

OCTOBER 4, 1957

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I remember it well - the day that I believe became the defining moment in science education in this half century. I was in high school. I had a date, of sorts, which in itself was a very rare event. While waiting for her to appear, I heard the announcement. The news was on the television in her parents' living room - and yes, I had heard it correctly: The Russians had successfully launched an artificial satellite. Tracking stations monitored its passing every ninety minutes. It was in orbit. I was in shock. Excited, enthralled, fascinated, and yes, in shock. It is hard to find the words that come even close to expressing the feelings. For the first time in history, man had just broken free of earth's gravity. (That was not really true, of course, but I did not know it at the time.) Just as Isaac Newton had conceived it nearly three centuries previously, if an object was given a high enough initial speed and the proper trajectory, it could be in a continual state of freefall - with the arc of its motion being mirrored by the curvature of the earth. But why was it the *Russians? Where were we?*

That last question, of course, set in motion a transformation in American higher education that is with us still. The immediate reaction, however, was typical of the way we always react to the news of monumental events - especially ones that are perceived as catastrophic. Denial. Those of us that remember November 22, 1963 will forever recall the helpless feeling at the initial news reports of that day - surely it could not be true. It was the twentieth century, after all. And presidents do not get shot in the twentieth century. The reaction to the news of an orbiting Soviet satellite was similar:

It must be a hoax, I thought. Man has never sent anything into space before - at least not outside our atmosphere, certainly not into orbit. Our rockets are not that powerful. Surely their technology is not superior to ours. They must have made the announcement to the world to gain an enormous propaganda coup - to frighten eastern Europe into submission to the great Soviet superpower. But surely it is not true! Of course, how would we ever know? Even the

Russians claim that the satellite is no larger than a grapefruit. How would we possibly know if they are telling the truth? That must be it. They claim to have orbited a satellite - and hence forever will claim to have been first even after we actually accomplish that task. And we will not be able to deny it. But wait - we have tracking stations picking up radio signalsbeep....beep....beep.... exactly as they had said. How did they do that? Could they have also tricked our tracking stations into believing they had detected a signal from an orbiting satellite?

Those were my initial thoughts, as well as those of an entire nation - in fact, of the entire free world! Why? Because this was the very same Soviet nation that tested megaton yield thermonuclear devices - and had only one year earlier rolled their tanks into Hungary - and whose Premier would say on the floor of the United Nations RWe will bury you!S And we all knew that any country capable of placing an object in orbit around the earth - just as the moon is in orbit around the earth - could also launch the very same rockets laden with warheads that could conceivably bury us.

With all of that in mind, I still hoped that the news was true. To me, it was one of the most exciting events imaginable. I did not yet know that I wanted to be a physicist. I had not yet conceived that I would spend my entire adult life at a university. But the idea that man could not only understand why a satellite could orbit the earth, but could also DO it was so intriguing that it drove science education for the next two decades. It drove students to want to participate in the adventure. It drove colleges and universities to revise their science curricula. And it drove the government to increase its funding for both pure and applied research as a way to regain our technological advantage over the Soviet Union. I, and probably most of this countryUs science and engineering faculty, can trace much of our academic and professional interests and opportunities - at least in part - to October 4, 1957.

EPILOGUE: I wrote this on my laptop while listening to Dvorak symphonies on CD. The incredible developments in micro-electronics that make that all possible is a direct consequence of the space race - our nation's need to beat the Soviet Union to the surface of the moon.