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THE 2003 PRESIDENTIAL AWARDEES FOR EXCELLENCE IN MATH AND SCIENCE TEACHING: A LESSON PLAN FOR SUCCESS

HEARING

BEFORE THE

COMMITTEE ON SCIENCE
HOUSE OF REPRESENTATIVES

ONE HUNDRED EIGHTH CONGRESS

SECOND SESSION

MARCH 18, 2004

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THE 2003 PRESIDENTIAL AWARDEES FOR EXCELLENCE IN MATH AND SCIENCE TEACHING: A LESSON PLAN FOR SUCCESS

THURSDAY, MARCH 18, 2004

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE,
Washington, DC.

The Committee met, pursuant to call, at 10:00 a.m., in Room 2318 of the Rayburn House Office Building, Hon. Sherwood L. Boehlert [Chairman of the Committee] presiding.

COMMITTEE ON SCIENCE
U.S. HOUSE OF REPRESENTATIVES

The 2003 Presidential Awardees for Excellence in Mathematics and Science Teaching: A Lesson Plan for Success

Thursday, March 18, 2004
10:00 a.m. – 12:00 p.m.
2318 Rayburn House Office Building (WEBCAST)

Witness List

Mr. Jonathan Roland
Teacher, Perry Hall High School
Baltimore, Maryland

Ms. Gail Bromiley-McGee
Teacher, Carnegie Vanguard High School
Houston, Texas

Mr. Jason Cushner
Teacher, Eagle Rock School and Professional Development Center
Estes Park, Colorado

Ms. Wendy Ehnert
Teacher, Austin E. Lathrop High School
Fairbanks, Alaska

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HEARING CHARTER

COMMITTEE ON SCIENCE
U.S. HOUSE OF REPRESENTATIVES

The 2003 Presidential Awardees for Excellence in Math and Science Teaching: A Lesson Plan for Success

THURSDAY, MARCH 18, 2004
10:00 A.M.—12:00 P.M.
2318 RAYBURN HOUSE OFFICE BUILDING

1. Purpose

On Thursday, March 18, 2004, the House Committee on Science will hear from teachers on how the Federal Government can help improve K–12 math and science education. Four secondary school math and science teachers will testify before the Committee. Each is a recipient of the 2003 Presidential Award for Excellence in Mathematics and Science Teaching (PAEMST), the Nation's highest commendation for K–12 math and science educators.

2. Witnesses

Mr. Jonathan Roland is a teacher at Perry Hall High School in the Baltimore County Public Schools in Baltimore, Maryland, where he teaches conceptual, standard, honors, gifted and talented and Advanced Placement physics. Mr. Roland is also an adjunct professor at Johns Hopkins University, where he designed and taught "Understanding and Teaching Physical Sciences in Middle School" and "Understanding and Teaching Physics in Elementary School." He received his Bachelor of Science degree in Chemical Engineering from the University of Delaware and his Master's degree in Teaching from Towson University.

Ms. Gail Bromiley-McGee is a science teacher at Carnegie VanGuard High School in Houston, Texas, and before that she taught biology at DeBakey High School for Health Professions. Ms. Bromiley-McGee holds a Bachelor of Science degree in Biology from Trinity University and she has completed 124 post-degree hours in biology, zoology and botany at the University of Texas at Austin.

Mr. Jason Cushner most recently was a teacher at Eagle Rock School and Professional Development Center in Estes Park, Colorado, a full-year, residential program for students who have dropped out or been expelled from high school. There he taught all levels of mathematics, from basic to calculus. Mr. Cushner holds a Bachelor of Science degree in Applied Mathematics from the University of California at Irvine, and a Master's degree in Secondary Math Education from Colorado College.

Ms. Wendy Ehnert is a teacher at Austin E. Lathrop High School in Fairbanks, Alaska, where she teaches biology, chemistry and physical science. Ms. Ehnert is a National Board Certified Teacher in Adolescence and Young Adulthood Science and she served as a Fulbright Exchange Teacher in Olomouc, a city in the Czech Republic. Ms. Ehnert holds a Bachelor's degree in Life Science from the University of Minnesota College of Education and a Master's degree in Teaching Biology from the University of Alaska, Fairbanks.

Background

On April 26, 1983, a blue-ribbon commission appointed by the Reagan Administration released "A Nation at Risk," a report containing strong language and disturbing findings on the state of education in the U.S. In one of its more memorable lines, the report claimed, "If any unfriendly foreign power had attempted to impose on America the mediocre education performance that exists today, we might well have viewed it as an act of war." Included among the "indicators of risk" were international comparisons of student achievement, which revealed that U.S. students were never first or second on any of 19 different academic tests, and they scored in last place in seven of them. National assessments also showed a steady decline in science achievement scores of U.S. 17-year-olds.

Also in 1983, President Reagan signed into a law a program establishing the Presidential Award for Excellence in Mathematics and Science Teaching (PAEMST) to identify outstanding science and mathematics teachers in kindergarten through 12th grade.

The 2000 National Assessment of Educational Progress (NAEP) shows that large numbers of U.S. students still demonstrate only a rudimentary understanding of mathematics: 31 percent of 4th graders, 34 percent of 8th graders and 35 percent of 12th graders scored below "basic," meaning that the student failed to demonstrate even partial mastery of the knowledge and skills that are fundamental for proficient work at each grade level. And, the achievement gap in NAEP math scores between white and black students and between white and Hispanic students has remained relatively unchanged since 1990, with 68 percent of African American 8th graders scoring below basic compared to 23 percent of white students.

On international assessments, U.S. performance relative to other nations actually declines with increased schooling. According to the most recent (1999) Third International Mathematics and Science Study (TIMSS), an assessment that evaluates the math and science performance of 4th, 8th and 12th grade students from 42 different countries, most U.S. students score above average in elementary school, but those in 12th grade—including our most advanced students—rank among the lowest of all participating countries, outperformed by nearly every industrialized nation and ahead of only Cyprus and South Africa.

Issues in K–12 Education

Over the years, a common theme in education reform has emerged: a qualified teacher is critical to the success of any K–12 science and math education reform effort. Yet, in response to impending teacher shortages, particularly in the areas of special education, math and science, many states have allowed individuals without appropriate background to teach. In fact, the 1996 National Commission on Teaching and America's Future found that "more than 50,000 people who lack the training required for their jobs have entered teaching annually on emergency or substandard license." More recently, a survey by the U.S. Department of Education found that 49 percent of seventh grade mathematics teachers did not have the equivalent of a minor in mathematics, and that 32 percent of middle school science teachers did not have the equivalent of a minor in any of the sciences.

A related problem is the exodus of new teachers from the profession, with more than 30 percent leaving within five years. High teacher turnover creates a continual demand for new teachers, and those teachers require teacher professional education and development. Partly as a result, many schools are moving toward the regulation of teaching practice, such as the use of more scripted curriculum materials—something that may limit some able teachers from exercising their professional knowledge and discretion, making teaching less inviting to those most qualified.

To achieve its twin goals of improving education and narrowing the achievement gap, "No Child Left Behind" requires a "highly qualified" teacher in every classroom, it raises the qualifications of paraprofessionals (also known as teacher aides) and it requires public reporting of staff qualifications. It also provides state grants to recruit and train teachers. In addition, loan forgiveness programs at the Department of Education and the Noyce Scholarship Program at the National Science Foundation (NSF), which seeks to encourage top math and science students to enter the teaching profession, are just some of the initiatives that have been designed to address issues of teacher recruitment and retention.

At its center, however, "No Child Left Behind" seeks to hold schools accountable for the progress of their students by requiring that all students in grades 3–8 be tested every year in reading and math (and, beginning in 2007, science), and that all students make "annual yearly progress" toward proficiency in these subjects. Failure to do so results in a school being identified as "needing improvement," which triggers various interventions, such as additional funding, choices for parents and corrective actions. The reliance on testing has led some educators to complain about the prevalence of drilling, test prepping, "teaching to the test" and "dumbing down the curriculum."

NSF K–12 Education Programs

President Bush's education reform initiative also called for the creation of a new Math and Science Partnership Program at NSF to unite the activities of higher education, school systems and business in support of improved math and science proficiency for K–12 students and teachers. Ultimately, Congress created complementary programs: one at NSF and one at the Department of Education. The NSF program awards grants on a peer-reviewed, competitive basis to partnerships between institutions of higher education and one or more school districts to improve math

and science education. Funds are used to develop innovative reform programs that, if proven successful, would be the key to large-scale reform at the state level.

The Department of Education program, with its program allocation based on a poverty/population formula, funds all 50 states, which in turn compete awards to math and science partnerships at the local level. Although similarly titled, the programs were created to be complementary, not duplicative. NSF funds innovative programs in science and math to develop and test new models of education reform, thereby remedying a lack of knowledge about math and science research. The Department of Education builds on its traditional relationships with school districts and schools and funds science-based teaching materials, curricula and training programs, with a recent focus on improving student achievement and teacher performance in math. The Fiscal Year 2004 omnibus appropriation provided the Education and the NSF partnership programs with approximately $150 million and $140 million respectively. The Fiscal Year 2005 budget zeroed out the NSF program and transferred $120 million to the Department of Education.

