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Enhancements for the Online Ethics Center for Engineering and Science

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Frazier Benya is a Program Officer in the National Academy of Engineering's Center for Engineering Ethics and Society (CEES). She manages the projects run by CEES including the Online Ethics Center (OEC) for Engineering and Science website. Her work at the NAE has focused on ethics education for engineers and scientists; climate change, engineered systems, and society; energy ethics; and ethical and social issues with advancing military technologies. She received her Ph.D. in History of Science, Technology, and Medicine from the University of Minnesota in 2012 and her M.A. in Bioethics, also from the University of Minnesota, in 2011. Her Ph.D. thesis focused on the history of bioethics and scientific social responsibility during the 1960s and 1970s that led to the creation of the first federal bioethics commission in 1974. Her M.A. thesis analyzed different types of institutional methodologies for considering the social implications of science with a focus on those that integrate scientific research with ethics research in the United States and Canada.

Dr. Rachelle Hollander, National Academy of Engineering

Rachelle Hollander directs the Center for Engineering, Ethics, and Society (CEES) at the National Academy of Engineering (NAE), which manages the NAE Online Ethics Center (www.onlineethics.org), a widely used resource for engineering and research ethics education. She is principal investigator on a current National Science Foundation (NSF)-funded project. For many years Dr. Hollander directed science and engineering ethics activities at NSF where she was instrumental in the development of the fields of research ethics and professional responsibility, engineering ethics, and ethics and risk management. She has written articles on applied ethics in numerous fields, and on science policy and citizen participation. Dr. Hollander is a Fellow of the American Association for the Advancement of Science (AAAS) and received the Olmsted Award "for innovative contributions to the liberal arts within engineering education" from the ASEE Liberal Education Division in 2006. She received her doctorate in philosophy in 1979 from the University of Maryland, College Park.

Dr. Karin Ellison, Arizona State University

Karin Ellison's research and teaching spans the disciplines of research ethics, ethics education development, and the history of American science and technology. Working with colleagues at the National Academy of Engineering and ASU, she is leading enhancement of Life and Environmental Science ethics education materials for the Online Ethics Center as part of a National Science Foundation sponsored project to improve the site. In the School of Life Sciences, she teaches core graduate courses in Responsible Conduct of Research.

Ellison also fosters graduate education at ASU through her positions as interim program chair of the Masters in Applied Ethics and the Professions, Biomedical and Health Ethics, executive director for the Biology and Society graduate programs, and a founding member of the university's interdisciplinary doctoral degree program in Human and Social Dimensions of Science and Technology.

Ms. Kelly Laas, Illinois Institute of Technology

Kelly Laas is the Librarian/Information Researcher at the Center for the Study of Ethics in the Professions (CSEP) at the Illinois Institute of Technology. During her four years at the Center, she has supervised a number of projects relating to the development of online ethics resources and collections, including the management of CSEP's large Online Codes of Ethics collection and the development of the NanoEthics-Bank, a web-based bibliographic database of materials on the social and ethical implications of nanotechnology. She also has collaborated with the National Academy of Engineering's Center for Engineering, Ethics and Society in developing bibliographies and other materials for the Online Ethics Center, as well as developing the Ethics Education Library, an online database of articles, syllabi, ethics case studies, and best practices of how to integrate ethics into existing technical courses and workshops. Ms. Laas received her MLS in 2005 from the University of Illinois at Urbana-Champaign, and is a member of the College

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Dr. Simil L Raghavan, National Academy of Engineering

Simil Raghavan is a member of the program office of the National Academy of Engineering (NAE). Since 2007 she has worked with both the diversity and ethics programs at the NAE where she manages both the EngineerGirl website and the Online Ethics Center (OEC) for Engineering and Science. Simil received her PhD in biomedical engineering from Johns Hopkins University in 2008 where her PhD thesis focused on neural and vocal plasticity in primates.

