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Potential of collaboration between history and mathematics teachers: investigation and framework based on a text by Abu' al-Wafa Buzj'ani

Abstract

Interest in the integration of the history of mathematics into mathematics education has grown in the last three decades, and, many professional councils and mathematics educators pointed out the importance of this integration for students, teachers and the subject of mathematics itself. The HPM itself, of course, was founded on the basis of feasibility and potential of integrating history of mathematics into mathematics teaching and learning.

Fried (2001), however, pointed out a difficulty in this enterprise, namely, that conflicting commitments of mathematics education and history of mathematics, as history, forced teachers of mathematics into an unhistorical attitude when attempting to use history of mathematics in the classroom. The problem, he maintained, was less a matter of not knowing historical facts than it was of understanding the spirit and basic premises of historical thinking. History teachers, on this count, might do better if they, rather than mathematics teachers, took up the history of mathematics in their classes. On the other hand, history teachers cannot be expected to understand the spirit of mathematical thinking and may need to be convinced that the history of mathematics is as relevant to history as it is to mathematics.

This suggests that integrating history of mathematics into mathematics education would benefit from the interaction between these communities of teachers, mathematics and history teachers. But this might involve a problem similar to that it is meant to solve, namely, a tension between the commitments and basic assumptions of history and mathematics teachers. Therefore, our study aims to bring history teachers and mathematics teachers together in order to see, first of all, what kind of presuppositions they have when they come to history of mathematics, and second, and most importantly, whether they are able to work together to produce a chapter on the history of mathematics for mathematics classes and perhaps for history classes. In effect, the solution to Fried's (2001) dilemma may be to think of history of mathematics as fundamentally a multi-disciplinary subject that requires enlarging the community which deals with it.

To this end, a course has been designed engaging both communities at once. The mathematics and history teachers involved belong to the Arab sector of Israel, so the history of Islamic mathematics is emphasized. The specific historical material is based on the work of Abu' al-Wafa Buzj'ani (940-998), *On the Geometric Constructions Necessary for the Artisan*. This particular work was chosen for two main reasons: 1) it contains genuine mathematical content; 2) the mathematics has a clear social and cultural context so that it touches upon Islamic history in addition to Islamic mathematics.

The design and realization of the course is part of a greater research program whose questions are the following:

1. What are the considerations, presuppositions, and beliefs of teachers for mathematics and history regarding the integration of history of mathematics into the classroom? Is there any significant difference in these considerations and beliefs, in either population or both, according to years of experience, gender, education, grade level and school level?
2. How and to what extent might a course in the history of mathematics impact the considerations and beliefs of the two teacher populations regarding mathematics, history, and the

history of mathematics? What are the characteristics of the learning experience of the two populations during their joint participation in a course in the history of mathematics?

3. How feasible is an interdisciplinary collaboration between mathematics and history teachers? To the extent that it is feasible, what are the characteristics of this collaboration, and how it is reflected in the construction and transfer of a joint learning unit in history of mathematics?

The presentation will emphasize the rationale of the course and the research program connected with it. In particular, we will discuss the potential and importance of collaboration between history teachers and mathematics teachers in the project of incorporating history of mathematics in classroom. It will also discuss the text by Abu al-Wafa at the center of the course.

The empirical investigation is ongoing, so, only preliminary empirical results will be given.

Reference

Fried, M. N. (2001). Can Mathematics Education and History of Mathematics Coexist? *Science & Education, 10*(4), pp.391-408.

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