



Ethics for Undergraduate Researchers

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The National Science Foundation (NSF) has been the primary funder of mathematics research experiences for undergraduates (REUs) in the nation since the 1960s. These REUs have allowed thousands of mathematics undergraduates to experience mathematical research years before they might encounter it during graduate school. In recent years, the NSF has also begun to push for an increased focus on the ethics of scientific inquiry. Since at least 2005 the NSF has funded ethics components in some mathematics REUs. Beginning in 2010 an ethics component became mandatory by law. Section 7009 of the America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science (COMPETES) Act (42 U.S.C. 1862o-1) requires that

each institution that applies for financial assistance from the Foundation for science and engineering research or education describe in its grant proposal a plan to provide appropriate training and oversight in the responsible and ethical conduct of research to undergraduate students...participating in the proposed research project [1].

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Wabash College has hosted an eight-week mathematics REU since 2005. From its inception, the Wabash REU has featured an ethics component, though the precise nature of this component has changed considerably. In the following we describe the format that we have found to be the most successful.

The secret is ice cream. In an attempt to more seamlessly integrate the ethics into the day-to-day running of the REU, we've developed a weekly Wednesday afternoon ethics session, known as *Ethics and Ice Cream*. Following the well-known student-behavior mantra "If you feed them, they will come," various ice cream novelties accompany each discussion, setting the scene for a comfortable but highly relevant minicourse on ethics. Each of the six ninety-minute ethics sessions is conducted as a group discussion involving the REU participants with two of the research mentors acting as guides.

The first two sessions feature a classic, and sometimes difficult, dose of Greek philosophy on the nature of *the good*. We begin with *The Meno* by Plato [2]. This text works well as an opener, and it has a lovely mathematical subtext to it. However, the main theme of the reading leads to a discussion on the nature of virtue, whether virtue can be taught, and what virtue (if any) is inherently common to us all. The goal here is to begin thinking of a foundation on which we may build a rationale for ethics.

The second session is, perhaps, the most challenging as we discuss the first book of Aristotle's *Nicomachean Ethics* [3]. Aristotle attempts to describe happiness and to determine the aim of ethics. This generates a good deal of spirited discussion among the participants (of all ages). While

we may not all agree on a definition of *the good*, we attempt to identify some common ground.

These first two texts seek to provide a space to frame what ethics are and why we discuss them. With this background, we move forward in time to the present day and narrow our focus to the mathematical community. In the third session, the participants read and discuss the codes of conduct/ethics for a variety of professional organizations such as the AMS, MAA, and ACM, as well as statements on *Ethics in Publishing* from Elsevier; see [4], [5], [6], [7]. This discussion begins with questions on the purpose of these statements as well as attempts to distinguish similarities and differences in the documents. Surprisingly, these professional codes tend to be short and general, and simply asking how detailed a professional code of ethics should be exposes the difficulty of rigorously prescribing ethical behavior.

The final three sessions feature a discussion of various case studies consisting of ethical situations mathematicians might find themselves in at various stages of their career. For the first two sessions, we consider case studies that we, the research mentors, have developed. Students are given two or three case studies, and the discussion focuses on some subset of these as time allows. In particular, students wrestle with the tension between what is advantageous and what is ethical; for example:

- Is it ever ok to renege on accepting a graduate school or other job offer?
- Can one objectively referee a publication if there are competing motivations?
- What if you discover errors in your own work even if no one else does?
- How should one deal with authorship on publications when contributions are vastly unequal?

Very rarely do we agree on a simple solution. Our case studies are available at [8] and may be freely used and/or modified.

A side benefit of these case studies is the relevance of the context which provides opportunities to collectively and comfortably talk about topics such as the process of applying to graduate school; surviving and thriving in graduate school; the peer review process, both from the author and reviewer point of view; collaboration and co-authorship; tenure and promotion in an academic career; and balancing competing responsibilities under pressure. Many of the participants in an REU will pursue a career in the mathematical sciences,

but few see clearly any details past finishing their undergraduate degree.

The final week of the ethics component features case studies again, but this time the students themselves create the situations. Students are asked to develop their own cases, which are combined into a single name-free document and distributed to all participants. The final ethics session then centers on the case studies they find most intriguing. These student-generated case studies prove to be a great way to end the ethics component, full of lively discussion, and by looking over all the case studies, we get a good look at the issues that are truly of concern to the participants. This knowledge can then be used to make the next summer's ethics component more engaging.

The participant response to this format has been quite positive. In the six years of conducting an ethics component within the REU, this method appears to be most meaningful to the participants. Below are two representative participant comments concerning the ethics component described above.

I really enjoyed the ethics component. I really liked that you brought up situations that could happen in my professional career that I had never thought about. It was nice to be able to talk about these potential situations as a group. I enjoyed hearing other peoples' opinions. Typically, I came into the room having my own thoughts on the situation, but then after listening to everyone else, I frequently left with an altered opinion about the situation.

I thought at first that the ethics component was going to be a big waste of time. I generally dislike talking about ethics and philosophy, but the group and the professors really had some thought-provoking questions and interesting discussion. I doubted there could be any ethics involved in mathematics, but clearly there were many aspects of an academic career that I hadn't considered.

An ethics component in a mathematics REU can be a difficult proposition. Mathematics, perhaps, has fewer inherent ethical issues than other sciences; however, there are certainly situations that can arise in mathematics that will put one's ethical code to the test. In addition, the very act of discussing what ethics are, why we have them, and how we make decisions in light of them is a healthy and invaluable practice for anyone in the mathematical sciences. The ethics component of

our REU is designed to explore these issues in an open format. Its purpose is not to provide answers but to provide space to examine questions of ethics that may someday arise. Besides, defending your ideas to your peers in a friendly environment over ice cream is a pretty good way to spend a hot summer afternoon.

References

- [1] <http://edocket.access.gpo.gov/2009/E9-19930.htm>, 2009.
[2] <http://classics.mit.edu/Plato/meno.html>.
[3] <http://classics.mit.edu/Aristotle/nicomachaen.html>.
[4] <http://www.ams.org/about-us/governance/policy-statements/sec-ethics>.
[5] <http://www.maa.org/aboutmaa/whistleblowerpolicy.html>.
[6] <http://www.acm.org/about/code-of-ethics>.
[7] http://www.elsevier.com/wps/find/intro.cws_home/ethical_guidelines.
[8] <http://persweb.wabash.edu/facstaff/westphac/ethics>.



Do Mathematicians Get the Author Rights They Want?

Kristine K. Fowler

“What do you want from your publisher?” is the way the IMU’s CEIC Copyright Recommendations frames the issues an article author could consider [1], [2]. “How important is it to you to retain the author rights listed?” was a survey question I recently put to a random sample of mathematicians [3]. Whatever the wording, the underlying idea is that authors can manage the rights in their papers at a more granular level than may be apparent when offered a standard journal publication agreement. This column identifies the rights mathematicians say they want when publishing an article, which

rights they often do not get, and how and why an author might keep the important ones.

“Copyright” may be grammatically singular, but it is helpful to think of it as the plural “author rights”. The author usually starts by owning all of them; when agreeing on publication terms, the separable rights in the copyright bundle may be divided in various ways between publisher and author. The author might, for example, give the publisher the exclusive right to publish the paper and distribute it in print. Author and publisher could somehow share the right to distribute it electronically, as might be specified in a clause allowing the author to post the paper on his/her website. The author might want to retain the right to use the content in his/her future articles or books (in legal terms, “preparing derivative works”). The CEIC recommends that the publisher authorize reprinting of the paper in collections [1], but this right might again be shared. There are myriad possible ways to apportion the various rights.

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