

Special Issue – Ethics in Mathematics: Foreword

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Special Issue – Ethics in Mathematics: Foreword

Cover Page Footnote

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Special Issue – *Ethics in Mathematics*

Foreword

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This special issue addresses ethical perspectives concerning the role of mathematics in 21st century life and its goal is to motivate conversations regarding the profession of mathematics, the practice of mathematics, and the culture of mathematics. Or simply put: how we do it, how we live it, and also, how we teach it.

Increased computing power, and the growth of modern areas of the mathematical sciences such as predictive analytics and data science, have resulted in considerable growth in the power differential between those who use mathematics and those who are subjected to the results of mathematical analysis. This is one reason to raise the need for an ethical framework and increased ethical discussions in mathematics. Recently, the use and misuse of data have erupted into global ethics conversations. These conversations often highlight scandals such as Cambridge Analytica and the targeted ad campaigns on social media,¹ the Russian hacking of U.S. election machinery and other politically motivated interferences,² and the hacking of private individual phone and online records. Additionally, books like *Weapons of Math Destruction: How Big Data Increases Inequality and Threatens Democracy* [3] cite algorithms that perpetuate inequality at large scales, including the criminal justice system, but in ways that are not subject to public scrutiny.

¹ For more information on this topic, see for example https://en.wikipedia.org/wiki/FacebookCambridge_Analytica_data_scandal, last accessed on July 21, 2022.

² For more information, see for example https://en.wikipedia.org/wiki/Russian_interference_in_the_2016_United_States_elections, last accessed on July 21, 2022.

Then, there are also groups like Data For Black Lives³ and the Institute for the Quantitative Study of Inclusion, Diversity, and Equity (QSIDE)⁴ advocating for change and activism through data.

But, this conversation cannot be and is not limited to those mathematicians who use data or design algorithms. As Cambridge philosopher Anna Alexandrova declared at a 2018 conference on ethics in mathematics,⁵ “No research, no matter how pure, is immune from social responsibility.”

While one’s research is often a defining identity in mathematics, we must also recognize that we are all also part of a mathematical community. This portion of our identity is unavoidable no matter how abstract a research topic is nor how solitary our chalkboard is. We also argue that one must go beyond the implications or applications, and focus on an “ethical consciousness” [1] in the practice of mathematics and in the culture of mathematics. In short, ethics is an important conversation and all too often mathematicians have been left out (either by choice, see Karaali [2], or by distinction or training). But, as members of the mathematics community, we have ethical obligations and it is time that mathematicians recognize the importance of taking this responsibility seriously and training the next generation of mathematicians to identify and resolve ethical issues in their professional lives.

We believe the eleven articles in this special issue on ethics in mathematics present both the breadth of the question of ethics in mathematics, as well as the elements in the mathematics curriculum to activate these conversations in the profession.

The first five papers address ethics and mathematical practices philosophically. Nickel starts the issue with reflections on the role of ethics in the philosophy of mathematics and its applications. They specifically examine the role of mathematics in 21st century society and modern philosophical positions regarding mathematics in light of a 1972 paper on ethics and mathematics by Kambartal. By way of contrast, Gordon focuses on a specific mathematical practice: the use of proof in mathematical discourse.

³ <https://d4bl.org/>, last accessed on July 21, 2022.

⁴ <https://qsideinstitute.org/>, last accessed on July 21, 2022.

⁵ “How to build an ethics: lessons for mathematics from other fields.” Talk at the First Ethics in Mathematics Conference, Cambridge, U.K. April 20–21, 2018. Recordings of talks from the conference are available at <https://ethics.maths.cam.ac.uk/EiM1/>, last accessed on July 21, 2022.

Gordon argues that proofs, whether in teaching or in research, should be accompanied by heuristics explaining how the author found the solution to their problem. Spindler explores the philosophical underpinnings, such as Platonic formalism, that inform mathematics practice — including mathematics teaching. They argue that the resulting approach leads to teaching mathematics in a way that is in fact harmful and calls for a re-evaluation of these assumptions.

Continuing with the philosophy of teaching ethically, Dematte filters the experience of the mathematics student through the lens of Levinas' understanding of violence. Specifically, they argue that education does violence, in the Levinas' sense, to the ethical relation between a student and mathematics, before offering interventions to address situations of violence. Aly focuses on developmental mathematics in United States undergraduate education. They assess that the reliance on “EdTech” (online commercial mathematics teaching programs) in current developmental mathematics courses irresponsibly reproduces the problems raised in a 1973 paper by Erlwanger.

From teaching ethically, the next three papers move us to teaching ethics in the mathematics classroom. Oldfield points out the disconnect between industry needs and the mathematics taught in both secondary and higher education in the United Kingdom, specifically addressing ethical reasoning. Alayont offers specific examples and instances in which ethics can be integrated into the undergraduate mathematics curriculum. Miller, on the other hand, dives deeper into a specific mathematics seminar where they taught ethics in mathematics.

The next two papers focus on the mathematics profession. Svitek examines graduate education in Europe, and questions whether an emphasis on research unethically excludes other professional development opportunities needed to prepare the graduate to fully contribute to the profession as a researcher, mentor, and teacher. Tractenberg, looking at the profession as a whole, offers the framework of professional stewardship as a vehicle to teach ethics. While the mathematical community does not have a single, comprehensive set of guidelines to teach from, stewardship as a concept includes ethical reasoning as a skill that can be taught, practiced, and transferred across multiple sets of guidelines.

The volume concludes with Alexander *et al.* looking beyond the confines of ethics to envision what a just mathematical community might look like.

They do this through a duoethnography, a methodology in which several researchers use discourse to explore the cultural factors that impact their lived experiences in a community. The authors use this methodology to examine how their identities shaped their participation in the mathematics community. Based on these lived experiences, the authors ask whether centering human rights and human experiences in mathematical practice would make an ethical framework unnecessary.

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