Impact of Historical Mathematical Problems on Student Metaperspectives of Mathematics

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Undergraduate students in a History of Mathematics course engaged with various historical mathematical problems. Reflective journals and interviews were used to analyze their perspectives on meta-issues of mathematics. The results indicate some revision of their metaperspectives and new cultural awareness.

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Jankvist (2009, 2011) distinguishes between mathematical *in-issues* and *meta-issues.* In contrast with in-issues, meta-issues are concerned with mathematics as a whole (Jankvist, 2009, 2011), including the nature of mathematics as a discipline and the social and cultural-situatedness of mathematical work (Bishop, 1988, 2002; D'Ambrosio, 1985). Student conceptions of these meta-issues are termed *metaperspectives*, and are important in shaping how they interact with and understand mathematics.

Work of the past few decades has established a number of potential benefits for integrating the history of mathematics into mathematics curriculum (Clark, 2012; Clark, Kjeldsen, Schorcht, Tzanakis, & Wang, 2016; Fauvel, 1991; Swetz, 1995). This project considers undergraduate metaperspectives as students engage with historical problems grounded in primary sources (Barnett, Lodeer, & Pengelley, 2014), investigating the research question: *How do students' meta-perspectives change as they engage with historical mathematical problems?*

Twelve undergraduate STEM majors enrolled in a history of mathematics course completed a series of journal entries reflecting on meta-issues in mathematics and their own experiences encountering historical mathematics. Initial journals included prompts such as "Describe a mathematician", and "Is mathematics invented or discovered?" As the semester progressed, prompts addressed reactions to class work more specifically. All journals were completed online. In addition, five students were interviewed two times each. One interview asked students to expound on passages from their journals, while a follow-up interview at the conclusion of the course prompted reflection on their views of the meta-issues described above. Themes within these journal entries emerged using open coding (Charmaz, 2014).

Results indicate that students initially viewed mathematics as "discovered" - existing independently of any human knowledge of it. Furthermore, an archetypal mathematician was described as an "old, white Greek man". Initial meta-perspectives indicated widespread exposure to a modified Eurocentric perspective on mathematics history (Joseph, 2011), with some awareness of historical mathematical work in Asia. As the semester progressed, students began to describe mathematics as arising from practical needs within a culture and recognize differences in mathematical communication. The proposed poster highlights themes in student metaperspective shifts, particularly new cultural awareness and appreciation of the way mathematics is embedded in cultures that produce it. The results indicate that historical problems prompted students to reflect on mathematical meta-issues and adjust their metaperspectives while not entirely dismissing their existing ones. For example, though more students described

mathematics as arising from needs within a culture, they still viewed mathematics as existing separately from any mathematician or culture's conception of it.

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