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Amelia Ahern-Rindell, Alex Quackenbush, *University of Portland*

Applied Ethics Can Foster the Teacher-Scholar Model and Impact Undergraduate Research Campus-Wide

The field of practical ethics brings together the fundamental axioms of ethics and everyday decision-making. No one would argue the importance of a well-formed conscience capable of grappling with large ethical questions. However, it is equally and perhaps even more important to be able to make sound judgments about day-to-day matters. Formal ethical training for undergraduates often focuses on philosophical questions and hypothetical scenarios rather than on teaching individuals the skills they need during a typical day in their chosen career. This is problematic, since students will not necessarily be equipped to deal with practical ethical issues as they arise. Officials at the University of Portland (UP), a small, private comprehensive institution in northwest Oregon, recognized the disparity between their goal of developing morally minded students and yet not fully providing the training students need to practice ethical behavior while engaged in scholarly pursuits.

In response, UP partnered with a university regent and her husband, a 1963 UP alum, to create the Dundon-Berchtold Program for Moral Formation and Applied Ethics. An exploratory gift based on some thought-provoking conversations with the university's executive vice president and now president, the Reverend Mark Poorman, C.S.C., subsequently led the couple to provide additional funds to create a $4 million endowment for an institute. The program that is currently in place has a two-pronged approach: First, it fosters students' moral development utilizing a team-taught course with a reflective format, and second, it provides student-faculty teams with opportunities to conduct applied ethics-related research in the arts, business, education, engineering, health care, and the sciences. The endowment ensures that these two activities will continue to offer UP students the opportunity to participate in guided discussions on how personal value systems can influence one's character and to conduct scholarly work delving into the applied ethics relevant to their disciplinary specialization.

We believe this program offers a model for other institutions to learn from and emulate. To accomplish the two-pronged approach described above, this innovative program builds on the university's core requirement that all students take Ethics (Philosophy 220), which provides an introduction to the major themes in classical and contemporary moral philosophy. This sets the stage for an elective known as The Character Project (Theology 324/424), which President Poorman team teaches along with a couple of other faculty members and Dan McGinty, the newly appointed director of the Dundon-Berchtold Institute. The latter course is an introduction to the theological ethics of character and utilizes guided discussions about values, decisions, conscience, habits, virtues, and vices to explore personal identity and its development.

The institute's second focus, on scholarly work, is more relevant to the ethos of the Council on Undergraduate Research (CUR), which recognizes the synergy involved in the functioning of student-faculty research teams. By supporting the exploration of discipline-specific scholarship on ethical issues, the Dundon-Berchtold Program provides a venue in which faculty and students can advance their shared discipline in a meaningful way, gaining perspectives on issues of both scholarship and personal growth.

The Benefits of Undergraduate Research

Undergraduate research (UR) is considered one of the high-impact practices associated with deeper learning (Kuh 2008). Deeper learning is a developmental process wherein students learn skills of critical thinking that go beyond comprehension and conceptual understanding to more complex abilities such as application and integration. CUR defines UR as "an inquiry or investigation conducted by an undergraduate student that makes an original intellectual or creative contribution to the discipline" (CUR 2011). It is an experience that involves a faculty member working with a student or a group of students on an original experiment, project, or creative product. Assessments of undergraduate research describe the many benefits to students and illuminate how they learn about the scholarship of their discipline (Lopatto 2003; Lopatto 2004; Laursen et al. 2010). UR experiences provide academic challenge, an enriching educational experience, active and collaborative learning, and close student-faculty interactions.

The most direct impact of UR is on a student's intellectual growth and cognitive development, but research experiences can also result in personal development. They can enhance confidence and self-esteem, and encourage other attitudinal changes that help students mature professionally. In the case of the University of Portland's Dundon-Berchtold Institute, the subject matter being investigated can also lead to a maturation of students' decision-making processes. This poten-

tial outcome is currently undergoing assessment and will be determined by longitudinal studies. By exposing students to ethical issues within their disciplines in a nurturing environment, one can help educate students on how to make good decisions and judgments in the future as they prepare for what they will encounter in their careers after college. Overall, UR leads to increased student engagement and closer connections to faculty, to other student researchers, and to the institution itself. Viewed across a campus, a culture of UR can enhance the intellectual and moral climate and provide benefits to all institutional stakeholders. However, it can be challenging to provide opportunities to all or even a majority of interested students, but initiatives such as the Dundon-Berchtold Institute can help reach more students.

