

## Letters to the Editor

### On “Two Views: How Much Math Do Scientists Need?”

The *Notices*, August 2013, reprints E. O. Wilson’s *Wall Street Journal* piece “Great Scientist  $\neq$  Good at Math” and Edward Frenkel’s spirited response in *Slate*, “Don’t Listen to E. O. Wilson”.

I agree with Frenkel, but a professor of mathematics is the least convincing person to advocate for students of other sciences taking more math courses. In fact, if the only people vigorously promoting math for scientists were mathematicians, I would have serious fears for the future of our profession!

I am convinced that this is not the case. Many eminent biologists can rebut Wilson’s piece with personal stories of how their own breakthroughs were made possible by their mathematical educations. I will ask some of my colleagues in the so-called nonmathematical sciences to read Wilson’s and Frenkel’s essays and send responses to me, and I encourage other members of the AMS to do the same. I will share these with the editor of the *Notices*; I guarantee they will be extremely interesting reading.

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### Frenkel Misreads Wilson

Reading E. O. Wilson’s essay and Edward Frenkel’s response to it [*Notices*, August 2013], I thought Frenkel mischaracterized Wilson’s views. Wilson’s point was that fear of mathematics was driving away potential scientists and that it need not do so. It seems to me that this point is hard to disagree with. In no way was Wilson arguing that potential scientists should not learn mathematics. Frenkel points out that Wilson is “octogenarian”. How is this relevant? The only point I can see of making this statement is to insinuate that Wilson is too old to have a valid opinion. Frenkel also says that Wilson believes fear of math is justified and most scientists don’t need math.

Wilson does not say that in his article, and I would be very surprised if he believed it. Frenkel says that Wilson’s thesis is that “great scientists don’t need math,” in quotation marks. The quotation marks lead one to believe that this is a quote from Wilson’s article, but no such quote appears in the article. Furthermore, I don’t think that is Wilson’s thesis. In all, Frenkel’s essay is of much lower quality than Wilson’s, and I think the *Notices* should have thought twice before publishing it.

—Mark Hovey  
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### Wilson’s Misguided Headline

Both articles speak for themselves, so I shall only respond to Mark Hovey’s comment that the quote “great scientists don’t need math” does not appear in E. O. Wilson’s article. In fact, this was the headline under which Wilson’s article was published online on the *Wall Street Journal* website, and under which it was distributed on social media, such as Twitter.

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### Do Scientists Need Math?

The disagreement in the essays by Wilson and Frenkel in the August issue of the *Notices* seems, on first reading, to be fundamental and sharp. But it can be made moot simply by qualifying the overly broad term “scientist”. The biological and social sciences are very different from the physical sciences. It is not controversial that physicists and chemists need quite a bit of math, but it may well be a defensible position that at the current state of their science many biological and social scientists do not need much mathematics beyond statistics.

And, by the way, other differences between the biological and physical

sciences occasionally show up. It is no longer surprising that when “scientific” fraud makes it into the newspaper, the science is usually biomedical. Also, most popular disbelief or distrust in “science” concerns biology, such as evolution and the efficacy of vaccines; very few people refuse to use airplanes due to distrust of aerodynamics.

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### Authors, Editors, and Referees

I would like to add a comment to Neal Koblitz’s letter on “Errors in Papers” (*Notices*, August 2013).

Even the most talented mathematicians make errors that were not detected by referees and ended up published. Nowadays, authors and referees are under pressure, as Koblitz points out, but editors also deserve criticism.

Let me describe a recent case. Professor X wrote a paper on a subject originally investigated by A and B, two bright, talented, and inspiring mathematicians. Professor X built on results by A and B, whom he duly quoted in his manuscript. However, he noticed an error in the first page of one of the numerous papers written by A and B: an equivalence between two definitions given by A and B was wrong, and he decided to investigate the two structures associated with the nonequivalent definitions. He submitted the manuscript to the same journal where A and B had published, among many others, the paper with the error.

He got a rejection, in a computer-generated letter, stating only that the journal applies the highest standard and has a broad readership. No answer to his polite and tactful cover letter (in fact, Professor A had meanwhile passed away), no referee’s report, nothing! Such an editor’s message is indeed ridiculous, to say the least. Highest standard, but an error was published and a correction was denied.

