

## Old Ills, New Remedies: A Conversation with Diane Auer Jones

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**Editor's Note:** *Diane Auer Jones is currently president and CEO of The Washington Campus, a non-profit educational organization dedicated to educating current and future business leaders about the intersection between business and public policy. She has served as Assistant Secretary for Postsecondary Education at the U.S. Department of Education, Deputy Associate Director for Science at the White House Office of Science and Technology Policy, Director of Government Affairs at Princeton University, and as a professional staffer on the U.S. House of Representatives Committee on Science. Prior to her career in science and education policy, Diane was a molecular biologist and professor of biology at the Community College of Baltimore County, program officer at the National Science Foundation, and the founder of several small businesses, including a natural and gourmet food store, a healthcare center, and an environmental biotechnology company.*

**Iannone:** Your lively address at our NAS conference in January showed that you have thought considerably about the state of higher education, and we'd like our readers to hear more of your ideas. For one thing, although you have taught college and worked in various other capacities related to higher education, you do not believe college is for everyone.

**Jones:** I believe that everyone should graduate from high school with the skills necessary to be successful in college, and I believe that socioeconomic

factors should not prevent well-prepared and hard-working students from attending college, and that students who had poor preparation during the K–12 years should have access to effective remedial classes, but I do not believe that a traditional college education is necessarily the only, the most efficient, or the most effective way for all young adults to prepare for meaningful lives and careers. For some students, an apprenticeship program, a certificate program, or a combination of programs may best serve their interests, needs, and learning styles; and there may be some efficiencies achieved and cost savings realized with these other models.

I have three major concerns about “everyone should go to college” messages.

First, when we push students who are socially immature or academically unprepared into college (without also providing good remedial education and support systems), this detracts from the experience provided to those who are ready to work hard and learn. This is especially true when colleges and universities invent all sorts of new majors—sans higher mathematics, foreign language, classical literature, advanced science, or career training—to serve those students who aren’t ready for a rigorous academic experience.

I am also concerned that as more people earn bachelor’s degrees, the best jobs will then go only to those who hold advanced and professional degrees, as we are already seeing in some fields. It is important to maintain the quality of the bachelor’s degree so that it continues to provide value in terms of lifelong learning and employability.

Third, while it appeals to our consciences to envision a society in which everyone has an advanced degree, a high income, and a corner office, I’m not sure that such a society is attainable or sustainable. In reality, there will always be the need for people who build buildings, repair cars, wire electrical outlets, and do all of the other important jobs that keep society running. Many of these jobs require specialized skills, but not necessarily those learned in a classroom or as part of a four-year curriculum. We need to respect individuals in trades and skilled professions, as well as the contributions they make to society. We also need to provide good options—such as apprenticeships, certificate programs, and job training programs—for them to learn the skills necessary to excel in their jobs. The “everybody should go to college” message devalues those who train in other ways to serve in very important and necessary professions.

***Jannone:* Isn't there a lot of data indicating a direct correlation between a college degree and higher lifetime income?**

***Jones:*** Yes, on average the data do predict higher lifetime earnings for college graduates than non-graduates, and substantially higher income for individuals with graduate and professional degrees as compared to those with no college or only a bachelor's degree, but we need to be careful how we use those data. Nothing makes me more frustrated than when we promise students a million dollars in added income if they go to college. It is true that in 2002, the U.S. Census Bureau determined, using synthetic estimates of work-life earnings, that a person with a college degree would, on average, enjoy a million dollars in added earnings across a lifetime. But this estimate does not guarantee that an individual will make a million dollars more across a lifetime, and the report very carefully points out that even among college graduates, lifetime incomes are highly variable across professions. An engineer with a bachelor's degree will significantly out-earn a teacher.

