The Mathematics Enthusiast

Volume 5 | Number 1 Article 4

1-2008

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Comments provoked by "Flaws and idiosyncrasies in mathematicians: Food for the classroom?" by Theodore Eisenberg

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Abstract
In mathematics classes, it is appropriate for many reasons to discuss mathematicians as people with lives, personal problems, both influenced by and influencing cultural movements and societal issues. Mathematics is a human activity, and mathematicians are human. Eisenberg's paper raises important and fascinating issues, such as the extent to which intellectual achievements can be kept separate from the personality and actions of their creator (such as Wagner). However, in my reactions, I suggest ways in which I believe the discussion needs to be broadened and refocused.

Nature of the sample of vignettes
The set of vignettes presented in Section 2 could serve to reinforce inaccurate and harmful beliefs about the nature of mathematics:

• Academic mathematics is solely a European intellectual achievement
Until comparatively recently, histories of mathematics were extremely Eurocentric. Such bias has been substantially corrected by scholars such as Swetz (1994), Joseph (1992), and Powell and Frankenstein (1997). There is no lack of examples of eminent non-European mathematicians – Ramanujan (Rao, 1998) immediately comes to mind (and in personal and social terms, his relationship with Hardy is of particular interest (Kanigel, 1991)). The representation of mathematics as the creation of solely dead, white males can be considered as a form of symbolic violence against non-European and female students.

On a specific point, the claim that "Isaac Newton … is a name that is known in most households throughout the educated world" is doubly disturbing. In any Western society, such as the United States, I find it hard to believe that the claim is accurate, unless there is an implicit qualification by social class. The claim also suggests that people living in, say, China or Peru are not educated.

• The history of mathematics is a history of great individual achievements rather than of collective and cumulative intellectual effort (see below). An example that also has a bearing on the previous point is the argument by Almeida and Joseph (2007) that elements of calculus had been developed in Kerala at least 200 years before Newton and Leibniz and that lines of communication between Kerala and Europe mean that it was likely that this work was known in Europe.

• Mathematics was all done in the past

The Montana Mathematics Enthusiast, **ISSN 1551-3440, Vol. 5, no.1**, pp.29-34

The paper contains few references to recent and contemporary mathematicians, for which excellent sources, which also portray the individuals as fully-rounded human beings are the sets of interviews by Albers and Alexanderson (1985), and Albers, Alexanderson, and Reid (1990).

• Women do not do significant mathematics

Anglin (1992), begins a section headed "How should the historian tackle the scarcity of women mathematicians?" with the forthright declaration that:

> Men and women are equal intellectually. Apparent differences between male and female mathematical ability are due to social factors such as cultural systems in which men take all the educational opportunities for themselves (p. 8).

This statement could be nuanced by reference to particular factors that relate to mathematics as opposed to, say, literature. Moreover, as Martin Gardner points out, in his introduction to Albers et al. (1990): "Although social forces inhibiting the entrance of women into mathematics may be abating, they are still very much with us". In terms of teaching, some suggestions may be made. First, there is no excuse these days for referring to the generic mathematician as "he". Second, reference should be made to female mathematicians who have made significant contributions (which avoiding the temptation, as Anglin (1992, p. 8) recommends, to exaggerate the role of women in mathematics). Most importantly, the social and cultural conditions should be carefully considered (several instructive examples can be found among the delightful collection of anecdotes assembled by Wells (1997)). It should also be considered whether there are aspects of academic mathematics as human practice that are differentially alienating to females, such as its (perceived or real) tendency to emotional detachment and its long and inglorious involvement in the making of war.

What kind of history of mathematics?

The mere fact that Eisenberg feels it necessary to inform students about the human weaknesses of mathematicians is itself a comment on the inadequacy of history teaching in general, whereby history is presented to the young as nationalistic propaganda in terms of flawless heroes – military leaders, political leaders, intellectuals, industrialists, and so on.

What form should a history of mathematics take? Several possible organizing frameworks listed by Anglin (1992) are cited by Eisenberg: individuals and their personal lives, nations or races, chronological periods. However, Anglin (p. 7) also comments that "There is no reason why one could not write a history of mathematics entirely from a communitarian point of view" and, later (p. 8) that "it may be more illuminating to relate a piece of mathematics to its social environment than to a fictitious anecdote about the private life of the author of that piece of mathematics". I like the suggestion made by Davis (1985) of a balanced approach that he calls "Jamesian" by reference to a quotation by Henry James (1917): "The community stagnates without the impulse of the individual; the impulse dies away without the sympathy of the community". Such an approach rightly rejects the "great men" (literally, in the case of Bell (1965)) style of history. Moreover, Davis also raises a number of deep questions about the role of mathematics in society, such as: "Why do we, today, allow our military strategies to be so mathematized and computerized when the difference of one bit in a program may send all down the road to oblivion?".

