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Ethics in the Pedagogy of Information Systems

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Keywords: accreditation, assessment, ethics, pedagogy

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EDSIG activities include the publication of ISEDJ, the organization and execution of the annual ISECON conference held each fall, the publication of the Journal of Information Systems Education (JISE), and the designation and honoring of an IS Educator of the Year. • The Foundation for Information Technology Education has been the key sponsor of ISECON over the years. • The Association for Information Technology Professionals (AITP) provides the corporate umbrella under which EDSIG operates.

Ethics in the Pedagogy of Information Systems

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ABSTRACT

This paper discusses how one academic department at a state-owned university has successfully embedded ethics into its undergraduate Information Systems program. The Computer Science Department at Slippery Rock University of Pennsylvania has made a concerted effort to emphasize ethics in all of its course offerings, especially in its Bachelor of Science in Information Systems program. Each Information Systems major chooses an Allied Area of Interest in which to apply his or her IS expertise. As most of the Allied Areas are in the School of Business (Accounting, Economics, Finance, Management, Marketing, etc.), these majors also may elect to take Business Ethics, which is taught by Philosophy Department faculty. Eight Information Systems courses required for the major have ethics components embedded in their curricula. Graduates of SRU's Information Systems program have an appreciation of the importance of ethics in the workplace because they have had this importance reinforced throughout their curricula. Furthermore, all courses contain assessable outcomes related to university-wide outcomes for student learning. As of September 2005, ABET has accredited all of Slippery Rock University's undergraduate Information Systems programs.

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1. INTRODUCTION

The Computer Science Department at Slippery Rock University of Pennsylvania has made a concerted effort to emphasize ethics in all of its course offerings, especially in its Bachelor of Science in Information Systems program. Each Information Systems major chooses an Allied Area of Interest in which to apply his or her IS expertise; as most of the Allied Areas are in the School of Business (Accounting, Economics, Finance, Management, Marketing, etc.) Information Systems majors also may elect to take Business Ethics, which is taught by Philosophy Department faculty.

No less than eight of the Information Systems courses, or twenty-four credit hours, which are required for the Information Systems major have ethics components embedded in their curricula so that students learn about ethics from the beginning of their study in the discipline and have their learning reinforced throughout all their years of study. Graduates of SRU's Information Systems program have an appreciation of the importance of ethics in the workplace because they have had this importance reinforced in their curriculum.

2. IS COURSE-EMBEDDED ETHICS

Information Systems courses with embedded ethics units include these eight required courses: Introduction to Programming and Information Systems, Introduction to Programming Principles, Advanced Programming Principles, Productivity Software, Challenges of Computer Technology, Systems Analysis, Computer Networks, and Software Project Management.

The criteria for teaching ethics in each of these courses had to be assessable; therefore, student surveys were created to gauge student perception of their confidence in the area of ethics and professional responsibilities. Students were surveyed each semester from February 2002 through March 2004 so that observations could provide a remedy to improve student performance via a continuous feedback loop. Once a remedy for a problem appeared, the department imple-

mented the remedy and then administered a follow-up survey. Students were surveyed after they had completed significant ethical components in their studies; additionally, those IS students who completed internships as an elective were surveyed. The latest student survey results indicate that 58% of freshmen, 48% of sophomores, and 45% of seniors were 'very confident' with their knowledge of ethics and professional responsibilities. (Computer Science Department, Questionnaire for Review of the Information Systems Program submitted by Slippery Rock University June 24, 2004 to the Computing Accreditation Commission of ABET, pp. 151-152).

Introduction to Programming and Information Systems	3 hours
Introduction to Programming Principles	4 hours
Advanced Programming Principles	1 hour
Productivity Software	7 hours
Systems Analysis	3 hours
Computer Networks	3 hours
Software Project Management	3 hours
Total Class Time	24 hours

In the Introduction to Programming and Information Systems course, three class hours are devoted to ethics and social issues, including an introduction to privacy and the web, as well as information technology professions.

Introduction to Programming Principles includes four class hours of a "computing in society" unit, which is comprised of the history of computing and professionalism and ethics, specifically a study of the ACM Code of Ethics and the importance of documenting references to respect intellectual property.

Advanced Programming Principles reviews these principles in a one-hour class session that focuses on collaboration, trustworthi-

ness, copyright & plagiarism, as well as professional codes of ethics.

Productivity Software addresses the global, social, and ethical implications of the role of information systems in organizations for a total of seven class hours of study.

Systems Analysis topics include legal and ethical feasibility, codes of ethics, federal and state legislation, requirements planning, project and change management, and systems support for a total of three class hours.

Computer Networks has a three-hour course segment that covers selected security and privacy issues as they relate to email and web security.

