

Bill Gates: Testimony before the Committee on Science and Technology, U.S. House of Representatives

Remarks by Microsoft Chairman Bill Gates before the Committee on Science and Technology
United States House of Representatives
Washington, D.C.
March 12, 2008

MR. GATES: Thank you. It's a privilege to be here. Chairman Gordon, ranking member Hall, members of the Committee, I'm Bill Gates and I'm the chairman of Microsoft. With my wife, Melinda, I'm also the founder of the Bill & Melinda Gates Foundation. And it's an honor to be here to commemorate your 50th anniversary.

During these 50 years incredible advances in science and technology have revolutionized the way people around the world communicate, run business, find information and much more. I'm optimistic that over the decades ahead, information technology will continue to transform business productivity and have a profound positive impact on our day-to-day lives. It will also help us address important global challenges related to education, healthcare, energy, and other issues.

Many of the key advances of these 50 years were pioneered by researchers working in U.S. universities and for U.S. companies. U.S. pre-eminence in science and technology and this nation's unmatched ability to turn innovation into thriving business have long been the engine of job creation and the source of our global economic leadership.

I know we will want the U.S. to continue to be the world's center for innovation. But our position is at risk. There are many reasons for this but two stand out. First, U.S. companies face a severe shortfall of scientists and engineers with expertise to develop the next generation of breakthroughs. Second, we don't invest enough as a nation in the basic research needed to drive long-term innovation.

If we don't reverse these trends, our competitive advantage will erode. Our ability to create new high-paying jobs will suffer.

Addressing these issues will take commitment, leadership, and partnership on the part of government, private, and non-profit sectors.

Let me start by saying that business has a critical role to play. The private sector must contribute to building a workforce that has the skills to innovate and compete. That's why Microsoft is committed to improving educational quality and encouraging young people to study math and science through programs like Partners in Learning, which has reached more than 80,000 teachers and 3 million students.

Non-profit organizations also have an important role to play. The Bill and Melinda Gates Foundation, for its part, has invested almost \$2 billion to help establish or improve nearly 2,000 U.S. high schools, and provided over \$1.7 billion for college scholarship programs.

But organizations like these cannot address the issues alone. Only government has the resources to effect change on a broad scale. If this nation is to continue to be the global center of innovation, Congress, the current administration, and the next president must act decisively.

It starts with education. Today, graduation rates for our high school students and their level of achievement in math and science rank at the bottom among industrialized nations. Thirty percent of ninth-graders and nearly half of African-Americans and Hispanic ninth-graders do not graduate on time. Fewer than 40 percent of high school students graduate ready to attend college.

As a nation, we must have a fundamental goal that every child in the U.S. should graduate from high school prepared for college, career and life. To achieve this, we need metrics that reflect what students learn and the progress they make. Such metrics may be difficult to develop, but they provide the essential foundation for deciding which programs best improve outcomes in our public schools. Better data will also help us identify the most effective teachers, and adopt better policies for recruiting, training and retaining these teachers for our public schools.

If the problem with high schools is one of quality, the issues at our universities is quantity. Our higher education system doesn't produce enough top scientists and engineers to meet the needs of the U.S. economy. According to the Bureau of Labor Statistics, we are adding over 100,000 new computer-related jobs each year. But only 15,000 students earned bachelor's degrees in computer science and engineering in 2006 and that number continues to drop.

One of the most important steps Congress can take to address this problem is to fully fund the America COMPETES Act. Introduced by this Committee, this act would significantly increase funding for the National Science Foundation's Graduate Fellowship and Traineeship programs.

As bad as the disparity between supply and demand looks, these numbers understate the severity of the problem. Today, our university computer science and engineering programs include large numbers of foreign students. In fact the science and engineering indicators report showed that 59 percent of doctoral degrees and 43 percent of all higher ed degrees in engineering and computer science are awarded to temporary residents. But our current immigration policies make it increasingly difficult for these students to remain in the United States. At a time when talent is the key to economic success, it makes no sense to educate people in our universities, often subsidized by U.S. taxpayers, and then insist that they return home.

U.S. innovation has always been based, in part, on the contributions of foreign-born scientists and researchers. For example, a recent survey conducted by several universities showed that between 1995 and 2005, firms with at least one foreign-born founder created 450,000 new U.S. jobs. Moreover, as a recent study shows for every H-1B holder that technology companies hire, five additional jobs are created around that person.

But as you know, our immigration system makes it very difficult for U.S. firms to hire highly skilled foreign workers. Last year, at Microsoft, we were unable to obtain H-1B visas for over a third of our foreign-born candidates.

An example is the story of our Arpit Guglani, a talented young man who graduated from the University of Toronto. He graduated in 2006 and we offered him a job, but he has not been able to obtain an H-1B visa for two straight years and we were forced to rescind his job offer. He's exactly the type of science and engineering graduate that we need to continue to add jobs and drive innovation.

There are a number of steps that Congress and the White House should take to address this problem, including extending the period that foreign students can work here after graduation, increasing the current cap on H-1B visas, clearing a path to permanent residency for high-skilled foreign-born employees, eliminating per-country green card limits, and significantly increasing the annual number of green cards.

I want to emphasize that to address the shortage of scientists and engineers, we must do both -- reform our education system and our immigration policies. If we don't, American companies simply will not have the talent they need to innovate and compete.

Finally, we must increase our investment in basic scientific research.

In the past, federally funded research helped spark industries that today provide hundreds of thousands of jobs. Even though we know that basic research drives economic progress, real federal spending on research has fallen since 2005. I urge Congress to increase funding for basic research by 10 percent annually for the next seven years. I fully support Congress's efforts to fund basic research through the American COMPETES Act.

I believe the country is at a crossroads. For decades innovation has been our engine of prosperity. Now economic progress depends more than ever on innovation. Without leadership from Congress and the President to implement policies like those I've outlined today and the commitment of the private sector to do its part, the center of progress can shift to other nations that are more committed to the pursuit of innovation.

I'm going to conclude by again congratulating the Committee on its 50th anniversary, and to thank you for this opportunity to share my perspective. I'd be happy to respond to any questions you may have on these topics.

CHAIRMAN GORDON: Thank you, Mr. Gates. And I now yield myself five minutes.

I went the other day to a rollout with OECD (Organization for Economic Cooperation and Development) on -- they had a report called the PISA Report on education of 15 year-olds, and mainly the EU countries and the United States. As usual, we do very poorly there. And I was trying to find some common denominators. Really it was Finland that almost just overhauled their whole education system a few years ago, which has overhauled their whole standard of living and improved it on a national basis. And I was trying to, you know, get common denominators, you know, what are the things they do?

And they really emphasized that they want to have national standards, but they want to have a contract in essence with the students, the parents, and the student to work in whatever is the best way to get there. So there wasn't just one common road. And in your testimony -- and let me say to those folks -- I know there are a lot of people that couldn't get in today -- and Mr. Gates shortened his testimony, but it really is -- his full testimony is going to be on our website, www.housegovernment.com, which is an award-winning website. You can find links to a lot of other things. But I think that it really will be beneficial if you want to read his full scale of work. You'll learn a lot more than was just said there.

And in your statement when you talked about secondary education, he talked about transparency. He talked about having student performance data as formation of measures for impact in making decisions and also developing that national scope. And this -- I want to see if you could help me get through this -- is that our teachers now are concerned that they have these national tests, that they're having to teach to the test and other things are falling off the table. From what you've seen and studied and around the world, how do we best combine those standards so you can measure teachers, students and their

success versus the problem of just teaching to the test?

MR. GATES: Well, the tests largely are about fundamental skills, math skills and reading skills. And these are exactly the qualifications that employers are interested in people having. And if you look at the other nations that do well on PISA, they're very serious about viewing tests as the metric and then looking at individual teachers, at schools, at systems, based on how those test results are coming about. The United States and PISA we're actually among the best at the 4th-grade level, we're in the middle at the 8th grade. It's only by senior year that we drop to the bottom of those results. And so clearly in the high school period, there's some level of rigor that exists in these other nations' systems that isn't as strong in our systems. The background of the teachers, comparing techniques.

And so we would say that data that look at these results and learning from that data is of great importance. In fact, there is funding for these data systems that are part of the America COMPETES Act. You know, we are gathering more data as a country. That's a great thing. Now there's a tendency when that data doesn't come out well to say, "Okay, who's problem is it?" and even a temptation to say, "If the data are so bad, let's stop testing, because it's really depressing to keep looking at these numbers. In fact, the amount of investment required to fix those numbers is very high, and it's a top problem. Where do you get the local, state, and federal level the resources to do those things?"

But, you know, I don't think reducing the availability of the data and understanding that data really is the right way to go.