The Science Committee adopted a clear position opposing this move in its Views and Estimates. In part, the Committee stated:

> The Committee is especially troubled by the proposal to eliminate the NSF's Math and Science Partnership Program. This program was specifically authorized as part of the *National Science Foundation Authorization Act of 2002.* The Committee strongly believes that NSF is the only federal agency with a proven record of selecting education projects that offer the best hope to narrow the achievement gap and raise student performance in math and science. Through its competitive, merit-based process, NSF is uniquely qualified to use its decades of experience in education research and evaluation to appraise grant proposals and to strengthen the link between research findings and classroom practice. The Partnerships program should be funded at the authorized level of $200 million.

NSF also sponsors a number of other programs through its Division of Elementary, Secondary, and Informal Education that are designed to improve pre-K–12 science, technology, engineering and mathematics education. Some, such as the Instructional Materials Development Program, are designed to develop and disseminate instructional materials and assessments. Others, like the Informal Science Education Program, are designed to promote learning outside the classroom, including through the media, museum exhibits and community-based organizations. Total funding for Elementary, Secondary and Informal Education at NSF—a division of the Education and Human Resources Directorate—totaled approximately $205 million in FY 2005, excluding the Math and Science Partnership program. The President's budget request provides $172.75 million for FY 2005.

PAEMST

The Presidential Award for Excellence in Mathematics and Science Teaching (PAEMST) was established by Congress and is run by the National Science Foundation (NSF). The program identifies outstanding science and mathematics teachers, kindergarten through 12th grade, in each state. These teachers are to serve as models for their colleagues and will be leaders in the improvement of science and mathematics education.

Since 1983 over 3,000 teachers have been selected to enter the network of Presidential Awardees. While most have remained in the classroom, some have become school principals, supervisors, superintendents and college faculty.

Recognition is given to K–12 teachers in four award groups: (1) elementary mathematics, (2) elementary science, (3) secondary mathematics, and (4) secondary science. The secondary groups include middle, junior, and senior high school teachers. The award now alternates yearly by grade level, beginning with teachers of grades 7–12 this year. Next year, the award will recognize teachers of grades K–6.

Teachers applying for the award must be nominated. Anyone may nominate a teacher (self-nominations, however, are not accepted), but a state selection committee chooses three finalists from each award group for recognition at the state level. A national selection committee, comprising prominent mathematicians, scientists and educators, reviews the state-level finalists and makes award recommendations to NSF and the President. Each award includes a $10,000 award from the NSF for the recipient's school and a Presidential citation. In addition, awardees are invited to attend an award ceremony and other Washington recognition events, including meetings with leaders in government and education.

4. Questions for Witnesses

The panelists were asked to address the following questions in their testimony before the Committee:

- Based on the involvement you have had with federal math and science programs, what are the most important and effective components of these programs?
- What are the factors that limit the performance of students and teachers in math and science? What is the single, most important step that the Federal Government should take to improve math and science education?
- What elements of your pre-service or in-service training have been most helpful in meeting the daily demands of working with students, developing innovative classroom strategies and delivering content rich instruction to a diverse group of students?

Chairman BOEHLERT. The hearing will come to order. I am going to keep my opening remarks brief because I had the privilege of having breakfast this morning with our distinguished guests and their very avid following back there.

Let me just say, though, that there is no issue within our jurisdiction that I care more deeply about than science and math education, especially at the pre-college level. And I suspect that every one of my colleagues on the dais, and there will be more joining us, would say the same thing. And for the benefit of the audience, you should know that so many of our colleagues here, they have about three committee meetings simultaneously, and despite all the study of physics in the early years, they still haven't figured out how to be in more than one place at a time, but we will have others join us later.

None of the other things this committee wants to see done, whether it is developing a hydrogen car or maintaining a presence in space, none of these things can be accomplished unless we have the scientists and engineers to do the work and a scientifically literate citizenry who will support it and learn from it. And, of course, there is only one way we can create those scientists and engineers and educated citizens, and that is through education, starting from earliest childhood.

And who will do the educating? Parents, surely, and for better or worse, the popular culture. But, most critical are our nation's teachers. The fanciest school in the world, all the books, everything else is secondary to a quality teacher, a dedicated, committed teacher in the classroom. That is why one of the first hearings I held as Chairman of this committee was with the Presidential Math and Science Teaching Awardees, and I promised them to make the hearing an annual event, and a lot of people on Capitol Hill found it unusual that we would invite teachers. We talk about teachers all the time, why not invite them and listen to them?

You would think that this sort of hearing would be happening all the time, but, unfortunately, it is not the case. Instead, Congress talks constantly about education, but it rarely listens, and it listens least of all to the most important experts: actual classroom teachers, the folks at the front lines of our nation's educational system.

So today's hearing offers us a rare opportunity to hear directly from teachers, and not just any teachers, I might add, but those who have been recognized as the very best. So we are eager to hear what you have to say. We want especially to learn how the Federal Government can help you do your jobs, which federal programs have been helpful, and which have not worked. Please be as candid and specific in your answers as you can be, and describe particular experiences that you have had. We hear policy prescriptions and theories all the time. We want to hear from you about real life.

But before we begin, let me congratulate each of you, not only for winning this prestigious award, but for doing the incredible work that enabled you to earn it. We want to hear from as many of you as possible, so we will go through our usual hearing listening to testimony and asking questions to our panel of four teachers, and then, if time allows, we will open the floor for a while to comments from other awardees.

Let me point out that—and this is one area of responsibility that we have—at 10:45, I have to temporarily take leave from the Chair and I will ask someone else to sit in, because I have to go to an important meeting for a Committee that didn't even exist two years ago. It is called the Committee on Homeland Security, and I would suggest to all of you that probably there is nothing more important on our overall agenda, particularly in these difficult times, than protecting us and our homes and our neighborhoods and our communities, and that is what this new Committee—bipartisan Committee of Homeland Security is all about.

With that, let me have the privilege of introducing my distinguished Ranking Member of the Committee, the gentleman from Tennessee, Mr. Gordon.

[The prepared statement of Mr. Boehlert follows:]

PREPARED STATEMENT OF CHAIRMAN SHERWOOD BOEHLERT

I'm going to keep my opening comments brief so we can get to our impressive witnesses without further delay.

Let me just say, though, that there is no issue within our jurisdiction that I care about more deeply than science and math education, especially at the pre-college level. And I suspect that every one of my colleagues on this dais would say the same thing.

None of the other things this committee wants to see done—whether it's developing a hydrogen car or maintaining a presence in space—none of these things can be accomplished unless we have the scientists and engineers to do the work and a scientifically literate citizenry who will support it and learn from it. And, of course, there's only one way we can create those scientists and engineers and educated citizens, and that's through education—starting from earliest childhood.

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We want especially to learn how the Federal Government can help you do your jobs. Which federal programs have been helpful and which have not worked? Please be candid and specific in your answers, and describe particular experiences that you have had. We hear policy prescriptions and theories all the time; we want to hear from you about real life.

But before we begin, let me just congratulate each of you, not only for winning this prestigious award, but for doing the incredible work that enabled you to earn it. We want to hear from as many of you as possible, so we'll go through our usual hearing listening to testimony and asking questions to our panel of four teachers—and then, if time allows, we'll open the Floor for a while to comments from any of the other awardees.

I'm eager to hear your testimony.

Mr. GORDON. Thank you, Mr. Chairman. I am pleased to join you in welcoming our distinguished witnesses to today's hearing. Our witnesses, and many of their colleagues in the audience, have come to Washington to receive the Presidential Award for Excellence in Mathematics and Science Teaching. These are men and women who serve with distinction on the front lines in K to 12 science and math education.

As the son of two teachers, I admire the skill and dedication of these outstanding teachers, and extend my warmest congratula-

tions to each of you. I would particularly like to acknowledge and congratulate two teachers from Tennessee who are awardees: Ms. Patricia Littlejohn from Freedom School in Franklin, and Ms. Samantha Stevens from Grundy County High School in Coalmont.

There is no more important job than the one these teachers perform every day. Their efforts inspire the next generation of scientist and engineers who will make the discoveries and create the technology marvels of the future. But equally important, these teachers help prepare all children who enter their classroom to function in an increasingly complex world, to be informed citizens, and to lead fulfilling lives.

Today the Science Committee has the privilege of hearing from some of the best math and science teachers in the Nation. I hope to learn what attracts you to teaching careers, and the factors that led you to outstanding success in math and science as teachers, and what it will take to replicate your success and increase your numbers. I am particularly interested in your views on such key issues as: how to improve the preparation of new math and science teachers; what constitutes effective professional development activities; and what factors influence teacher retention. I would also appreciate hearing about your experience with federally sponsored teacher professional development programs and activities that result in new and hopefully improved teaching materials. Specifically, what kinds of federal actions and programs do you believe have been most effective in improving math and science education?

I want to congratulate the Chairman for convening a hearing to honor this distinguished group of teachers, and, again, I want to offer my congratulations to our witnesses on their Presidential Awards, and I appreciate their attendance before the Committee and look forward to their discussion today.

Thank you, and I yield back the balance of my time.

[The prepared statement of Mr. Gordon follows:]

PREPARED STATEMENT OF REPRESENTATIVE BART GORDON

Mr. Chairman, I am pleased to join you in welcoming our distinguished witnesses to today's hearing.

