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## AN OPEN LETTER TO UNITED STATES SECRETARY OF EDUCATION, RICHARD RILEY

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(November 18, 1999)  
Washington Post

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Dear Secretary Riley:

In early October of 1999, the United States Department of Education endorsed ten K-12 mathematics programs by describing them as "*exemplary*" or "*promising*." There are five programs in each category. The "*exemplary*" programs announced by the Department of Education are:

- Cognitive Tutor Algebra
- College Preparatory Mathematics (CPM)
- Connected Mathematics Program (CMP)
- Core-Plus Mathematics Project
- Interactive Mathematics Program (IMP)

The "*promising*" programs are:

- Everyday Mathematics
- MathLand
- Middle-school Mathematics through Applications Project (MMAP)
- Number Power
- The University of Chicago School Mathematics Project (UCSMP)

These mathematics programs are listed and described on the government web site:  
<http://www.enc.org/ed/exemplary/>

The Expert Panel that made the final decisions did not include active research mathematicians. Expert Panel members originally included former NSF Assistant Director, Luther Williams, and former President of the National Council of Teachers of Mathematics, Jack Price. A list of current Expert Panel members is given at: [http://www.ed.gov/offices/OERI/ORAD/KAD/expert\\_panel/mathmemb.html](http://www.ed.gov/offices/OERI/ORAD/KAD/expert_panel/mathmemb.html)

It is not likely that the mainstream views of practicing mathematicians and scientists were shared by those who designed the criteria for selection of "*exemplary*" and "*promising*" mathematics curricula. For example, the strong views about arithmetic algorithms expressed by one of the Expert Panel members, Steven Leinwand, are not widely held within the mathematics and scientific communities. In an article entitled, "*It's Time To Abandon Computational Algorithms*," published February 9, 1994, in Education Week on the Web, he wrote:

*"It's time to recognize that, for many students, real mathematical power, on the one hand, and facility with multidigit, pencil-and-paper computational algorithms, on the other, are mutually exclusive. In fact, it's time to acknowledge that continuing to teach these skills to our students is not only unnecessary, but counterproductive and downright dangerous."*  
(<http://www.edweek.org/ew/1994/20lein.h13>)

In sharp contrast, a committee of the American Mathematical Society (AMS), formed for the purpose of

representing the views of the AMS to the National Council of Teachers of Mathematics, published a report which stressed the mathematical significance of the arithmetic algorithms, as well as addressing other mathematical issues. This report, published in the February 1998 issue of the Notices of the American Mathematical Society, includes the statement:

*"We would like to emphasize that the standard algorithms of arithmetic are more than just 'ways to get the answer' -- that is, they have theoretical as well as practical significance. For one thing, all the algorithms of arithmetic are preparatory for algebra, since there are (again, not by accident, but by virtue of the construction of the decimal system) strong analogies between arithmetic of ordinary numbers and arithmetic of polynomials."*

Even before the endorsements by the Department of Education were announced, mathematicians and scientists from leading universities had already expressed opposition to several of the programs listed above and had pointed out serious mathematical shortcomings in them. The following criticisms, while not exhaustive, illustrate the level of opposition to the Department of Education's recommended mathematics programs by respected scholars:

Richard Askey, John Bascom Professor of Mathematics at the University of Wisconsin at Madison and a member of the National Academy of Sciences, pointed out in his paper, "*Good Intentions are not Enough*" that the grade 6-8 mathematics curriculum Connected Mathematics Program entirely omits the important topic of division of fractions. Professor Askey's paper was presented at the "Conference on Curriculum Wars: Alternative Approaches to Reading and Mathematics" held at Harvard University October 21 and 22, 1999. His paper also identifies other serious mathematical deficiencies of CMP.

R. James Milgram, professor of mathematics at Stanford University, is the author of "*An Evaluation of CMP*," "*A Preliminary Analysis of SAT-I Mathematics Data for IMP Schools in California*," and "*Outcomes Analysis for Core Plus Students at Andover High School: One Year Later*." This latter paper is based on a statistical survey undertaken by Gregory Bachelis, professor of mathematics at Wayne State University. Each of these papers identifies serious shortcomings in the mathematics programs: CMP, Core-Plus, and IMP. Professor Milgram's papers are posted at: <ftp://math.stanford.edu/pub/papers/milgram/>

Martin Scharlemann, while chairman of the Department of Mathematics at the University of California at Santa Barbara, wrote an open letter deeply critical of the K-6 curriculum MathLand, identified as "*promising*" by the U. S. Department of Education. In his letter, Professor Scharlemann explains that the standard multiplication algorithm for numbers is not explained in MathLand. Specifically he states, "*Astonishing but true -- MathLand does not even mention to its students the standard method of doing multiplication.*" The letter is posted at: <http://mathematicallycorrect.com/ml1.htm>

Betty Tsang, research physicist at Michigan State University, has posted detailed criticisms of the Connected Mathematics Project on her web site at: <http://www.nsl.msui.edu/~tsang/CMP/cmp.html>

Hung-Hsi Wu, professor of mathematics at the University of California at Berkeley, has written a general critique of these recent curricula ("*The mathematics education reform: Why you should be concerned and what you can do*", American Mathematical Monthly 104(1997), 946-954) and a detailed review of one of the "*exemplary*" curricula, IMP ("*Review of Interactive Mathematics Program (IMP) at Berkeley High School*", <http://www.math.berkeley.edu/~wu>). He is concerned

about the general lack of careful attention to mathematical substance in the newer offerings.

While we do not necessarily agree with each of the criticisms of the programs described above, given the serious nature of these criticisms by credible scholars, we believe that it is premature for the United States Government to recommend these ten mathematics programs to schools throughout the nation. We respectfully urge you to withdraw the entire list of "*exemplary*" and "*promising*" mathematics curricula, for further consideration, and to announce that withdrawal to the public. We further urge you to include well-respected mathematicians in any future evaluation of mathematics curricula conducted by the U.S. Department of Education. Until such a review has been made, we recommend that school districts not take the words "*exemplary*" and "*promising*" in their dictionary meanings, and exercise caution in choosing mathematics programs.

Sincerely,

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