The report also does not distinguish between lifetime earnings for skilled versus unskilled workers in the category of non-college educated. There is a vast difference in earning potential between a licensed electrician and a minimum-wage fast food worker. In fact, a skilled plumber, electrician or contractor is likely to out-earn a college educated engineer. The point is that people increase their earning potential—and potentially their level of job satisfaction—by gaining a skill and/or earning a postsecondary credential, but we cannot guarantee an increase in income of a million dollars just because someone completes a traditional four-year college degree.

Students need to understand that higher education is about a lot more than just increased earning potential, which means that sometimes the adults in charge need to require students to take hard classes that we know will enrich their minds and serve them well in the long run, even if the class doesn't directly boost earning potential on graduation day. We also have to make sure that students understand that the million dollars in added earnings may come very late in their career, and not during the early years when they are paying back large student loans. I don't see the government bailing out students who took on too much student loan debt, yet few of this year's college graduates will find those million-dollar jobs they were promised. Keep in mind that unlike bad mortgages and bad corporate debts, student loans cannot be included in bankruptcy proceedings and there are no short sales on student loans.

***Iannone:*** What do you think of President Obama’s exhortation that every American take at least a year of post-high school education, whether it be through an apprenticeship, vocational training, or at a two- or four-year college?

***Jones:*** I am glad that President Obama is validating apprenticeship and vocational training programs as important and legitimate alternatives to a traditional four-year degree. However, I’m not sure that career and vocational training must necessarily take place in a postsecondary context, or that a year is a sufficient period of time to complete this type of training. We may see real benefits in reinvigorating high school vocational training and apprenticeship programs, or in exploring new dual enrollment opportunities that allow all students, not just “A” students, to complete a postsecondary credential while still in high school. I would also emphasize that vocational training and college preparation need not be an “either/or” proposition. Students in vocational and apprenticeship programs can also be developing the academic skills necessary to succeed in a traditional college program as well.

I speak from personal experience. The best thing I ever did in high school was drop out of the college express curriculum and enroll in a vocationally-focused cooperative education program. I spent the last years of high school taking a few morning classes and then working the 3:00 to 11:00 shift as a nursing assistant at the local hospital. I learned valuable workplace and social skills, surrounded myself with wonderful mentors and teachers, and still gained the academic skills I needed to be very successful in college.

I worry about the “at least a year” message, since colleges and universities are penalized when students leave without earning a degree. The data show, too, that student loan defaults are highest among non-completers, which may mean that a year of college may not lead to better career outcomes. My preference would be to encourage the completion of a credential rather than focusing on chronological targets.

***Iannone:*** President Obama has also called for the U.S. to lead the world in the number of college graduates by 2020.

***Jones:*** I’m not sure that such international comparisons are terribly meaningful for any of the countries involved. A country could have very high college participation and completion rates, but that says nothing about

the quality of the educational experience, the population of students served, or the impact of that education on overall employment or individual quality of life. We learned a few years ago that China was out-producing the rest of the world in the total number of engineers, but as we examined the data more closely, we realized that many of those engineers received training that would not meet the standards of U.S. accrediting bodies and that many Chinese “engineers” are working in unskilled jobs. My preference would be to focus on maintaining the quality of the U.S. higher education system and increasing the number of options we provide to all young adults, rather than focusing on international comparisons that may not be relevant to the U.S. economy and labor market.

***Iannone:* It seems that the European countries actually do better than the U.S. at providing more vocational options that don’t require university training. Would you agree?**

***Jones:*** I believe that the European countries do a much better job of providing vocational training, much of which begins during their equivalent of the high school years. Some criticize the European system because it culls students at a very young age, sending some on to college and relegating others to trade professions. I would agree that a child’s performance at the age of eight or nine should not determine his destiny, but the Europeans, on average, do have an excellent system to educate and train people in various trades and skilled crafts fields. Most important, perhaps, Europeans seem to value skilled artisans much more highly than do Americans, and the quality of their products, efficiency of their rail system, and longevity of their built environment speaks to the high return on such an investment.

