UNDERGRADUATE STUDENTS' BELIEFS AND MISCONCEPTIONS ABOUT PROOF

Katrina Piatek-Jiménez
University of Arizona

This study takes a qualitative look at the beliefs and misconceptions about mathematical proof held by students in a beginning proof-writing course. This poster presents results from task-based interviews of six undergraduate students in such a course. Implications for teaching will also be suggested.

Proving mathematical theorems is an essential part of being a mathematician, however, most mathematics students are not exposed to mathematical proof or abstract mathematics until their sophomore or junior year in college. This transition from computational mathematics to theoretical mathematics tends to be a difficult one (Dreyfus, 1999). In this study I explored the following questions: How do beginning proof-writing students view proofs and mathematics as a whole? How are beginning proof-writing students thinking while constructing proofs? What are some of the major stumbling blocks in students' learning to carry out mathematical proofs? How do sociomathematical norms (Yackel & Cobb, 1996) of the mathematics community affect students' learning of mathematical proof-writing?

The results can be broken into two categories.

Students' beliefs about mathematics and mathematical proof:

Input from peers caused many of the students in this study to fear taking this course in proof-writing. By the end of the semester, while some of the students had recognized a purpose and meaning for proofs, other students in my study still struggled to understand the role proof plays in the field of mathematics.

Students' approaches and misconceptions of mathematical proof:

Students had difficulties dealing with the notion of infinity. Notation was another great difficulty for many students, especially the idea of keeping certain notation arbitrary within proofs. The students in the study demonstrated difficulties with understanding the structure of mathematical statements and with deviating from the structure of direct proofs. One useful tool that many of the students used was symbolic logic. Those students who used symbolic logic were able to "unpack" many of the mathematical statements and deviate from the standard direct proofs.

References

Yackel, E.& Cobb, P. (1996). Sociomathematical Norms, Argumentation, and Autonomy in Mathematics. *Journal for Research in Mathematics Education*. 27, 458-477.

Dreyfus, T. (1999). Why Johnny Can't Prove. *Educational Studies in Mathematics*, 38, 85-109.