Software Project Management ethical topics include: software ownership and liability; trade-offs between cost vs. safety, cost vs. functionality, etc.; privacy and security; responsibility of a team member for the overall product and the way it is used. As with the previous advanced courses, total class time devoted is three hours.

Finally, Challenges of Computer Technology contains a full nine class hours of emphasis on ethics. It is an upper-level liberal studies course that was specifically designed for majors and non-majors to place a special emphasis on the study of ethics, in addition to social and legal issues. (Computer Science Department, Questionnaire . . ., pp. 37-94).

Challenges in Computer Technology is one of the 'goal' courses in the Challenges of the Modern Age block of Slippery Rock University's Liberal Studies curriculum. The course is taught every semester and is offered in both intensive-writing and non-intensive writing sections. In the past five years enrollment in the course has doubled.

The stated goals for this course include three of the major university outcomes for student learning and development:

1) Communications

2) Critical Thinking and Problem Solving

3) Values and Ethics

The university outcome of Values and Ethics states that students should be able to:

"Demonstrate an understanding of how the values of personal integrity, cooperative action, and respect for diversity influence one's

own behavior and the individual and group behavior of others." (Slippery Rock University Liberal Studies Guide, available at http://www.sru.edu/pages/2580.asp).

The Liberal Studies critical goal designated as Challenges of the Modern Age states:

"We live in a rapidly changing world that demands making difficult decisions. The student will demonstrate the ability to weigh alternatives and make thoughtful choices. Primarily: Critical Thinking and Problem Solving and Ethics outcomes." (SRU Liberal Studies Guide).

Please note that the following details (taken from Questionnaire For Review Of The Information Systems Program submitted in June 2004 by the Computer Science Department at Slippery Rock University to the Computing Accreditation Commission) is in accordance with ABET requirements.

According to the Computing Accreditation Commission of ABET, an accredited program's "curriculum combines professional requirements with general education requirements and electives to prepare students for a professional career in the information systems field, for further study in information systems, and for functioning in modern society. The professional requirements include coverage of basic and advanced topics in information systems as well as an emphasis on an IS environment. Curricula are consistent with widely recognized models and standards…." (Computer Science Department, Questionnaire for Review of the Information Systems Program submitted by Slippery Rock University June 24, 2004 to the Computing Accreditation Commission of ABET, p. 22).

For those not familiar with CAC and ABET, according to ABET's standards:

"There must be sufficient coverage of global, social and ethical implications of computing to give students an understanding of a broad range of issues in this area….Global, social and ethical implications of computing must be covered in the program. This information should be included in course descriptions….." (Computer Science Department, Questionnaire, p. 34).

Because the Challenges of Computer Technology course contains the greatest concen-

tration of ethical content coverage, one must discern the depth and the breadth this course by reading the approved curriculum document that details its course outline. This course offers so many possibilities for incorporating specific student needs in the study of ethics into the pedagogy. A good exercise is having each student write an essay that details his or her own personal code of ethics. Another productive ethical exercise is the various case studies in the textbooks used in the course. One of the most useful techniques for teaching the importance of ethics in a student's chosen field of study is an assignment such as the one found in Appendix B.

On the next page is this course outline, which was created using the criteria for accreditation for undergraduate Information Systems programs applying for computer accreditation by ABET/CAC, in preparation for a Program Evaluator Team visit to Slippery Rock University of PA in late September 2004.
(http://www.abet.org/info_prgs_cac.html).

Please note that, as of September 2005, ABET has accredited all five undergraduate Information Systems programs at Slippery Rock University.

ABET/CAC Category Content

	CORE	ADV
Hardware and Software		
Data Management		
Networking and Telecommunications		
Analysis and Design		
Role of IS in Organizations	1	17

(Computer Science Department, Questionnaire, p. 61).

Cp Sc 300 Course Outline: Challenges of Computer Technology

Catalog Description: An in-depth study of the critical issues related to the computeri-

zation of society. Ethical, legal, and moral issues raised by the evolution of computer technology will be discussed. Prerequisite: Advanced standing. (3 credits)

Audience: Required for all Information Systems and Information Technology majors. Liberal Studies recognizes it as a Goal course in the Challenges of the Modern Age block.

Learning Activities:

Refer to Course Competency Plan for CpSc 300.

I. Ubiquitous computing (1 hour)

II. Legal & Privacy Issues (10 hours)

    a. Impact of Technology

    b. Government & 4th Amendment

    c. Consumer Information, including Health Care

    d. Encryption & Communications

III. Reliability & Safety (6 hours)

    a. Information Integrity

    b. Critical Systems & Human Life

IV. Freedom of Speech & Censorship (6 hours)

    a. Global WWW & International Legal boundaries

    b. Spam, anonymity and "technological trespass"

V. Intellectual Property (6 hours)

    a. Copyright, patent, trademark, and trade secret law

    b. Sharing of digital information

    c. Open Source and monopolies

VI. Security & Computer Crime (3 hours)

    a. Attacks and Trespass

    b. Scams, fraud, ID Theft, digital forgery

VII. Computers in the Workplace (3 hours)

    a. Data collection, data integrity, secondary use

    b. Employee monitoring, privacy issues and ethics.