Dr. Thomas M. Powers, University of Delaware

Thomas M. Powers is the founding director of the Center for Science, Ethics, and Public Policy (CSEPP) at the University of Delaware. He holds appointments as Associate Professor in the Department of Philosophy and in the School of Public Policy and Administration, and resident faculty at the Delaware Biotechnology Institute. His research concerns ethics in science and engineering, the philosophy of technology, and environmental ethics, and his publications range from topics in artificial intelligence and robotic ethics to the ethical aspects of design. Powers received aB.A. in philosophy (College of William and Mary) and a Ph.D. in philosophy (University of Texas at Austin) for a dissertation Immanuel Kant. He has been a DAAD-Fulbright dissertation-year fellow at the Ludwig-Maximilians-Universität, Munich, a National Science Foundation postdoctoral fellow in the School of Engineering andApplied Science at the University of Virginia, and a visiting researcher at the Laboratoire d'Informatique (LIP6) at the Université Pierre et Marie Curie in Paris, France.

Enhancements for the Online Ethics Center for Engineering and Science

Abstract

Early in 2016 the Online Ethics Center for Engineering and Science (OEC) website released a significant set of enhancements to its site. These enhancements make it easier to find and use resources for teaching ethics in engineering and science and to recognize those who are authoring and contributing resources. Enhanced search capabilities allow users to refine their search by topic area, discipline, and resource type. Individual resources connect to their related resources using a three-tab system (supporting resources, subject aids, and teaching aids) and a box on the right side that highlights other related resources. While browsing and searching, OEC users can also connect to the more expansive collection of published literature, educational resources, and codes of ethics at the Ethics Education Library (EEL). A new classification system for resources organizes the OEC for easy browsing and future expansion. The site is expanding its collection on issues of diversity, globalization, social responsibility, and social justice. In the next three years, the OEC will also implement and strengthen new social features supporting the resource collection and the community of people using and contributing to the site. A diverse, interdisciplinary project advisory group, an outreach group, and editorial boards guide these efforts. The poster details the new site features and identifies opportunities for ASEE members, and engineering faculty, students, and practitioners to contribute and use the OEC.

Project Background

This five year project will expand the National Academy of Engineering's Online Ethics Center (OEC onlineethics.org) to be the go-to online source for critical resources and support for ethics and ethics education in science and engineering. The original OEC provided ethics and ethics education resources for engineering and research, and this expansion will incorporate resources for all sciences. An important aspect of the project is to improve the infrastructure of the website so that it can support the expansion of resources and can better serve the key audiences for the site: faculty and instructors; undergrad and graduate students; post-docs; practicing scientists and engineers; and academic administrators.

The National Science Foundation funds the project, which is undertaken with cooperation of the National Academy of Sciences and the National Academy of Medicine. The Advisory Committee that oversees the project includes leaders in ethics, the sciences, and engineering, and members of all three bodies of the National Academies of Science, Engineering, and Medicine. The Ethics Education Library (EEL) of the Center for the Study of Ethics in the Professions at the Illinois Institute of Technology partners with the OEC to provide access to a wider array of materials than are housed in the OEC and also promotes interactions with other repositories of ethics-related information.

Six Content Editorial Boards and an Outreach and Engagement Working Group support the project. The editorial boards evaluate, identify and develop materials, as well as reach out to and meet the needs of their communities. The Content Editorial Boards are: Engineering; Life and Environmental Sciences; Computer, Mathematics, and Physical Sciences; Social and Behavioral Sciences; Research Ethics; and International Ethics. The Outreach and Engagement Working Group involves professional organizations and research communities in the activities of the site. Members of the Content Editorial Boards, the Outreach and Engagement Working Group, and the Advisory Committee are listed at: http://www.onlineethics.org/Community/CommunityDirectory.aspx

In the first year of the project, the team reviewed the existing resources on the site and developed plans for a website system for storing, organizing, and editing the resources. In the second year, the team built and revised the new user interface and website design for the site[1]. At the end of the second year, the new site interface and site enhancements were launched. In the next three years of the project, the Content Editorial Boards and Outreach Group will focus on identifying and developing materials to expand the collection, and on reaching out to meet the needs of their communities. The review process for new materials is also being refined and will be incorporated into the site to encourage a seamless submission, review, and posting process.

