Round Table Discussion

Online Ethics Instruction for International and Domestic Engineering Graduate Students

Nineteenth Annual Meeting
Association for Practical and Professional Ethics
Cincinnati, Ohio
March 6, 2010

Presenters:
William D. Lawson, P.E., Ph.D.
H. Brent Guinn, MSIE
Association for Practical and Professional Ethics

Nineteenth Annual Meeting

March 4 - 7, 2010
Cincinnati, OH

Meeting Information

The Nineteenth Annual Meeting will convene at the Hilton Cincinnati Netherland Plaza, 35 West Fifth Street, Cincinnati, Ohio 45202.

Association's Annual Meeting

The Nineteenth Annual Meeting, open to Association members and nonmembers, welcomes persons from various disciplines and professions for discussion of common concerns in practical and professional ethics. The meeting provides an opportunity to meet practitioners, professionals and scholars who share your interests. The Association for Practical and Professional Ethics was founded in 1991 to encourage interdisciplinary scholarship and teaching of high quality in practical and professional ethics by educators and practitioners who appreciate the practical-theoretical aspects of their subjects. The Association facilitates communication and joint ventures among centers, schools, colleges, business and nonprofit organizations and individuals concerned with the interdisciplinary study of teaching of practical and professional ethics. The Association is also the sponsor of the National Intercollegiate Ethics Bowl held at the Annual Meeting and the 10 Regional Intercollegiate Ethics Bowls held under its auspices.

Submissions are invited on ethical issues in various fields (e.g., public administration, law, the environment, accounting, engineering, computer science, research ethics, business, medicine, health care, journalism, higher education) and on issues that cut across professions. Special consideration will be given to topics that deal with ethical issues which cut across at least two disciplines or professions and are co-authored by persons from different disciplines. Teaching demonstrations, discussion of moral education, and presentations on ethics curriculum development are welcome. You do not need to be a member of the Association to make a submission. Submissions will be considered in the following categories: 1) Individual Formal Papers; 2) Panels including Formal Papers; 3) Panels for Round Table Discussions; 4) Pedagogical Demonstrations for Teaching Ethics; 5) Case Study Presentations and Discussion, 6) Author Meets the Critics; 7) Lunch with an Author. You may submit materials in more than one category, but normally only one submission will be accepted for the program for all except the Author Meets the Critics and Lunch With an Author sessions.

The Submission Postmark Deadlines are:
Formal Paper, Panel, Pedagogical Demonstration, Case Study Presentation and Discussion Submission Deadline is October 16, 2009
Lunch With an Author Submission Deadline is October 9, 2009
Undergraduate Submission Deadline is October 30, 2009

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Abstracts

Abstracts are now available for the Nineteenth Annual Meeting.

To view a full copy of the Abstracts click here: Nineteenth Annual Meeting Abstracts publication. Registrants will receiving a copy in their conference folder upon check-in at the Association's meeting registration desk.

If you are interested in attending the session presented by Chris Papadopoulos "Using an Inverted Classroom Model in the Social, Ethical, and Global Issues (SEGI) in Engineering Program": Attendees of this presentation are encouraged to preview and simulate the inverted class model by visiting https://moodle.uprm.edu/ >> Ingeniería >> Social, Ethical, and Global ... >> SEGI 0001 ..., then logging in as guest with enrolment key "appe2010". Information specifically for attendees will be marked APPE and use the same key.

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ONLINE ETHICS INSTRUCTION
FOR INTERNATIONAL AND
DOMESTIC ENGINEERING
GRADUATE STUDENTS

NSF Award 0629344

NINETEENTH ANNUAL MEETING
ASSOCIATION for PRACTICAL and PROFESSIONAL ETHICS
CINCINNATTI, OHIO
MARCH 6, 2010

PRESENTERS/CONTACT INFORMATION

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- H. Brent Guinn, MSIE
  Senior Director, Distance Learning, Edward E. Whitacre, Jr. College of Engineering
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Those on our team not with us today:
- Katherine Austin, Ph.D.
  Department of Psychology/Office of the CIO
  Texas Tech University

- Thomas J. Darwin, Ph.D.
  Professional Development and Community Engagement
  The University of Texas at Austin

- Greta J. Gorsuch, Ed.D.
  Classical & Modern Languages and Literatures
  Texas Tech University

- Monica W. Matzner M.Ed.
  Texas Tech University

- Byron Newberry, Ph.D., P.E.
  Mechanical Engineering
  Baylor University
We present findings from research aimed at improving ethics education for international and domestic graduate students in engineering.

