

Teaching Professional Development in the First-Year Writing Course

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Abstract

Two of the significant thrusts of reform in the first-year engineering curriculum--creating enthusiasm for engineering and preparing engineering students for the realities of a greatly altered context of professional practice--can be conceptualized as a challenge of fostering professional development. At the School of Engineering and Applied Science (SEAS) at the Univ. of Virginia, a team of concerned faculty has attempted to define the qualities of an engineering graduate well on the way to mature professional development, as well as the learning experiences that would foster these qualities. This paper recounts an attempt to work professional development into a first-year writing and speaking course designed for engineering students.

Introduction

Throughout the US, engineering educators are experimenting with the first-year E-school curriculum--and with good reason. With the population of engineering freshmen declining more than 26 percent between 1982 and 1994, attrition is a concern. How can the first-year curriculum do a better job of helping students cope with the engineering curriculum successfully--and even more, create a sense of enthusiasm for careers in engineering?

In addition, engineering graduates are finding themselves in a markedly different workplace, in which cross-functional team communication, experience working in small groups, and thoughtful approaches

to ethical dilemmas are prized just as highly as problem-solving expertise. Engineering educators are calling for curriculum reforms that will bring industrial readiness to the fore.

In one important way, these two curricular reform efforts emphasize the same, underlying theme: Professional development. How can we inspire our students to see engineering as a vital and satisfying profession--and, at the same time, prepare them to function effectively in the rapidly-changing context of professional practice?

In this paper, we describe the definition of professional development created by the Professional Development Committee (PDC) at the University of Virginia's School of Engineering and Applied Science (SEAS), and recount our efforts to bring professional development to the fore in a first-year writing course, TCC 101. A course required of all incoming first-year students (save those with advanced placement credit), TCC 101 is taught by faculty of SEA's Division of Technology, Culture, and Communication, a service unit that is housed within SEAS and committed to supporting the engineering curriculum.

In the Fall of 1995, two sections of TCC 101 were paired with two sections of a core engineering course ENGR 164, which focused on engineering problem solving. Among the objectives of this pairing was to support the teaching of professional development through instructor coordination, so that the same themes would be repeated by both instructors.



Defining Professional Development

Formed in the fall semester of 1995 by a cross-disciplinary group of SEAS faculty concerned about fostering professional development, the Professional Development committee believes that the outcome of a professional development process is a set of qualities, and that these qualities are best learned through experience.

The following, abstracted from the Committee's reports, are the qualities of a professionally-developed engineer:

- **Technological Capability** Graduates should possess the fundamental and contemporary knowledge of their discipline. They should be able to use it rationally in a variety of professional activities including analysis, design, experiment, and manufacturing. They should know how to retrieve, process, and generate technical information with accuracy and reliability and will be facile with current computer systems and other information technology.
- **Leadership/Cultural Competence** Graduates will hold the conviction that technology, wisely and creatively applied, will hold the key to a better human future. They will recognize that engineers are called to be leaders in enhancing the quality of life. They will be acquiring the maturity, self-discipline, independence of thought, and skills necessary for effective leadership.
- **Industrial Readiness** Graduates will understand elements of the evolving structure and functioning of American and global enterprises, and will possess adequate skills and adaptability to sustain a variety of productive roles in human organizations, even in the face of rapid change.
- **Individual/Team Effectiveness** Graduates will be able to function comfortably and well in a variety of working situations. They will be able to recognize optimal modes for efficient

productivity and can organize and motivate themselves as well as others.

- **Ethics/Values/Service Commitment** Graduates will have assimilated the ethical dimensions of professional practice and developed codes for professional integrity and personal values. They will consider, and expect to carry out, their professional work as a means of service to others: society, customer, employer, colleagues. Graduates will be sensitive to the consequences of their activities on health, safety, and the environment. They will understand the importance of supporting social institutions, the need to contribute philanthropically, and the value of professional society activities.
- **Communications Skills** Graduates will possess writing and speaking skills to enable effective communication among all those with whom they interact: technical peers, managers, non-technical colleagues, the broader public.
- **Career Vision** Graduates will have given serious thought about, and developed some images of, various stages of their lives and careers. They will have efficiently used their academic program to help them identify, and become qualified; for, their options. They will have conducted an effective search that optimized their initial postgraduate experience. Graduates will be ready to rationally manage their careers with knowledge, flexibility, and confidence, and have made a commitment to lifelong learning and growth. They will have started on a path of life expecting to make significant contributions and to find great personal satisfaction.