***Iannone:* You have worked on federal student aid programs. What do you think of Obama’s proposal to make permanent a \$2500 a year tax credit per family for college costs, and to create a Social Security-level entitlement of \$5,500 per year, indexed to inflation plus 1 percent, for financially needy people who wish to attend college?**

***Jones:*** President Obama intends to do this through increased Pell funding, and I am supportive of that, just as I supported President Bush’s similar request to Congress to increase funding for this program. However, I am very concerned about moving the program from the discretionary side of the budget to the mandatory side. The annual budget process brutally pits good

programs against each other for limited resources. For example, appropriators have to decide each year between giving money to the Pell program or to the National Institutes of Health, since both are funded in the same appropriations bill. These sorts of decisions are hard—even painful.

But moving Pell to the mandatory side of the budget joins it to Social Security, Medicaid, and Medicare as an entitlement program, and essentially punts the really hard budget decisions to Congresses of the future. Current incumbents can appeal to voters by saying that they increased funding for the Pell program, but future Congresses will have to make even harder decisions as entitlement programs and interest payments eliminate the discretionary budget altogether. Keep in mind that the discretionary budget funds priorities such as highways and transportation, energy development, scientific research, K–12 education, community police programs, food and drug safety, emergency response, and national security, to name just a few. Congress should increase funding for the Pell grant program, but should do so by setting priorities and making hard decisions as part of the annual budget process rather than by contributing further to the entitlement train wreck that all agree is in our near future.

President Obama has said that he will pay for Pell increases by eliminating the Federal Family Education Loan (FFEL) program and expanding the government-run Direct Loan (DL) program for student and parent educational loans. While the DL program may be less expensive to the taxpayer (although not as much less as the Congressional Budget Office has estimated since the CBO estimate does not include the cost of administering the larger DL program, nor does it include the cost of borrowing the \$300 billion required to make the loans in the first place), it is clearly much more expensive for the individual student or parent since Congress sets interest rates and origination fees for all participants in the DL program. There are no benefits for students and families who have good credit scores and many loans in the DL program are at interest rates well over 8 percent.

We must also acknowledge that while some FFEL lenders have behaved badly and all have enjoyed generous government guarantees for the non-secured loans they make, they have enabled millions of low- and middle-income individuals to attend college. These lenders have also achieved dramatic reductions in borrower default rates due to improved consumer counseling and customer service. In addition, many have used their profits to establish scholarship and college-readiness programs, which have benefited

thousands if not millions of students. Eliminating the FFEL program may save the taxpayer money (although the government will have to borrow billions of dollars from somewhere to make the loans in the first place), but it also means the elimination of even more jobs, the shutting down of yet another industry, and the elimination of many good scholarship and college-preparation programs that benefit students. Beyond that, I am concerned about the ability of a government-run monopoly to provide the kind of efficiency and customer service that private lenders provide. But maybe I'm jaded by my recent experiences at the U.S. passport office and at my local post office.

***Iannone:* You taught microbiology, anatomy, genetics, environmental science, and more for ten years at the Community College of Baltimore County. In your conference address you spoke highly of the work community colleges are doing and indicated that we could be putting more effort into improving them.**

***Jones:*** I firmly believe that community colleges are the crown jewel of our higher education system, given the number and diversity of students they serve, the quality of the educational opportunities they offer, and the low cost at which they provide outstanding academic and support resources. Community colleges serve all kinds of students, of all ages and backgrounds, and while they provide important remedial education opportunities, they just as frequently provide advanced education for career changers and professionals. Community colleges are not only fine institutions of vocational and technical learning, but also critically important institutions of liberal arts education—especially among future teachers, healthcare providers, and even scientists and engineers.

Unfortunately, we have done little at the federal level to help community colleges fulfill their mission. For example, despite the \$3.2 billion dollars spent each year on federal grant programs to improve math and science education, only one program with a budget of less than \$50 million specifically focuses on improving community college math and science education programs (and at that, the funds are limited to science and math technician training programs). This seems foolish given the large number of teachers who take their only college math and science courses at community colleges.