Moral Formation and Applied Ethics

Student and faculty Dundon-Berchtold Fellows receive stipends for a year of collaborative work pertaining to applied ethics. Each student fellow is paired with a faculty fellow. To get the ball rolling at the beginning of the fall semester, faculty fellows participate in a series of seminar-like discussions led by the faculty member holding the university's chair of endowed ethics and a couple members of the Department of Philosophy, to reacquaint the faculty with themes and frameworks for ethical decision-making. This ensures that both the faculty and student fellows are prepared to conduct timely and potentially controversial research that can be informed by the practical application of discipline-specific ethical standards. The individual pairs work together throughout the year and also meet with all the paired teams as a group a couple of times in the spring to share thoughts about their experiences and the progress of their respective projects. One of the goals is that the fellows' work will provoke meaningful reflection and discussion that leads to transformative change (see Table 1).

Table 1. Summary of Goals for the Dundon-Berchtold Institute in Applied Ethics

Goal	Student	Faculty
Consideration and discussion of ethical issues in more courses		X
Awareness of ethical dimensions within discipline of study	X	X
Develop ability to conduct responsible research	X	
Make a contribution to the advancement of knowledge	X	X
Enhance the scholarly agenda campus-wide in relation to ethical practices	X	X

Some of these changes occur within courses when faculty make references to the research they are conducting as part of the ethics initiative. Describing these research experiences to their students in the classroom helps to bring ethical issues into the curriculum and provides meaningful examples that reflect reality. This is, in part, how students learn to appreciate that a discipline frames ethical issues through its own lens. It allows students to begin to comprehend how the knowledge they are acquiring, which is specific to their discipline, is used to inform how practitioners make decisions by utilizing facts and evidence acquired from research and scholarly endeavors.

The work of each pair of fellows culminates in a final report disseminated to the entire group of participants, the fund's benefactors Amy Dundon-Berchtold and James Berchtold, and other supporters during a banquet on campus, and then is externally disseminated in oral/poster presentations, performances, or published manuscripts. The disseminated research findings add to the scholarly work of each discipline and contribute to the advancement of knowledge. However, regardless of where research is undertaken, by whom, and for what purpose, the mere act of conducting research requires an understanding of acceptable practices that ensure the scholarly process is performed in an ethical manner with integrity.

Formal Ethical Training

The Dundon-Berchtold program enrolled its first cohort of seven faculty-student teams in academic year 2012-13 and sponsored nine teams during academic years 2013-14 and 2014-15. During the academic year 2013-14 the authors of this article represented the biological sciences as Dundon-Berchtold Fellows. The title of our study and the subsequent presentation student researcher Quackenbush made was "Designing an Ethics Tutorial for Students Engaging in Undergraduate Biological Research" (Quackenbush and Ahern-Rindell 2014). Quackenbush received the Rita W. Peterson Award in Science Education for this work, and as a result of our study and the resulting recommendations, in the future all University of Portland students, faculty, and staff engaging in any form of research—regardless of discipline or intent—will receive formal training in conducting their scholarly activities in an ethical and responsible manner. Our study thus paved the way for a more concerted effort to ensure that all research conducted on campus will be ethically sound and compliant with federal regulations.

When UR is centered on ethical issues, it can push students beyond their comfort levels while at the same time teaching them technical skills associated with their discipline. In or-

der to be successful scholars and educated citizens, students must possess an understanding of what are acceptable and unacceptable research behaviors. Our Dundon-Berchtold project proposal grew out of observations made of the undergraduate research environment in our university's biology department.

We currently require biology students to complete a safety tutorial in order to protect them and others from the inherent dangers associated with conducting lab and field-oriented biological study. However, aside from serving as models for our students on how to ethically perform scientific research, we have no formalized training in place to ensure that our students act with integrity and follow the code of ethics outlined for scientists (Resnik 2011). However, such training is vital if we are to ensure that our students learn how to practice science ethically as they engage in biology-focused study not only here on campus but also in preparation for graduate education and/or post-baccalaureate employment. Quackenbush and I wanted to encourage activities beyond just expecting our students to gain the required attitudes and practices by observing their mentors and imitating their behavior.

In the past, and far too often today, faculty hope that their students will come to possess an understanding of what constitutes acceptable and unacceptable research behavior simply by chance, possibly through osmosis or some ethereal force. This is not practical and certainly does not meet the standards required of grantees by the National Institutes of Health or the National Science Foundation (NIH 2009; NSF 2009). These federal agencies require researchers receiving their support to obtain training in the responsible conduct of research from an institutionally certified source. Appropriate content and method of delivery are left to the discretion of the institution. This mandate, and the lack of formal training available for students at UP, motivated us to frame our inquiry-driven research. We sought to find out whether intentional training in ethical research behavior is necessary, or if students actually pick up and internalize the appropriate behaviors required to practice science with integrity using the existing model, which we fondly call the "non-intentional" model.