Our witnesses, and many of their colleagues in the audience, have come to Washington to receive the Presidential Award for Excellence in Mathematics and Science Teaching. These are the men and women who serve with distinction on the front lines of K–12 science and math education.

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I hope to learn what attracted you to teaching careers and the factors that led to your outstanding success as math and science teachers—and what it will take to replicate your success and increase your numbers.

I am particularly interested in your views on such key issues as how to improve the preparation of new math and science teachers, what constitute effective professional development activities, and what factors influence teacher retention.

I would also appreciate hearing about your experiences with federally sponsored teacher professional development programs and activities that resulted in new, and hopefully improved, teaching materials. Specifically, what kinds of federal actions and programs do you believe have been most effective in improving math and science education?

I want to congratulate the Chairman for convening a hearing to honor this distinguished group of teachers.

Again, I want to offer my congratulations to our witnesses on their presidential awards. I appreciate their attendance before the Committee, and I look forward to our discussion.

Thank you and I yield back.

Chairman BOEHLERT. Thank you very much, Mr. Gordon. And as our witnesses entered the room, they received a standing ovation from the audience, most of whom are Presidential Awardees themselves. So I would suggest that we start this hearing, before we introduce our distinguished panel, by giving all these Presidential Awardees a standing ovation from the Congress.

Thank you most sincerely for what you are doing so well. You got this award the old-fashioned way. You earned it. Our panel today consists of Mr. Jonathan Roland. Mr. Roland is a teacher at Perry Hall High School in Baltimore, Baltimore County. Right, Baltimore County? Baltimore County Public Schools in Baltimore, Maryland, where he teaches conceptual, standard, honors, gifted and talented, and Advanced Placement physics. Mr. Roland is also an adjunct professor at Johns Hopkins University where he designed and taught "Understanding and Teaching Physical Sciences in Middle School" and "Understanding and Teaching Physics in Elementary School." He received his Bachelor of Science degree in Chemical Engineering from the University of Delaware, and has Master's Degree in Teaching from Towson University.

For the purposes of introduction, the Chair recognizes Ms. Jackson Lee of Texas.

Ms. JACKSON LEE. Thank you very much, Mr. Chairman. Let me add my appreciation and accolades for the outstanding audience. We have a lot of hearings, but sometimes our audience ranges from those who like us to those who dislike us. We are delighted that we all like each other in this room today and applaud everyone that is here. I associate myself with the words of the Distinguished Chairman and the Distinguished Ranking Member. This is an exciting day for us and a very, very important hearing.

I start my remarks very often in this Science Committee by saying, "Science and technology was the work of the 21st Century." Obviously, I started on this committee before the turn of the century. How does that sound? And I have always said how important math and science is, and making it where it is so attractive to our young people.

How exciting it is to look at these awardees who have obviously done so, and enjoyed their work. Let me say that I am a mom of a young teacher, and it is exciting——

Chairman BOEHLERT. Aw.

Ms. JACKSON LEE [continuing]. To see her excel in the teaching field, and might I just add that one of her very fine products was to get her first grade class to be the champion science project win-

ners for her local community in the Houston Independent School District.

And now they are all going to be scientists. It gives me great pleasure to celebrate all of you, the Nation's best and brightest teachers in science and mathematics. I am very pleased to announce that one of those teachers, among many others, who is here to join us today is from my district and our district and our city, the wonderful Ms. Gail Bromiley-McGee, and we are so happy to have her here today.

Ms. McGee holds a Bachelor of Science in Biology from Trinity University, has completed 124 post-degree hours in biology, zoology and botany from the University of Texas in Austin. She received a Presidential Award for Excellence in Mathematics and Science Teaching while teaching biology at the William DeBakey High School for Health Professions in Houston, Texas. My colleagues are aware of Dr. DeBakey and his outstanding contributions to medical science. She now teaches biology at Carnegie Vanguard High School, also in Houston. It is amazing that she has earned this honor after only teaching for about 10 years. Obviously, barely a girl herself, Ms. McGee has said that she sees her responsibility as a dual role: one to help students make informed decisions, not just as students, but as people and as voters. "I want them to understand sexuality, nutrition and big ideas like that." Secondly, I feel it is critical that science is grounded in experiences so that the things we learn about are tied into real life and become a concrete part of their lives. I can just imagine Ms. McGee utilizing the finding of a very special small new planet as a science question. I commend her for those sentiments.

Science is often confused with technology. Science is not about sitting at a computer or playing with chemicals only. Science is a way of approaching tough problems and answering hard questions using logic and experimentation, and I, too, look forward to hearing from all of the panelists, and particularly Ms. McGee for her understanding of how we can best educate our children. It is a skill that helps people make real decisions about their lives and the world they live in. It is vital that our children develop the life skills and savvy that science training offers. The City of Houston is very lucky to have Gail McGee to help guide our children, and I hope today in our panelists we will hear how the Federal Government can interface with your efforts, how funding impacts what you do, and, as well, what we can do better.

Your impact will be felt for years, if not for generations to come, and I am so delighted to welcome you to the Science Committee. I conclude, Mr. Chairman, by saying I likewise have the same difficulty in the Homeland Security Committee, which I am on, and presently I am also serving as a moderator for my Committee that is going on right now on immigration, so I beg your indulgence as I depart, but I look forward to hearing as much as I can. I thank the Chairman and Ranking Member. I yield back.

Chairman BOEHLERT. Thank you. And next on our list, Mr. Jason Cushner was most recently a teacher at Eagle Rock School and Professional Development Center in Estes Park, Colorado, a full-year residential program for students who have dropped out or been expelled from high school, a challenging and difficult assign-

ment. There, he taught all levels of mathematics from basic to calculus. Mr. Cushner holds a Bachelor of Science degree in Applied Mathematics from the University of California at Irvine, and a Master's degree in Secondary Math Education from Colorado College. Let me point out to the audience that Mr. Cushner is engaged and will be married on August 28. He had the good judgment to select the Finger Lakes region of Upstate New York, my neighborhood, for the ceremony, and you are all invited.

Next, Ms. Wendy Ehnert is a teacher at Austin E. Lathrop High School in Fairbanks, Alaska, where she teaches biology, chemistry, and physical sciences. Ms. Ehnert is a National Board Certified Teacher in Adolescence and Young Adulthood Science, and she served as a Fulbright Exchange Teacher in the Czech Republic. Ms. Ehnert holds a Bachelor's degree in Life Science from the University of Minnesota College of Education and a Master's degree in Teaching Biology from the University of Alaska, Fairbanks.

The Chair recognizes the Distinguished Vice Chairman of the Subcommittee Mr. Gutknecht for one minute.

Mr. GUTKNECHT. Thank you, Mr. Chairman, and I think on behalf of all of our colleagues we are delighted to have all of you here. You may not realize this, but we spend an awful lot of time on this committee trying to figure out how we can encourage more interest in the whole issue of mathematics and science because we know that is one area where we fall behind.

I want to say a special welcome to Mark Ryan, who is here from Willow Creek Junior High School in Rochester, Minnesota, where I call home, and I want to say a special thank you to Ms. Ehnert who is originally from Winona, Minnesota; went to Madison Elementary School, Winona Senior High School, and the University of Minnesota, so we are doubly represented here today, and we are proud of it, Mr. Chairman.

Chairman BOEHLERT. Thank you so much. Chair recognizes Mr. Gilchrest.

Mr. GILCHREST. Thank you, Mr. Chairman. I look forward to that wedding at the Finger Lakes.

Chairman BOEHLERT. Yeah, you go up Route 81 and——

Mr. GILCHREST. All right. We will stop at the Baseball Hall of Fame along the way. I want to welcome all the teachers here this morning, and especially Mr. Jonathan Roland from the First District of Maryland. For you, Mr. Roland, and for the other teachers, your dedication to this process of fusing a spirit of opportunity to these young people is profoundly important, and I would hope—now, you follow any direction you want to follow in life—but I would hope that you understand that importance that you are buttressing the pillars of civilization, without a doubt.

And so, your expertise and your feeling of joy for each one of those young people that you deal with on a daily basis, I hope that lingers with you, so that your job is fundamentally sound and fundamentally important. And we want to express our strong appreciation for the things that you are doing. I can't help—and I will close with this, Mr. Chairman—I often come across people that have a joy in reading as well, and recently in the last few years I have read two books that I think each of you would find profoundly interesting, if you haven't read them already. One is

Consilience by E.O. Wilson. It is a unity of knowledge. And the other one is one I just finished—fascinating—called *Measuring Eternity* by Gorst, and it talks about, over the last 3,000 years, people trying to understand how old the Earth was—or is, and we finally figured out with Hubbell, Mr. Chairman, so we would want to hold on to the Hubbell Space Mission. I yield back, Mr. Chairman.

Chairman BOEHLERT. Let me point out that those remarks from the heart come from one of yours, a teacher—former teacher, and people sometimes will say to Congressman Gilchrest, "do you miss teaching now that you have come to Congress," and it is reported that his answer was "no, I am still teaching, but only at a lower level." Chair recognizes the gentlelady from California, Ms. Woolsey.

Ms. WOOLSEY. I can't one-up that one, Mr. Chairman. First of all, the four of you, it is very seldom that we sit and look out at a panel of young people, professionals your age, and it is very refreshing. And, what I am hoping you will tell us today is how we can keep you interested and involved in this field so that we can see you again in over the years, and you will share your experience and wisdom.