Beyond starving these institutions, we also don't help community college students access the financial assistance they need to complete a credential. For example, while the Pell Grant maximum covers about 70 percent of the cost of

attending a community college, disproportionately few low-income community college students actually qualify for Pell Grants because they attend part-time or work a significant number of hours to help support their families. This and other aspects of the Pell eligibility determination need to be corrected by Congress.

***Iannone:* You have also held posts in the federal government concerning higher education and served as Assistant Secretary for Postsecondary Education in the Department of Education (DOE) under Margaret Spellings in the administration of President George W. Bush. Do you think the federal government can play a beneficial role in higher education?**

*Jones:* I really enjoyed serving at both the Office of Science and Technology Policy and at the DOE. On the issue of higher education, I learned that a great deal of agreement exists among stakeholders, policymakers, elected officials of both parties, and college administrators about the importance of higher education and the challenges our higher education system faces. However, fixing some of the problems is an extraordinarily expensive proposition, and finding the money to implement solutions is very difficult given the various competing demands for federal resources. The disagreement on Capitol Hill isn't so much about "whether" we should pay or "how much" we should pay; instead, it concerns "whom" we should pay and "how" we should pay. For example, it costs billions of dollars to increase the Pell grant maximum award by \$200, but I'm not sure that \$200 is enough actually to make a difference in retention and graduation rates for recipients. While I support an increase in the Pell maximum award, I think there may be other ways to structure the entire Pell program to make better use of the resources available and to yield higher graduation and completion rates among recipients.

As the assistant secretary for postsecondary education, I served as a federal regulator, and quickly concluded that the federal government plays far too large a role as a regulator of higher education. The only legitimate link between the government and higher education is through the Federal Student Aid program, yet hundreds of regulations that have nothing to do with student financial aid, fiscal accountability, or even educational quality are imposed upon colleges and universities, just so the students attending these institutions can use federal aid dollars to help pay tuition. Many of the regulations also extend to the entire student body and not just to those students who receive federal aid.



For example, colleges must now file missing person's reports and notify family members when a residential student is away from his or her dorm room for more than twenty-four hours, without reporting in advance that he or she will be away. While everyone wants to know that their children are safe at college, I'm not sure that the college should be responsible for monitoring students' dormitory attendance, and I'm positive that student babysitting has nothing to do with financial integrity or good use of taxpayer dollars delivered through the Federal Student Aid system. It will cost colleges and universities, as well as local law enforcement agencies, a great deal of money to follow up on students who are simply sleeping in rooms other than their own (shockingly, college students do this from time to time) or who are on a typical (and sometimes unplanned) college road trip.

I believe that government regulations contribute significantly to the rising costs of higher education and yet there is no evidence which, if any, of these regulations actually yields the intended benefits. I would like to see a scientific determination of the cost and benefits of each higher education regulation, and I would like to see institutions bill students separately for regulatory compliance costs (rather than including them in tuition and fees) so that students, parents, and taxpayers realize the true costs they bear as a result of the regulations that we as citizens seem to demand. Some regulations are absolutely necessary, but hundreds of unnecessary regulations are increasing the cost and having no positive impact on the quality of higher education.

***Iannone:* You also worked as head of government affairs for Princeton University. Why does a private university need such coverage in Washington? What can you tell us about that and your experience with Princeton in general? Princeton professor Robert George has become one of the few beacons of possibility for traditional teaching and scholarship in the contemporary university. Too bad there's only one of him.**

***Jones:*** I feel very fortunate to have had an opportunity to work at Princeton and to learn more about the structure, function, challenges, and opportunities associated with elite institutions. The experience helped me understand that while the academic programs and opportunities at the Ivies may actually be quite similar to those at state colleges and universities, the access to resources, leaders, and networks is extraordinary and well worth the price of admission. I have never seen anything like the Princeton alumni network, and I have never

met a group of people more willing to help their own be successful than the Princeton faculty and staff. However, it is unsettling to me that institutions like Princeton practice a form of aristocratic meritocracy that not only cautiously and fervently rations admission to the club (based on the institution's narrowly-defined preferences and values), but then seeks to guarantee lifelong privilege to its members, often times at the expense of others who are equally capable but lack similar institutional pedigree. Keep in mind that Princeton denies admission each year to thousands of top students.