CHAIRMAN GORDON: When you mention depressing, what is, I think most depressing about that, is that our students in the elementary level come out pretty well. Then at the middle school not quite as well. And then it starts to fall off the table in high school. And I think what we're talking about is not trying to produce just a lot of elite Ph.D.'s, but rather those folks who are the high school graduate or junior college or college graduate that can work at that higher technological level.

And as we looked into it, what we found was that on the middle school level, 63 percent of the math teachers have neither a certification to teach math or do they have a degree in it. Ninety-three percent of the physical science teachers have neither certification or a degree. So it's hard to be able to teach something that you don't have that core background, as good a teacher as you might be. And that's one of the things we want to try to do in COMPETES.

I'm from Tennessee and the home of country music, and we say that, you know, the song all starts with the words, and I think school all starts with the teachers, and we're going to try to get a better educated teacher.

As I looked over your resume, I noticed I got a little bit of a head start, but we're somewhat contemporaries in terms of age. And you think of Bill Gates as a sort of measuring stick not too many people measure up to well. So I was trying to look at common measures here. I notice that you are a billionaire and I'm not.

(Laughter.)

CHAIRMAN GORDON: I notice that you're a college graduate, and you're not.

(Laughter.)

CHAIRMAN GORDON: But also noticed that we both have 7-year-old daughters, and I suspect you're a little bit obsessed, as I am, in making sure that she gets the best education so that she can be able to compete.

And as we were growing up, sort of a national world but very much an international world now. And, you know, so this is a little personal question that I suspect other folks would like to know. Outside of good schools, good parenting, in terms of hardware and software, what are those items now that you would recommend for us that want to help our 7-year-olds and older children to be able to adapt to this new technology in this new world?

MR. GATES: Sometimes I envy kids who are growing up today that to the degree they're encouraged and get a chance to use the new tools, the ability to pursue your curiosity is really phenomenal today. And I was growing up, you know, the best you do is read the World Book.

(Laughter.)

MR. GATES: Kind of alphabetical and not very enticing. Today if you have access to the internet online, which either home or through local libraries, through a program that Microsoft and my foundation was involved in, most kids do have some way of getting access. The breadth of information out there, whether it's things like Wikipedia, Encarta, or now the greatest teachers being videotaped, and so you can go up and watch courses. Even as an adult now I can go up. I just watched an MIT course that was quite phenomenal in terms of updating me on some science advances.

So my kids, you know, out on the Internet, and my son or daughters often ask questions, that my answer's "Hey, let's go study that, and learn about the stars," or whatever it is they're curious about; whereas when I grew up, my parents had to say they didn't know the answer and it wasn't easily at hand.

So, you know, there is a huge advantage in having the internet widely accessible that people should take advantage of.

CHAIRMAN GORDON: And I think we have to recognize if we don't, somebody is somewhere else.

MR. GATES: And that's right. This is a global tool. And you know, in absolute it's great that they're able to educate people as well. We always have to think there's you know, improving the whole pool of the world's knowledge and innovation, and then making sure the U.S. gets its share. But those are both valuable things. And I'd say the one that's most at risk is our relative share.

CHAIRMAN GORDON: Which means first to market, and that's R&D.

Thank you, Mr. Gates.

Mr. Hall is recognized.

MR. HALL: I thank you, Mr. Chairman. Mr. Gates, you mentioned engineers, and with China and India graduating record numbers of engineers with skills -- I guess the question I really want to ask is: What skills are going to be required by the future U.S. science and engineering workforce in order for them to compete with the foreign scientists and engineers? And in asking that, I have to ask you how do you recommend that we change our education system, if you do so recommend, to produce graduates with the skills necessary to fit the new competitive environment and the evolving needs of industry?

And my final question on that is whether or not Microsoft employs scientists and engineers from foreign universities, primarily China or India? And if so, what's the quality of these engineers versus those graduated in the United States? You can take any or all of those, or none of them.

MR. GATES: The United States preeminence is -- today is still very, very strong. That is if you in science and engineering looked at what are the top 20 universities in the world anywhere, from 15 to 19 of those people would probably agree are U.S. universities and so the quality of our top schools and their engineering and computer science departments is very, very high. Now over time other countries see that. They're trying to match that you know, in China there's one university that Ching Wa that is nearly as good as the best U.S. universities, but still if you look at the raw number of engineering - graduated, that over - that would overstate the current status.

The very top engineers the U.S. universities still have a strong position but as I have said the majority of the students in the computer science department are foreign born. And so we educate them. We provide the world's very best education and the research funding and various things are a major factor there. And then those are the students who are not allowed to stay and work in the country because of the limits we have and that's where we create jobs around them.

So the U.S. universities are still the best and the kind of funding that the government's provided really is a huge part of that. Also the ability of U.S. universities to work in corroboration with business. That's a practice whether it's information technology or biology. The U.S. has been a leader in that. The (inaudible) that incents universities to get their research out into the marketplace, that's been a fantastic thing that's driven these university business corroborations. And so you know, the preference of a company like Microsoft is very much to take these graduates of U.S. institutions and hire them and employ them here in the United States because all of the complementary jobs - management, testing, the various things we can find the best candidates here in the country but unfortunately, the job's going to go where the engineering talent is and the other jobs around it will follow where that engineering talent is.

In terms of improving the high schools, both Microsoft and my foundation have been involved in this. There's a number of new high schools that have as a theme science and technology. They kind of have projects to get kids enthused about those topics. Overall, we see the numbers dropping and the numbers of women and minorities are also very low in these fields despite a lot of good effort that's being put into that. So we think it's at the high school level that you can kind of develop a fascination and understanding of these topics and make them far more engaging. And we are seeing good results in a number of these schools, which are mostly charter schools taking a different approach to education. We think we can get a lot more people to stay in science and technology.

MR. HALL: Then in quality we're there, but in quantity we're not?

MR. GATES: Well, if you take - if the quality is the quality of the graduates of our top universities, we are number one by a lot still. If you take the broader picture of the quality of all our high school graduates that's where this piece I studied comes in and says that broad numbers - the U.S. does not measure up very well, but the people who get the best public school education and some of the people get a private school education, those people go into these top universities you know, about 40 percent of the computer science departments are U.S. born students and they come out and they are the best. They are the most attractive - those graduates are the most attractive. So we have a piece that absolutely is still the best.

MR. HALL: And if we educate them we ought to try to keep them?

MR. GATES: Absolutely. All of those people are graduating from these top universities are going to get job offers of high paying jobs in many, many different countries so they have a choice of where they end up being employed.

MR. HALL: We're not doing too well with our immigration situation in general so we can try to do a little better in the quality of our education. I yield that and I thank you.

CHAIRMAN GORDON: Thank you Mr. Hall. Our university system was or is the magnet for the best and brightest around the world. They would come in and beside our home grown we would bring in the best for that innovation and jobs that are created. Unfortunately, we're not quite the magnet that - there's alternatives now and hopefully we can get back to bringing the best and brightest and keeping them and helping them to produce jobs in this country. Mr. Baird, the chairman of our community overseas National Science Foundation is recognized.

MR. BAIRD: Thank you. Mr. Chairman, Mr. Gates, thank you for your comments. I just want to follow up on two issues. One, thank you for your recognition for the Chairman's America COMPETES Act.

I want you to know that we'll pass a budget today that allows for precisely the kind of expansion that you have called for. The Democratic budget allows for a substantial expansion for science and math research and education and then we'll hope our friends in the appropriation side can support that effort as well. I also share your concern about how difficult it can be to bring international scholars here for either work or education purposes.

To the extent that our research and education subcommittee can, we've already had two hearings on this general topic and we will do everything we can to try to facilitate that arrival of scholars and the retention of scholars who have trained here. In your technical expertise, I'd like to ask you a broad question about a technical issue.

One of the great merits of technology because it changes so fast that it brings us better and better things but it also creates problems with legacy information and I'm particularly interested in the issue of Open XML and the broader question about standards and your belief about how things like Open XML and standards, international standards for the Internet - the pros and cons of those and where you see those heading.

MR. GATES: Well thank you. That is an important area because we're building up more and more records that you want to be able to access and understand and you want to be able to preserve those records over a period of time. In fact, these digital archives will cover a lot of people's activities and parents who want to be able to go back and get essays for children or researchers who want to be able to go back and get the data from different experiment and even libraries -- a lot of their collections will be in this digital format and you want to be able to access that. Microsoft is very engaged in the standards process.

There's a new standard we put in front of the International Standards Organization called Open XML and it uses XML in a way that means that anybody using our software or other software that meets a standard will be able to access it out into the future. So it's very important to us that Open XML become an ISO standard so that families and researchers and archivists will be able to access information from the past and use it to interact in the future, and it's by mining data like this that I think a lot of the advances in understanding how education is best done or understanding what should be in the medical field, so it's both an important thing for innovation and an important thing for citizens to have access to information.