Experiences That Foster Professional Development

The committee concluded that these professional development qualities should be fostered by experiences throughout the undergraduate curriculum:

- **Introspection/Self-Assessment** The injunction "Physician, Know Thyself" applies equally to



engineers. To develop career vision, leadership, and technical competence, students must understand their personalities, strengths, weaknesses, behaviors, and styles as well as how to assess themselves throughout life. They should have experiences that sensitize them to the implications of honest self-appraisal; who they are, where their strengths and limitations lie, and how they fit into teams.

- **Learning/Growing** To have a chance of achieving their potential and to reach and maintain viability in our rapidly evolving world, students must assimilate knowledge and procedures, achieve significant maturity, and develop strategies for continuing this process all their lives. They should have experiences that build their competencies, their appreciation of diversities, and their skills in expression. Students should meet challenges to their abilities and values as well as explore career options.
- **Performing/Doing** To become professionally proficient, students must not only have assimilated knowledge and methodology, they must have practiced using it so that mistakes are minimized and they are appropriately comfortable and confident. Students should be put into situations of resource utilization, presentation, decision-making, risk-taking, job searching, leading meetings, helping others, abstracting, and thinking critically.
- **Leading/Following** To be effective engineers, students must be able to lead as well as to follow other leaders, to understand the human processes that call for these distinct positions, and to recognize what they should do to be effective in given situations. They should live through orientations, goal-oriented teamwork, operation of an organization, closures and endings.
- **Employment/Service** To understand how the commercial world functions and what roles engineers and others play in producing goods and services, students should study in class as well as observe and participate in a variety of work situations. In addition to non-professional jobs

they may take to earn personal funds, they should get involved with the functions of research, development, design, manufacturing, marketing, regulations, etc. They should have opportunities for experience outside the university as well as inside.

- **Interactions** In a diverse and increasingly complex world where human progress and accomplishment will result more and more from combined efforts and where people interact more rapidly and extensively, students must be successful and comfortable in a variety of situations where they meet and work with others. They should have meaningful experiences with students, university personnel, professionals, and the general public.

Professional Development in TCC 101: Qualities

TCC 101 is a writing and speaking course that is designed to meet the needs of the professional undergraduate engineering curriculum. While retaining the course's current focus on quality writing and speaking skills, our innovation efforts focused on introducing some of the experiences that the Professional Development Committee had outlined—experiences that could help first-year students get started on a life-long process of professional development.

In brief, we decided to expand the traditional objectives of TCC 101 by introducing the following additional objectives, which form a subset of the professional development qualities we would like to see in our engineer graduates:

- **Technological Capability** After taking TCC 101, students will know how to use electronic databases and the Internet to research engineering-related topics.
- **Leadership/Cultural Competence** After taking TCC 101, students will understand the need for leadership in small groups and will learn how to follow as well as to lead in independent small-group exercises.



- **Industrial Readiness** After taking TCC 101, students will understand the changes taking place in engineering industrial practice. They will understand the importance of working effectively in cross-functional teams and they will seek out and value contributions from co-workers who have thinking styles that differ markedly from their own.
- **Individual/Team Effectiveness** After taking TCC101, students will understand why some teams work well--and why others don't. They will know how to diagnose faulty small group processes and take steps to remedy them.
- **Ethics/Values/Service Commitment** After taking TCC101, students will appreciate that companies want to hire engineers with a strong sense of professional ethics. They will have thought through a variety of ethics-related situations and learned how to discuss ethics-related issues in situations of conflicting interests. In addition, students will have interviewed a local United Way agency and learned to describe and defend the value of professional philanthropy.
- **Communications Skills** After taking TCC 101, students will (in addition to the traditional writing and speaking objectives of the course) learn how engineers can communicate effectively with managers, technicians, users, and the general public.
- **Career Vision** After taking TCC 101, students will have taken a personality inventory and learned more about their characteristic tendencies in social interaction, thought, emotion, and empathy. They will have examined the varied careers that one can pursue within engineering, and devoted some thought to choosing a major that matches what they have learned about themselves.
- **Engineering Career Options Program (ECOP)** An outgrowth of the TCC 101 Research Interview Project (RIP), in which TCC 101 students interviewed individual faculty concerning their research interests as an aid to major selection, this project was substantially redesigned to emphasize team work, communication with a variety of engineering practitioners, self-discovery, and research skills. In teams of four, students were asked to extensively research one of the fields of engineering offered at SEAS; to interview upper class students, teaching and research faculty, and practicing professionals in this field; to identify the current hot issues and fast-breaking subfields within this field; to find and describe a significant achievement of this field that has substantially contributed to human welfare; and to present their findings in high-quality, half-hour presentation.
- **Engineering Issues Case Study** In tandem with a paired section of ENGR 164, a design course required of all incoming first-year SEAS students, TCC 101 students were asked to write a case history of an engineering failure that has subsequently become the focus of a significant liability lawsuit. They were taught how to use computer search services and the Internet as an aid to information acquisition. They were asked to examine and critique the ethical implications of the case they researched.
- **Communication in Cross-Functional Settings** In numerous writing and oral presentation exercises, students were evaluated (through role-playing and evaluation by visiting faculty) in terms of how successfully they could communicate with a variety of audiences: fellow technical experts, technicians, users, corporate "bean-counters," technical managers, and non-technical executives.
- **Small Group Dynamics** Students were first asked to work in groups without guidance, and then to reflect on what went right--and what went wrong. Groups that did not function well did not develop strong internal leadership, failed

