

Dear Evaluation Committee:

I am writing this letter to support Professor Sinn and Professor Briggs' project on "Mathematics Immersion and Proof Intensive Courses". I supported the project when they proposed it to the National Science Foundation several years ago. I think recent findings in the literature have made their work more urgent and their proposal more promising.

The most pressing problem for teaching mathematics majors is to develop their understanding of mathematical proof. Proof is central to mathematical practice and mathematics majors are expected to read and produce proofs in most of their junior and senior level classes. Yet anyone who has taught these courses or has read the mathematics education literature is aware of just how greatly mathematics majors struggle in this regard.

I recently authored the review chapter on proof in the NCTM's *Compendium for Research in Mathematics Education*. Based on my analysis of the literature, I believe that there are three reasons for why Professor Sinn and Professor Briggs' project needs to be carried out. First, while there is a large body of research outlining students' difficulties with proof, there are too few studies trying to ameliorate the situation. Indeed, because of the shortage of intervention studies designed to teach proof, there was a recent special issue in *Educational Studies in Mathematics* (one of the top two journals in mathematics education) reporting on intervention studies to spur work in this area.

Second, while I would support any sensible intervention study, Professor Sinn and Professor Briggs' approach is particularly promising. Most of the previous work on proof has either focused on students acquiring decontextualized proving skills (proof techniques or heuristics) that can be applied to proving situations or having students be convinced by the "right" kinds of evidence (by proofs, not example-based arguments). To oversimplify the literature, both have made contributions in K-12 mathematics, but neither seems to be of much use for teaching math majors, whose needs and difficulties are different than K-12 students. I believe that the most promising approach nowadays for teaching mathematics majors is to view proving as a cultural practice that intermeshes in complicated ways with other mathematical practices. The best way for students to come to learn the nuances of proof is to immerse them in actual practice with real mathematical content, something that is not done in traditional math programs. This is what the authors propose to do.

Third, there are two communities of scholars who both are trying to help mathematics majors learn to prove: mathematics educators in undergraduate mathematics education and mathematicians in the IBL community. Given the large overlap in these groups' goals, it is surprising that there is little interaction between these two communities. This is unfortunate! Mathematics educators have theoretical tools and methodological rigor that the IBL community lacks; the IBL has practice-based findings and pragmatic know-how that the mathematics educators lack. Professor Sinn and Professor Briggs' proposal capitalizes on the best findings from each community. If their work is successful, it can help build a bridge between these two communities.

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I hope I have made clear how important this work is and why I support it. If you have any questions, please do not hesitate to e-mail me (keith.weber@gse.rutgers.edu) or call me (848 932 0804).

Sincerely,

A handwritten signature in blue ink, appearing to read "Keith Weber". The signature is fluid and cursive, with the first name "Keith" and last name "Weber" clearly distinguishable.

Keith Weber
Professor in Mathematics Education
Rutgers University