MR. BAIRD: I appreciate that. I actually have, believe it or not, some old 5 1/4 inch floppy disks in the CPM format which if I'm ever achieve anything of note, some poor librarian is going to have to go find an old CPM machine and dig out my great works from back then, which will be hard because there will be very few, but I think your point is well -aken and I applaud Microsoft for its leadership in this area and the whole issue of standards.

One of the issues on H1Bs that I particularly want to compliment your company on is I hear from constituents: "Hey, wait a second. Why are we doing more to let folks international train either stay or come into our country? Shouldn't we be doing more to educate our own people?" and Microsoft really has been a leader in that. Schools throughout this country have benefited from Microsoft's leadership.

One of the thoughts I've kicked around a little bit - I know there's a small fee for an H1BV set and that goes back again in the education system but is there a way we should actually put companies a little more skin in the game, if you will. Through internships or other things. In other words, if you're applying for an H1B position in your company, then your company must demonstrate -- not yours per se -- but one's company because you've already done it. But many companies I don't think have followed the example of Microsoft. But what are the pros of that and how might we do that?

MR. GATES: The importance of being able to retain and hire these world top engineers is super important. And you know, the fact that there's this limit, you know, I can't overstate the impact that has, not only on the decision of the people who are educated here to stay here, but also on their decision to even come to the United States in the first place. You know, if you wanted to say, "Okay, how do we compete with Asian countries?" The fact that their smartest people often want to come here has been a huge advantage to us, and in a sense we're kind of throwing that away.

You know, to be honest, if there was a way that we could get the freedom to hire these people that set a threshold for the companies involved to be concretely involved in giving back education, you know, I think that would be acceptable, you know, as long it's concrete and it really solves the problem that we're all facing here. You know, I think even without that though, it's a total win-win situation for the economy and job creation to not force these people to be employed outside the United States. We at Microsoft, partly because of the current U.S. immigration policies, we created an office up in Vancouver, Canada, because that government, like virtually every government other than the United States, recognizes that competing for talent and encouraging talent, particularly talent educated in a country, getting them to stay, that that's very, very important.

And so just across the border you have quite a contrast in terms of how high-skilled workers are treated. Thank you.

MR. BAIRD: I appreciate that. I think we need to impress upon this Congress and the Administration the urgency of this matter for our competitiveness. Thank you.

CHAIRMAN GORDON: Thank you, Dr. Baird.

Mr. Rohrabacher, I'm not picking on you, but I want to remind the members that Mr. Hall and I agreed that Mr. Gates can leave at 12:00. He has appointments, so we're going to try to keep everybody for five minutes, again not picking on you, but rather I noticed the rule was just employed at this moment, though.

(Laughter.)

MR. GATES: I'll try to be more succinct.

MR. ROHRABACHER: All right. Well, thank you very much. And again, thank you for coming here to help us celebrate this 50th anniversary. I've been on this committee 20 years and I've been a very proud member of this committee -- this is the most bipartisan committee that you will find in the United States Congress, although I am not the most bipartisan guy that you'll find in the United States Congress.

A couple things that I have learned over these last 20 years is that when the fundamentals of the economics of the solution are wrong, sort of like programming a computer, if the fundamental programming is wrong, in the end there's going to be problems. You have to go to the fundamentals. And just to be frank, I think some of the things you're suggesting are not going to the fundamentals, but instead -- going way after the programming problems.

For example, in education let me note that the hearings that we had on education were very enlightening for me, but what I learned seemed to be different than what my other members learned, and that was that math and engineering and science teachers have no difference in pay in our public education schools than do basket-weaving and English literature teachers. And do you believe that we need to pay our science and mathematics teachers more money in order to attract higher-quality people to be science and mathematics teachers?

MR. GATES: I definitely think that you want to set high standards, and you want that those standards should be based on how well you do for the students, which we need to come up with ways of measuring that that people view as very, very reliable.

MR. ROHRABACHER: Because I've only got five minutes, maybe I should go directly to the issue. Should science and math teachers be paid more than other teachers in order to attract higher-quality people in public education to those parts of the education system?

MR. GATES: Yeah. If you're measuring these teachers' ability to really improve the students' capabilities, in selecting for those people to do it, you'll find that there's a supply shortage, and because of that supply shortage, you'll probably have to pay this group somewhat more.

And there are various experimental --

MR. ROHRABACHER: So you do believe that if you pay more money, you actually will attract more people to a profession and get more of it?

MR. GATES: If you tie it to an ability to really look at --

MR. ROHRABACHER: -- True --

MR. GATES: -- the improvement that they derive --

MR. ROHRABACHER: Right. Well, also if you improve the basket-weaver teachers, it's less important than if we improve the science and mathematics. Now let's relate that directly to the other issue that you brought up today, which was the immigration. And let me just note that if we bring in more people from the outside, realizing that we're bringing the most talented people from other countries, will it not hurt those countries, and will it also not depress the wages in our own

country that people like yourself would have to pay your employees in order to get quality people or in order to train people within our own society?

MR. GATES: No.

MR. ROHRABACHER: It wouldn't? Okay.

MR. GATES: These top people are going to be hired. But just a question of what country they do their work in --

MR. ROHRABACHER: I'm really not talking about top people here. You know, the --

MR. GATES: -- These ---

MR. ROHRABACHER: There are a lot of other people in the society rather than just the top people.

MR. GATES: That's right.

MR. ROHRABACHER: It's the B and C students that fight for our country and kept it free so that people like yourself would have the opportunity that you've had. Those people, whether or not they get displaced by the top people from another country is not our goal. Our goal isn't to replace the job of the B student with A students from India.

MR. GATES: That's right. And --

MR. ROHRABACHER: And the B students deserve to have good jobs and high-paying jobs.

MR. GATES: That's right. And what I've said here is that when we bring in these world-class engineers, we create jobs around them.

MR. ROHRABACHER: Okay.

MR. GATES: And if we don't -- so the B and C students are the ones who get those jobs around these top engineers. And if these top engineers are forced to work, say in India, we will hire the B and C students from India to work around them.

MR. ROHRABACHER: Okay. But, according to "BusinessWeek", there are almost 150,000 programmers have lost their job in this country since the year 2000. Now my reading of all of this is that there are plenty of people out there to hire, but people want to have the top-quality people from India and China and elsewhere, and they're willing to let these 150,000 American computer programmers just go unemployed.

MR. GATES: Actually, "BusinessWeek" doesn't do surveys. I think you're referring to a quote in "BusinessWeek" from an Urban Institute study --

MR. ROHRABACHER: That's what I said, according to "BusinessWeek", yeah.

MR. GATES: Well, they quote -- it's not according to "Business Week".

MR. ROHRABACHER: Okay.

MR. GATES: There was a study that a group at Urban Institute did that was deeply flawed in terms of how it defined what an engineer is. When we say that these jobs are going begging, we're in business every day.

MR. ROHRABACHER: Mm-hmm.

MR. GATES: We're not kidding about it. These jobs are going begging, and the result is that in a competitive economy --

MR. ROHRABACHER: You'd have to raise wages.

MR. GATES: No, no --

MR. ROHRABACHER: -- if the job is going begging, you raise wages, now in --

MR. GATES: No.

MR. ROHRABACHER: Okay.

MR. GATES: It's not an issue of raising wages. These jobs are very, very, very high-paying jobs.

MR. ROHRABACHER: Okay --

MR. GATES: And we are hiring as many of these people as we can.

MR. ROHRABACHER: Let me give you one example --

CHAIRMAN GORDON: Mr. Rohrabacher, if you don't mind, we'll finish this on the second round.

MR. ROHRABACHER: You know, I am one of the guys that helped Kosovo become independent, and I'm on the Foreign Relations -- hearing there. Maybe at the reception tonight, which you're going to be at, maybe we can continue this discussion.

CHAIRMAN GORDON: I'm sure he's excited to know you'll do that.

(Laughter.)

CHAIRMAN GORDON: Thank you, Mr. Rohrabacher. And Ms. Giffords is one of our new members from Arizona. And I'll warn you, somehow she's going to work Arizona into her question. I don't know how it's going to be, but that's what will happen. Ms. Giffords is recognized.

SPEAKER: And this witness won't forget Rohrabacher.

(Laughter.)

MS. GIFFORDS: Thank you, Mr. Chairman. Thank you, Mr. Gates, for coming before our Committee today. The first question I have is one that I struggle with serving as a new member on the Science Committee, a new member coming from the great State of Arizona --

(Laughter.)

