



Online Ethics Center
FOR ENGINEERING AND SCIENCE

Creating a Community of Ethics Educators in Engineering

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Description

This activity is considered an NAE Exemplar in Engineering Ethics Education and was included in a 2016 [report](#) with other exemplary activities. The activity discusses a faculty training program from the Rock Ethics Institute that helps instructors integrate ethics into their engineering courses.

Body

Exemplary features

Approach to preparing engineering faculty to teach ethics that is integrated and relevant to engineering

Why it's exemplary

For more than a decade the Leonhard Center and Rock Ethics Institute have collaborated to design and implement activities aimed at incentivizing, preparing, and supporting engineering faculty to integrate ethics in their teaching. These activities are exemplary in three aspects:

1. Interdisciplinary—Led by a team of philosophers and engineers, the initiatives combine skills such as ethics spotting and ethical decision making with relevant factors of teaching, advising, and research in engineering.
2. User-oriented—Instead of presenting prepackaged teaching in a top-down approach, the initiatives are firmly grounded on the actual needs and challenges perceived by engineering faculty (e.g., big lecture courses vs. small project-based courses) and provide them with the skills to integrate ethics in their teaching.
3. Across the curriculum—The initiatives serve the specific and relevant needs of engineering instructors who teach a variety of courses, from first-year seminars to senior capstone design and graduate courses.

Program Description

Since 2002 the Leonhard Center for Enhancement of Engineering Education and the Rock Ethics Institute at Penn State University have worked together to engage and support engineering faculty members in integrating ethics in their teaching. Drawing on their respective strengths in engineering education and ethics education, the two institutes have launched a series of faculty development initiatives aimed at creating a community of ethics educators in engineering. Over more than a decade these initiatives have provided basic training in ethics skills and instructional design to more than 100 participants at and beyond the College of Engineering at Penn State, serving every discipline of engineering. Three particular initiatives symbolize the two institutes' commitment to engaging engineering faculty in ethics education: Learning and Teaching Ethics in Engineering, Creating an Ethical Classroom, and Enhancing Ethics Education of Graduate Students. From 2002 to 2010 the Leonhard Center and the Rock Institute offered eight summer workshops on "Learning and Teaching Ethics in Engineering," designed with three initial objectives:

1. preparing the participants (engineering faculty members) to teach ethics in engineering;
2. helping participants design ethics-related course activities specifically tied to the content in major courses with instructional design methods; and
3. promoting ethics education throughout the college.

The workshops were designed and facilitated by the directors of the two institutions as well as invited faculty members from the Philosophy Department and College of Engineering. The workshops presented in accessible language the basic concepts

and frameworks of ethics because many engineering faculty members expressed concern and anxiety about their lack of understanding of ethics. Leaders of the workshop also shared their teaching experiences and helped the faculty participants apply instructional design methods to create course assignments and discussions for integrating ethics. The 3-day workshops were supplemented with two follow-up meetings: one month after each workshop, the participants met to present the learning objectives, instructional strategies, and assessment methods each had chosen for their own courses and received feedback from peers and from workshop leaders; several times there was an additional meeting at the end of the spring semester the following academic year, where all the participants met again to present the implementation of the ethics teaching plan in their own courses and evaluate their experiences. Since 2013 the Leonhard Center has collaborated with Dr. Tricia Bertram Gallant, an internationally known expert on academic integrity, to offer workshops entitled “Creating the Ethical Classroom” for faculty at the College of Engineering. The workshops have three objectives:

1. to enhance participants’ self-efficacy in teaching academic integrity and professional ethics;
2. to help participants develop instructional strategies to integrate academic integrity and ethics in their courses; and
3. to support faculty in implementing the ethics-related teaching plan in classes.

Drawing on Dr. Bertram Gallant’s long experience in engaging issues involving academic integrity and helping students understand its importance, the workshops help the faculty participants understand the ways in which choices that they make in their assignments and assessments affect students’ behavior. The workshop also discusses the literature—and students’ perspectives—on academic integrity. The workshops provide strategies for instructors to introduce academic integrity not as arbitrary rules but as principles closely related to the development of professional engineers. For example, the participants receive suggestions on helping students understand the values underlying academic integrity and how many of the same values underlie engineering codes of ethics. In the month after the workshops, faculty participants develop their own plans to integrate academic integrity more effectively in their teaching and to create bridges to professional ethics. Before the fall semester starts, the Leonhard Center hosts meetings for faculty participants to share their plans and receive feedback from the Center director, peer workshop participants, and Dr. Bertram Gallant via video chat. At the end of the following

academic year, faculty participants meet again to report and evaluate their implementation of the teaching plan.