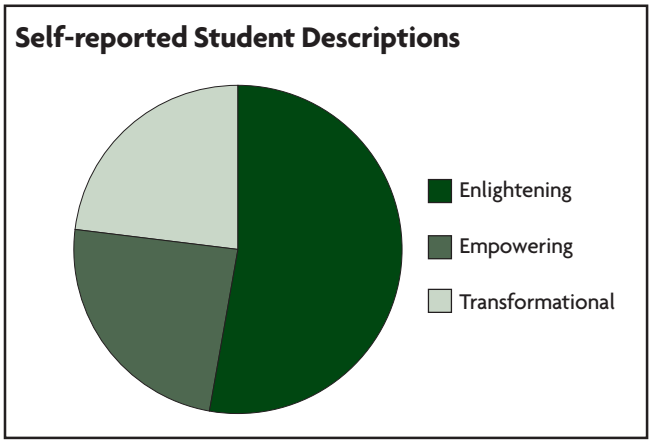
Ethical Research Behavior in Biology

Our approach utilized a qualitative survey we developed for our biology majors, and we invited students participating in UR in my Genetics Lab course and a couple of other research-focused biology classes to respond to our questions, which were approved by UP's institutional review board (IRB). The survey presented behavioral scenarios covering the topics of authorship and acknowledgements, collaboration, data management, experimental design, mentoring, peer review, plagiarism, and safety. Students were asked to read and then judge the acceptability of each scenario. If students knew all they should about ethical research practices, there would be

Table 2. Selected Behavioral Scenarios and Variance in Student Responses, by Topic

Topic	Behavioral Scenario	Number of Students Answering Incorrectly
Collaboration in a Research Team	A student is part of a research team including other students and a professor. This student works very hard on the project and obtains consistent and accurate results. When the other students on the team, who have not worked as hard, ask the student how his work is going, he makes an excuse for not sharing his results.	11/29
Data Analysis	A researcher is testing a hypothesis that she feels is highly likely, with the goal of submitting a manuscript for publication. She runs an experiment and collects precise data that seem to support the hypothesis. However, in order to make a statistically appropriate generalization, she would need a few more data points. Since she has no time to do more testing, she does not make any claims about her hypothesis in her paper.	10/29
Experimental Design	Suppose a field researcher is working in a community surveying people using various quantitative and qualitative questions. Some of the scheduled interviewees are close friends of the researcher. As a result, the researcher decides not to include them in the sample even though it makes the size sample too small to make any generalizations.	13/29
Authorship	A group of three students have been conducting research for over a year with their research mentor and are in the process of writing a manuscript to submit for publication. Their professor tells one of the students, Ellen, to be sure the order of their names on the paper reflects the amount of intellectual contribution made, in addition to the amount of laboratory work conducted by each student. Ellen decides that since they all contributed equally that she will just list their names in alphabetical order.	21/29

Figure 1. Student Descriptions Summarizing the Impact of Participation in the Dundon-Berchtold Applied Ethics Fellowship Program



little variance in responses. However, considerable variability was seen in the answers; there were no questions that were answered correctly by every student. We received twenty-nine completed surveys, a response rate of about one third. While this is a small number that limits our ability to make generalizations, the results provide useful information about questions of ethical conduct that are unclear for students. Areas of authorship, data management, and experimental design proved to be particularly troublesome (see Table 2).

Based on our results, we concluded that there are gaps in students' knowledge of ethical practices or uncertainty about the application of their knowledge of proper ethical research practices. These must be addressed for them to be truly successful in undergraduate research or in their future education or careers. The current model of learning by example is not sufficient. Thus, we recommended that the university adopt a web-based training program for responsible conduct of research. We are pleased that the university agreed with our suggestion and implemented a program to train students, faculty, and staff, as noted above. This online training became available to all university personnel in the spring 2015 semester. With UP's movement toward incorporating research directly into the design of content-driven courses, more students will become involved in research, thus underlining an increased need for formal ethical training. This may also encourage more students to participate in group and/or independent research. We recommend that institutions that have not already done so should adopt similar online training, especially if undergraduate research is expanding on their campuses.

Impact and Assessment

In addition to yielding the interesting results outlined above, our applied ethics research personally impacted us. The experience was powerful as it allowed us to participate in meaningful study of an ethical issue in our academic field. Dundon-Berchtold student fellows' responses to a survey after the conclusion of the research with their faculty mentor indicated that they appreciated this unusual opportunity for undergraduates and that this intensified their effort and investment in their own learning. Their responses implied that participation in the program had a significant impact on them; they used words such as enlightening, empowering, and transformational to describe the impact. (See Figure 1 for details.) These responses illustrate the effectiveness of the program in developing reflectively minded students who are more aware of applied ethics in their discipline.