MS. GIFFORDS: -- about you know, I hear my colleagues and had a chance to face these portraits of a former chairman, several of the portraits that face me have images of the shuttle program or the space program. I happen to be married to an astronaut, which also makes NASA and the issue of the space race that we had with the Russians more relevant probably than most people. But even today's testimony when I hear the Chairman and also ranking member Hall talk about what it was like to look up into the sky and see Sputnik, or to listen the words of Neil Armstrong walking on the moon, it moved people in a way that I don't think has any comparable type of experience in today's world.

I know what we did here as Americans was something unique, and I know that it generated a new generation of engineers and scientists and mathematicians, kids that we so inspired. So my question to you, Mr. Gates, is -- what today is comparable? I mean I believe it's energy, but sometimes I don't see that, that transition going to kids in terms of being excited about solar technology, new ways of moving vehicles around, heating and cooling our homes. But, you know, you have a chance to work with a lot of kids. You work in a lot of different countries. What's going to be that thing that is really going to make relevant a lot of the stem education focus that we're talking about?

MR. GATES: Well, I would think that the direct use of advanced technology and the chance to participate in making breakthroughs in those technologies is in some ways more evidence today than ever in the past. You know, if we look at the frontiers of science that we have today, teaching computers to see, teaching them to hear; the kind of modeling of the world that's very important for all the energy challenges we face; or the kind of software we need to make health breakthroughs, you know I think that it's more exciting even now, you know, that you can say "Here's what you're learning that will help you make an energy breakthrough."

You know, you just look at one group. Blind people historically only had access to a few books that many years after they were available were put into Braille. Today, because of speech synthesis and capabilities that we built into our software, blind people can browse the Internet and have same access to information that you have. And to me, you know, there's just dozens of examples like that where technology has empowered people to work in new ways, and in some ways it's less abstract even than, you know, going to the moon. You can go and meet those people and talk about how their life was changed; or you can look at diseases that we haven't yet conquered and see what impact that's having.

And clearly, by advances in biology and information technology are absolutely the reason why we can be optimistic than in the next generation, whether it's the diseases of the poor countries or the diseases that are prevalent here, we're very likely to have breakthroughs for virtually all of those things.

Now given, you know, that I think there are so many reasons that that would draw people into science, I have to admit it's a surprise to me how few students choose to pursue the fields.

MS. GIFFORDS: The high tech industry in my state of Arizona depends a lot on our ability to recruit and retain scientists and mathematicians. In terms of the exports in the high tech field, it totaled about almost \$9 billion in 2006, which was an increase of almost \$2 billion from 2005.

We have a lot of high-tech clusters, particularly in southern Arizona, and, you know, I am personally working on H1B visa reform because I think that's really the key. I think at the University of Arizona, Arizona State University, Northern Arizona University, we're not producing those students.

So I ask you, because you mentioned in your earlier testimony, aggressively, what could our country do to compete with

other specific nations around the world to make sure that we can retain these students who want to come here, who are the best and the brightest from wherever they come from wherever they come from, and have them be part of this work that we're dedicating ourselves to?

MR. GATES: Well, there are some things in terms of the process that they go through and the uncertainties of the process that are daunting to them. But at the end of the day, by far the key thing right now is they are being told they cannot stay and work here. That is, the backlog on green cards is longer than ever, the H1B visa thing was by far the worst this year where in the first day they were all gone. So anybody who graduated in June couldn't even be part of the process because they didn't have their degree, and you have to have your degree to get into the pool.

I will say that this is an issue that the technology industry has a very strong consensus, very clear message on. So if you take an employer like Intel, who is very present in Arizona, they depend at the top of their research activity on having the very best scientists. And they're a good example, like Microsoft, where if they get those, they create the manufacturing plants and things that reach out and drive fairly substantial numbers, that it's easier for them to site those activities here in the United States.

CHAIRMAN GORDON: Thank you, Ms. Giffords. And now our resident physicist, Dr. Vern Ehlers, is recognized.

MR. EHLERS: Thank you, Mr. Chairman. And also I'd just like to comment. Don't feel too sorry for Arizona. Most of the wealthy people in Michigan have moved down to Arizona.

(Laughter.)

MR. EHLERS: Clearly, we need more help than they do. First of all, before I get into my questions, I want to thank you for more or less loaning Ms. Stonesifer to the Smithsonian Board. She has done yeoman work. You know, we've had some problems there, and she has done more than any other person that I know of in trying to straighten out this problem. She's a real gem. I was very sorry to hear that she's leaving your foundation. But she was -- she's just a marvelous person, and I'm sure she has served you there, too.

I have spent most of my life in education. I have spent a great deal of my life, over 40 years now, trying to improve math science education in this country, both before I got here and after I got here. And I very much appreciate your comments about scientists and engineers serving as role models.

In all my speeches to scientific and engineering groups, I encourage them to visit their nearest school, volunteer to speak to the classes, even better, volunteer to take students on field trips through their own laboratories, their workplace, or if they're civil engineers, the nearest bridge they're building, things like that.

A hundred years ago, students learned these things on the farm. Today they come to school without a lot of practical experience. And your comments were right on. The more we can get the engineering and scientific communities to interact with the students, the best. I always enjoy it when I'm invited to speak to high schools. Most of the students don't know much about my background. When I tell them I'm a nerd, there's some disbelief there until I show them my plastic pocket protector.

(Laughter.)

MR. EHLERS: But I also tell them that in high school they have a very important choice to make, and that choice will determine whether they someday will be a nerd in the workplace or working for a nerd, and they have to make the choice between being one or working for one. That really just tends to wake them up a bit to why they should study science in high school.

I totally agree with the comments you've made, and I hope that through your foundation -- and you do marvelous work in your foundation -- that through your foundation, we could work together on this problem in our elementary and secondary schools. Your comments were right on about PISA and what happens there.

Somehow we have to get the picture changed in America. I find it fascinating, for example, that surveys of parents, the parents will say, yes, we need better math and science in the schools. When you ask them about their school that their kids are in, they say, oh, our school is fine. They just don't recognize the depth of this problem. And I'd appreciate any comments you might have about how we can do a better job of waking up America, both the parents and the school boards.

The teachers, in my experience, and I've worked with a lot of teachers, I never blame them. They have not had the proper education in science or math and have not been taught how to teach it properly, but they are very eager to do it and very eager to do it well. So here I've concentrated my efforts on professional development programs.

I would be interested in ideas you might have about other ways that either business and government together or just government can actively get involved with this problem and helping the teachers in meaningful ways to help them become

better math and science teachers.

MR. GATES: Well, I think the most stunning data I've seen in many years related to education are how the huge difference in the very best teachers versus the teachers who don't do as well. And the willingness to look at that data and say, okay, what is it that those teachers who are doing very well, you know, what techniques are they practicing versus the other students?

And some of the assumptions that, you know, about, okay, it's the ones that are certified are going to do better or the ones that have been there a long time, some of those as you really get into the data, you know, some of those assumptions don't play out and you really look, okay, what are those differences?

So I think these -- gathering the data and really looking at who's doing well and seeing that students who are far behind, if they're lucky enough to have good teachers, they can be brought all the way up to be well above average. The difference of having a good teacher is very, very dramatic. And yet, in terms of figuring out what those things are and investing in them, and using data to drive that, I'd say we are way behind other countries in being able to do that.

One other comment about Patty Stonesifer, you know, I appreciate your comments. She's done a fantastic job at the foundation. And fortunately, she'll stay involved some special initiatives, although she'll step down after 11 years of being CEO. So, we'll still have her -- some of her efforts.

MR. EHLERS: Well, I appreciate that, and I certainly hope that your foundation will continue its efforts in math and science education as well, because government is by its very nature limited in what it can do. It can't coerce. It can entice. Foundations can do a much better job of coercion.

MR. GATES: Our biggest partnerships have been where you get one person who's really taken responsibility for improving the education system, like, you know, the mayor of New York said, okay, he'll base his record on that or the mayor of Chicago, where you have a clear level of responsibility that the right tradeoffs are being made. Those are some of the systems where the willingness to make tough changes is taking place. And we're seeing very, very good results in that type of structure.

CHAIRMAN GORDON: Thank you. And Dr. McNerney is recognized for five minutes.

MR. MCNERNEY: Thank you, Mr. Chairman. You'll be glad to know that your members are getting exercise this morning running back and forth. Thank you, Mr. Gates, for appearing this morning. I want to say that I appreciate your innovation and its effect on our nation, and the world, and your generosity both with education and with health.

One of the things I really am concerned about is how to inspire the next generation. What do you think the Fed should do? I mean, some earlier members talked about the Russian satellite and Ms. Giffords asked about the next big thing. What do you think we can do as a Fed to actually inspire kids to take advantage of what education is being offered?