My job was to help Princeton fulfill its education and service mission by making available to policymakers the rich knowledge and academic resources of the faculty. For nearly any policy issue, there is an expert at Princeton who has topical expertise and data to inform the debate. My job was to connect experts to policymakers to enable good decision-making.

In addition to advancing the social good, there were also myriad other policy issues that directly impacted the business of higher education. Princeton actively provided expert advice and testimony on a full range of issues, including immigration policy, intellectual property rights, tax policy, federal student aid, federal funding for scientific research, and energy sciences research.

I also played a small role in institutional advancement because many Princeton students want to pursue careers in policy and government, and because many of Princeton's most successful alumni are situated in Washington, DC. Relationship-building and education are the key jobs of a government affairs professional, and no organization in the world understands that and leverages its relationships better than Princeton.

Perhaps Professor George is unique in that his political views are the focus of his scholarship, not adjunct to it. Students can easily acquaint themselves with his scholarship before signing up for his class, and Professor George has a reputation on campus for challenging all of his students to defend their own viewpoints rather than adopting his. This is in contrast to other professors for whom political ideology may be adjunct to the focus of their scholarship, who may communicate their biases through subtle cues and signals rather than scholarly works, and who may demand conformity to a single set of viewpoints rather than scholarly debate and defense of a range of views.

I believe that there are still institutions in this country that focus on academic excellence and traditional scholarship. For example, St. John's College (in Annapolis and Santa Fe) is a remarkable institution that continues to provide traditional scholarship and rigorous undergraduate education, by requiring that

all of its graduates complete coursework in literature, advanced mathematics (all students take eight semesters), laboratory science (all students take six semesters), and two foreign languages. There are no “easy majors” that allow students to slide through St. John’s without the required four semesters of calculus and demonstrated proficiency in Greek and French.

***Iannone:*** You implied before that there is a kind of natural diversity present at community colleges, and you have expressed some disdain for the aristocratic approach at places like Princeton. What do you think of Princeton and other selective schools using preferences to enroll more minorities? Just another thin layer added to the hierarchy of elites meant to govern us all?

***Jones:*** While Princeton students are brilliant and have a great deal to offer as future world leaders, my concern with the aristocratic approach of the elites is that it advances the notion that those who make it through the Ivy admissions process (with its narrow focus and particular set of values) are entitled to lead, while others are relegated to a lifetime in the category of “follower.” There is a benefit to having our leaders come from a diversity of backgrounds and experiences, including a variety of educational experiences.

Community colleges reflect the world around us, and so students who earn their education at these institutions, in my opinion, have learned to value diversity and collaboration through experience rather than mandates or admissions directives. At community colleges, students tend to integrate naturally into groups that are focused on particular interest areas, whereas my observation at Princeton was that despite the institution’s efforts to increase diversity, the campus was a collection of self-segregating groups rather than a body of fully integrated peers and colleagues. The diversity on community college campuses, which includes racial and ethnic diversity, as well as age diversity and socioeconomic diversity, enriches the educational experience in ways unimaginable to those who have spent their lives on pristine campuses full of hand-picked traditional college students.

There is a benefit to having students on a campus reflect the general diversity and background of the community in which it exists. But if we are to call the college admissions process a meritocracy, then we should administer it as one. It is reasonable to provide some degree of flexibility within the meritocracy to enable admissions officers to look at individuals in a way that levels the playing field, for example, for a hard-working student who couldn’t

afford to take an SAT prep course or attend a school that offers AP or IB (International Baccalaureate) classes. However, I'm not sure that preferences are valid when they are given to an entire group of people, based on assumptions that may prove to be false for many in the group, as opposed to individuals who may have actual circumstances that call for special considerations or allowances.

