Teachers must be up for count

By Solomon Friedberg
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Mathematics is crucial in the modern world. It is the foundation of modern science and engineering, and the prerequisite to any number of careers. Children’s formal learning of mathematics occurs throughout elementary school, and their success or failure at this level will have an impact on the entire rest of their lives.

Thus it is vital that elementary teachers be well-prepared to teach mathematics.

You would think that all elementary teachers know elementary math. After all, they are college graduates. Unfortunately, you’d be wrong. For example, mathematics educator Liping Ma, a senior scholar at the Carnegie Foundation for the Advancement of Teaching, reports that only 43 percent of a group of “above average” U.S. elementary teachers chosen for their interest in math could carry out a simple calculation involving division of fractions.

Moreover, teaching elementary school math requires more than simply knowing how to do elementary school math. Teachers must be able to present mathematics as a coherent body of knowledge rather than a bunch of arbitrary rules, to recognize and address a range of misconceptions, to encourage mathematical thinking and develop student self-confidence. They need to know elementary math well enough to teach it in all its subtlety.

In Ma’s study, only 4 percent of U.S. teachers were able to write a story problem that corresponded to the division of fractions problem. If that’s the case, how can they teach this subject well?

This is not the fault of current teachers. The present system in Massachusetts allows prospective teachers with inadequate knowledge of mathematics to pass the general curriculum requirement for teacher licensure. Passing is determined by the cumulative score on an exam in which mathematics is only one of five subject areas.

Moreover, the curricula of teacher-preparation programs reflects this testing, and frequently includes very little mathematics. The present situation ignores a great deal of research linking teacher knowledge and student achievement in mathematics, and it ignores the reality of what is necessary if our children are to succeed in their schools and careers.

Proposed remedies are before the Board of Education. The board recently mandated a separate math subtest of the general curriculum test beginning in 2008, and this month it will vote on additional math course requirements. These changes are long overdue, and adopting them is simple common sense. Teachers must know math if they are to communicate it to our children.

The new regulations are accompanied by guidelines for the scope and depth of knowledge required in math. These guidelines are consistent with an emerging consensus of mathematicians and mathematics educators concerning math knowledge related to the elementary curriculum. (Full disclosure: I provided feedback on a draft of these guidelines.) Programs preparing teachers will be required to offer multisemester sequences in math for elementary teachers. Such courses can be rich intellectual experiences, developing the kind of knowledge that we know makes a difference and enabling the next generation of elementary teachers to enter classrooms genuinely prepared.

In today’s quantitative society, the ability to teach math is just as necessary as the ability to teach reading for prospective elementary school teachers, and we should design our license requirements with this in mind.

Solomon Friedberg is a professor of mathematics at Boston College, and a member of the Commonwealth’s Math-Science Partnership Steering Committee. He is teaching a course in mathematics for elementary teachers at BC.