MR. GATES: I think what we owe to the kids is to have teachers who, you know, have proven that they can make the subject engaging. You know, that's where you see the big difference is, you know, does the subject really come to life in a very strong way?

As you get up to our university systems, there the right things are happening. That is, these universities compete for talent vigorously with each other. They compete for federal research funding. They compete for students. And that's why the vibrancy of these top universities has really been incredible and such a big asset. You don't have, in terms of measurement and, you know, that kind of competition, you don't have it in other levels of the system.

And, you know, so one of the tools that's been used in many states is charter type approaches where you can experiment and give teachers some more freedom in terms of how they do things and try out new approaches. And that's, you know, really a lot of where the innovation is coming from is those new types of schools.

Still, you know, I am amazed at how the numbers in science and engineering are going down, and that is not true in Asia. The numbers are going up in Asia and they're going down everywhere else. It's all -- there's no rich country, assuming you take Korea out of the picture, that all -- Europe and the U.S. are experiencing the same phenomena of less and less students going into science and technology. So there's no simple government policy, given the variety of policies that are used, there's no simple policy thing that explains that decline.

MR. MCNERNEY: The way we view engineering and science and anything you can do to help us inspire that generation would be very deeply appreciated. I'm especially interested in your foundation's work to establish stem education at the secondary level. Could you describe the criteria -- I'm sorry, the curricula -- at these schools? In particular, what subjects the stem differs from normal schools?

MR. GATES: There's two things there. One is to take the normal schools and try to make it more approachable, and the

other is to then actually have specific schools that are designed from the beginning to have stem excellence. So there's a number of things. There's a program in Ohio, a program in Texas. A lot of these charter schools in different cities where they really thematically decide that they're going to bring the students into science by using projects and that the traditional boundaries of biology is different than chemistry, is different than math -- that they break across those boundaries to take some project activity to make it clear to the student why they should learn a little bit of math or a little bit of chemistry or biology to be able to achieve something very interesting. And in the best of these schools, the number of kids, including woman and minorities, who show an interest in math and science, has more than doubled what we have in the traditional public schools.

So there is some good data that says by changing the curriculum you can start to take the drop off in interest which is very pronounced at the high school level in stem that to some degree. Now there's further drop off once you get up into the university and there are also some universities at how they do the curriculum and I'd say it's the same thing. It's more project-based and cutting across the boundaries that have existed between the different science subject areas.

CHAIRMAN GORDON: Thank you and now we've turned to Dr. Bartlett. You're recognized for five minutes.

MR. MCNERNEY: I yield back.

DR. BARTLETT: Thank you very much. In education our society faces two huge challenges which you mentioned. One is the quality of education in our K through 12 as you know our third graders score about even with third graders around the industrialized world, but the longer kids stay in our schools the poorer they do. And so when they graduate from high school they're at the bottom or near the bottom of any industrialized nation. And the other huge challenge we face is the challenge of getting more of our best and brightest into careers as science, math and engineering. Increasingly as I talk to audiences and ask our kids what degrees they're going to pursue - they're pursuing what I tell them are potentially destructive pursuits. They're becoming lawyers and political scientists.

We've got enough of both - of each of those, thank you. I think that both of these maladies are the symptoms of a common disease and that is that a society gets what it appreciates. Our society just does not appreciate academic achievement and as a society we do not appreciate scientists, mathematicians and engineers. I will believe that this culture is changing and it needs to change, sir, despite of the best efforts of organizations like yours.

The culture really needs to change and I'll believe it's changing when the White House invites academic achievers and scientists, mathematicians and engineers and slobbers all over them they way they do entertainers and sports figures. What can we do, sir, to change the culture out there?

MR. GATES: I still think there's a strong element in the culture of this country that is very positive towards science and innovators and if you look at the interest in you know, Steve Jobs has done, or the work that the guys in Google have done, or the work that I and my colleagues have done, there is a fascination with science and engineering and certainly the opportunities are pretty vivid.

You know, even young people get a chance to play around with Windows PCs or the different technology advances that have been created. So I'm not sure that we fail on that front. It's somehow along the way, particularly for women and minorities, these science jobs just don't seem as interesting. There's a lot of outreach we do to bring kids in and show them that these are very social jobs. They're very interesting jobs that the next several decades will be the most interesting. So there's a component of it even knowing that the curriculum should be a lot better.

There's a component that's surprising to me and we did see that during the late '90s. We had an increase of people going in what some people call the internet bubble and then as that went away, the number of applicants went down quite a bit. If we smooth it out we ignore that bold share, there still is a decline that has continued. But if you look at the figures going only back to 2001, you get an even worse impression because there was an - right before that and that dropped off a bit. You know, maybe some of all the bright minds that are going into finance will now go into science and engineering with their bubble, perhaps, not being as big as it was in the past.

There's an element of this that I do find mysterious because I do think our culture still values innovation and every student understands about the potential for breakthroughs in health and breakthroughs in energy and breakthroughs in information technology. And so you know, it's surprising that we're not getting - that these departments are not over crowded.

MR. BARTLETT: You mentioned half or more in all of these departments are foreign born students.

MR. GATES: That's right. That's based on -- if anything the departments go overboard to try to keep that number low but as they're bringing in the very best students they end up with typically about 60 percent foreign born in the top departments.

MR. BARTLETT: During the decades that we spent putting a man on the moon, the imagination of the American people was captured and our young people were inspired to go into careers in science, math and engineering. I remember a cartoon that showed a red-headed, freckle faced, buck-tooth kid and he said six months ago he couldn't even spell engineer and now

I are one. You know, what do we need to capture the imagination of our people again to inspire young people to go into those careers like them?

MR. GATES: I think we need to celebrate the achievements that we've had. I mean we are the envy of the world in terms of the science that's been done here. We are still far ahead. The relative show that we have is going down but we're in a position of great strength and the magic that we've had that other countries haven't achieved is a balance between private industry and universities, and I mean basic research in the universities, and then allowing the formation of companies, lots of which fail but some of which succeed spectacularly to be a well rewarded well thought of thing in this country.

That idea of entrepreneurship, starting new companies, having venture capital, we are still the envy of the world. Having these incredible university departments that need NSF funding and various other government science type fundings to stay strong you know, that is a magic formula that others are on the way to duplicating but it's not something that can be done over night. And so if we renew our commitments to these things, whether it's research funding or the role models.

You know, letting the smartest people who want to come to this country continue to come here. There's no area in science where you'd say that at least a third of what got done got done by foreign born scientists from the creation of medical breakthroughs or you know, the transistor or various things. I mean just think through in your mind who the great scientists are and you'll realize in many cases over half are foreign born.

So a willingness to let those scientists in has been an incredible thing. So I'd say one thing that's unique in this era is this idea that it's controversial to let smart people come to the country and stay and work here. That is really novel -- like there's no time in our history where we've been turning those people away.

CHAIRMAN GORDON: Mr. Gates, for your information, this committee agrees with you in terms of getting the bump in math and science in terms of minorities and women. We have passed a number of initiatives to do that, and we want to continue. That's the best way to grow, I think, new home grown. And Ms. Richardson from California is recognized for five minutes.

MS. RICHARDSON: Yes. Thank you, Mr. Chairman. Good morning, Mr. Gates. I am kind of in a unique position in that I've only been in Congress about five months, so I'm what they call a freshman, a newbie here. But I had an opportunity to work for Xerox Corporation for about 14 years, and I attribute a lot of the way I've been able to approach legislation to that, so I admire all the work that you've done.

I have a couple of comments and one question. One, it's noted in our information here your program, U.S. Libraries program, which I commend you for. However, I will tell you the district I represent in California is Watts, Compton, Long Beach, some very challenging communities. And oftentimes we have long waits in the library and all of that.

And I would say that if we really want to reach out to all children, would you be interested in maybe considering expanding such a program to our parks? And the reason why I say that is a lot of kids tend to go to the library. They might be doing their homework or doing some research work.

But if we're going to encourage children to learn the innovative aspect side, the exciting side of science and engineering, I think that's really a missed opportunity, particularly in some of our underserved communities where you have some of these facilities and there's absolutely no resources there for children. So I wanted to get your thoughts on that.

MR. GATES: You're saying the parks?

MS. RICHARDSON: Parks. Yes, parks and recreation.

MR. GATES: Well, I think we shouldn't miss any opportunity to expose kids to these things. What was done in the libraries, you know, it's so impactful that the resources should be made available so that kids aren't waiting in line. The Internet, access to the Internet with a modern personal computer was added to one of the things you could think of having at the library. When Microsoft and the foundation started that program, 25 percent of libraries had computers. And by the time we were done granting over 60,000 machines to 11,000 libraries, we got it up to over 95 percent.