And, now, Mr. Cushner, I want you to know that you could ask the Chairman to marry you. He is allowed to do that. We can marry couples, and I will tell you, it would be a real experience.

Chairman BOEHLERT. Exactly. Thank you very much. That is a new one. I haven't faced that challenge before. The Chair recognizes the distinguished gentleman from Michigan, Mr. Smith.

Mr. SMITH. Well, again, thank you very much, certainly to our witnesses, to all of the teachers. A couple from Michigan that I would acknowledge, and that is Angela Newing and Jeffrey Bradley. When we were passing the legislation for Math and Science Partnership and having a review in my Subcommittee on Research, I asked the witnesses the following question: "To stimulate students and have a successful venture for those students, and interest in math and science, to the extent that maybe that kind of education in those years are more like a lighting of a fire to develop interest and enthusiasm rather than filling a container with just information, when is the fire lit, especially in the area of math and science?" And the reaction was maybe when they are four years old, five years old, maybe in the first, second, and third and fourth grade, and if there is no fire then, it is really difficult to rekindle that fire later on. But, you have not only made success in your individual schools, but set an example.

And just as a footnote, I am introducing a bill with a lot of the members of this committee to try to get private sector industry more involved in working with schools to develop that kind of interest in students in math and science with a Congressional Medal. Anyway, my compliments, my congratulations, and good luck on your future. Thank you, Mr. Chairman.

[The prepared statement of Mr. Smith follows:]

PREPARED STATEMENT OF REPRESENTATIVE NICK SMITH

I want to welcome each of the witnesses here today, and take this opportunity to thank you for the fantastic work that you are all doing in our schools to improve math and science education.

During consideration of legislation to authorize the Math and Science Partnership Program two years ago, I asked our witnesses to consider the following question: if education is more the lighting of a fire than filling a container, when is that fire lit for math and science? They all had different answers. Some said third grade. Others said kindergarten. Yet they all agreed that our greatest failure—and our greatest challenge was that too many children failed to experience the spark at all. As a result, too few received the math and science education they deserved.

Here on the Science Committee we are working to improve the American educational system so that it produces more young people that have the skills and interest in technical fields to compete for jobs in the increasingly global economy. My latest project is creating a Congressional award for businesses and associations that partner with K–12 schools to improve math and science education. I'd encourage the witnesses to go to my web site at *http://www.house.gov/nicksmith/* and look over the draft legislation. If any of you have comments or suggestions, feel free to e-mail me through my web site or give my Washington office a call.

As you can imagine, my colleagues and I spend a lot of time talking about you, but perhaps too little time listening to you. So it is indeed a great honor to have you here to explain how you have been able to light the spark of interest and improve the achievement of all students.

[The prepared statement of Ms. Johnson follows:]

PREPARED STATEMENT OF REPRESENTATIVE EDDIE BERNICE JOHNSON

First, I would like to thank the Chair and Ranking Member for calling this hearing. Today we are here to honor a group of teachers who have received national recognition for their excellence as science and math teachers, and to explore some of the factors that influence the recruitment, professional development and retention of science and math teachers.

It is very important that we meet to recognize the important contributions made by these individuals. Teachers improve the lives of children and their families and strive to give voice to their legitimate professional, economic and social aspirations, to strengthen the institutions in which we work, to improve the quality of the services we provide, to bring together all members to assist and support one another and to promote democracy, human rights and freedom in our union, in our nation and throughout the world.

I believe that education must be our number one national priority. In fact, during my almost thirty years as a legislator, I have fought to ensure that education is on top of the legislative agenda.

Without teachers, this nation could not flourish. A skilled workforce is the essential fuel to propel the economy and ensure a high quality of life. It is absolutely critical to the success of our nation's economy that we continue to produce a scientifically literate workforce. It is also very important that we continue to aggressively recruit more minority and women students into careers in science and technology.

In order to attract and keep talented teachers like the ones who are here today, we must re-emphasize our commitment to education. Now is the time to increase education spending. Education is not a luxury item that can be trimmed when more enticing budget items beckon. It is an essential element that should be our highest national priority.

It is time to take action to ensure the best possible education for our children.

Chairman BOEHLERT. Thank you all very much, and if there is no one else to seek recognition, we will go right to our distinguished panel. Mr. Roland, you are up first.

STATEMENT OF MR. JONATHAN ROLAND, TEACHER, PERRY HALL HIGH SCHOOL, BALTIMORE, MARYLAND

Mr. ROLAND. Thank you. Thank you very much. This is amazing for us, and we would be happy to come down anytime and testify for you.

Sometimes I give my students a question to answer on a test, and they come up with an answer that is completely—seems disconnected to the question, but I hope that what I say today will somehow connect to what you want us to say, to hear.

We look around D.C. and it is amazing. It is so cool. We got the monuments. We got the structure—the power structure of everything that is down here. Look around at it and marvel, and then realize that I teach physics and it is my understanding that it is all either going to burn up or it is going to be frozen sometime in the future. It is all going to be gone, but look at the people in this room and the people that you see. It is my belief that long after the sun has gone and the Earth has burned to a cinder that these people will still be around. Every person, then, is more important than all of the power and all of the money, and everything that you see in D.C. and in this nation. Each person is more valuable because all that is going to be gone. People are going to be around forever.

And when I think about that and think about my life, and you think about your life, I don't—first, I know I am going to die. I know it is going to be over, and I don't want those last five minutes of my life to be the first time that I thought about what my life was all about. I don't want to look back and say, "what was that all about?" when I am lying there. So, I want that bigger context to envelop everything that I say, because this is the truth.

My student's greatest need, then, is to develop a nose for the truth and the skills to track it down. They are constantly being bombarded with messages from people who want to sell them things, whether it be the newest deodorant, the immoral decision, or the extreme political view.

One of my favorite sells is for a deodorant. It is called Axe, and I saw this ad. It shows a boy with a stick of Axe deodorant in one hand and girls' names and phone numbers scrawled over his other hand—his other arm. And I tell my students—well, they get the message: use Axe and you will be a babe magnet. I tell them the advertisers are lying. I know. I tried it. I tell them even those phone numbers are fake. I know. I have tried them.

They laugh, but they also realize that they are going to be puppets of the sell unless they are equipped to sniff out truth. Now, NSF Programs have focused my attention and my energy on nurturing students who are immune to arguments that play on immaturity, or arguments that are simply based on authority or the power of persuasion. But before I share the role that NSF has played in helping me develop my students nose for truth, I want to share with you a—that we need to think about traditional teaching methods in light of a story that my friend Chuck told me of his trip to Yellowstone National Park.

My friend Chuck was traveling to Yellowstone National Park, and on the way in, he saw billboards that said "Please do not feed the bears." He went in through the entrance and they gave him literature, and there were things that said, "Please do not feed the bears." As you drive through the park, there are signs—reminder signs—and they remind you, please, do not feed the bears. And he said, in between the reminder signs, there were folks pulled over to the side of the road and they were getting out their picnic baskets and they were feeding the bears.

Well, he talked to a ranger and he said, "Mr. Ranger, what is wrong with these people? Can't they read? Are they criminal? Why do they feed the bears?" Well, the ranger told him something that

changed his life, and it changed my life, too. It was an epiphany. The ranger said, "Mister, you don't know the worst of it. The saddest part of this story is when the tourist season is over and we have to drive around in our pickup trucks and carry away the carcasses of bears who have starved to death at the side of the road waiting for someone to feed them because they have forgotten how to find food on their own." And I thought, "That is what I was doing with my classes. I was feeding them science every day." I didn't want to drive by my high school five years from now and see Sierra sitting there on the side of the road waiting for someone to feed her because she has forgotten to find knowledge on her own.

I desperately wanted to produce students who eventually did not need me, but who could independently find truth. And NSF calls this process inquiry, and they are champions and prophets of inquiry. They have given us opportunities to practice inquiry, like, I had a research experience for teachers down at Johns Hopkins where I worked in the labs, and I brought home authentic research opportunities to my students, and now they do this every day—every other—a couple times a week.

They guided and they funded inquiry curriculum like active physics, which changes the lesson paradigm from plug the numbers into the formulas to find answers to these real-life problems. They have given us accountability and affirmation through this Presidential Award.

I am not an extremely together teacher. You can ask my students. My socks don't even match, typically, but my wife dressed me today, so I am okay. But I have given the—I have been given extraordinary focus and extraordinary opportunities through the National Science Foundation.

You have got to love science. The world is filled with interesting questions. My six-year-old, Jonny, he asked me the other day, "Dad, how can we see really big things like trees and like buildings when our eyes are so small?" How do you guys put a blank sheet of paper into a Xerox machine and out it comes looking like this? You know how that happens? No, you don't. No one does. No one does. You and I could—you know, you know. You and I could make a machine that could put ink on a piece of paper but it wouldn't look like this. How does that happen? It is almost miraculous.

How about it is late at night. You are in bed. It is cold outside. It is, like, two in the morning, and all of a sudden, you realize you shouldn't have had that last glass of water before bed because you gotta go. So you get out of bed and you get to the bathroom and your feet touch that cold tile. "Brr. Brr," until you get to the fuzzy mat, yes. Right beside the bathroom is your, like U-shaped right there and you are there and it is cozy. Hey, did you know the mat and the tile are exactly the same temperature? Why does one feel so chilly and the other feel so cozy? I am not going to tell you.