VIII. Professional Ethics and Broader Issues (9 hours)

    a. Professional Codes (ACM/IEEE/other non-computer codes)

    b. Digital Divide

    c. Loss of skills & judgment

    d. Technology: good, bad, neutral?

(http://cs.sru.edu/300_Outline.htm)

Required Textbooks:

Baase, Sara. A Gift of Fire: Social, Legal, Ethical Issues for Computers and the Internet. 2nd edition. An Alan R. Apt Book. Upper Saddle River, NJ: Prentice-Hall/Pearson, 2003. 382pp. ISBN: 0-13-008215-5

DePalma, Paul, ed. Computers in Society 05/06. 12th edition. Annual Editions Series. Guilford, CT: McGraw-Hill/Dushkin, 2005. 223pp. ISBN: 0-07-284717-4

Oral and Written Communications

Every student is required to submit at least _1_ written reports (not including exams, tests, quizzes, or commented programs) of typically _5-15_ pages and to make _0_ oral presentations of typically 0 minutes.

While writing assignments are required of all students, each student in a course section designated "Writing Intensive" is required to write a major research paper that relates both to his/her major and to one of the critical issues related to a challenge of computer technology.

Global, Social and Ethical Issues

Please list the topics that address the global, social and ethical implications of computing covered in all course sections. Estimate the class time spent on each topic. In what ways are the students in this course graded on their understanding of these topics (e.g., test questions, essays, oral presentations, and so forth)?

The entire course is comprised of global, social, legal, and ethical issues. Students are graded on essays, exams, research papers, oral presentations, written reports, and class participation. (Computer Science Department, Questionnaire, pp. 60-61).

COMPETENCY PLAN FOR STUDENTS IN COMPUTER SCIENCE/INFORMATION SYSTEMS COURSE: CpSc 300 Challenges of Computer Technology

Communication, Ethics, and Critical Thinking

COMPETENCY DESCRIPTION	STRATEGY	ASSESSMENT METHODS
The student will be able to: 1. list the problems associated with the uses of computer technology in our global society and identify possible solutions to these problems 2. identify the factors affecting security in information systems and the techniques involved in disaster planning and recovery 3. identify the legal issues surrounding privacy of electronic data, and involving electronic information and software management 4. identify and discuss issues of intellectual property rights, copyright protection and modern technology 5. Identify the main components of the ACM Code of Ethics.	Together, the students and the professor will: 1. examine the problems associated with advances in computer technology and discuss, in detail, possible solutions to these problems 2. use critical thinking skills to debate their various points of view regarding each issue covered in the course 3. investigate the facts and opinions in the assigned essays and articles about the moral, legal, and ethical uses of computers and information technology 4. listen to guest speakers discuss their points of view related to the computerization of society 5. conduct independent research in a related area 6. keep up with current print and electronic literature on the subject	The student will: 1. answer questions regarding the professional, moral, legal, and ethical uses of computers and information technology; these questions may be textbook-based, standardized, or professor-developed 2. prepare succinct written analyses of critical issues related to the challenges of computer technology 3. participate in class debates and discussions concerning each of the "challenges" addressed 4. complete exams that assess understanding of the problems concerning advances in computer technology as they relate to individual, national, and global importance

(Computer Science Department, Questionnaire, p. 62; also available at http://cs.sru.edu/300_Outcome.htm).

3. REFERENCES

ABET Accreditation, http://www.abet.org.

Association for Computing Machinery, Association for Information Systems (AIS), and Association of Information Technology Professionals (AITP) (2002) IS 2002 Model Curriculum and Guidelines for Undergraduate Degree Programs in Information Systems.

Baase, Sara (2003) A Gift of Fire: Social, Legal, Ethical Issues for Computers and the Internet, 2nd ed. Boston: Prentice-Hall/Pearson.

Challenges of Computer Technology Outcomes, http://cs.sru.edu/300_Outcome.htm.

Challenges of Computer Technology Outline, http://cs.sru.edu/300_Outline.htm.

Computer Science Department, http://cs.sru.edu.

Computer Science Department of Slippery Rock University (2004) Questionnaire for Review of the Information Systems Program submitted by Slippery Rock University 24.6.04, to the Computing Accreditation Commission of ABET.

CSAB, Inc., http://www.csab.org.

DePalma, Paul, ed. (2004) Computers in Society 05/06, 12th ed. New York: McGraw-Hill/Dushkin.

Johnson, Deborah G. (2000) Computer Ethics, 3rd edition, New York: Prentice-Hall.