The goal is to make it so that, you know, any kid could into that library and not have to wait too long. Funding for libraries in this kind of technology use often falls off the radar screen, because libraries are of course locally funded, and they're just even in that budget process, they don't get the attention that they deserve. That's a program that's had a huge effect.

There are things going on to expand it into other community centers like Boys and Girls Clubs and, you know, to the degree that you've got indoor facilities in the parks, that's another perfectly great place that you might have some of the equipment and the chance for people to get exposed.

So I agree with you that we should be creative about finding the places where we can create the capacity there. I will also say, you know, Xerox traditionally did a lot of great research that Microsoft and many other companies benefited from that,

you know, and that's why things like R&D tax credits and things that encourage R&D have been great. You know, Xerox certainly did its fair share of great R&D contribution.

MS. RICHARDSON: So, sir, I'm just simply suggesting that as you go into your second career here that you consider the Department of Parks and Recs as well.

MR. GATES: Okay.

MS. RICHARDSON: My second question to you is regarding scholarships. You know, there's been much effort of us saying for a student, for example, who decides to go into nursing or teaching, that we would consider having a program that would provide a full scholarship for those students.

Have you had much thought about if we were to provide full scholarships to students who made a commitment to work in the science and engineering field or math? What would you think as a CEO in joining other CEOs to make a commitment to help fund such a program to provide full scholarships for students who would make a two-year, four-year, five-year, whatever commitment might be required to engage them to really take on these positions?

MR. GATES: You know, the federal government plays a very strong role in terms of helping students be able to afford going to universities. The foundation also has a very significant program that's focused on minorities that funds both their undergraduate education and then their graduate education if they're in a number of these areas related to science. And today we have 14,000 students, all minority students, receiving those scholarships.

So I do think when it comes to women and minorities that it's pretty important to have scholarship money available to increase the numbers, and particularly if they saw more scholarship money in these fields, it might be the thing that would make the difference.

I would say overall that in terms of the total numbers in the field, it's partly the attractiveness of the field, you know, the motivation to go into the field. We also have to work on that. So scholarships I think can be helpful, but, you know, I'm not sure that a loan would drive the kind of shift in attractiveness that we need to see here. I do think it can make a big difference in terms of the minority and women percentages in these fields.

CHAIRMAN GORDON: Thank you, Ms. Richardson.

MS. RICHARDSON: If I could, a follow-up question.

CHAIRMAN GORDON: Certainly.

MS. RICHARDSON: Sir, though, specifically what I'm saying is, it has been said that due to the Visa situation, you know, corporations, you're spending money of recruitment costs, legal costs, administrative costs, etcetera. I would venture to say if corporations were willing to put that money into full scholarships to ensure that students who came out, they would have to have a commitment. It's very similar, for example, with the military, other positions. You know, yes, excitement is a part of it, but pay is also another excitement. And I think if students had a guarantee that if I completed four years, got a degree, that I would be able to guarantee I could get a job at X, you know, company.

So I'm not necessarily just your foundation alone, but your thoughts as a CEO of do you think other innovative companies would be interested in joining you in making a greater focus in that area?

MR. GATES: Yeah, okay. But I think broadly, it can help the number of people going into the field. But anyone who graduates from the top universities with a computer science degree has five job offers. Now the 60 percent that are foreign-born can't accept their U.S. job offers, but there is just no shortage of jobs being offered to these top students in the field of computer science. They are, you know, highly, highly, sought after. And so I think in terms of the aggregate numbers, the U.S. to get its relative share, the big lever is not saying that the foreign-born students have to leave the country.

As you get to the broader things, particularly minority and women, that's where I think some of these scholarship things can come in. I don't think we have an issue where people get degrees in these fields and then they leave the field. So, you know, they would stay in the field. It's not like asking them to work in a rural area or, you know, volunteer to be a teacher where you may need a commitment in order to make sure you're achieving your goal.

If people are educated in these areas, then, you know, once they graduate from college in these areas, they tend to stay in the areas. The drop-off is further down the line. Once we get them into the workforce, then we have no issue about them staying in the area.

CHAIRMAN GORDON: The gentlelady's time has expired. Mrs. Biggert is recognized.

MRS. BIGGERT: Thank you, Mr. Chairman, and thank you, Mr. Gates, for being here. Because I agree with you on just about every point that you've made in your testimony, especially with respect to making the R&D tax credit permanent,

strengthening science, math and technology education and increasing the funds for basic research, I want to turn to just a little bit different issue.

Free trade agreements such as NAFTA has been the subject of much public debate, as of late. Some members of Congress, even some presidential candidates, believe that free trade agreements threaten U.S. jobs, domestic manufacturing and U.S. competitiveness, and other members believe that free trade agreements simply open foreign markets to U.S. goods and services by bringing down the tariff barriers on U.S. exports, which lead to job creation, encourage companies to remain in the U.S. and actually improve U.S. competitiveness.

And just yesterday in the "Chicago Magazine", the CEO of Caterpillar said curtailing U.S. free trade policies would be cataclysmically bad for the nation's economy and would derail caterpillar's ambitious sales outlook in the coming years. So I'd appreciate your opinion. How critical to job creation and our nation's competitiveness are free trade, free trade agreements and the opening of foreign markets to U.S. goods and services?

MR. GATES: (Microsoft is) a gigantic -- exporter. That is, we get the majority of our sales outside the United States, and we do the vast majority of all our work inside the United States. And so the openness of markets is actually absolutely critical to use in terms of the people we employ. And we're expanding our employment in the United States at a very rapid rate. The only limit on that is this supply of engineers.

If the free trade system were not to continue the expand, then that would have a very serious effect on Microsoft and other businesses that are engaged in international trade. So, you know, I'm very concerned that people not think that free trade agreements on balance are a bad thing for this country. And in my opinion, they're a very, very good thing for this country, and I think we need to explain that to the voters, because, you know, the biggest winner in the free trade system has been the United States and the companies that have been able to lead in having much bigger markets than ever before.

MS. BIGGERT: Thank you. And then going back to the R&D tax credit, do you have any other ideas or suggestions for the private sector incentives to encourage research and development?

MR. GATES: Well, economists have always known that companies have a hard time capturing the full benefit to society of the result work they've done. And so that's why some basic research needs to be funded by the government. That's why having a clear incentive system, through patents where you're rewarded for the breakthroughs that you make, and some tax policies that give an extra incentive for doing research and development makes sense. And we see many countries putting big investments in, making sure that this takes place.

You know, some of the trends in terms of research in the U.S. are a bit scary. We are still, compared to other countries, in the lead on this, and Microsoft is spending over \$7 billion in R&D in the next year. We're one of the biggest R&D spenders. And we speak very openly about what a great investment that's been for us. Even the risky research part of it and the way we've formed great relationships with the top universities, so that we're helping to fund their work and to the degree they make breakthroughs, where simply one way that they can make sure it gets out there and gets --

MS. BIGGERT: If I might ask then --

MR. GATES: Yeah.

MS. BIGGERT: As far as you've mentioned the laws in your testimony and providing universities and other recipients federal funds. But I think that these laws have been very successful, except maybe not so much in the case of energy and energy technologies, and I wonder if you have any suggestions for us to help to move new advanced energy technologies out of the lab and into the market. And maybe your foundation will take up the issue of energy.

MR. GATES: Well, energy is a very exciting area, and there is starting to be a shift of a lot of bright people working on the energy field. There are some aspects of energy that you need that are so difficult and so long-term, you can't expect the private sector by itself to totally solve the problem. And if you look at new approaches to nuclear. If you look at something like geo-thermal, some of these areas the private sector's not going to step in.

We're in a fairly ironic situation right now with respect to the incentives. Many of the incentives are only short-term in nature. And if you want big breakthroughs, the last thing you want is a short-term incentive. And so the way that some things are subsidized right now are probably not the most efficient use of dollars to cause these energy changes to take place. And that's a very urgent thing. You know, I think we can get across the various possibilities of where a breakthrough could take place. The U.S. could do a much better job spreading out the energy research dollars.

MS. BIGGERT: Thank you.

CHAIRMAN GORDON: The gentlelady's time has expired.

Mr. Gates, one common denominator today has been talking about additional funding of R&D. And so we're going to let

you have a chance to talk directly with one of the check-writers now, Mr. Rothman, a member of the Appropriations Committee, from New Jersey, is recognized for five minutes.

MR. ROTHMAN: Fortunately, it's not a personal check -- those projects wouldn't go very far. I happen to serve on the committee that writes the checks with the taxpayers' money.