Well, how about this. Close your eyes for a moment. I am not sure of the procedures, if you are allowed to close your eyes, but if you are, close your eyes real quick. Okay. You hear it? Okay. While your eyes were closed, I spilled water on one of my pant legs. Can you tell which one the water was spilled on? Mr. Ehlers?

Mr. EHLERS. Doctor.

Mr. ROLAND. Dr. Ehlers, you should know.

Mr. EHLERS. You spilled it on your left anterior appendage.

Mr. ROLAND. It is. Now, how do you know that one—I better ask Chairman Boehlert because you may know. How do you know that that one is wet? Well, first, do you agree?

Chairman BOEHLERT. Because Dr. Ehlers told me.

Mr. ROLAND. Well, I guess we have a lot of work to do. That is an appeal to authority. Why does it look—why do you know that is the one? Are you psychic? No, why? Because it looks——

Chairman BOEHLERT. It looks wet.

Mr. ROLAND [continuing]. Wet. What makes it look wet? What is your observation?

Chairman BOEHLERT. Well, it is darker than the rest of your slacks.

Mr. ROLAND. Okay. Why is it that it is darker? Well, what color is water?

Chairman BOEHLERT. Clear.

Mr. ROLAND. Why does it make it look darker? Well, I am not going to tell you because that is not the way we do science, is it? We will teach you how to talk directly to the universe and find out without deferring to some authority. If we don't make our students dig and scratch and claw and argue to obtain knowledge through direct interaction with the universe, but instead hand them knowledge on a silver platter of textbooks or direct assertions by the teacher, they become gullible and lazy.

I think, now, I can give you my wish list. Can I do that, to finish up?

Please continue to provide teachers with effective opportunities to see and practice inquiry through research experience and through focused in-service trainings so we can develop our own noses for truth and get equipped to provide noses of truth for our students. And please, do for curriculum what the Food and Drug Administration does for pharmaceuticals and surgical procedures. Protect us from the bad ones and help us develop good ones. I have encountered countless curricular options and educational ideas that were advised by many people who had very strongly held, but uninformed and fickle, personal views of what good teaching looks like. I would rather do something that has been tested, and I don't like people continually changing the targets.

Along the way, continue to dangle carrots in front of us. It takes very little to motivate a teacher, but we need a personal justification for putting national standards on our already-packed to-do list. Empowering individual teachers is a very efficient use of resources. We return so much on your investment because we intrinsically love what we do.

Thank you very, very much. I have never done this before.

[The prepared statement of Mr. Roland follows:]

PREPARED STATEMENT OF JONATHAN ROLAND

My students' greatest need is to develop a nose for truth and the skills to track it down. NSF programs have successfully focused my attention and energy on meeting this greatest need through developing standards and curriculum and through providing opportunities and carrots.

My students are constantly bombarded with messages from people who want to sell them things, whether it be the newest deodorant, the immoral decision, or the extreme political view.

One of my favorites sells is for a deodorant called AXE. The ad shows a boy with a stick of Axe deodorant in one arm and girls names and phone numbers scrawled all over his other arm. My students get the message, "Use Axe and you will be a babe magnet." I tell them, "They are lying. The message is a fraud. I know. I've tried it." "Even the phone numbers are fake." "I know, I've tried them."

They laugh, but they also realize that they will be puppets of the sell unless they are equipped to sniff out truth.

Before I share the role that NSF has played in equipping me to give my students noses for truth, I'd like to frame the nature of our challenge. Chuck, my friend, went on a vacation to Yellowstone National Park. He said on his way into Yellowstone he passed billboards welcoming him to the park and informing him that it was against the rules to feed the bears. As he entered, he received literature that told him not to feed the bears. As he drove through the park he passed reminder signs that said, "Do not feed the bears." And in between the reminder signs he saw, you guessed it, people feeding the bears.

He talked to a ranger and asked, "Mr. Ranger, sir, what is wrong with people? Can't they read? Are they all criminals? Why are they feeding the bears?" The ranger told him something that changed my life. The ranger said, "Mister, you don't know the worst of it. The heartbreaking part of all of this is when tourist season ends. We have to ride around in our pickups and carry away the carcasses of bears who have starved to death on the side of the road waiting for someone to feed them because they have forgotten how to find food on their own."

AAAAARGGHH. That was what I was doing in my classes, feeding students science every day. I had to change. I didn't want to drive by the high school five years from now and find Julio sitting on the sidewalk starving for knowledge because no one was feeding him anymore and he had forgotten how to find knowledge on his own.

NSF has convinced me that the key to producing students who can independently sniff out truth is the spirit of inquiry.

The world is filled with interesting questions. My six-year-old son, Jonny, asked me, "Daddy, how can we see really big things like trees or houses when our eyes are so small?"

How can you put a blank paper into a machine and have it come out like this? You or I could make a machine that puts ink on paper—SPLAT—but it would look more like a Rorschach test.

Or how about this. Close your eyes a moment. (Spill water on pants.) While your eyes were closed, I spilled water on one of my pant legs. I want you to try and pick which one. I am probably not the first person you've seen wet his pants while giving testimony to the Committee.

Good guess. How did you know? Did you peek? Are you psychic? What did you observe that let you know which leg was wet?

Looks wet. Good inference. But what did you observe that made it "look wet?" Looks darker. Right. Wet things look dark. Now tell me, what color is water? Why would clear water make things look dark?

No I am not going to tell you. That would not be how we do science. We teach you to talk to the universe yourself and find out without deferring to some authority.

I am not an extraordinary teacher, but I have been given extraordinary focus and opportunities by NSF. I can see now how the NSF was like a fairy godmother behind the scenes making sure that my pumpkins turned into carriages and my mice became horses.

Like most teachers, I had plenty of enthusiasm and love, but I did not know much and I could not do much. NSF guided my energy through national standards. I have been presented with countless curricular options and advised by many people who have strongly held, but never critically examined, personal views of what good teaching looks like. I didn't know exactly what or how to teach because people were continually changing the targets.

You can do for curriculum what the Food and Drug Administration does for pharmaceuticals and surgical procedures. Protect us from the bad ones and help us know how to develop good ones.

Please continue to provide teachers with effective opportunities to see and practice inquiry through research experiences and focused in-service training so that we develop our own noses for truth and get equipped to nurture noses for truth in our students.

Along the way, continue to dangle the carrots in front of us. It takes so little to motivate a teacher, but we need a personal justification for putting national standards on our already packed "to do" list. A couple hundred dollars, a course credit,

and we will return so much on your investment because we intrinsically love what we do.

BIOGRAPHY FOR JONATHAN ROLAND

Even as a child I wanted to teach so badly that I created clubs where I could teach my little friends. I formed a karate club once so that I could teach karate and I didn't even know karate. I am addicted to the rush of watching the lights go on and of equipping students with fresh skills, new knowledge or great attitudes. Now as an adult, I still get headaches and unbearable agitation when I have no opportunity to teach, so I teach Sunday School on the weekends and graduate classes and institutes during the Summer. I am perpetually amazed that Baltimore County pays me to teach. I would be happy to pay them for the opportunity—although I'd rather that information didn't get back to payroll. I'd be happy enough, but my four children wouldn't eat.

I didn't want to begin teaching without ever having been outside of a classroom, so I earned a degree in Chemical Engineering and spent a few years as an engineer before I returned to school to earn my Masters in Teaching and certification.

I could easily write a book entitled, "Everything I Need to Know About Teaching Seems to Continually Elude Me." By what I used to think was serendipitous happenstance, but have recently realized has been the result of the hard work and strategizing of many wonderful people behind the scenes, I have learned I have been given great opportunities to improve my teaching.

I believe that science is an interactive adventure of learning to talk to the universe, rather than a guided tour down clearly marked and established pathways. This is why in addition to traditional laboratory experiences, my students have frequent, significant, authentic outings into the unknown. Students choose and direct their own projects, studying chocolate chips melting, marshmallows in a microwave, and how the weight and length of arrows affects their penetrating power. Students present their results to each other for peer review and develop a nose for discovering truth through scientific habits of mind.

I frequently engage in informal science lessons to neighborhood children, serve as a judge at private and public school science fairs, and engage adults in science activities at parties. I try to seize every opportunity to share the rich, fulfilling, exciting experience of science with children and adults whose passion for science might not yet have been set aflame.

Science cannot be lived vicariously; students must embrace exploration and learn to talk to the universe personally. Nothing rewards me more than when my students initiate and conduct investigations. I love seeing a class mature from an orchestra into an organism, a community of learners.

Following, in resume format, is some of my history.

A. Formal Education

1992, *Master of Arts in Teaching (MAT), Towson University.*

1988, *Bachelor of Science in Chemical Engineering (BS ChE), University of Delaware.* From childhood I wanted to teach, but I wanted to bring more than education into the classroom. I chose engineering to gain a strong grasp on the content and process of my discipline, and five years in the chemical engineering profession gave me valuable authentic experience to share with my students and shape my pedagogy.

B. Teaching Experience

1997–Present, *Teacher, Perry Hall High School, Baltimore County Public Schools.* Taught conceptual, standard, honors, gifted and talented, and Advanced Placement physics.

