

An Undergraduate Student's Experiences with Mathematical Proof's Values and Norms

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I use a poststructuralist stance to interrogate some of the discourses for mathematical proofs and their relationship to their author. Discourses are anything in our world that can be thought of and brought into existence through writing or creation which also influences the way that we think about or view social entities and/or relations or even what can be said, thought, or done in particular situations (Fendler, 2010; Walshaw, 2016). Scholars have adopted a poststructuralist perspective due to its ability to question the “normalities” in different social settings (Gutiérrez, 2013). While some mathematics education studies use poststructuralist theory (Dubbs & Herbel-Eisenmann, 2021; Johnson et al., 2022; Stinson, 2008, 2013), this perspective has not yet been widely used to explore questions related to the practices of mathematical proof. I view values and norms for mathematical proof as some of the discourses that inform the mathematics community about what is “normal” in mathematical proof.

Dawkins and Weber (2017) conceptualize some values for mathematical proofs, including the aim for mathematics that mathematical truth is purely objective and should not rely on the experiences of the author or their community. Norms upholding this value include omitting how an individual may have come to understand an object or concept in a particular way in a final proof or the norm that the author leaves out how they came to build their proof as the final argument should stand on its own without the experiences of the author. Researchers have worked to support students' *access* to these and other mathematical norms and values (Rupnow & Randazzo, 2023; Vroom et al., 2024; Vroom & Ellis, 2024); here, I aim to interrogate this value and associated norms. I address the research question: What are some ways that mathematics students respond to reading about norms that adhere to the value that mathematical proofs should be independent from the author and proofs which follow or breach these norms? During an unstructured interview, I presented an undergraduate student, Sherine, who completed an introduction to proofs course, with an excerpt from Dawkins and Weber's (2017) “Values and norms of proof for mathematicians and students” along with a theorem's textbook proof and a modified version of this proof which is meant to breach the norms mentioned above within an unstructured interview session setting. After I presented each material to Sherine, we discussed how she has experienced these values and norms.

From her reading of the excerpt, Sherine questioned the convention that an ideal mathematician should conceal that they are human. Sherine said, “We know that they are human, so why would we conceal that fact?” Despite this questioning, Sherine expressed her appreciation for the textbook proof which she said was “short and clear” compared to my personalized proof that, “makes sense and it's an explanation but that's not what a proof is.” Instead, Sherine felt that the personalized proof sounded as if someone were verbally sharing the proof with another person or in a lecture. Sherine's recognition of my personalized proof as something to be shared in a lecture could have implications for how proofs are presented to students. In my future research, I will continue to investigate how more students in a focus group setting respond to this excerpt and different versions of proofs.

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