Is such an editor acting in a rational way?

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### Can *Bulletin* Papers Be Made More Readable?

My purpose in writing is to raise the question: Is there a better format for some of the papers in the *Bulletin of the AMS*—better meaning, more likely to achieve the goal of the *Bulletin* as implied by the statement on the inside of its front cover: The *Bulletin* publishes expository articles on contemporary mathematics research written in a way that gives insight to mathematicians who may not be experts in the particular topic.

This question was motivated by the paper in the July 2013 issue of the *Bulletin*, “Chern-Weil Forms and Abstract Homotopy Theory”. Let me hasten to say that I have no doubt the paper describes research results that are an important contribution to the relevant field. I am raising a question about format, not content.

In particular, the question was motivated by my realization, soon after I began attempting to read the paper, that I had no chance of understanding most of it. It seemed to me to be a paper written for specialists. And so I began asking myself the following questions:

(1) What are the criteria that the editorial staff uses to determine if a paper is likely to give insight to mathematicians who may not be experts in the particular topic?

(2) Does the staff conduct tests on randomly-selected members of the readership to determine to what degree the goal of the *Bulletin* is being met?

(3) What is the minimum knowledge that the staff assumes that any reader should have?

It seems to me that some policies that might improve readability are: (A) written specification, for use by editorial staff, of the minimum level of knowledge assumed for any reader; (B) in each paper containing

terms outside this minimum level, an index, with specific references to definitions or brief informal explanations of terms in the paper; (C) structured proofs (à la structured programs) so readers could read proofs top down, hence only to the depth of detail they were interested in; (D) a statement at the beginning of each paper as to why it was chosen for the readership—what is important about it, etc.

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### Reply to Letter of Spencer Bloch

Thanks to Professor Bloch for his thoughtful comments (Letter to the Editor from Spencer Bloch, *Notices*, October 2013). It is nice to know that my article was read and stimulated some reactions. Actually I am pleased to have heard from a number of mathematics departments in institutions nationally and internationally that are engaged in discussing teaching practices for their mathematics classes.

I agree with Professor Bloch that evaluating teaching is a challenging task. What particular teaching style works for some students may not work for others. Therefore any generalizations about teaching practices must be offered with caution. Having said that, I think the pioneering work that Carl Wieman (Nobel Prize in Physics in 2001) has done in science education is worthy of careful study and discussion by faculty members in mathematics departments. Much of the innovation in teaching being advocated in science education is based on evidence-based teaching practices. While successful evidence-based teaching practices may differ among the sciences, indeed even among teachers, it seems that any mathematics department seriously discussing teaching practices would want to engage in some self examination.

The goal of a departmental self-study would not necessarily be to identify a particular teaching approach, but rather to learn more about what kinds of teaching practices work

best in what specific mathematics classes with what types of students. This research involves multiple variables, many of which are difficult if not impossible to control. Such research is generally considered in the mathematics education domain, but more mathematicians are needed in this effort. Research of this type is complex, always messy, and may be excruciating to the researchers engaged in this effort. I am reminded of the book *Mathematics Education Research: A Guide for the Research Mathematician*, by C. McKnight, A. Magid, T. Murphy, and M. McKnight (AMS, 2000), which identifies some of the challenges faced. This book might provide a nice starting point.

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### “AMS to Launch New Open Access Research Journals”: A Step in the Wrong Direction!

I firmly believe that offering two new gold open access journals is not in the best interest of the average member of the AMS; see *Notices*, August 2013, p. 873. The “author-pays model” [1] is not even in the best interests of the most talented mathematicians: it will introduce a filter that pre-selects among mathematicians of similar quality only those who are able and willing to spend money for their publications, even before any referee is able to evaluate their results. The attempt to equate the quality of research with money is a step in the wrong direction that will sooner or later backfire. From an ethical perspective, it looks even worse than impact factor manipulation.

[1] PISANSKI, TOMAŽ, Open access—Who pays?, *Newsl.-Eur. Math. Soc.*, June 2013 **88**, 54–56. <http://www.ems-ph.org/journals/newsletter/pdf/2013-06-88.pdf>

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