Kizior, Ronald J. and R. F. Zant (2004) "IS/CS Accreditation: The Ethics Component." The Proceedings of ISECON 2004: the 21ST Annual Conference on Information Systems Education, ed. Don Colton, William J. Tastle, Mark Hensel, and Amjad A. Abdullat, AITP Foundation for Information Technology Education.

Quinn, Michael J. (2005) Ethics for the Information Age, New York: Addison-Wesley.

Slippery Rock University Liberal Studies Guide, http://www.sru.edu/pages/2580.asp.

Snyder, Larry (2004) Fluency with Information Technology: Skills Concepts, & Capabilities, Boston: Pearson Education.

APPENDIX A

SAMPLE SYLLABUS

CpSc 300: Challenges of Computer Technology

Professor Patricia A. Joseph

Course Description: This is an in-depth study of the critical issues related to the computerization of society. Ethical, legal, and moral issues raised by the evolution of computer technology will be discussed. (3 credits)

Goal course for Challenges of the Modern Age. Section 1 is Intensive Writing!

Prerequisite: Advanced Standing.

Required Reading:

Baase, Sara. A Gift of Fire: Social, Legal, Ethical Issues for Computers and the Internet. 2nd edition. An Alan R. Apt Book. Upper Saddle River, NJ: Prentice-Hall/Pearson, 2003. 382pp. ISBN: 0-13-008215-5. See also http://www-rohan.sdsu.edu/faculty/giftfire

DePalma, Paul, ed. Computers in Society 05/06. 12th edition. Annual Editions Series. Guilford, CT: McGraw-Hill/Dushkin, 2004. 223pp. ISBN: 0-07-284717-4. See also http://www.dushkin.com/online/get-isbn.mhtml?isbn=0072968869

The New York Times. Free online subscription is available at www.nyt.com

Course materials designed for this semester are available to each registered student using his/her SRU login and password on Blackboard 6.1 at http://blackboard.sru.edu.

Attendance: Regular attendance is necessary to ensure optimal learning & earn a passing grade. Anyone expecting to earn an A or B grade should have perfect or near-perfect attendance. Class will not meet on school holidays.

Evaluation:

    5 UN-ANNOUNCED EXAMS (there is no final exam)............................ 50% OF GRADE

    RESEARCH PAPER (300-01) or TEAM REPORT (300-02)........................ 20% OF GRADE

    The New York Times ARTICLES Mid-Term ASSIGNMENT .... 10% OF GRADE

    The New York Times ARTICLES End-Term ASSIGNMENT....................... 10% OF GRADE

    INFORMED PARTICIPATION IN CLASS DISCUSSIONS............................ 5% OF GRADE

    ORAL PRESENTATION of RESEARCH PAPER or REPORT.......................... 5% OF GRADE

There is no final exam in this course. Students will make oral presentations during the day/time scheduled during Finals Week

Grading Scale, Assignment Evaluation, etc.: SEE separate General Policies and Procedures document. I do NOT accept late ASSIGNMENTS unless you have a medical excuse or a family emergency. Furthermore, I will NOT give MAKE-UP EXAMS. Un-announced exams are used to ensure your regular attendance and your reading of all assignments given.

Office Hours: 106 Maltby Center, M-W-F, 9:30 to 11:30 AM. Telephone me at 724.738.2138, or if on campus at x2138. E-mail me at patricia.joseph@sru.edu

(http://cs.sru.edu/joseph).

APPENDIX B

SAMPLE ASSIGNMENT

CpSc 300 Challenges of Computer Technology

Professor Patricia A. Joseph

Ethics Assignment

Name_____   Section _____ Points Earned _____

Skills Assessed: Communication, Ethics, and Critical Thinking

A Gift of Fire 2nd edition -- Chapter 10: Ethics

Identify the professional organization which represents workers in your major field of study. Find the website for the organization, and print out the code of ethics for professionals working in this field. Make sure that you label the web site address on the hard copy if it does not print automatically.

If your major is Computer Science, Information Systems, or Information Technology, you cannot use the ACM or IEEE-SE or the CS code of ethics. Instead, find a more specific professional organization, and print its web site's professional code of ethics.

Word-process a carefully written paragraph that summarizes the major points addressed by your professional organization's code of ethics.

Note: this paragraph should be a minimum of 5-6 sentences and a maximum of one page. Be sure to address any/all issues that relate to the use of computer technology in your chosen organization. Then word-process a second paragraph that explains your comments about this professional organization's ethical code.

ASSESSMENT CRITERIA FOR THIS ASSIGNMENT:

TWO WORD-PROCESSED PARAGRAPHS: 2 @ 25 points each   = 50 points

     Communication, Critical thinking

CODE OF ETHICS OUTPUT, correctly labeled: = 50 points

     Ethics

TOTAL: 100 points