1997–Present, *Adjunct Professor, Johns Hopkins University.* Designed and taught three graduate physics courses and two graduate seminars on action research and leadership.

1992–1997, *Teacher, Patapsco High School, Baltimore County Public Schools.* Taught earth science, physical science, aerospace science, standard, honors, gifted and talented, and advanced physics.

C. Professional Development

National Board for Professional Teaching Standards Adolescence and Young Adulthood Science Certification, 2001. Through deep reflection on my practice in the

light of the National Board's high standards, I demonstrated accomplished teaching and a commitment to strengthening our profession.

Physics Advisory Board at University of Maryland Baltimore County (UMBC). I shared ideas and concerns with high school, university and community college faculty and developed innovative programs like the University/High School faculty visitation partnership.

Research Experience for Teachers (RET) at the CISST Engineering Research Center at Johns Hopkins University (JHU). A Summer of robotics research with faculty at JHU inspired me to design authentic, self-directed, intrinsically meaningful research experiences for my classroom and to teach my students that forming a worthwhile research question is one of the biggest challenges in conducting research.

Continual efforts to grow in my content, pedagogical, and technological understanding and proficiency through courses, workshops and conventions. Engaged in many professional development activities including Teachers Teaching with Technology, AP Physics workshops, Eisenhower Professional Development Conferences, Physics is Phun lecture-demonstration series, IEEE Power Engineering Society meetings, Great Courses(r) and other courses focused on content, expectations, learning, and thinking skills.

D. Professional Service

"Taking it to the Streets—a high-frequency, high-stakes interactive homework technique" Presentations at the 2002 Eisenhower Professional Development Conference and the Fall 2002 MAST Convention. I presented a way to synthesize and optimize the convenience of Think-Pair-Share (TPS) with the high-stakes motivation of student presentations by sending students home to teach a concept, reconstruct a demonstration, or conduct a lab with a sibling, parent, neighbor or other non-physics student.

Teaching Elementary and Middle School Teachers as an adjunct professor for Johns Hopkins. I designed and taught "Understanding and Teaching Physical Sciences in Middle School, Parts I and II" and "Understanding and Teaching Physics in Elementary School" based on the National Science Education Standards, Benchmarks and Project 2061. The courses prepared elementary and middle school teachers to cognitively engage their students with science concepts and processes through age-appropriate, interactive, authentic activities and laboratory experiences. I also co-taught two graduate seminar courses, "Action Research for School Improvement" and "Teacher Leadership." These courses led teachers to reflect strategically on their practice through action research that reshaped and refined their instruction.

Mentoring new teachers, developing curriculum, and facilitating professional networking and growth as Co-chair of the Baltimore County Physics Study Committee. In addition to selecting textbooks, writing curriculum, and organizing the Physics Olympics, I formally and informally mentor new physics teachers. I equip and encourage them, monitor their progress and help them strengthen their practice.

Initiating, nurturing and expanding the Advanced Placement Science program at Perry Hall High School. During my first year at Perry Hall, I petitioned my administration to let me to start an AP Physics program. We had no AP science courses at the time. We now run three sections of AP physics. This success encouraged our department to offer courses in AP Biology and AP Chemistry as well.

Leading professional development within Baltimore County Public Schools. I regularly present workshops on the 5–E Lesson Plan, physics demonstrations and mini-labs, the High School Improvement Program, the Science Core Learning Goals, GT Physics, Final Examinations, technology, and more. I also developed county-wide final examinations and curriculum to set achievement standards and improve assessment.

Frequent informal science lessons to neighborhood children and adults, judging private and public school science fairs, presenting science activities for Cub Scouts. I serve as an informal science education facilitator in my community. At neighborhood Halloween parties I have dressed as Bill Nye, distributed diffraction grating glasses and advised parents about science education. I initiate informal science experiments and conversations with children at community events and in my neighborhood. I volunteer to judge science fairs and I spend time with

each student discussing inquiry and encouraging his or her interest in science. I seize every opportunity to share the rich, fulfilling, exciting experience of science with children and adults whose passion for science may not yet have been set aflame.

Publication of "Applying Newton's Laws with the CBL" in Eightysomething*!* My article inspired teachers to catch the vision of teaching graphical functions as real relationships that can be used to solve authentic problems. Physics and mathematics are not pure abstractions, but are pictures of concrete reality and are tools for understanding the universe through inquiry.

Training science and math teachers to use technology as part of a math-science technology team. With a team of math and science teachers, I developed probe-ware workshops, trained and equipped teachers, and catalyzed implementation of probe-ware and graphing calculators into their curriculum.

Integration of the Science and Technology programs at Perry Hall High School. I formed and nurtured relationships with our technology teachers and worked with our administration to establish formal and informal sci-tech connections and take advantage of the powerful synergy between our programs.

E. Awards, Grants, Professional Organizations

Presidential Award for Excellence in Mathematics and Science Teaching, 2003

Radioshack National Teacher Award, 2004

Maryland Association of Science Teachers Award for Excellence in Science Education, 2002

National Board for Professional Teaching Standards, Adolescence and Young Adulthood Science Certification, 2001

Outstanding Teacher Award, Perry Hall High School National Honor Society, 1999

Mentoring to Master Technology Integration Project Grant, Towson University, 2002

Eisenhower Professional Development Grant, 1996

Maryland Equipment Incentive Fund Grant, 1995

Baltimore County Physics Study Committee Co-chair

Maryland Association of Science Teachers

American Association of Physics Teachers

University of Maryland Baltimore County Physics Advisory Board

F. A letter from my principal:

Dear Radioshack National Teacher Awards, November 4, 2003

Jon came to Perry Hall with a Chemical Engineering degree, four years of engineering experience and a Master's degree in teaching. Jon's goal, from childhood, has been to excel in teaching. He wanted to bring more than an academic background into his classroom, so he deliberately chose a career path that led through the rigors of engineering. Our students benefit from his experience, perspective, and insights into scientific and engineering applications.

Students not only enjoy Jon's classes; they learn in a way that equips them to pursue science independently, without relying on someone else to teach them. Jon's students enjoy using a myriad of high and low technology in their investigations because he believes that students can learn more from 10 minutes of authentic investigation than from 90 minutes of lecture. Jon's curriculum is well-planned and executed, but is constantly being modified and shaped by his reflections on how students interact with his teaching. He not only acts purposefully in the classroom, but he is insightfully perceptive of how students are responding.

Jon is an active member of the science-learning community. He actively draws on and engages in educational research and scholarship to improve his practice as well as to develop and deliver professional development at the building, local, and state levels. Jon co-chairs the County-wide Physics Study Committee, has taught three graduate courses on science and two on action research and teacher leadership as an adjunct professor for Johns Hopkins, and serves on a number of University Advisory Boards. Jon's professionalism, enthusiasm, and mentoring activities have won many teachers over to active learning.

Jon is very connected with the mathematics and technology teachers at Perry Hall and throughout the county and state. He has jointly led teams of students to tech-

nology competitions and has taught connections between math and physics at county-wide math workshops. He performed research and developed curriculum on artificial intelligence and surgical robotics with technology teachers during a National Science Foundation (NSF) Summer Research Experience. He and a math colleague co-created workshops on technology which they presented to middle and high school teachers throughout the county. Most of all, Jon has opened and continues to maintain communication and synergy among science, mathematics and technology programs.

Jon enthusiastically pursues excellence in teaching, harmonizing successful teaching practices with his personality, talents, and students through perpetual reflection. He initiated the Advanced Placement Science Program at Perry Hall High School and has inspired students to pursue the highest goals in science. Jon nurtured the program from zero to five AP classes in five years. He has earned our National Honor Society's Best Teacher Award, National Board Certification and the Maryland Association of Science Teachers Excellence in Science Education Award. Jon is currently one of three Maryland finalists for this year's NSF Presidential Award for Excellence in Mathematics and Science Teaching.

G. A letter from one of my students

Mr. Roland was my teacher last year in Standard Physics and is now my AP Physics teacher. He gave me the confidence that I could do AP Physics and made Physics so much fun and so interesting that I wanted to take AP. In Physics, I began to care why a wet cloth looks dark (even though water is clear) and why bathroom tile feels so much colder than the fuzzy bath mat (even though they are the same temperature).

Mr. Roland always says that it's not what he does, but what we do that matters. That's why he often makes us re-teach the things we've learned in class. Sometimes we have to teach someone at home or in the neighborhood as our homework assignment. It's so exciting to share with someone else how physics really matters in their lives and to see them get it. Mr. Roland says, "If you can't teach it to someone else, you probably don't understand it. If you want to really learn something, try explaining it to someone else."

In class, we always feel accountable for our learning. We have to present our results to the class for peer review, just like real research scientists have to. Mr. Roland lets us make up our own investigations and carry them out. He is teaching us how to formulate questions, how to discover our assumptions and preconceived notions, how to follow the rules of evidence, and how to "think outside the box." From my research experience in Mr. Roland's class, I know better than to depend on "what the book says" or "what I heard on TV." Science is all about sharing and challenging each other's ideas, and I have as much right to talk to the universe as any Nobel Prize winner.

If all the coaches at my school worked like Mr. Roland, we would be State Champions in every sport! He gets so much out of us, more than we even thought possible. We work like a team, and he's taught us how to encourage each other and let each other make mistakes without being laughed at. In fact, we learn so much from our mistakes that it seems like we've scored a big win on each one!