Firstly, thank you, Mr. Gates, for being here. Secondly, thank you for creating a great American company. And finally, thank you for your work and your wife's work in the foundation and being so conscientious in your philanthropy. You are a role model for anybody whose done reasonably well, and for the rest of us as well.

For better or worse, Mr. Gates, it appears that the H1B visa debate is part of the whole immigration debate in America, and so I'd be interested in your thoughts as to whether, for example, there should be any limits on the numbers of H1B visas issued, or permanent resident status granted. Any limits at all. And I'm being a little bit facetious, but I would love to just plumb the depths of your thinking on this. Do we give them an IQ test before we cut them off? And what about immigration limits as a whole? Do you have views, for example, as to whether there should be any quotas for anyone who wants to come into the United States from any country regardless of their IQ or educational achievement?

MR. GATES: Well, first in terms of writing checks, you know, I've personally written over \$5 billion of tax checks to the United States government.

(Laughter.)

MR. GATES: So maybe that's one of the sources of --

MR. ROTHMAN: We're glad you could afford to pay the tax.

(Laughter.)

MR. GATES: -- of revenue. But, you know, I don't begrudge it in any way. I'm glad you're all working hard to make sure it's well spent.

In terms of the H1B visa issue, the key focus that Microsoft has here is on highly skilled people. And we're talking about jobs that, you know, starting salary is if you include benefits over \$100,000 a year. And the policy that Canada, for example, has says that if a company is offering somebody a job at that type of salary level, then they will facilitate the person coming into the country.

I'd also suggest that if somebody's educated in a U.S. university, that because of the research funding that comes out of the government, you know, basically you've subsidized that education, I think there should be a direct path to permanent residency for --

MR. ROTHMAN: I don't have much time. My question --

MR. GATES: Sorry.

MR. ROTHMAN: Sir, should there be any limits on H1B visas and should there be limits on immigration from any country, regardless of IQ or educational achievement by the applicant?

MR. GATES: Okay. The position Microsoft takes is really focused on a very highly qualified set of people that the numbers in total wouldn't make a huge difference in terms of the overall immigration thing. And so Microsoft doesn't take a position on the broad issue. On the broad issue, I happen to think that immigration has been a great thing for the country and that, you know, if you look at lots of rich countries, they're facing overall population declines, this country is one of the few that because of immigration is actually -- the population will grow.

I don't know what it would be like if you didn't have limits, you know. There may need to be limits. I'm not an expert on that --

MR. ROTHMAN: -- Forgive me, I apologize. I have one more question. I'm a father of a bunch of teenagers, and I have to ask this question. I know that there's a different kind of socialization that occurs now on the Web and with computers, and I understand the arguments about the value of them, and there are great advances in that regard. Are there any cautionary tales for us from you -- you are a father as well -- about how to get the best out of the internet, yet not have sacrificed something that's human, that makes us human, or enhances the best of our humanness?

MR. GATES: Well, you know, whenever new technologies come along, parents have a legitimate concern about how it's being used. And the internet had to be high on the list there. You know, my oldest is 11, so we haven't quite gotten into the toughest years in terms of, you know, having Facebook accounts and spending a massive amount of time instant messaging. But I'm sure that's ahead. And we tended to keep our computers at home out in the open, so that as the kids are doing things on the computer, they know we're going to be walking by at any point. And by doing it that way, we've avoided having to

have much in the way of hard limits, either in terms of time or specific things. We're just all involved in seeing what's going on and talking about what those things are.

You know, there definitely are things where parents need to stay involved and understanding how their kids are spending their time, including their time on the internet. There are some amazing things out there, in terms of courses and material; but I also think that there can be misuses in terms of how information is shared, and how the kid is prioritizing their time. And you know, that's why I'm going to always have an awareness of what my kids are doing, using these tools.

MR. ROTHMAN: Thank you, sir.

CHAIRMAN GORDON: The gentleman's time is expired.

Mr. Gates, you're my test pilot. I hope your 11-year-old, you can figure it out there, so you can tell us what to do for our 7-year-old when that time comes.

(Laughter.)

CHAIRMAN GORDON: Mr. Reichert from Washington State is recognized for five minutes.

MR. REICHERT: -So one of the problems with being one of the last members to ask a question is that a lot of the questions have already been asked. so I have a couple follow-up questions. One follow up to Ms. Biggert's question about the importance of the global economy and our global markets that we compete in. What impact does our corporate tax rate have on American companies as you compete across the world?

MR. GATES: It's important to look at how our tax policies are influencing corporate behavior. You know, in the case of Microsoft to the degree that we can hire engineers here and we can still hire a lot, not enough - overall on balance we prefer to do our R & D here and that's despite the fact that there's very attractive tax advantages that are being offered in other places. That is, even though the taxes are higher here, they're still within the range of what's reasonable given the other benefits that are provided. On tax policy, RNV tax credit would be a very top priority to make sure other countries aren't getting ahead of us too much in terms of the generosity they provide in that area. So tax policy does make a difference but companies won't immediately just go to a place that's more advantageous. You'll make a comparison. The U.S. still has a lot of things that are very much in its favor.

MR. REICHERT: Here is another, it may also be another follow-up question, but I think it's been touched on lightly as I bounced in and out of the hearing here. But you stated in your testimony that the public and private sectors are not longer investing in basic research and development to the levels needed to drive long term innovation. Why is the private sector no longer investing in the levels it should be, in your opinion?

MR. GATES: Well, some of the investment that came out of the private sector came out of what are called the semi-private sector. That is AT&T through Bell laboratories was a highly regulated business and one of the things they sort of did in return was do a lot of research that they weren't receiving a direct economic return for but it was one of their great contributions to the country and to the world and as they became more and more a typical private company as it was broken up into the various pieces, the liberty they had to take profits and fund research largely went away. So then that R & D spending coming out of the antecedents of what was the Bell System was quite a bit less than it was in the past.

There's also cases of companies like Xerox who weren't quite as adept at taking their research work and themselves benefiting from it by productizing it the way that they had expected and so that was a cautionary tale and when in fact Microsoft 15 years ago started really going into this pure research area we wanted to make sure we were going to not only benefit society but also be able to get those products out. You know, I can say that that's worked extremely well for us and we are a big advocate when talking with private companies that they're always running a research budget that means that you get very, very high returns from that work.

You know, just last week we had TechFest, where our researchers show their work and all our engineers go and look at it, and that's really the most fun thing during the entire year is to see that new research work. So there are methods that best practices that the private sector needs to spread that will build the confidence that those investments are well worth making.

MR. REICHERT: And you're one of those companies that has succeeded in that and you're sharing your thoughts, ideas and experience. Are there other companies doing the same thing -- sharing that information with others?

MR. GATES: Yes the - well another sector that's been incredibly R&D-intensive is the drug industry and they're of course facing some challenges in terms of the number of breakthrough new advances they've made. So now they're looking at the cost of R&D for their new products as being very, very high and so hopefully we'll get into a period that other advances and the encouragement they're giving will get them back into increasing their R&D budgets. But if you look at the various sectors, a sector that's been huge which is that sector that's at risk now because of a variety of things that don't make it look as attractive to them.

CHAIRMAN GORDON: Jim's time has expired. With Mr. Neugebauer's acquiescent and I'm sure Mr. Hall will agree, what I would like to do is ask the next questioners to try to limit themselves to one question -- so take your best shot so that everybody will be able to participate today. Mr. Carnahan from Missouri is recognized for one question or statement.

MR. CARNAHAN: Thank you again for being here on this 50th anniversary of the committee. You really outlined well in your remarks talking about the last 50 years and the revolutionary advances that have been made and how we've built on those so well. I'd like you to look ahead to the next 50 years when we have the 100th anniversary of this committee and our grandkids or kids being born today are sitting on this committee. What do you think are going to be some of those profound changes in the way we live and work and how technology is going to effect that?

MR. GATES: Well 50 years is an amazing - is a long period of time in the world of technology. Particularly given that we have an accelerating rate of innovation and so it's not just that we'll take what we've done on the last 50 years and do the same. The world at large will do far more and so you know, you'd find me quite optimistic that the breakthroughs that will allow us to have energy that's both cheaper and environmentally friendly, that those breakthroughs will come. In fact there's many approaches that already we can see that there's a good chance that the advances will be there. In information technology, the ability to have computers that are very easy to work with and almost so pervasive we take them for granted will be quite phenomenal. The breakthroughs in diseases you know, even in the next 20 years I'd expect breakthroughs for the major killers around the world so this is the amazing time.