The conversation focuses on development and assessment of an educational intervention, consisting of a series of online ethics learning modules, intended for students of all cultural and ethnic backgrounds but which has been specially designed to be sensitive to the needs of the international graduate student.

**Theme One**

- Theme One is about the underlying rationale for the project.
- The conversation will focus on needs of the significant numbers of international students who remain in the United States after graduate school are who are expected to adhere to normative ethical obligations that have been established in this country for engineering research and practice. This discussion lays the groundwork for methodical design and development of the educational modules and web interface.
THEME TWO

- Theme Two is about the methodical design and development of the educational modules and web interface.
- This includes module topic selection, specification of learning objectives, authoring content, module assessment, and design of the web interface. The conversation will focus on the challenge of articulating ethics content at an appropriate degree of specificity to facilitate engineering graduate students recognizing and understanding ethical norms and values such that this knowledge can be measured.

THEME THREE

- Theme Three is about the integrative approach used to help international graduate students overcome acculturation barriers to personally knowing and inculcating normative ethical obligations associated with engineering practice in the United States.
- This conversation focuses on how cultural competency, language proficiency, and specific acculturation stress indicators were considered in the research design. This also includes the use of linguistic and other accommodations to create learning content which is more user friendly for international students for whom English is not their first language.
THEME FOUR

- Theme “Four” is about formative and summative assessment approaches implemented for this study, and the initial research results.
- The conversation will focus on the design and selection of survey instruments relative to operationalizing the research model, the descriptive statistics for the student population who completed the modules, and the comparative efficacy of the instructional intervention for both domestic and international students.

THEME ONE

- International engineering graduate students are a natural audience for an educational intervention aimed at helping them overcome the acculturation barriers to personally knowing and inculcating normative ethical obligations associated with engineering practice in the United States.
PREMISES

- Ethics is important to engineering profession, hence featured in Accreditation Board for Engineering and Technology (ABET) requirements.
- How professional ethics is conceived, including codes, regulations, conventions, & practices, varies by culture as defined by geopolitics.
- Many international grad students will stay & work in U.S., either practicing engineering or teaching undergraduate students. They are critical to the U.S. economy (Susan Hockfield, WSJ)
- These individuals will benefit from a formal exposure to the professional ethics conventions of the U.S.

APPROACH

- Web-based modules/short course
- Can be offered within graduate course/seminar or as an extracurricular requirement
- Embed specifics of U.S. professional ethical conventions in engineering within the context of broad, “universal” principles.
- Address acculturation issues in module development
- So far, so good. But.......might not these last two points require perspectives from other disciplines?
ACROSS DISCIPLINES

- What do civil engineers, mechanical engineers, cognitive psychologists, applied linguists, and rhetoricians have in common?
- We share an interest in the success and contributions of international students in U.S. universities.
- We wish to explore and improve international students’ entrance into communities of practice as graduate students and future professionals.

ACROSS DISCIPLINES

- The process of developing the curriculum and platform for the course was interdisciplinary out of necessity.
- Ethics education goes beyond learning rules, policies, and procedures.
- Ethics education is at the core of preparing individuals to function well in a community and live productive, meaningful lives.
- Multiple disciplines and perspectives must be blended to create an effective platform for this kind of education.
THEME TWO

Ethics ultimately concerns itself with how we live on a daily basis, how we make the right choices in complex and ambiguous situations, and how we do this while balancing the different and sometimes conflicting interests of those around us. Ethics training must go beyond learning codes of conduct or satisfying compliance requirements. It must prepare individuals to function well in a community, live meaningful and productive lives, and contribute to the overall wellbeing of that community. This is particularly true for engineers, as their work has a widespread impact on the lives of people in general.