Categorizing Resources for Enhanced Browsing and Searching

To assist visitors in finding and using resources for teaching ethics in engineering and science, the OEC instituted a categorization system based on resource type, topic, and field area. This categorization system can be used to browse or to search for specific resources using the OEC's new facetted searching capabilities. This revised search allows users to refine search results by checking relevant categories.

Resource type categorization allows users who know what type of resources they are looking for to refine their search and narrow in on specific items quickly. Based on usability studies conducted in the first year of the project the team knows that the case study collection is very popular, and this new categorization system allows OEC users to quickly see all case studies on the site. This is true even when case studies are embedded within other resources such as teaching modules or published papers. Users can also quickly find other resources collected by the OEC such as educational activities/programs; assessment tools; instructor materials such as syllabi, lesson plans, or

pedagogical notes; bibliographies, and more (figure 1).

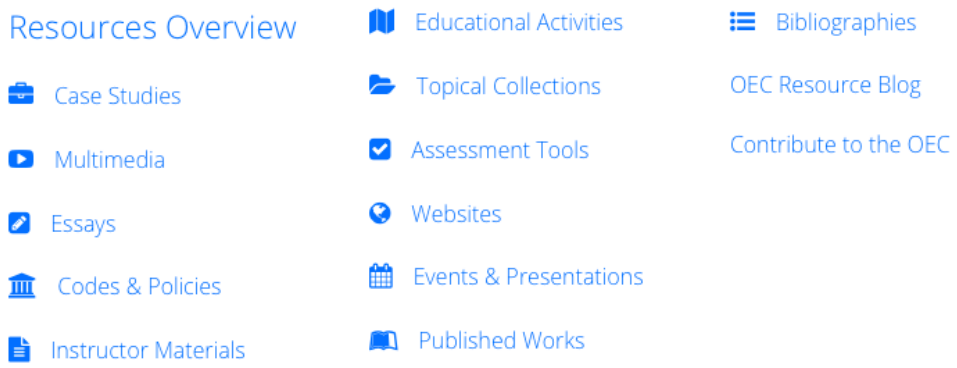

Figure 1: Resource types

In addition to categorization by resource types, topical categories provide a method for finding resources based on ethical themes and also by controversial issues in science and engineering. The ethical topics are grouped into two areas: Ethics and Society and Research and Practice. The first area is sometimes referred to as macro ethics. These are broad ethical and social issues in engineering and science that call for the collective social responsibility of the science and engineering professions and societal decisions about research, practice, and technology. The Research and Practice terms are sometimes referred to as micro ethics, which concern the interactions and individual actions of scientists and engineers in their research and practice, and cover responsible conduct of research[2]. The topics in Controversies are areas of science and engineering that involve ethical issues and concerns about their potential societal implications. These areas often do not fit into just one field or discipline in science and engineering.

The field areas reflect the six editorial boards that assist the OEC (figure 2). These are primarily based on science and engineering disciplines, but the addition of research ethics and international ethics allows special attention in those areas and encourages the disciplinary groups to focus more on macro ethical issues. These groups also work together to address topics across groups, especially in regard to international and research ethics issues.

Figure 2: Field areas

Connecting Resources

The new site provides an enhanced method for viewing longer cases, papers, and course descriptions. This system makes use of a table of contents that includes chapters for different parts of the resource ensuring that they are viewed together as they were intended. The table of contents feature, combined with a notice pointing users to the

parent resource (the primary page that houses a collection of that set of resources, figure 3), allows the OEC to fully display and connect resources that were created as a suite of materials or as a collection.

Figure 3

Additionally, there are some resources that are related because they discuss the same case, issue, or event in history, even when different authors developed the items or collections. In these instances, the OEC connects these related resources via a notice and link on the right side of the page so that users viewing one item will be aware of the other similar item on the site.

Partnership with the Ethics Education Library (EEL, http://ethics.iit.edu/eelibrary/) provides users with enhanced access to a collection of 15,000+ published articles, case studies and other teaching aids in the field of ethics (figure 4). The goal of this partnership is to provide access to materials from past NSF-funded ethics online resource centers, and to collect, organize and provide access to a wide array of peer-reviewed published and unpublished materials. The EEL uses the same categorization system as the OEC to enable nearly seamless searching between the two sites. Currently, a user can navigate to the EEL by clicking on a logo on the left side of the OEC home page. In the near future, we will be enabling automated searches of the contents of the EEL based on the content users of the OEC are viewing and launching an internal search box that will appear on a side menu of the OEC, and allow users to search the contents of the EEL without ever leaving the OEC site.

