

A "Proof Story" Across the Grades: Building a Collaborative on the Teaching and Learning of Proof in K-16 Mathematics

On September 16-18, 2004, the Proof Project held a research conference, *A "Proof Story" Across the Grades: Building a Collaborative on the Teaching and Learning of Proof in K-16 Mathematics*, in Providence, Rhode Island (USA). The conference brought together an international group of researchers who are currently active in the study of proof at the elementary, secondary, and tertiary levels, and began a research collaborative that aims to coordinate individual and collective research programs in the teaching and learning of mathematical proof across grades K-16.

The collaborative provided a much needed forum to exchange ideas among researchers, analyze current understandings in this area, study connections among our work, and identify and pursue collective goals on a topic that is increasingly important in teaching mathematics at all levels, especially the tertiary level. Our purpose was to initiate conversations between K-12 education and higher mathematics concerning what counts as proof, the nature of student thinking about proof across the grades, how content can be exploited to increase the emphasis on proof, and instructional strategies that support the development of proof. We see this work as essential to articulating a K-16 "proof story" that delineates how to support students' understanding of proof across all levels of mathematics.

Several key ideas evolved from presentations and informal discussions. As participants searched for a shared meaning of "proof", "justification" and "argumentation", it became clear that these terms take on different meanings across cultures and grade levels and that it is important to clarify and acknowledge these differences and convergences. Diverse perspectives on the epistemology of proof suggest a need to understand the development of students' abilities to prove or justify or build mathematical arguments and to study the ways in which the development of each of these skills may support or constrain one another. Additionally, different media and representations - and students' access to these - also may support or limit the development of students' ability to read and construct proofs. How this plays out in classrooms needs further elaboration.

Overall, the collaborative underscored the need for the creation of a *community* of scholars with a focus on the topic of proof in K-16 mathematics education, a community that is interested in working together to turn differences in views into research problems and answers.

The conference was funded in part by the National Science Foundation and is the first of several such meetings to be held over the next 3 years. For more information on the research collaborative and for participation in future meetings, please visit www.theproofproject.org.