MATH OLYMPIADS' GENDER PROBLEM: TIP OF THE ICEBERG?

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For many years people interested in gender equity in STEM fields have been concerned about the extreme under-representation of girls in mathematical olympiads. In the U.S., although currently women earn about 30% of the PhDs in mathematics, the country's team at the International Math Olympiads (IMO) is usually 100% male. Most countries have had very few girls on their IMO teams.

The Kovalevskaia Fund set up two projects, one in Vietnam and one in Colombia, designed to increase girls' participation in the olympiads. Both failed, in part because of lack of interest by olympiad organizers. Other people have had equally frustrating experiences. It was largely because of such frustrations that mathematicians in China and in Europe organized all-girls math olympiads, starting in 2002 and in 2012, respectively. This is a partial solution, but it does not get to the root of the problem.

It sometimes happens that extreme gender imbalance in some type of activity not only is a cause for concern in its own right, but also is symptomatic of a broad range of structural problems. Such is the case with the math olympiads; the gender problem is the tip of the iceberg.

Obviously the IMO is not representative of the international mathematical community, in which women play a large and increasing role. Beyond that, we need to ask whether the IMO is representative of mathematics in the 21st century. Let's look at its structure:

(1) The IMO is hyper-competitive; the central goal is to win medals. Mathematics is not hyper-competitive; the central goal of mathematics is to solve problems.

(2) The IMO is based entirely on individual work. Most practicing mathematicians work collaboratively, often in multidisciplinary groups.

(3) The IMO is concerned only with formal, pure math problems. Most jobs in mathematics today are in the applied mathematical sciences.

(4) The IMO, like the Olympic Games after which it was modeled, is based on fierce competition between countries. Mathematics, in contrast, is the most international of all professions; mathematics does not care about national borders.

(5) Participation at the international level is limited to a very small number of people (one team per country). Mathematics is not limited to a tiny elite.

(6) The IMO is costly (especially for poor countries) because of the travel required. In mathematics, we often try to avoid unnecessary international travel and save our money for other purposes. Because of the internet, it is even possible for coauthors of a research paper never to have met!

(7) Most girls — and also plenty of boys — find the atmosphere at olympiad practice sessions and competitions to be unpleasant and intimidating. In contrast, the mathematical profession is a big tent with room for people with diverse talents, interests, and styles of work.

The good news is that at the university level there is something much better. In the international Mathematical Contest in Modeling (MCM), several thousand teams (with three students in a team) each work as a group over a 96-hour period to write a paper that describes a mathematical solution of a practical problem. Two recent problems concerned the search for a missing plane and the spread of ebola. The contest is conducted via the internet; the only cost is a $100 registration fee for each team.

Remarkably, at one stroke the MCM removes all seven of the above deficiencies of the IMO. Concerning (7), young women who do not feel comfortable working intensively for 96 hours in a mixed team can simply form an all-female team.

The MCM is not nearly as well known as the IMO internationally. I have been trying to rectify that in the places where the Kovalevskaia Fund has projects. I am hopeful that colleagues at universities in Vietnam, Cuba, and Mexico will soon be fielding teams of students in the MCM. In the case of all-female teams, the Kovalevskaia Fund has offered to pay the registration fees.