Fixing U.S. Education

Amir S. Gohardani

Aerospace engineer Amir S. Gohardani has seen the U.S. education system up close as a graduate researcher and educator at the University of Arizona and the University of Florida. He holds five degrees, including a Ph.D. in aerospace engineering. Having emigrated to the U.S. from Sweden, he now has a personal stake in a vibrant American aerospace sector. He offers some ideas for how to improve the American system.

Global competition has transformed the aerospace domain. China's Chang'e 3 robotic spacecraft achieved its objective on the nation's very first attempt to conduct a landing on an extraterrestrial body. India has a scientific probe headed to the red planet under its Mars Orbiter Mission. With an increasing number of spacefaring nations and an unprecedented investment in aerospace activities, U.S. leadership in this domain is no longer a given. Leadership will require reconsideration of key elements of the country's education system.

Why is it necessary to re-consider a system that has hitherto proved successful at turning out aerospace innovators? The short and concise answer to this specific question is summarized in one single noun: change. Countries around the world are improving the education of their populations, and the U.S. must continue to make positive educational changes too if it wants to retain its aerospace leadership.

To be sure, there has been much progress in the U.S. Over the decades. By 2010, Americans led the nations of the OECD, the Organisation for Economic Co-operation and Development, in average years of education. Americans reported receiving an averaged 13.46 years of schooling, followed by Sweden with 13.40 years. Years of schooling are not all that matters, however. Educational performance and the pace of improvements must be considered against what is happening in competing nations. By that metric, there is much reason for alarm, and noticeably not just in terms of math and science but for reading skills too. Since 2009, American 15-year-olds have slipped from 25th to 31st place in math performance; from 20th to 24th place in science, and from 11th place to 21st in reading, according to the U.S. National Center for Education Statistics. The Nation's Report Card for 2013 was worrying too. Just 36 percent of 8th grade boys and 35 percent of girls scored proficient on the math assessment. Just 31 percent of 8th grade boys and 42 percent of 8th grade girls scored proficient on the reading assessment. Scores have been improving since 1990, but not enough to keep pace with competing nations.

One factor could be that students continue to get a later start in the U.S. than in other nations. The U.S. currently ranks 28th among the OECD nations with regard to the enrollment rates of 4-year-olds in early learning. Investments in early education are still pending.

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Somewhat ironically, despite it all, graduate aerospace programs remain a magnet for international students, which is a tribute to the American culture of freedom and reputation for aerospace excellence and innovation. These students provide a positive learning influence at universities, and they experience a very different culture than that which they came from. But in the end, most of these students will either choose to go home or will be required to do so, and they will take their skills and knowledge with them. This emerging trend is underappreciated. These students have a positive impact, but they cannot form the engine for future U.S. aerospace success. What is the answer? It would be a mistake to artificially limit foreign student participation, because this would harm the learning environment. Instead, ways must be found to equip and encourage more U.S. permanent resident students to participate in these higher level programs together with international students.

Curricula and teaching techniques need to be modernized to keep pace with the constantly modified global education spectrum. In today's dynamic atmosphere, a stagnant approach relying on the curricula of yesterday is unfavorable. New learner-centered techniques should be embraced even more highlight the careers of selected prominent leaders in science and technology and refer to their schooling or college drop-out status as somehow a predictor of success. Undoubtedly, human ingenuity and creativity may flourish even without formal schooling.

But if one considers the major aerospace achievements since the 1960s, highly educated individuals were essential to each. More often than not, those who succeed with limited education do so despite the lack of education, not because of it. Only a tiny percentage of people will succeed in such an unstructured environment, and they could still make that choice if the U.S. were to modernize its education system. These individuals nearly always have more discipline in educating themselves than the rest of society, as they voluntarily invest time and effort in the subjects that interest them, without abiding by formal schooling attendance regulations. A classic example of this kind of dedication is documented from the early days of aviation. Years before their first flight on December 17, 1903, at Kitty Hawk, the Wright brothers widely.

One such technique is explained in an article I wrote with my brother and fellow aerospace engineering doctorate Omid Gohardani, in NASA's Ask magazine, "Attracting Tomorrow's Engineers." Simply put, too many students in the U.S. fear math, and this fear can deflect talented people from the aerospace profession or make others hesitant to pursue their educations at the highest levels. It does not have to be that way. There are ways to make math education more accessible, valuable and memorable to students. Students are more engaged about learning airfoil/wing aerodynamics if they also go to a wind tunnel and watch a wing drop because of stall. Students who are denied such experiences will lack a valuable sense of déjà vu when solving complex engineering problems later in their careers.

No one would question America's history of aerospace achievements through the decades. The 1960s brought us the Boeing 747 and the Apollo missions. The 1970s and '80s gave us the space shuttle, followed by GPS and now unmanned aircraft.

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That history can sometimes mislead casual observers to assume that this record of innovation will continue into the future, no matter how U.S. students perform compared to those in other nations. This belief amounts to gambling with the nation's aerospace future. A related fallacy comes when observers highlight the careers of selected prominent leaders in science and technology and refer to their schooling or college drop-out status as somehow a predictor of success.

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These individuals nearly always have more discipline in educating themselves than the rest of society, as they voluntarily invest time and effort in the subjects that interest them, without abiding by formal schooling attendance regulations. A classic example of this kind of dedication is documented from the early days of aviation. Years before their first flight on December 17, 1903, at Kitty Hawk, the Wright brothers searched for information on aeronautics from their local library. On May 30, 1899, Wilbur Wright even wrote to the Smithsonian Institution (with Samuel P. Langley as a secretary), asking for Smithsonian publications on aeronautics and suggestions for other readings. That Wilbur Wright educated himself at the start of the 20th century should not suggest that this strategy can carry America through the 21st century. A modernized U.S. education system is essential.

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