I'm reminded of a good friend who laughs about the fact that he grew up in southern California with blond hair, blue eyes, and surrounded by affluence, yet enjoyed a college scholarship as a result of his Hispanic surname (his great-grandfather was from Puerto Rico). It is clear that my friend did not need a scholarship to attend college, and that he had not been disadvantaged in any way during his youth, yet there were many low-income students who did need scholarship assistance and did not receive it either because they were not part of a preferred racial or ethnic group or because they were part of the preferred group but couldn't compete with the more advantaged students who were also part of that group. I am equally bothered by admissions preferences that favor athletes over non-athletes, legacy kids over first-generation college students, first-generation college students over non-legacy second-generation college students, students from the Midwest over students from the East Coast, students from southern Virginia over students from northern Virginia, students who pay higher out-of-state tuition rates over those who pay in-state rates, etc. The admissions game is unfair and ugly...yet we pretend that it is a pure meritocracy. Perhaps this is why I love community colleges so much. They provide opportunities to everyone and produce outcomes based on the quality of instruction, not on the keen eye of their admissions team.

***Iannone:* What did you think of some of Margaret Spellings's initiatives as Secretary of Education? She ran something called the "Academic Competitiveness Council." She gave the American Academy of Liberal Education (AALE), which of course had its genesis in the National Association of Scholars, rather a hard time of it. And she promoted something that Peter Wood protested as highly inappropriate for higher education—outcomes assessment for college graduation.**

***Jones:*** I was heavily involved in the work of the American Competitiveness Council and feel that it was an excellent and necessary effort to show just

how much the U.S. is spending to improve math and science education, and how little systemic success we have had in making progress. We learned that a great many federal agencies spend a great deal of money, and that every grantee claims to have had wild success, but few results met a rigorous standard of evidence, were reproduced by others, or were tested at full-scale. The study illustrated the need to move away from a funding model in education that favors constant change and innovation instead of the more traditional scientific research approach in which one investigator reproduces the results of another, and then builds upon that result, adding incrementally to the body of knowledge in a linear way.

I admire and support the work Secretary Spellings was doing to help parents and students understand that current college rankings are not based on empirical data or anything that qualifies as evidence, but instead on the opinions of others in the field, which is tied largely to an institution's reputation and marketing efforts, as well as its skill in fundraising and expanding the admissions pool. All of this was intended to help students and families make informed decisions about the investment of their hard-earned tuition dollars. Unfortunately, some who were advising her on how to provide alternatives to the current rankings had a far too simplistic view of higher education—and perhaps a disdain for the institution—and were looking for nonexistent quick and easy answers.

With regard to AALE, I do not believe that Secretary Spellings is against liberal arts education, especially since she spends a considerable amount of her own money to send her daughter to a fine liberal arts institution. The regulations regarding accreditation disallowed me from discussing AALE or any other accreditor directly with Secretary Spellings, and quite frankly, gave others in the DOE too much power to manipulate the documents and recommendations that Secretary Spellings would ultimately review when making her decisions. I found substantial evidence that AALE had been held, by individuals far below the Secretary's level, to a separate, unpublished, and unauthorized set of standards and I worked to correct that. In the end, AALE developed what I believe to be the most thoughtful, rigorous, and effective institutional evaluation plan of any accreditor, but the process revealed significant weaknesses in the accreditation regulations, which I hope will be remedied in the future.

***Iannone:*** Lawrence Summers got into a lot of trouble with the few words he uttered about the possibility that more boys than girls scoring at the top of math and science tests in high school might account for some of the disproportion of men versus women in the higher echelons of those fields. The implication was that the disproportion might not be due to socialization but to innate ability. What was your reaction to what he said and, perhaps more important, what was your reaction to the reaction, especially from feminists and women in science? Were you surprised to see even outstanding female scientists like Shirley Tilghman failing to come to Summers's defense, on the grounds that what he was saying did have a basis in empirical study, or on the grounds of academic freedom, or both?

