

# Ignorance, Ignorantly Judged

By Roald Hoffmann

**T**he past few years have seen a dirge of statistics testifying to the depth of ignorance of Americans. There seems to be no end to what we do not know, be it history, geography, but especially science. Is that really the case?

In one survey, 75 percent of U.S. respondents believe antibiotics are effective against viruses. In another, one of six respondents could not identify DNA. Were such a question posed, I'm certain that Walt Whitman would just as likely be identified as a left fielder for the old Brooklyn Dodgers as a poet.

A recent survey by the International Association for the Evaluation of Educational Achievement compared ninth grade general science students in 16 countries. Americans ranked next to the bottom, outscoring only students from Hong Kong. Advanced chemistry pupils (grade 12) in the U.S. finished 12th of 14, ahead of Canada and Finland, and far behind England, Singapore, Japan, Hungary, Australia and Poland.

Surveys that plumb the depth of our ignorance and that of our students are methodologically suspect. More importantly, the interpretation of these statistics in isolation is questionable. One needs an accompanying discussion of the social, cultural and economic environment in which these supposedly ignorant individuals function as members of a productive society.

The methodology used in these surveys typically compares American high school students with their foreign counterparts. This fails to take into account the continued elitism of foreign educational systems. Although European children are no longer shunted out of a university-bound track at age 11 on the basis of a single examination, the educational

*Roald Hoffmann, who shared the Nobel Prize in chemistry in 1981, is professor of physical science at Cornell University.*

## Comparing U.S. students with others can be misleading.

pyramid narrows much more steeply everywhere else.

The study that compares a 12th grade student in Finland or Hong Kong with one in the U.S. is not satisfactory: We have many more people in our educational pipeline. Yet this study, as well as similar "statistics of ignorance," are superficially used as certain indicators of the decline, first educational, then economic and technological, of our country. The Japanese are far ahead, the South Koreans and Taiwanese not far behind. As a nation, we're doomed.

It's not so simple. Most will agree America was clearly a leader, not only in wealth and power, but in science and the arts from 1945 to 1969. Were there a clear, causal tie between level of education, knowledge and economic success of a country, then there should have been a recorded superiority of American youth in the years preceding that period. I've never seen a shred of evidence for that and suspect that surveys of our state of knowledge would have shown us years behind Europe.

It is impossible to make a connection between statistics of ignorance and past or future status of a country without consideration of society as a whole. One has to look at the economic system, the history of the country, patterns of immigration and the psychological forces at play.

Let's look at the countries ranked ahead of the U.S. in the survey. Perhaps Hungarian and Polish students know more, but the tragedy is what the Soviets' ineffective social and economic system does (or did) to them.

England has traditionally had a

first-class educational system, but one that is elitist. Furthermore, the superior English system has not stemmed the economic decline of this former colonial power. And as for Japan, I doubt if we'd want to subject our children to the psychological pressures, the exam fever and the tension of Japanese schools.

In America, if you are not as motivated toward learning as your peers in high school, you can still get a diploma. After working for a while, there are no barriers to studying at a local community college. The strength of our system is the multitude of paths to an education.

The ways to national economic and political power are manifold. A country certainly requires a basic level of scientific and technological literacy and fundamental skills on the part of its population. But after that the political system needs to provide an open, mobile society, a superstructure of higher education and industry into which people can move, a society which encourages hard work and creativity. With all our faults, this is what we have.

Moreover, we have managed to build such a system with a heterogeneous population, with immigrants from hundreds of cultures, from incredibly divergent family structures and work ethics. Compare this to the homogeneous societies of, say, Norway or Japan.

Yes, we've missed out in part on fairness. And, yes, we've got a long way to go on access to education for some segments of our population. And, yes, we have this terrible, wide range of incomes — real poverty co-existing with immense wealth. But we've done pretty well.

What concerns me about scientific, or humanistic, illiteracy is the barrier it poses to rational democratic governance. Democracy occasionally gives in to technocracy — a reliance on experts on matters such as genetic engineering, nuclear waste disposal or the cost of medical care. That is fine, but the people must be able to vote intelligently on these issues. The less we know as a nation, the more we must rely on experts and the more likely we are to be misled by demagogues. We must know more. □