**Module Topics**

1. Codes of Ethics
2. Protecting Human Life and Welfare
3. Competence
4. Honesty
5. Fairness
6. Conflicts of Interest
7. Intellectual Property & Plagiarism
8. Data Integrity

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**Module Topics**

- Module topics blend content about rules, conventions, and laws necessary for being an effective professional with deeper cultural values.
- Module topics were all developed with input and vetting from the different disciplines represented on the team.
- The progression of the topics is also by design—it presents paramount principles first and then goes more in depth on areas essential to engineering practice.
Ethics in Engineering

There are two important points to consider:

1. It is the responsibility of each engineer to know his or her area of competence. Engineers begin to develop their areas of competence during their education. Areas of competence are influenced by major field of study, areas of concentration within the major, special design or research projects, and internship experiences. After completing school, engineers develop on-the-job experience in particular industries, technologies, and job functions.

At work, a new engineer needs to learn from more experienced engineers. In most companies, the work of new engineers is checked by senior engineers to ensure that any mistakes due to inexperience are corrected (Figure 2). (Reducing mistakes) As engineers move up in their work, they should increase their knowledge and skills and should take on more responsibility. Throughout their working lives, engineers must be able to objectively assess their own competence. They must know what type of work they are capable of, and know whether to seek the help of other engineers.
**THEME THREE**

- Having to use English as a second (or third) language for international graduate students in the U.S. has a major impact on their successful entry into professional communities of practice. Ethical norms and obligations constitute a significant part of engineering culture whether it be in academia, industry, or consulting. For ethics instruction to have the greatest effectiveness for international students, the content must be readable and comprehensible in the students' second or third language (English). Grappling with these language constraints is an ongoing process and brings to the fore challenges which the students, and their teachers and institutions, must confront in all aspects of the educational process.

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**COMMUNITIES OF PRACTICE**

- Communities of practice are collaborative, informal networks that support professional practitioners in their efforts to develop shared understandings and engage in work-relevant knowledge building.
- Another thing engineers, rhetoricians, applied linguists, etc. have in common.
- Communities of Practice are what we academics experience as doctoral students and faculty members.
- Applied linguists focus on the processes of second language learning and comprehension as students enter communities of practices in which new participants and “old timers” interact and establish “‘legitimate peripheral participation’...of all participants who have varied degrees of familiarity with the practices of the community”
- Other disciplines might (and do!) call this acculturation.
INITIAL VETTING OF MODULE CONTENT

- While we cannot presume to know the cultures of others, we DO know our own culture.
- Modules written with full input from all authors and Cultural Advisory Panel; revised with three or more iterations.
- Learners’ English proficiency in the genre of general engineering writing on ethics issues becomes a salient issue—second language reading processing!

MONITORING THE LANGUAGE OF TEXTS IN THE MODULES

- Lexical density: the number of different words, compared to the number of total words, in a given text
- Lexical range: how frequently particular words in a given text are likely to be encountered by readers in other reading contexts
- Grammatical structures: congruity of tense selection and active/passive sentence structure.
- Relevance of illustrations: appropriate illustrations within text fosters complex thinking and results in better comprehension
- Developing and Designing Online Engineering Ethics Instruction for International Graduate Students, Austin et al.
ACCULTURATION: TRANSNATIONAL AND PROFESSIONAL

Acculturation definition: “second culture learning,” also “strategic reactions of the minority to continuous contact with the dominant group”

- Possible barriers to acculturation include:
  - Level of learners’ cultural competency
  - Learners’ English language proficiency (NOT a simple, unidimensional condition or trait)
  - Levels of acculturation stress

SECOND LANGUAGE LEARNING AND COMPREHENSION

- Often overlooked as an issue in acculturation
- The operating hypotheses of much graduate education is: “if international students come to the U.S. they will be good enough in English (their second or third language) to do well, and if they are not, they will ‘pick up English’ after their arrival”
- Not the case at all.
LANGUAGE ISSUES AND GRADUATE EDUCATION

- New communities of practice mean:
- New genres of language use.
- However:
- Graduate programs are L2 acquisition poor environments.
- L2 comprehension, even over time, cannot be assumed.
- Language may determine the success and speed of international students’ acculturation to graduate school and professional communities of practice.
- For applied linguists, language and identity are inextricable.