***Jones:*** I think very highly of Larry Summers and admire his willingness and ability to do exactly what leaders in higher education should do—challenge the status quo, overturn the dogma, ask provocative questions, and offer hypotheses that stimulate new dialogue and spark research that seeks new solutions to age-old problems. A review of the transcripts of the fateful speech will show that Dr. Summers offered three hypotheses to explain the participation gap between men and women in some fields of science and engineering—two of which advanced the favored hypotheses (that women fail to participate because of discrimination or negative socialization or that they elect to pursue less demanding careers so that they have more time for family) and one which questioned whether or not innate differences exist in terms of aptitude or preferences that lead women to pursue different career options than men.

I don't think that Dr. Summers was saying that women aren't as smart as men or aren't as capable of being good physicists and engineers. His choice of the word "aptitude," as opposed to "intelligence" is key. In fact, he talked about his own daughter as someone who was highly capable in math and science, but seemed to lack interest in pursuing a career in either area. I think what he was saying is that it could be that men and women, on average, are interested in applying their abilities in different ways, to solve different problems and pursue different options. If this is true, then there might be ways to teach science and engineering or develop career pathways that are more inviting to women.

I would point to Marie Klawe's work as anecdotal evidence that Dr. Summers may well have been on the right track. In her work, Dr. Klawe found that engineering persistence was much higher among all students, and especially among women, when she engaged them early in their educational careers in real-world applications of engineering, and in particular when those applications of engineering were seen as contributing to humanity. I am not embarrassed if someday a researcher determines that women are more compelled to pursue engineering careers if they can apply their skills to help humanity, as opposed to building a faster race car. And, yes, I do acknowledge that some women are attracted to engineering precisely to design faster race cars!

Even if the hypothesis is refuted—although brain imaging studies would suggest that women *do* process information and solve problems using different brain centers than men, and aptitude tests *do* reveal a higher percentage of men than women in the top scores in mathematics (although we don't know if this is cause or effect)—I still think Dr. Summers's hypotheses are worthy of consideration if the research results help us improve participation rates of women in the sciences (and men in nursing and education, fields in which men are underrepresented). Larry didn't offend me.

I was, however, offended by the reaction of Nancy Hopkins, whose behavior and statements essentially set women back thirty years and validated all of the negative stereotypes women of my generation have been trying desperately to fight. She stormed out of the room because she didn't like Dr. Summers's hypothesis, and then I heard her tell a reporter that she almost fainted. Is fainting the reaction typical of a reasoned scientist? Let science prove Dr. Summers wrong, or right, but save the fainting for some other venue.

I don't know what Dr. Tilghman thought about Dr. Summers's speech, but in the world of capital campaigns and political correctness, there is nothing to gain and everything to lose for a person in her position to defend someone as controversial as Dr. Summers. As a scientist, I realize the need to ask questions and accept answers that are counter to my personal beliefs and even conventional wisdom. Remember that there was a time when scientists produced "evidence" that the sun revolved around the earth.

***Iannone:* As a result of Summers’s remarks, there are major efforts now to increase the representation of women in science and math. What do you think of them and of the objective in general?**

***Jones:*** These sorts of efforts—supported largely by the National Science Foundation—have been going on since the 1980s, largely as a result of the excellent work of Dr. Camilla Benbow, who studied test scores and educational patterns among highly able boys and girls beginning in the 1970s. However, success in achieving gender parity in computer science, some areas of the physical sciences, and engineering has been marginal and incremental at best. Despite significant federal as well as state and institutional spending on programs that provide special incentives, opportunities, and experiences for women in mathematics, engineering, and the physical sciences, we have had only minimal success in increasing participation by women in these fields. In fact, although I am not necessarily suggesting that a causal link exists, about the only major change in enrollment patterns in those fields during the years we were investing so heavily in women in science is a precipitous decline in the number of American men pursuing education and careers in some of those fields, many of which are now dominated by international students at the graduate level.