Professional Development in TCC 101: Experiences

To foster these experiences, the revised TCC 101 syllabus included the following exercises:



to develop supportive group norms, and were marked by varied levels of participation and commitment. New groups were formed with training given in leadership, time management, setting agendas, taking minutes, and positive norm formation.

- **Social Responsibility of Professionals** Student teams were asked to interview officials, workers, and beneficiaries at a local United Way agency. In a presentation, they described the extent of the social problem with which the agency dealt and reflected on the need for professional philanthropy.

Evaluation

The experimental sections of TCC 101 were evaluated using a variety of instruments, including questionnaires, interviews, and focus groups. We are still analyzing the findings, which will be presented at the ASEE conference. Preliminary analysis of the evaluations indicate that both sections of TCC 101 were exceptionally well received by the students. One of the experimental sections received the highest marks among the dozen TCC 101 sections offered in Fall, 1995; the others fell within the top one-third.

When asked to name the most valuable aspect of the course, students supplied the following (representative) comments:

- "Communication skills... but the atmosphere in class--almost a team spirit--fostered a learning environment which surpassed all my other courses."
- "Working well in small groups, because that is the way the real world works."
- "How to communicate with peers as well as professors effectively."

Students needed no arm-twisting to grasp the importance of small group communication, and this led them naturally to develop an coherent approach to communication. In turn, this approach enriched the more traditional communication curriculum of TCC

101, which also received high marks. Many students found the Engineering Career Orientation Project (ECOP) to be exceptionally valuable. As one student put it, "I personally knew little about the specific engineering fields, and I wasn't sure if I wanted to stay in engineering. The ECOP presentation was a valuable project for me."

Conclusions

Communication courses designed to benefit engineering students provide many opportunities for introducing professional development concerns---and without compromising their traditional writing and speaking objectives.

Today's engineering graduates must communicate effectively in greatly altered professional environment, in which self-knowledge, awareness of others, sensitivity to differences in thinking styles, teamwork, cross-functional collaboration, and ethical reasoning are increasingly important. By introducing learning experiences intended to foster professional development, the first-year writing course provides additional opportunities for learning about communication in the greatly altered context of contemporary professional engineering practice.



<p align="center">TCC 101 Syllabus Fall 1995 Mr. Shields/Mr. Pfaffenberger</p>		
UNIT I Getting Started		
Week 1		The Challenger Disaster: A Communication Failure?
Week 2	Locating information/documenting sources	Engineering student, know thyself! (Interpreting the MBTI)
UNIT II What They Don't Teach You in English Composition Classes		
Week 3	You can communicate—IF you adapt your message to your audience	So you have to write a technical report!
Week 4	So you've got to give a speech!	Your first oral presentation (gasp)
UNIT III Secrets of the Technical Communication Masters		
Week 5	Let's get our bearings: Definitions and technical description	How does this thing work? Process analysis and instructions
Week 6	Can't you see it my way? Persuasion	Wouldn't it be great if... Proposals
UNIT IV Choosing Your Major (ECOP Presentations)		
Week 7	It's a material world: Mechanical Engineering, Aerospace Engineering, Materials Science, Nuclear Engineering, Biomedical Engineering:	FALL BREAK
Week 8	Information, signals, systems: Electrical Engineering, Computer Science, Systems Engineering:	The world around us: Civil Engineering, Chemical Engineering, Environmental Engineering, Architectural Engineering:
UNIT V Small Group Communication		

Week 9	Understanding small group Communication... and miscommunication	Relating to people in small groups
Week 10	Making small groups work	Group decision making and problem solving
UNIT VI So You Want To Be A Professional!		
Week 11	Professions, professionalism, and you	Student professional organizations
Week 12	The complete professional: ethics, social service, philanthropy	Student presentations
Week 13	Student presentations	THANKSGIVING BREAK
Week 14	Gasp! It's an open-ended problem!	Critical thinking, judgment, wisdom
Week 15	Toward effective leadership	The global context