As the faculty participant on the team studying biology ethics, I experienced benefits that aligned with, and reinforced, many of my professional goals as a teacher-scholar. As a geneticist/cell biologist with a longtime interest in bioethics, I have always been aware of ethical issues pertinent to my discipline. I include case studies in my courses to explore these issues and their potential implications with my students. I have also taught topic-specific seminar classes that have zeroed in on bioethical themes, including one on the ethical, legal, and societal implications of the Human Genome Project. I have researched the subject of how to incorporate ethics into the undergraduate biology curriculum since I believe ethics to be an essential component for science classes taught to majors and nonmajors (Ahern-Rindell 1999). My scholarship relevant to improving science teaching also encompasses utilizing UR as a pedagogical tool. I converted my Genetics Lab course into an authentic, hypothesis-driven research experience based on my own research program (Ahern-Rindell 2015), and I offer numerous students opportunities to join my research group so they can benefit from this type of experiential learning. My participation in the Dundon-Berchtold program was a natural fit based on my academic credentials, interests, and teaching history.

As a faculty member I have experienced more than 20 years of varied interactions with students. These have ranged from being their instructor in the classroom, research mentor in the laboratory, academic advisor for course/career decisions, supervisor for teaching assistants and tutors, advisor for honors or senior theses,

manuscript/presentation co-author, and chaperone during study-abroad activities or other university associated travel. Many of these close interactions with students resulted in bonding that has led to life-long friendships. I suspect that this will also be the case for this most recent experience with Alex Quackenbush as a team of Dundon-Berchtold Fellows. However, the bond that we, as collaborators and co-authors, have forged is somewhat different because of the sharing that occurs when discussing ethical issues, which generate more personal reactions. We developed a level of comfort and trust that was much less formal and more open than most student-faculty interactions. I believe we each revealed more about who we are as people than is customary in a faculty-student relationship. Although this made us more vulnerable as individuals, it also made the experience more rewarding because of the greater potential for personal growth and development.

A more comprehensive assessment plan for the initiative is in the planning stages and will specifically address how to accurately measure all the intended programmatic goals. The creation of the Dundon-Berchtold Institute for Moral Formation and Applied Ethics, and the appointment of its full-time director, will help to ensure that the necessary and important task of assessment is accomplished to help steer future strategic planning and implementation. An important aspect of the program that should be routinely analyzed is its overall quality. Different measures can be used to assess this. One measurable indicator of quality pertains to the extent to which the fellows' research findings are disseminated through the peer-review process. This can easily be quantified through conference presentations and journal publications. The authors, for example, made an oral presentation of their findings at the annual meeting of the Pacific Division of the American Association for the Advancement of Science (AAAS) in June 2014 in Riverside, California (Quackenbush and Ahern-Rindell 2014).

We anticipate that as the Dundon-Berchtold program continues to grow and touches more students and faculty, its benefits to participants and the UP community as a whole will increase and broaden. We hope this model program can serve as an example for other institutions and help encourage higher education in general to utilize the teacher-scholar model to effectively improve the intellectual and moral development of undergraduates.

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Amelia Ahern-Rindell
University of Portland, ahernrin@up.edu

Amelia Ahern-Rindell is an associate professor of biology at the University of Portland in Oregon. She has served as chair of the Department of Biology, as a member of the Academic Senate, chair of the university's institutional review board, and, currently, as a member of the Undergraduate Research Advisory Committee. She is involved in modernization and assessment of the biology curriculum, especially in the area of undergraduate research and scholarship. She has an active research program in which she collaborates with students and teaches courses in cell and molecular biology, genetics, evolution, and bioethics. A long-time member of CUR, she has participated in governance of the organization for more than 13 years. She received her MS and PhD in genetics and cell biology from Washington State University and was an NIH Postdoctoral Fellow at the Center for Molecular Genetics at the University of California, San Diego.

Alex Quackenbush recently graduated from the University of Portland with a bachelor of science in biology and mathematics. She participated in the university's honors program, was a Dundon-Berchtold Fellow in 2013-14, and a Murdock Undergraduate Research Program Scholar in 2014-15. She founded and was president of the Undergraduate Research Club at the university and served on the UP Undergraduate Research Advisory Committee as a student representative. She will enter a graduate program in molecular and cell biology at Oregon Health and Science University this fall.