LANGUAGE AND ETHICS EDUCATION MODULES

- If we wish international students who have English as their second or third language to learn from our educational interventions,
- And if our interventions use traditional means of concept development (such as reading),
- We must ensure students can access the content fairly fluently (reasonably quickly and accurately).
- We must adjust and monitor lexical density, lexical range, the range of grammatical structures, and the relevance of images in the text (details to come).
L2 Processing Constraint Remedies

- Writing to U.S. 9th - 10th grade level
- Shorter sentences
- Narrowed vocabulary range
- Embedded definitions for anticipated unknown or infrequent terms (Academic Word List)
  http://www.nottingham.ac.uk/~alzsh3/acvocab/
- Effective use of illustrations
- Usability Studies

Theme FORU

- Formative and summative assessment approaches incorporated into the online course design:
  - Course pre-test
  - Tutorials
  - Module assessment quizzes
  - Course post-test
  - Learning strategies module
  - Remedial content, language helps, enhanced content

- Tailored design approaches implemented for this research study:
  - Module authoring process
  - Pilot study
  - Time completion study
  - Cognitive task analysis
  - Think-aloud protocol
  - Year one data analysis & review
CONTENT ASSESSMENT QUIZZES

Ethics in Engineering

<table>
<thead>
<tr>
<th>No.</th>
<th>Module Description</th>
<th>Complete?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Effective Learning Strategies. This module presents tools to help engineering students develop and stimulate interest in learning skills.</td>
<td>✔</td>
</tr>
<tr>
<td>2</td>
<td>Colors of Ethics. Engineering codes of ethics emphasize values and obligations of the profession and provide a framework for ethical decision making.</td>
<td>✔</td>
</tr>
<tr>
<td>3</td>
<td>Promoting Human Life and Welfare. Preventing harmful and hostile is the most important - personal professional duty for engineers.</td>
<td>✔</td>
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FORMATIVE ASSESSMENT: WITHIN MODULES

Part A: Practice Questions:
1. All the following are true statements. A. They are not true. B. They are true.
2. Situation as follows: A company needs to use a certain software for its operations. The software is owned by another company. The company is not authorized to use the software. C. The company is allowed to use the software. D. Not applicable.
3. Permission required to use the software in a different location. A. It is not required. B. It is required.
4. What is the proper action in the following scenario? A. All unauthorized use is considered theft and should be reported to the police. B. Unauthorized use is considered unethical and should be reported to the appropriate authorities.
5. The following software is copyrighted and can be used without permission for certain types of educational, research, and journalistic purposes. A. Yes, because it is not copyrighted. B. No, because it is copyrighted.

Formative assessment may be used without permission for certain types of educational, research, and journalistic purposes.
COGNITIVE TASK ANALYSIS

THINK ALOUD PROTOCOL

Eight (8) international graduate students were selected to participate in the TAP study, representing the following countries: China (3), Japan (1), India (2), and Taiwan (2). After reviewing the session transcripts and the associated synopses, several common themes surfaced in our formative TAP study:

- Discord existed between student vocabulary and module word choices (lexical range);
- Modules showed excessively high lexical density;
- Passive voice was used too frequently;
- Complex tense transitions created confusion;
- The content contained unclear idea transitions; and
- The web interface exhibited isolated navigation issues.
YEAR ONE STUDENT DEMOGRAPHICS

OVERALL ASSESSMENT: “THIS COURSE WAS A VALUABLE LEARNING EXPERIENCE”
2009 PRELIMINARY PRE/POSTTEST RESULTS

COURSE WEBSITE

http://aln.coe.ttu.edu/ethics/