG207 in order to provide engineering undergraduates training in a range of collaborative communication and academic skills typically found in engineering workplaces. Since the course contents cover in addition to research skills other vital communication skills, the researchers have incorporated in the body of the engineering multidisciplinary project the communication skills listed in the course learning objectives detailed below.

Engineering Multidisciplinary Project-based teaching and learning can provide the appropriate context for introducing, developing and implementing not only research skills, but also the technical communication skills stated in the course learning objectives. The section below shows the structure, the components and the steps of the engineering project in the old & new syllabi and the modifications introduced.

1. Old Syllabus

1.1. Individual Technical Presentations

- Proposal
- Progress report
- Technical presentation

In the old syllabus, students worked individually and were required to choose an engineering research topic, conduct research on it, give an in-class oral presentation, and finally submit a written report. By contrast, in the new syllabus, the engineering project has been given a multidisciplinary dimension in that it is used as a tool for teaching and giving students hands-on collaborative research experience through planning and writing engineering research projects. This is in addition to making available to students authentic contexts where they can practice workplace communication skills. These new elements are shown below:

2. New Syllabus

2.1. Multi-Disciplinary Presentation (MDP)

- Topic Choice and Approval
- Proposal Submission
- Oral Progress report
- Submission of written progress report
- Submission of Final Written Report

2.2. Meeting, Planning and Documentation

- Minutes of official team meetings
- Documentation of informal team meetings
- Documentation of key decision-making
- Documentation of team meetings with officials, academicians and experts.
- Documentation of planning
- Timeline for MDP execution and submission

Learning Outcomes:

All achievement measures used for assessing the effectiveness of the teaching and learning point to the following:

-Academic Skills

- Students are better able to use and apply paraphrase, summary, quoting and synthesizing skills in addition to citing sources in their EMDPs. Also, the use of visuals is enhanced and mastered.
- Course learning objectives have been practiced in a naturalistic and authentic context.

-Professional Communication Skills

- Students' email messages, calls for meetings, minute taking and editing skills exhibited greater development and accuracy in terms of language and context of use.
- Students' power-point preparation and presentation skills are enhanced.

- Organizational Skills

- Students, through EMDPs, are given authentic tasks through which they practice organizational skills such as, forming teams, calling for, organizing and managing meetings, giving presentations, interviewing field and academic experts, engaging in and responding to audience's questions and comments during oral presentations.

-Strategic Planning

- Students practice full autonomy in planning, proposing and executing the whole work with little guidance, when needed, from the course instructor.

Reflections:

EMDPs have proven to be an effective and successful vehicle for developing workplace communication skills. Instructors' and students' deliberations on the course and the way it is conducted indicate that EMDPs have helped achieve the following:

- Shift focus from teacher-centered practices to students' collaborative learning-centered environments, thus achieving more student autonomy, confidence and responsibility.
- Realize Swales' (1990) & Mercer's (2006) concept of "community membership".
- Provide learners with real opportunities to create their own texts, engage in real communication tasks and reflect on the outcomes of their communication processes.
- Use language for real purposes. Rilling and Dantas-Whitney (2009, p. 2) rightly argue that "The goal of using and creating language for real-world purposes within language instruction is to bring authenticity to the learning experience...".
- Develop in students "transferrable skills and knowledge" (Chun 2010, p. 24).
- Provide an "interdisciplinary, student-centered approach to teaching focused around student-generated projects (Stipe and Yasen 2009, p.130).

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