"Here, students write math differently": An Exploration of Indian and USA Students' Non-proof Mathematics Writing

Omkar Devlekar
Texas State University

Garima Gogia
Texas State University

Keywords: Mathematical Writing, Calculus, International Comparison

As undergraduate instructors both in the USA and India, we observed that Algebra and Calculus students write mathematics differently across the contexts. We suspected that the differences related both to presentation and the student's purpose of mathematics writing. However, exploration into the literature suggested that RUME community has attended primarily to proof-based writing in mathematics (Guce, 2017; Nachowitz, 2019; Pugalee, 2010; Teledahl et al., 2024). This leaves open the question of how undergraduate students write in courses like Calculus where one needs to provide reasons, justifications and perform computations.

Students' written mathematical communication is a critical competence emphasized worldwide, serving as an essential part of mathematics. Defining and measuring quality in mathematical writing remains challenging (Guce, 2017; Kline & Ishii, 2008; Morgan, 2001; Pugalee, 2001; Teledahl et al, 2024). Students' mathematical writing in assessments revealed that there is a fundamental disconnect between teachers' expectations for evidence of conceptual reasoning and students' reliance on imitative or algorithmic solutions driven by perceived assessment demands (Boesen et al., 2010; Guce, 2017; Lithner, 2008; Miller et al., 2018; Morgan, 2006).

We employ Garofalo and Lester's (1985) framework to capture the metacognitive complexity by identifying the orientation, organization, execution, and verification behavior in students' written descriptions of their answer-writing and problem-solving process. We further analyze its relationship with the familiarity of the task (Boesen et al., 2010). In this study, we explore: *What forms of metacognitive behavior do students engage in while writing mathematics in an exam setting? What impact does familiarity of the task have on students' metacognitive behavior?*

Our poster will present the theoretical framework, methodology and the results obtained from to pilot task-based interviews with students. The pilot is intended to generate responses on four types of tasks which are classified based on their relatedness to textbook/reference material.

Results are expected to provide us with a viable range of cognitive monitoring acts (Garofalo and Lester, 1985) that Indian and American students engage in while writing solutions to obtain maximum points on familiar and unfamiliar tasks (Boesen et al., 2010). Not only do we expect this exploration to shed some light on the factors that caused us to hypothesize but we also expect that it would provide some base for further exploration of institutional factors affecting students' mathematics writing – both as a product and a process.

Acknowledgments

The authors would like to thank Dr. Kathleen Melhuish and Dr. Cody Patterson for their valuable feedback, thoughtful suggestions, and guidance throughout the development of the project.

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