Given the demographics of most graduate programs in physical science and engineering, I think the question needs to be expanded not only to explore why women don’t seem to be participating in these fields, but why American students (of both genders) don’t appear to be interested in these fields.

We did reach gender parity in medicine and the life sciences decades ago (although not yet in top positions, such as in the rank of full professor), so perhaps we can learn something about how and why women were attracted to these demanding fields instead of physical science and engineering.

I do think that there are benefits to having both men and women participate in all professions—engineering, physical science, nursing, and education, to name a few. However, there is a difference between cultivating gender balance and forcing it.

***Iannone:* Regarding the gender parity in medicine and life sciences that you say we reached some time ago, would that be attributable at least in part to affirmative action and preferences for women?**

***Jones:*** While early on preferential treatment of women in the admissions process may have resulted in increased participation by women in medicine



and biology, the “success story” can’t be fully attributed to preferential treatment, since such treatment has not had similar success in engineering or the physical sciences. Perhaps medicine was the next logical step for women who had served as nurses for as long as there have been nurses. Perhaps women saw biology as the pathway to medicine, so enrollment of women in biology programs increased as women had greater opportunities in the field of medicine. Or perhaps there is something about biology and medicine that is seen by more women as being compelling or appealing than engineering. Or maybe it is the fact that biology and medicine are less focused on applications of advanced mathematics that makes these fields more attractive to women than physical science or engineering (which then reopens questions about women and math, nature versus nurture, and socialization and opportunity versus innate aptitude and ability, and so on).

***Iannone:* You have worked in the White House Office of Science and Technology and in other projects related to these fields. Science and math education in general seems to be less than optimal in this country. We import large numbers of doctors, engineers, and scientists. Third World countries seem to offer better math and science education than we do! Would you agree?**

***Jones:*** I don’t think we can evaluate the science education provided by other countries by looking only at the individuals who come to the U.S. on an H1-B visa to work in the science and technology industries. There are cultural differences in countries like India and China, where parents understand that the “way up and out” for their children is through a career in science and engineering, whereas for Americans, the way “up” is seen as the more lucrative fields of medicine, finance (at least prior to 2009), and business.

For better or worse, money and lifestyle speak to American students. Think back to the 1990s, when the dot-coms introduced a new lifestyle for the IT industry and interest on the part of American students soared. If we want American students to be interested in science and mathematics, we certainly need to give them a stronger foundation in mathematics during the K–12 years, but we also need to ensure an ample supply of high-paying jobs in those areas (and by jobs I don’t mean lifelong post-doctoral positions or soft-funded research positions), and we need to understand what about the lifestyle of scientists and engineers seems unappealing to young people.

In the area of mathematics, I do believe that most other countries do a much better job of educating students than we do. I attribute our mathematics education decline largely to the initiatives advanced by the National Science Foundation (NSF) back in the 1980s. With good intentions but no scientific evidence, the NSF decided that the way to solve the achievement gap in mathematic performance between minority and white students was by developing a new way of doing and teaching mathematics that focused not on computational ability, mastering standard algorithms, or getting the correct answer, but instead on inventing new algorithms, being able to translate the language of symbols to the language of words, and having “fun,” regardless of the ability to determine the correct answer. In the end, this new math only further widened the divide, as students who could afford outside tutoring developed skills to outperform students who were stuck with what their school provided them.

I recommend reading the report of the National Mathematics Advisory Panel to learn more about the mythology upon which the last thirty years of math education has been based, as well as efforts to return to empirically-based mathematics instruction.

***Iannone:* It sounds analogous to the whole language approach to teaching reading, which unfortunately displaced phonics, except where old-fashioned teachers clung to that proven method.**

***Jones:*** Yes—the new math people took their cues from the whole language people and further destroyed a whole generation of young people on the grounds of falsely stated claims of “research shows.”

***Iannone:* Thank you so much for sharing your experience and insight with us. Your remarks have been eye-opening; I think they will prove enlightening and useful to our readers.**