You know, the kind of spirit that got this committee and started like Vannevar Bush who talked about the endless frontier. I wouldn't go back and change anything that he wrote when he talked about the advances and how government encouraging science will be at the center of those. 50 years from now the U.S. may not have the same relative share of innovation it has today but with the right policies we can have the leading share even if you go out into a long timeframe like that. Which is pretty phenomenal given that we have five percent of the world's population that we've been - however you measure it, over 50 percent of the innovation that's taking place and I think if we renew our strengths that same type of preeminent position is not impossible for us to maintain.

CHAIRMAN GORDON: Thank you, Mr. Carnahan. I suspect that the new 50 years will be 10 years and many of this on this committee will be here and if we're going to be successful we're going to need to do our part. Mr. Hall's assured us that he will be here. Dr. Gingrey, you're recognized.

MR. GINGREY: -- and the information we received from the committee basically said that you were going to be here this morning to share your thoughts on efforts needed to further strengthen our country's competitiveness in the global marketplace. You spent the last hour and a half I think doing a pretty good job of that, but I have concerns about -- the entire committee does -- about the lack of stem education in our country.

You see, when you read a local newspaper, as I often do -- I am a former school board, public school board chairman in Marietta, Georgia, and every year they have the start students of all of the high schools that have the best scores on the SAT and their respective teacher that they give most of the credit to.

But when you look at those names, and we're talking about maybe 30 high schools in that area, you see a lot of Asian and Indian names. And it seems like every year it's more and more, a greater percentage. And, obviously, youngsters that look like me are not, as I did, not going on to Georgia Tech and majoring in chemistry and pure science and becoming one of our great engineers working on the space program or whatever. So I have some real concerns about that. I don't know what to do about it. Maybe you can share your thoughts on that particular point.

But let me just cut right to the chase by asking this question regarding H1B visas, because we talked about that a lot this morning. Do you believe that an increase in the H1B visa program -- more, a greater number of them -- increasing the volume then of foreign labor in stem fields could have the unintended consequence of deterring American students in those same fields from pursuing stem education and then ultimately getting those highly skilled jobs? Because that's exactly what the problem is as I see it.

My friend from New Jersey brought that up in a more broad way in regard to overall immigration quotas. But we're talking now about H1B. And also the J1 visa program when we bring college students from Serbia to play basketball or from Sweden to play tennis so that our college teams can win the NCAA championships and you cut out the little kids that look like me that have been taking those tennis lessons all those years and are just one little step below in our ability level.

So this is a real concern. If we expand this program so much, then do our youngsters say, you know, we don't have a shot, we don't have a grasp at the golden ring? Thank you.

MR. GATES: Our youngsters are competing with these students even if we turn them away from this country. That is, no policy related to H1B will impact the percentage of foreign labor that works in computer science. All it will affect is what portion of that is done in the United States and where the surrounding jobs are created.

So if the goal is to have a series of medals or awards that are just about the best in the U.S., yes, you know, shut down immigration. You know, you should have shut it down in 1900. I mean, immigrant families have been achieving very well in this country for a long, long, long time, and that's always been a controversial thing. But H1B does not -- computer science is not a game played only in the United States. It's not like a local competition. It's more like the Olympics where you are, at the end of the day, you are going to compete with the best in the world. And the question is, you know, does that -- is that happening in the United States?

CHAIRMAN: Thank you. Mr. Chandler is recognized for one question.

MR. CHANDLER: Thank you, Mr. Chairman. Mr. Gates, thank you for taking these incoming missiles. Also, thank you very much for what you do and have done for our schools and what you're doing in particular for our high schools. I'm a little bit ahead of both you and our chairman. I have a 14-year-old daughter who's a freshman in high school, and I can tell you the issues are already there for me. So I'll let you know.

I am wondering. I've got a bill that calls for significant federal investment in the infrastructure, first the physical plants of our schools in this country, but also calls for significant investment in technology infrastructure and in training for technology. I'd like to get your idea on where we need to go in that area. Do you have a sense of how much investment we need to make in our schools in this country in those areas? And do you believe that the government needs to make a much more significant investment? Thank you.

MR. GATES: Computers in schools and technology training, you know, that's going up at a pretty rapid rate, and there's certainly some best practices that more funding would help spread more rapidly. We're involved in a so-called school of the future where a group in Philadelphia came to us, came to Microsoft and asked about some ideas of how technology could be used. And what they did was quite impressive. You know, we were just there in terms of providing advice. And I know a number of high schools around the country are looking at some of those same things.

When you get a chance to do new infrastructure, you can do something quite spectacular as a result of that. In terms of requirements in high school, you know, there's already a lot of controversy over a push that really is more the foundation is behind, that encourages states to move away from simply asking for two years of math, to move up to three or four years of math.

There actually has been good progress in that regard, and that is another contrast you'll see between the U.S. and these countries that score well on the PISA exam is that they are requiring -- all the ones that do well require four years of mathematics as part of the high school education.

Some of the states push back on that because of the shortage of teachers and that then comes back into these issues of how do you measure teachers and what -- particularly for the math and science shortage, how do you alleviate that problem that's coming along?

So I do think funding the teachers to get trained on technology and technology in the schools is a very important thing. I don't know what sort of -- I don't think we at this point need to add specific requirements for technology training, because I think if we train the teachers the right way, they'll be bringing that in to all of the different subject matter that they teach.

CHAIRMAN: The gentleman's time has expired. One more nervous father, Mr. McCaul, is recognized for what I am sorry to say will be our last question, to meet our agreement.

MR. McCAUL: Okay. Thank you, Mr. Gates, for being here. Yeah, I have five kids. Three are triplets. And they're six years old, so.

MR. GATES: Wow.

MR. McCAUL: It's great to have you here. Michael Dell is actually one of my constituents, probably my most famous constituent. I know you're good friends. And thank you for the work you do in education with him and his foundation. I also represent UT. I got a tour of the Pickle Center where the largest super computer was unveiled about two weeks ago through an NSF grant, so it's an extraordinary technology.

I just want to focus on two areas that I know we've covered to some extent, but when I see the students at the University of Texas building the computer chips and other things, and then when I found out after we invest and trained in them, we lose them, and they go back to where they came from, usually China or Asia, and work for our competitor.

That seems to be a failed policy, in my view, and that's one reason why I've co-sponsored raising the cap on H1B visas. We're looking at a bill to issue green cards to Ph.D.s, graduates with a Ph.D.. Obviously, we would like to have more home grown talent, but we're losing that, as you have talked about. If you could -- and this is, you know, a broad question, but in terms of prioritizing federal funding, that's what we have to do. We have limited federal dollars. Where do we need to be really focusing that money both from an education standpoint and an R&D standpoint?

MR. GATES: Yeah. I appreciate your points on HIB and your support on those issues. And, you know, I'd just really highlight how urgent this issue is, whether it's short-term relief or long-term relief, you know, this is making a big difference in terms of where jobs are created.

And if you want to grow the pie of, you know, how many taxpayer dollars they have, these are the types of people and jobs that really do add to that and ideally allow the virtuous that the government funds the universities, the universities train the great people. They go out into companies and get money back to you that then in some form gets to those universities. That's that magic cycle that we've had.

I was just in Austin a couple of weeks ago visiting and seeing the great work they do there, including some particularly good things to encourage Hispanics to come into computer science where they've done amongst the best.

You know, where do federal dollars have the biggest impact? I do think the NSF budget -- it's not actually a very gigantic budget, but those dollars are very impactful, and so if COMPETES was appropriated over these next seven years, we would get as a country a very good return on the increase that goes into that amount of money.

You know, I often think if you said, okay, take something like energy. Should you fund, you know, currently using something that's not economic and so you subsidize it versus fund research to make it, and it won't be overnight, but to make it over time economic, the benefit is so dramatically in favor of funding the research to make it economic versus subsidizing the consumption of the thing that's not economic. I mean, you could take, you know, not even a huge percentage of those dollars and get some I think impactful research funding.

So, you know, the theme that research is where it's at, and that's been successful for the U.S., you look at health, you know, and the exploding health costs. How do you deal with that? Research. You look at energy and the challenges there. You know, you come back to research. Unfortunately, the ability to funnel it through the universities that spend it very well, particularly if they have these talented people from all over the world engaged in their activities, that's the, I think the clearest use of federal dollars.

CHAIRMAN GORDON: Regretfully, I have to say that the gentleman's time has expired. Let me also apologize to those members that did not have a chance to directly ask a question today. But the record will continue to be open for statements or questions that you might like to have.

I think -- Mr. Gates, we very much appreciate your being here. I think your concluding statement is a summary for all of us. And that is, if you look at the major issues today before us, whether it's competitiveness, health, energy independence, we have to have a technological bump. You know, more of the same is not enough. Incremental change is not enough. We're going to have to invest in R&D and get that bump.

Thank you for being here, and this hearing is closed.

MR. GATES: Thank you.

END