In fall 2014 the Leonhard Center and Rock Ethics Institute began a new initiative focused on ethics education for graduate students, jointly employing a postdoctoral scholar in engineering ethics to expand ethics education in the College of Engineering, beginning with an assessment of the challenges and needs of ethics education at the graduate level. In spring 2015 the postdoc interviewed graduate coordinators and faculty representatives from all but one graduate program in the College of Engineering. The interviews explored current approaches to ethics education in each graduate engineering program and examined the advantages and challenges of the approaches and needs of different programs. As Penn State University requires all of its graduate students to complete Scholarship and Research Integrity (SARI) training, the interviews also inquired into the status of this training in each program. Findings of the current approaches, challenges, and needs of graduate ethics education have been summarized and reported to the associate dean of the college. The Leonhard Center and the Rock Institute are scheduling a meeting with all the engineering graduate coordinators to present these findings and to propose collaborative projects to build resources (e.g., online learning modules) to assist graduate ethics education in engineering. An initial activity of the team was to create a 4-hour ethics workshop for graduate students involved in an NSF ERC on medical devices. In this workshop, the students were asked to create visual representations (“connections maps”) of the many connections of their particular research—e.g., developing a new biosensor—to other researchers, users, and patients that might one day use or be affected by their devices. Students also considered aspects of the production of medical devices and impacts on people and the environment. These diagrams were then used to explore different ethical issues involved in human-human and human-environment interactions.

Assessment information

Over the years of our work on ethics, our assessment has improved in sophistication. Early on, we used surveys of participants and asked about the effectiveness of the workshops and whether they were meeting the needs of the participating faculty. Survey results provided a basis for improving the workshop design. After offering the “Learning and Teaching Ethics” workshop for several years, we interviewed past participants to learn what they found most useful and what they were still using

from the workshops. Most were still using what they had learned in the workshops; the specific tools they were using depended on the way they had decided to integrate ethics in their courses. For example, some participants had their students study the introduction to ethical frameworks from the workshop and use the frameworks to analyze codes of ethics. Others used models for ethical analysis of cases that were presented and used in the workshop.

Our assessment of “Creating an Ethical Classroom” involves pre- and postworkshop surveys and interviews of the participants as well as surveys and short-answer assessments of their students. Data from these assessments show that the workshops are seen as very valuable by the participants, changing their perspectives on academic integrity from compliance to a perspective of trying to inspire students to act with integrity. Conversations with faculty about the workshops indicate that beginning with academic integrity and bridging to professional ethics is an intellectually comfortable way for them to engage ethics. Postworkshop interviews showed that participants felt more confident discussing academic integrity topics with students after the workshop; participants also reported instructional changes to integrate academic integrity in a variety of ways—syllabi, class discussion, course assignments, and exams.

To assess the outcomes of the faculty development on students’ ethical learning, pre- and postsurveys were conducted in faculty participants’ classes. Published research outcomes show that students developed deepened understanding of academic integrity and its importance for engineering professional development. Students also acknowledged the effectiveness of class discussion of academic integrity and clearly perceived the instructional changes compared with other courses.

Since 2013 the assessment for the “Creating the Ethical Classroom” workshop has evolved. For the summer 2015 workshop faculty participants are interviewed three times: before the workshop, immediately afterward, and one after the faculty members have implemented the ethics teaching in their courses. Feedback generated from the more comprehensive assessment will be used to continuously improve the faculty development initiative. The new initiative for expanding ethics education at the graduate level is still at an early stage, but the interview data for the current ethics education, strengths, and limitations in the engineering graduate programs will serve as a “benchmark” for comparison once new ethics programs are implemented.

Related Publications - Penn State Ethics Education Team

1. Tang, X., Miller, S. C., Litzinger, T. A. 2016. "From Nanosystems to Ethical Eco-Systems: Designing a Workshop for Graduate Researchers on Self-Powered Wearable Health Devices." Proceedings of IEEE International Symposium on Ethics in Engineering, Science, and Technology.
2. Liu, S., Zappe, S., Mena, I., Litzinger, T., Bertram Gallant, T. 2015. "Faculty Perspectives about Incorporating Academic Integrity into Engineering Courses." Proceedings of 2015 ASEE Annual Conference. <https://peer.asee.org/faculty-perspectives-about-incorporating-academic-integrity-into-engineering-courses>
3. Hochstedt, K, Zappe, S., Litzinger, T., Bertram Gallant, T., Melton, R. 2015. "The Impact of a Faculty Development Workshop on Students' Understanding of Academic Integrity." Proceedings of ASEE Annual Conference. <https://peer.asee.org/the-impact-of-faculty-development-workshop-on-students-understanding-of-academic-integrity>
4. Chinn, G., Raman, V., Walton, S., Litzinger, T. 2010. "Using Technology-mediated Collaboration in the Teaching of Ethics and Globalization." Proceedings of ASEE Annual Conference. <https://peer.asee.org/using-technology-mediated-collaboration-in-the-teaching-of-ethics-globalization>
5. Tuana, N., Christman, J., Wise, J., Lau, A., Litzinger, T. 2003. "Learning and Teaching Ethics in Engineering: Preparing Engineering Faculty to Teach Ethics." Proceedings of 2003 ASEE Annual Conference. <https://peer.asee.org/learning-and-teaching-ethics-in-engineering-preparing-engineering-faculty-to-teach-ethics>

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Resource Type

Educational Activity Description

Parent Collection

NAE Exemplars in Engineering Ethics Education

Discipline(s)

Engineering

Teaching Ethics in STEM