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Due to Technical Difficulties

Reprinted From Arizona Science Teacher

The worst thing about a burning issue is that no one can smell it until there's a fire. We all spend our days deeply engrossed in ourselves, noses pressed to the grindstone. Who can see anything in that position? Then, something ignites a spark — and, suddenly, everyone calls "Fire!"

It happened during the late '50s and early '60s when the U.S. tried desperately to catch up with the Russians during the infamous space race. Tome Wolfe's fabulous book on this, *The Right Stuff*, should be required reading for the country. Right after Sputnik, math and science were "in," and reading and arts were "out." That push left a backlash; for, quick on the heels of this emphasis, came the sad realization that while Johnny could add, he couldn't read or write. Not surprising, since Johnny had been spending his days learning to be an aeronautical engineer.

Somehow, after we had that one small step for man, I sort of lost track of it all. It came, then, as a tremendous shock to meet James G. Cook, president of the Thomas Alva Edison Foundation. Cook, who is a lean and handsome traveling salesman for science education, is a more easily listened to, slimmed-down version of futurist Herman Kahn in some ways. Like the Great Predictor, Cook feels that technology saves. Unlike Kahn, Cook feels there is a good chance that in this country it just might not work. The Foundation has as its goal turning on youngsters to the fields of science and technology, and to upgrade the science education students receive. It's an uphill battle; for Cook related that in the last decade, 40 out of 52 states have actually lowered their standards for science education, until, today, a high school graduate needs only a single science credit.

For those of you who suffered through biology 1 and 2, and chemistry and physics, this comes as a blow. In my memory, biology is forever green and moist and intertwined with basketball. Our teacher was also the varsity basketball coach, and my biology year coincided with our team's fight for the state championship. So, when I think of this high school course, I see parts of frogs jumping through hoops. Physics, unfortunately, is more grim. I took this because my father said it would be a challenge. The teacher agreed, and told me to report back that it was one I'd have trouble meeting. I'll always treasure that "B" I pulled on the final exam. It was the only thing that saved me from a D in the course.

So, while I can't tell you why a pulley works, and never did get around to the specifics of specific gravity, the course was invaluable. I learned terms and vague theories (other people learned them clearly), and, most importantly, learned about a discipline that has relevancy to my life. But today, Cook said, students in more than half of our nation's high

schools couldn't take a physics course if they wanted to. It isn't offered. Instead, "soft" sciences are in.

Ironically, this is happening when our pace of scientific discovery is accelerating so rapidly that literally half the information taught today in a biology class was unknown prior to World War II. Overall, Cook said, the amount of scientific knowledge is doubling every two years.

Just to show how dismal things really are, he added that in 1970, the United Nations did a world-wide test on 10- and 14-year-old students to test their technological literacy. Japanese children came out Number One, he said. And the U.S.? Fifteen . . . just ahead of barely literate nations, including Chile, Thailand, Iran and India.

The fallout from this can be seen in the declining numbers of new inventions that are patented each year. Of those patented, Cook noted, 36% of the U.S. patents were awarded to foreigners. Today, our scientific supremacy has been cut to smithereens. We hold only a slim lead in computer know-how, and still have first place in agricultural technology.

Internationally, this has staggering implications. In a speech last October, Cook stated, "Technology is, and has long been, the principal product we have to trade internationally. We can no longer export natural resources on any great scale. We cannot compete with the Koreans, Taiwanese, and other peoples of other countries which have millions of cheap laborers: technology has been and must continue to be our strength and principal saleable product. Even our ability to export grain and other farm products is the result of our technologically superior system of farming."

Cook couldn't have known then that just a few months later the U.S. would be bargaining for the lives of its citizens with Iran. Nor could he have guessed that Russia would stamp on Afghanistan with such staggering force. And what was President Carter's first move? In both instances, the President threatened to withhold U.S. technology, our strongest peaceful weapon. Yet, in light of these national trends, who can say how much longer this threat will hold?

At the risk of sounding like a right-winger — a position that as a left-hander I staunchly reject — I had to also agree with Cook's analysis of how we have gotten into this bind. He quoted a British journalist, Henry Fairlie, who observed recently, "The once rambunctious American spirit of innovation and adventurousness is today being paralyzed by the desire to build a risk-free society." And, whether or not you stand to the left or right of Goldwater, who can disagree? Today, the simple truth is that it's difficult to experiment, tough to innovate, and darn near impossible to take a flyer. Cause and effect must be proven dogmatically, all possible implications considered; and any unusual or unsightly or unhealthy effects planned for and banished forevermore. It's a fairy tale standard which just doesn't fit the more grim, real world.

To take that cause and effect just a step forward, look at our educational system. Surely there are others of you besides me who remember the old "Clubs" of high school. Not sororities, but things like "science"

and “future farmers” and “future teachers.” If you wanted to meet boys, you joined the radio club — there were other benefits besides education. Today, these clubs are, for all practical purposes, gone. Teachers belong to unions, and unions control the number of hours teachers teach. After school, teaching is taboo. So, science is covered in class and there’s rarely time for innovation, experimentation, or excitement — the frills that make the subject come alive. In a normal school day, there just isn’t time.

Arizona schools aren’t alone in this dilemma. It’s happening everywhere, Cook assured me. So, as a direct result of this weakened science foundation, and stronger governmental red tape our country’s days as a supreme scientific and technological power are numbered. And the numbers are rapidly running out.

In the last four years, we have witnessed a virtual standstill in U.S. productivity growth. From 1960 to ’76, our output per man-hour in manufacturing has increased more slowly than in any of the other 11 industrialized nations who compete against us. In August, 1979, the Joint Economic Committee of Congress warned that the average American is likely to see his standard of living drastically reduced in the 1980’s unless productivity growth is accelerated.

Call me an alarmist, because I am truly alarmed. Don’t call me an anti-environmentalist, because I am not. And most of all, don’t put me on any Bircher’s lists; for while these are strong statistics, I feel that there are things we can do short of revolution and insurrection. OK. Call me a chicken.

For starters, Cook said begin with the PTA organizations. Meet with your principals and stress the need for science education. Push for more dollars to be spent on these courses. Make a concerted effort to upgrade our state law and fight to have at least two science courses mandatory before high school graduation.

You see, whether you like it or not, our lives are bound up with science. We must learn to understand it; we are living in a technological age, at a time when our ingenuity will be tested further than it has ever been before. We will be called upon to make serious social and moral decisions. And, Cook insists, if we cannot understand them intellectually, we will be making them based upon our emotions. We are surrounded by science. It’s as easy and complex as that. Yet we are closing our eyes to the reality, hoping to fool ourselves by saying that somebody else is minding the store. In truth, business hasn’t been good for a long time, and nobody’s even noticing.

Where can you begin? Start at the school level; then move on to the district. Ask how much money is slated toward science education? Are there ways to reinstate clubs after school? Can we bring in outside speakers in the fields of science? Investigate the science courses offered in high schools. Human behavior has its place, but it shouldn’t squeeze out chemistry and physics.

Ultimately, carry this campaign to the state level through your legislators. We desperately need to give our children a chance to catch up on tomorrow's world. Every day we wait, we fall further and further behind.

Rocketry Workshop

**Robert L. Cannon, Director of Educational Services, Estes Industries
Penrose, Colorado 81240**

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