We all love Mr. Roland's classroom. It is just packed with technology, and he makes sure we get to use all his stuff as much as possible. We use batteries and light bulbs, an audio-generator and an oscilloscope, probeware, computers, and an old video camera Mr. Roland lets us use to present our results on the many old monitors he has wired all over the classroom. It makes us feel like we're presenting papers at a major conference. Maybe some of us will, some day. I would not be surprised.

Mr. Roland's excitement about science is contagious. He is energetic and enthusiastic. He has so much confidence in us and sets very high standards, but always encourages us if we fall short. We have done more than we ever dreamed we could because he believes in us. He loves what he does and he does it very well.

March 18, 2004

The Honorable Sherwood Boehlert
Chairman, Science Committee
2320 Rayburn Office Building
Washington, DC 20515

Dear Congressman Boehlert:

Thank you for the invitation to testify before the U.S. House of Representatives Committee on Science on March 18th for the hearing entitled *The 2003 Presidential Awardees for Excellence in Mathematics and Science Teaching: A Lesson Plan for Success*. In accordance with the Rules Governing Testimony, this letter serves as formal notice that I received no federal funding directly supporting the subject matter on which I testified, in the current fiscal year or either of the two proceeding fiscal years.

Sincerely,

Jonathan Roland

Chairman BOEHLERT. Thank you very much, Mr. Roland. Next up, Ms. McGee.

STATEMENT OF MS. GAIL BROMILEY-MCGEE, TEACHER, CARNEGIE VANGUARD HIGH SCHOOL, HOUSTON, TEXAS

Ms. MCGEE. Okay. That was cruel and unusual punishment to ask me to go next after that. I asked Kara to put me first, but I think my testimony is maybe a little bit more traditional, but I think that we might share the same views, and you will see some of the same ideas in some of my suggestions as well.

I would like to thank the Science Committee for giving me this opportunity to testify. It has been a tremendous honor just to be chosen as the Presidential Award for Excellence in Math and Science Teaching, but it is especially highlighted by this experience for me.

I am a biology teacher at Carnegie Vanguard High School, which is in the Houston Independent School District. We are a very small school. We have about 220 students from grades 9 to 12, and all of our students have been identified gifted and talented. I think Carnegie Vanguard really represents everything that is good about public education.

We know that students learn in small communities where they have a sense of ownership in their education. My students know and interact with each other on a daily basis. Their voices are heard and their suggestions are incorporated, giving them control

in their education. Our administration gives teachers the freedom and the resources to utilize creative approaches in teaching, and my principal firmly believes in the power of professional development and uses her limited resources to ensure that we have access to professional organizations and conferences and training.

To me, the hallmark of a good science teacher is one who inspires the intellectual curiosity and growth in her students. The most basic definition of science is a process of inquiry, and there is that word again. If we want our students to learn science, instead of simply regurgitating facts, we must guide them through the process of approaching situations scientifically. In order to do so, a teacher must tie concepts into the existing knowledge of the students and challenge them to develop a better working understanding of the concepts. Students should be empowered to ask questions and develop the skills to answer those questions independently, although I still want to figure out that one about the fuzzy rug.

As much as I would like for all my students to be doctors or scientists, realistically, for most of my students, their science education ends with me. Yet, the challenges and decisions that they will face in their lives will require that they have a working knowledge of the world around them. They will all become voters and consumers, and many of them will become parents. In each of these roles, they are empowered with a working education of science.

One of the biggest issues that I see facing public education today is teacher training, recruitment and retention. If we are truly serious about the world of education in the life of a student, then we should do all that we can to ensure that the teachers are well-educated, motivated, and compensated. The teaching profession faces many stigmas. Comments like "those who can do and those who can't teach" are all too familiar. Many people feel like teaching is a noble profession because there is little compensation and much consternation. While that may be true in some schools, my district has tried very hard, and succeeded, in changing the perception of teaching. I personally feel like Texas teachers are very well compensated, and the Houston Independent School District has made teacher salaries a major priority. When you take into account our holidays and summers, our salaries are very competitive. Our retirement package is one of the best. And the working environment has changed very dramatically, even in just the 10 years that I have been teaching.

Unfortunately, not enough people know about that side of education, and this is where effective teacher recruitment comes into play. Too few students even consider teaching as a profession. As they learn about the benefits of the profession and the personal reward of working with students, it may become a viable option for motivated, intelligent people. But recruitment is just the first step to increasing the quality of our teacher workforce.

Just like every other profession, success requires an understanding of the process and the concepts. An understanding of one cannot short-change the other. We need to ensure that our system of teacher preparation tackles both aspects required for effective teaching: mastery of the content and strategies for management in the classroom. Individuals from industry bring tremendous experi-

ence and expertise, especially in the field of science, but all too often, they are not equipped with the management skills that they need to succeed in the classroom. By not giving these exceptional professional the tools that they need, we short-change the entire education system. Likewise, it is critical that teachers, especially secondary teachers, have adequate training in their subject area. Mastering the classroom management aspect of the job is only effective when the information being conveyed is accurate and current.

What role can the Federal Government play in improving math and science teaching? I think the Federal Government could serve as a repository for successful teaching approaches, activities, and methodologies. As a new teacher, I thought that all of the insight and creativity to make teaching meaningful and effective had to come from me. Little did I realize that there was no need to reinvent the wheel. Seasoned veterans in the field have developed activities and approaches that were highly successful. It was just a matter of finding them and incorporating them. Perhaps one of the most powerful things that should be done to improve the teaching profession is to cultivate a network of teachers to share ideas and insights and activities.

We live in an era of tremendous opportunity for sharing ideas. The Internet can serve as a powerful tool in making this happen, and the Federal Government could spearhead a commanding web site dedicated to the collaboration of teachers. Organizations like Access Excellence, run by the National Health Museum, attempt to expand this concept to the national level. Support from the Federal Government could make this a very powerful resource for all teachers.

I think we also need a system of accountability for teachers, much like we use for our students. Our current system of evaluation breeds mediocrity. As long as teachers meet minimum evaluation standards, their job is secure. Teachers need both positive and negative consequences for their actions. Teachers who surpass the minimum requirements should be rewarded. And likewise, teachers who fail to do their job should be removed. It is unfair to base a teacher's ability solely on their students' test scores and attendance. Even the best teachers are limited by the ability of their students. The system of teacher evaluation needs to be revamped to include measures of content knowledge, perhaps even incorporating a testing system for teachers in their field of expertise. Especially in science, where concepts are constantly being updated and refined, a current understanding is critical to being an effective teacher. I think teachers should have increased requirements for professional development, and should be required to participate in professional organizations in their content area.

Students should also be given a voice in a teacher's performance. While a teacher's performance should not be relegated to a personality contest, students are the ultimate evaluators of a teacher's ability. How can we expect our students to succeed in education if we do not offer them successful teachers? If our expectations of teachers are raised, so is their performance, which ultimately translates into better-educated students, our ultimate goal.

Unfortunately, at least in my experience, Federal Government education programs are at the end of a long list of voices seeking to be heard. As teachers, we face requirements and procedures at the district level first and foremost. There is a system of consequences for not participating in the district-mandated curriculum and guidelines. Because each district varies widely in its interpretation of curriculum, the end result is inconsistency in student experience from one district to the next.

Next on the list are our state requirements. Texas has made national headlines with our Minimum Skills Testing Program. While our Texas Assessment of Knowledge and Skills testing program has faced mixed reviews, I am an advocate of testing because it causes students to be accountable for their education. While our testing system is not perfect, it is the first step in holding students and teachers responsible for their science education. With these pressing requirements, each with a built-in level of accountability, few teachers have the luxury of participating in federal programs.

I am a major advocate of the partnerships in education and the National Math and Science Partnership Program seems to promote excellent opportunities for affiliations between secondary and higher education. Collaboration needs to work in two directions: horizontally between teachers of the same discipline, and vertically between educators who teach our students before us and the professors who will face our students after us.

I am fortunate enough to participate in a program called the GK–12 Program through Baylor Medical School in Houston. This is a National Science Foundation funded program that partners a high school science educator with a working scientist. We work together throughout the year to develop integrated curriculums and activities for my students.

Last semester, my Advanced Placement biology class teamed up with the Advanced Placement psychology class, and we developed a unit on the nervous system. Through the GK–12 program, we were able to work in conjunction with an actual neuroscientist, Dr. Daniel Plas. He spent two weeks with me teaching my class. The students participated in brain and eye dissections, they learned the physiological effects of the brain and addiction, and they tested their sensory systems, all with the support and guidance of a true expert in the field.

Aside from the level of expertise that Dan brought to the nervous system unit, and other informal experiences that we shared throughout the year, Dan served as a model for students interested in science. He is a tangible example of what a career in science can look like, and he has been able to share his personal roadmap of becoming a scientist with my students.

As exciting as the National Math and Science Partnership sounds, it involves a level of initiative on my end that is—I am very hard pressed to meet at the end of the day. I certainly hope that part of the Federal Government's approach to supporting science education is the continued funding of excellent local and well-organized programs like the GK–12 program.

