

GIFTS: Big E Little e, What begins with Ee? – Ethics

We develop our students' ability to navigate professional ethics in our Introductory Engineering course. In seven sessions, we examine ethical decision making both at the big E – societal impact of the profession – level and the little e – individual professional responsibility – level. Instead of the typical ethics gone wrong at the corporate level, often captured in classic case studies (i.e., Challenger Disaster, VW emissions scandal), we encourage students to both consider the grand implications of their responsibility as engineers alongside issues of personal integrity as an engineering student. Too often, students react to the case studies with critical judgment but feel detached from such a situation. We intentionally developed activities that challenge students' thoughts and beliefs, so they connect their actions as students to their lives as working professionals.

We first examine ethics on a global scale by considering engineers' roles in promoting global health and wellbeing through sustainability. Students learn about green design and manufacturing strategies through assigned readings, a video on cradle-to-cradle design, and gameplay. Students play the *In the Loop*® board game, which teaches players about the finite resources necessary for devices such as LCD screens, MRI machines, and wind turbines [1]. Throughout the game, players develop strategies to manage limited resources using circular economies. A reflective exercise complements this gameplay, where students consider how the Great Achievements of the 20th Century [2] contributed to the Grand Challenges of the 21st Century [3].

From this big-picture perspective, we pivot to everyday decisions. Using selected choose-your-own-adventure-style cases from the www.onlineethics.org collection, students consider how to navigate realistic entry-level-engineering slippery-slope case studies. Through lively debate, the students parse where along the gray space between ok and unethical each decision in the sequence falls.

On a more personal level, students consider engineering ethics through a creative fiction assignment. Throughout the activity, students explore ethical dilemmas that a student or entry-level engineer might encounter. They use the National Professional Society of Engineers (NSPE) Code of Ethics as a lens to navigate the ethical decision-making process [4]. Students develop their own choose your own adventures, original video productions, or even raps. World premiere day allows all the students to reflect on the challenges presented by their peers.

Finally, the students consider how the NSPE code of ethics plays out in their lives as engineering students. We ask students to play the role of an academic integrity review board and make rulings on violations of the school's integrity pledge. The students then rewrite the nine professional obligations of the NSPE code with three to four specific rules of practice for engineering students under each of the obligations. We then compile the individual submissions into the official code of ethics for the department for the next academic year. Every student in the department feels a connection to this code as it evolves gradually year by year. We have observed students actively referring to posters with the code when considering how to handle a particular situation.

References

- [1] “In the Loop Games.” intheloopgame.com. <https://intheloopgame.com> (accessed June 24, 2019).
- [2] National Academy of Sciences. “Greatest Engineering Achievements of the 20th Century.” <http://www.greatachievements.org> (accessed June 24, 2019).
- [3] P. Anastas and J. Zimmerman. “12 Design Principles of Green Engineering.” ACS.org. <https://www.acs.org/content/acs/en/greenchemistry/principles/12-design-principles-of-green-engineering.html> (accessed June 24, 2019).