

ADD IT UP

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The teaching of mathematics in this country is a case of the intellectually blind leading the potentially intellectually sighted until the potentially sighted become as intellectually blind as their leaders.

Several months ago, I alluded—in connection with a discussion of the deficiencies of our textbooks—to the landmark work of Liping Ma, *Knowing and Teaching Elementary Mathematics*, in which she showed the superiority of Chinese elementary school mathematics teachers to American elementary school mathematics teachers in both mathematical knowledge and pedagogical acumen.

That damning judgment now has been extended to our middle school mathematics teachers.

As part of a Michigan State University project called *Mathematics Teaching in the 21st Century*, Professor William Schmidt and his team of eleven researchers have produced a preliminary study of middle school mathematics teaching in the United States, South Korea, Taiwan, Germany, Bulgaria, and Mexico. The areas of mathematics tested were algebra, functions, number, geometry, and statistics. The study (MT21 Report) is titled *The Preparation Gap: Teacher Education for Middle School Mathematics in Six Countries*.

The report is preliminary to a study of both elementary and middle school mathematics teaching in nineteen countries. However, the report's findings are not preliminary: they are solid, and distressing.

In terms of overall mathematical knowledge, the United States and Mexico were ranked at the bottom. In Chapter I, the report states, "Taiwanese and South Korean future teachers typically covered about 80 percent or more of advanced math topics in their training, while those in Mexico and the U.S. covered less than 50 percent."

Therefore, while Taiwanese and South Korean middle school teachers study a breadth and depth of mathematics equivalent to what would be required for a mathematics major, our teachers fall far short. Professor Schmidt adds, "What's most disturbing is that one of the areas in which U.S. future teachers tend to do the worst is algebra, and algebra is the heart of middle school math." Indeed, United States teachers were at or near the bottom in both algebra and functions.

Previous studies should have alerted us to this deficiency. In Chapter III, the report states, "The Third International Mathematics and Science Study [TIMSS]...show[ed] low U.S. achievement in math compared to other countries [and] indicated that one of the major factors related to this low performance was a U.S. middle school curriculum [that was] unfocused, lacking coherence, and not demanding."

In another study, published last month by the Washington-based American Institutes for Research (AIR), the performance of our students on international science tests was discovered to deteriorate as they progress through our system, with our 4th graders scoring comparably higher (although nowhere near the highest) when compared to other countries than our 8th graders score.

The root of this problem is a deficiency in our college education programs and our system of preparing teachers. Schmidt puts it simply and directly: "It is important for us as a nation to understand that teacher preparation programs are critical, not only for future teachers, but also for the children they will be teaching."

These studies highlight three major deficiencies of our schools: (1) teachers with an inadequate knowledge of academic subject matter; (2) curricula that are vague, empty, and incoherent; (3) students of whom too little is demanded.

The culprits who are in collusion to perpetuate this failure are: (1) college and university education departments (who attract primarily our worst students to be future teachers and demand little or nothing of them); (2) bloated school system bureaucracies (who are more interested in feathering their own nests than in providing rigorous education and who demand even less academically of themselves than of their constituents—teachers and students alike); (3) elected public officials of both parties (who preen and posture to hide their cowardice to act forcefully and their ignorance of what constitutes high quality education), and (4) parents (who are credulous of what their schools tell them and undemanding of their own children, preferring tokens of educational progress like diplomas to substantive academic achievement).

In mathematics, competence has been given the name "numeracy" (parallel to "literacy") and incompetence the name "innumeracy." We are producing a nation crippled by innumeracy.

Forty some years ago, I began college as a mathematics/physics major. My first teaching position (under one of my former high school teachers) was in high school mathematics. I taught mathematics as the language that it is and with the same rigor that had characterized my own mathematics and English classes alike.

Innumeracy and functional illiteracy go hand in hand. Our schools have become factories in which these twin incapacities are the chief products.

Our loss of global excellence and preeminence is dire in its prospects for our future. It is rooted more than we want to admit in our abandonment of educational excellence and preeminence.

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