In the examples discussed by Eisenberg, it may be useful to distinguish three levels of increasing relevance and importance:

1. Details of the personal life and character of the individual.
There is a certain justification for introducing such details, in the service of enlivening a lesson, and stressing the humanity of the individuals whose work is being discussed. Anglin (1992, p. 11) also suggests making reference to blunders by mathematicians, which entertainly underlines their humanity and undermines the view of mathematics as immaculately conceived. I would suggest minimizing the use of personal references in a disconnected way and with an emphasis on "spice". Rather, it is appropriate to choose anecdotes in order to make important points. For example, consider the letter that Charles Babbage wrote to Tennyson about one of his poems, as cited in Wells (1997, p. 51). In this letter, Babbage suggested replacing the lines "Every moment dies a man/ Every moment one is born" with "Every moment dies a man/ Every moment $1^1/_6$ is born", with the comment that, while this is not strictly correct, it is sufficiently accurate for poetry. This anecdote, while amusing, also could be the starting point for a discussion of alternative ways of seeing the world.

I find it strange that Eisenberg at one point states that "we are simply asking if such things as Newton's alleged virginity should be mentioned in the classroom", since elsewhere he does go beyond such a narrow focus. It would be of great interest to know whether the incidences of various forms of behavior are higher among top-flight mathematicians than among comparable groups (e.g. great scientists or artists – or, indeed, people in general), and to investigate whether some causal relationship could be established. A subtle methodology is necessary for such comparisons, otherwise many well-known subjective mechanisms come into play...

2. Aspects of the mathematician's life in relation to the social and political milieux of his/her time.
A good example, to which Eisenberg refers, is the persecution of Turing in England after the Second World War on account of his homosexuality, despite his crucial contribution to that war in leading to effort to break the German codes (the play about Turing has the double-meaning title "Breaking the Code").

3. Cases wherein the mathematical practices were directly influenced by, or influenced political/ social events.
In my opinion, university curricula for mathematicians and future mathematics teachers ought to include at least one course on the social history of mathematics. This should deal with in-depth analyses of such issues as the anti-Semitic activities within their academic practices of mathematicians in Germany (Segal, 2003) and elsewhere. It should also address more general sociocultural topics such as the interplay between probability and statistics, social science, and world-views (Hacking, 1975, 1990). Moreover, forms of mathematical practice other than academic mathematics (in other word, ethnomathematics (D'Ambrosio, 2006)) should be considered in such a course.

A final point regarding the writing of history is the question of accuracy, the problem of knowing whether a story is true (a problem which, ironically, has become magnified in the "Information Age"). Accordingly, care should be taken in characterizing the provenance of anecdotes (see comment by Anglin (1992) cited above). As with all history, that of mathematics is subject to the

proliferation of myth through failure to consult primary sources. Moreover, as pointed out by Anglin (1992) historians of mathematics are particularly susceptible to subjective biases related to their own perspectives about the nature of mathematics. The whole question of the reliability of documentary evidence, and of information gleaned from the Internet, is appropriate for discussion with students.

Ethical responsibilities of mathematicians and mathematics educators

Details of the personal ethics of mathematicians (on which Eisenberg tends to concentrate) are much less important, in my view, than their larger ethical responsibilities to society. This view has been most eloquently expressed by Ubi D'Amrosio (2003):

> It is clear that Mathematics is well integrated into the technological, industrial, military, economic and political systems and that Mathematics has been relying on these systems for the material bases of its continuing progress. It is important to look into the role of mathematicians and mathematics educators in the evolution of mankind. … It is appropriate to ask what the *most universal mode of thought* – Mathematics – has to do with the *most universal problem* – survival with dignity.
>
> I believe that to find the relation between these two universals is an inescapable result of the claim of the universality of Mathematics. Consequently, as mathematicians and mathematics educators, we have to reflect upon our personal role in reversing the situation. (Emphasis in original).