Figure 4: Ethics Education Library

Providing Background Resources

Two key audiences for the OEC are students and faculty who are not experienced in teaching ethics. To assist both of these audiences, the OEC is developing subject aids that provide background information on the ethics topics addressed in a resource and identifying teaching aids to provide approaches and tips for teaching the resources. The subject aid materials are based on the OEC topic terms for Ethics and Society, Research and Practice, and Controversies. For instance, if a case study is categorized as dealing with publication ethics and authorship, then an item identified as a subject aid for that topic area will appear in the Subject Aids tab below the text describing the original resource (figure 5). The teaching aids are keyed to the type of resource. For instance, on case studies the Teaching Aids tab provides resources on how to teach ethics case studies. As the project progresses, teaching aids may also be provided based on topical area, and a search strategy for displaying both kinds of aids appropriately may be refined. The site also contains a glossary which will be updated and expanded over the course of the

project, and its on-site display features will be improved.

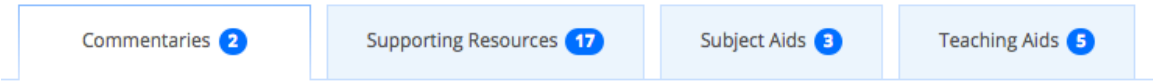

Figure 5: Resource tabs showing subject aids and teaching aids, supporting resources, and commentaries.

Recognition for Authors and Contributors

The materials available on the OEC would not be possible without the contributions of many skilled and dedicated individuals. However, science and engineering departments that emphasize technical research and practice often undervalue research and teaching in ethics. In an effort to improve the recognition and value received by those who contribute materials to ethics education in science and engineering, the new OEC prominently highlights the primary author or contributor for each resource (figure 6), and author profile pages list all the resources and commentaries a person has contributed to the site. The site also highlights organizations such as ethics centers and professional societies that contribute resources. For authors and contributors on the site, this feature provides one location where they can gather and cite important work and achievements in science and engineering ethics, and it enables users of the OEC to quickly and easily find additional resources authored by the same person or organization.

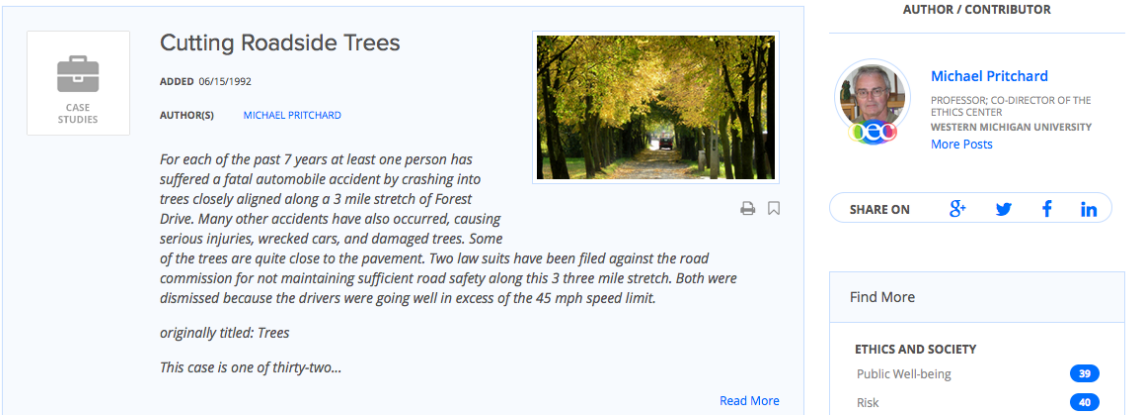

Figure 6: Resource page with author/contributor attribution.

Acknowledgments

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improve the international offerings on the site. Any opinions, findings, and conclusions or recommendations expressed in this article are those of the authors and do not necessarily reflect the views of the National Science Foundation or the sponsoring institutions.

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