In this respect, discussion by Eisenberg of anti-Semitism in the academy is very appropriate. I would have liked to have seen a least a sketch of other possible topics. In particular, the history of the involvement of mathematicians in the development of nuclear weapons comes to mind. Accounts of the Manhattan Project (e.g. Rhodes, 1986) paint a picture of a group of mainly men motivated by patriotism, camaraderie, competition, and intellectual challenge, with little thought given to the deeper consequences of their work – at least until after the Hiroshima and Nagasaki attacks, and with honorable exceptions. The fact that this analysis is not just a matter of past history is made clear by an article under the title "Rival US labs in arms race to build safer nuclear bomb" (Vartabedian, 2006):

> "I have had people working nights and weekends," said the head of the Los Alamos design team. "This is a chance to *exercise skills that we have not had a chance to use for 20 years*." At Livermore Labs, a similar picture: The lab is running supercomputer simulations around the clock, and teams of scientific experts working on all phases of the project "*are extremely excited*." (Emphasis added).

Final comment

The paper is appropriately provocative (in the best sense of the word) and correct in its central point that mathematics education should reflect the nature of mathematics as human activity. The comments above reflect the various directions in which I think that central message should be extended and strengthened and the ways in which the paper provoked me personally.

References

Albers, D. J. & Alexanderson, G. L. (Eds.). (1985). *Mathematical people: Profiles and interviews*. Boston: Birkhaüser.

Albers, D. J., Alexanderson, G. L., & Reid, C. (Eds.). (1990) *More mathematical people*. Boston: Harcourt Brace Jovanovich.

Almeida, D. F & Joseph, G. G. (2007). Kerala mathematics and its possible transmission to Europe. *Philosophy of Mathematics Education Journal*, *20* (June). Retrieved 7/9/07 from: http://www.people.ex.ac.uk/PErnest/pome20/index.htm

Anglin, W. S. (1992). Mathematics and history. *The Mathematical Intelligencer*, *14*(4), 6-12.

Bell, E. T. (1965). *Men of mathematics*. New York: Simon and Schuster.

D'Ambrosio, U. (2003). The role of mathematics in building up a democratic society. In Madison, B. L., & Steen, L. A. (Eds.), *Quantitative literacy: Why numeracy matters for schools and colleges. Proceedings of National Forum on Quantitative Literacy, National Academy of Sciences, Washington, DC, December, 2001*. Princeton, NJ: National Council on Education and the Disciplines. (Available at: http://www.maa.org/ql/qltoc.html)

D'Ambrosio, U. (2006) *Ethnomathematics: Link between traditions and modernity*. Rotterdam, The Netherlands: Sense Publishers.

Davis, P. J. (1985). Introduction: Reflections on writing the history of mathematics. In D. J. Albers D. J., & G. L. Alexanderson (Eds.) *Mathematical people: Profiles and interviews* (pp. xi-xvi). Boston: Birkhaüser.

Gardner, M. (1990). Introduction. In D. J. Albers, G. L. Alexanderson, & C. Reid (Eds.) *More mathematical people* (pp xi-xv). Boston: Harcourt Brace Jovanovich.

Hacking, I. (1975). *The emergence of probability*. Cambridge: Cambridge University Press.

Hacking, I. (1990). *The taming of chance*. Cambridge: Cambridge University Press.

James, W. (1917). *Selected papers on philosophy*. London: Dent and Sons.

Joseph, G. G. (1992). *The crest of the peacock: Non-European roots of mathematics*. London: Penguin.

Kanigel, R. (1991). *The man who knew infinity: A life of the genius Ramanujan*. New York: Scribners.

Powell, A. B. & Frankenstein, M. (Eds.) (1997). *Ethnomathematics: Challenging Eurocentrism in mathematics education*. Albany, NY: SUNY Press.

Rao, K. S. (1998). *Srinivasa Ramanujan: A mathematical genius*. Chennai: EastWest Books.

Rhodes, R. (1986). *The making of the atomic bomb*. New York: Simon and Schuster.

Segal, S. L. (2003). *Mathematics under the Nazis*. Princeton, NJ: Princeton University Press.

Swetz, F. (1994). *From five fingers to infinity*. Chicago: Open Court.

Vartabedian, R. (2006). Rival US labs in arms race to build safer nuclear bomb. *Los Angeles Times*, June 13. Retrieved 7/4/07 from: http://fairuse.100webcustomers.com/fuj/latimes52.htm

Wells, D. (1997). *The Penguin dictionary of curious and interesting mathematics*. Penguin: London.