I think the Federal Government is on to a good thing offering educators a consistent, well thought out overview for success in science education. The National Science Education Standards are

a perfect example of what the Federal Government can contribute to science education. They succinctly outline the concepts that all our students should understand in science. They are a solution for the lack of consistency we face at the district and state level. By incorporating a process of collaboration between science educators, creating a repository of effective science techniques, and including a set of professional standards in addition to the content standards, the National Science Education Standards could serve as a foundation for effective science teaching. Coupled with the continued financial support of the federally funded National Science Foundation programs, the Federal Government sets high standards for science educators.

I commend the Committee on Science of the U.S. House of Representatives for convening this hearing, and for giving science and math teachers an opportunity to voice our opinion and our suggestions, and for having the foresight to tackle the reform issues in science education. Thank you.

[The prepared statement of Ms. McGee follows:]

PREPARED STATEMENT OF GAIL BROMILEY-MCGEE

Thank you to the Science Committee of the U.S. House of Representatives for giving me an opportunity to testify. It is a tremendous honor to be chosen as the recipient of the Presidential Award for Excellence in Mathematics and Science Teaching, and it is especially highlighted by this experience.

My name is Gail McGee and I am a biology teacher at Carnegie Vanguard High School, in Houston, Texas. Carnegie Vanguard is the gifted and talented high school, in the Houston Independent School District. We are a small school, with only 220 students, grade 9 to 12. All of our students have been identified gifted and talented. Carnegie Vanguard represents everything that is right about public education. We know that students learn best in small communities, where they have a sense of ownership in their education. Our students know and interact with each other on a daily basis. Their voices are heard and their suggestions are incorporated, giving them control in their education. Our administration gives teachers the freedom and the resources to utilize creative approaches in teaching. My principal firmly believes in the power of professional development and uses her limited resources to insure we have access to professional organizations, conferences, and training.

To me, the hallmark of a good science teacher is one who inspires the intellectual growth and curiosity in her students. The most basic definition of science is a process of inquiry. If we want our students to learn science, instead of simply regurgitating facts, we must guide them through the process of approaching situations scientifically. In order to do so, a teacher must tie concepts into the existing knowledge of the students and challenge them to develop a working understanding of the concept. Students should be empowered to ask questions and develop the skills to answer those questions independently. As much as I would like for all my students to be doctors or scientists, realistically for most of my students their science education ends with me. Yet, the challenges and decisions that they will face in their lives will require that they have a working knowledge of the world around them. They will all become voters and consumers and many will become parents. In each of these roles, they are empowered with a working education of science.

In my teaching, I try very hard to make things real, concrete and understandable. Given the abstract nature of many biological concepts, achieving my goals can be difficult. By using analogies, tied to student experiences, I hope to make difficult concepts understandable. The physiological process of learning actually requires the development of connections between neurons. New concepts and ideas are physically linked with existing ones. Why should teaching be any different? Start with a concept students know and understand and make connections with new and abstract ideas. Learning itself is the basis of our most effective methods in teaching.

Another characteristic that I think is critical in a good teacher is acknowledging that students learn at different rates and using different approaches. I try very bard to take this into account in my classroom, by using both a multisensory approach and a multidisciplinary approach. Teachers must take into account that there are many approaches for learning, and teaching should not be limited to the traditional

methods. I try to offer students opportunities in linguistic, logical, mathematical, musical, artistic, and kinesthetic learning approaches. Students learn by doing. I try to get my students up and moving, asking them to model processes and allowing them to interact with one another. I incorporate musical activities in my classroom, thanks to Dr. Art, the Singing Scientist, who plays popular songs with biology lyrics. The students are given a variety of artistic activities including creating pop-up books, brochures, flip books, and catalogs.

Biology is not a vacuum; to the contrary, it coexists in a world with many other disciplines. By taking a multidisciplinary approach, I am able to focus experiences around major issues, themes, and ideas that define both real world application and theoretical modeling within and across areas of study. Furthermore, although I teach a science course, reading and writing are a major component to the course. My students have written research papers that have been graded both in English and biology. An understanding of Latin and Greek root terms is critical to deciphering the terminology in the field of science. My students take a weekly quiz over root terms. When they see a big scientific term they do not know, they can break it down into its root terms and deduce its meaning. In a field like science, it is essential to keep up with the latest information, so I share current journal articles and newspaper clippings with my class. Finally, an understanding of technology is crucial to our student's future success. I try to incorporate technology at every opportunity. Students work with CBL's, computer modeling programs and participate in a variety of web-based activities. Many times the students are more proficient at the technology than I am, but the exposure is critical for the students to foster a level of comfort in working with technology they will need in their future.

What role can the Federal Government play in improving math and science teaching? I think the Federal Government could serve as a repository of successful teaching approaches, activities and methodologies. As a new teacher I thought that all of the insight and creativity to make teaching meaningful and effective had to come from me. Little did I realize that there was no need to reinvent the wheel. Seasoned veterans in the field bad developed activities and approaches that were highly successful; it was just a matter of finding them and incorporating them. Perhaps one of the most powerful things that should be done to improve the teaching profession is to cultivate a network of teachers to share ideas, insights and activities. We live in an era of tremendous opportunity for sharing ideas; the Internet can serve as a powerful tool in making this happen and the Federal Government could spear bead a commanding website dedicated to the collaboration of teachers. Organizations like Access Excellence, run by the National Health Museum, attempt to expand this concept to the national level. Support from the Federal Government could make this a very powerful resource for all teachers.

One of the biggest issues that I see facing public education today is teacher training, recruitment, and retention. If we are truly serious about the role of education in the life of a student, then we should do all we can to insure their teachers are well educated, motivated, and compensated.

The teaching profession faces many stigmas. Comments like "those who can, do, those who can't, teach" are all too familiar. Many people feel that teaching is a "noble profession" because there is little compensation and much consternation. While that may be true in some schools, every district has tried hard, and succeeded in changing the perception of teaching. I personally feel that Texas teachers are very well compensated. The Houston Independent School District has made teacher salaries a major priority. When you take into account our holidays and summers, our salaries are very competitive. Our retirement package is one of the best. The working environment has changed dramatically, even in the 10 years that I have been teaching.

Unfortunately, not enough people know about this side of education. That is where effective teacher recruitment comes into play. Too few students even consider teaching as a profession. As they learn about the benefits of the profession, and the personal reward of working with children, it may become a viable option for motivated, intelligent people. But recruitment is just the first step to increasing the quality of our teacher workforce. Just like every other profession, success requires an understanding of the process and the concepts. An understanding of one cannot shortchange the other. We need to insure that our system of teacher preparation tackles both aspects required for effective teaching: mastery of the content and strategies for managing a classroom. Individuals from industry bring tremendous experience and expertise, especially in the flied of science, but all too often they are not equipped with the management skills that they need to succeed in the classroom. By not giving these exceptional professionals the tools they need to succeed, we shortchange the entire education system. Likewise, it is critical that teachers, especially secondary teachers, have adequate training in their subject area. Mas-

tering the classroom management aspect of the job is only effective when the information being conveyed is accurate and current.

Equally important is recognizing that teaching is not static; it is a dynamic field where the content knowledge is constantly changing. Once teachers have mastered the classroom management component of the job, they must continue their professional growth within their content area. I would like to see more meaningful professional development opportunities offered to all teachers. I have had the luxury of participating in several enrichment programs during the summer, including an excellent six week science educator program at MD Anderson Cancer Center and LIT Health Science Center. During this program we are given the latest cutting edge information in science from the people who are actually doing the research. Unfortunately, there were only six participants in this excellent program, certainly not representative of the number of science teachers in our area. Money is always an issue with public education, but the additional expenditure on teacher training and recruitment is money well spent Professional growth is a critical component of success in education, and individuals that take it seriously should be rewarded. Again there is a role for the Federal Government in making this happen. Your continued support of the National Science Foundation, and the programs it funds, make courses like this possible.

I think we need a system of accountability for teachers, much like we use for students. Our current system of evaluation breeds mediocrity. As long as teachers meet minimum evaluation standards, their job is secure. Teachers need both positive and negative consequences for their actions. Teachers who surpass these minimum requirements should be rewarded and likewise teachers who fail to do their job should be removed. It is unfair to base a teacher's ability solely on their student's test scores and attendance. Even the best teachers are limited by the ability of their students. The system of teacher evaluation needs to be revamped to include measures of content knowledge, perhaps incorporating a testing system for teachers in their field of expertise. Especially in science, where concepts are constantly being updated and refined, a current understanding is critical to being an effective teacher. I think teachers should have increased requirements for professional development and should be required to participate in professional organizations in their content area. Students should also be given a voice in evaluating teacher performance. While a teacher's performance should not be relegated to a personality contest, students are the ultimate evaluators of a teacher's ability. How can we expect our students to succeed in education if we do not offer them successful teachers? If our expectations of teachers are raised, so is their performance, which ultimately translates into better educated students, our ultimate goal.

Unfortunately, at least in my experience, Federal Government education programs are at the end of a long list of voices seeking to be beard. As teachers, we face requirements and procedures at the district level, first and foremost. There is a system of consequences for not participating in the district mandated curriculum and guidelines. Because each district varies widely in its interpretation of curriculum, the end result is inconsistency in student experience from one district to the next. Next on the list are our state requirements. Texas has made national headlines with our state minimum skills testing program. While our Texas Assessment of Knowledge and Skills testing program has faced mixed reviews, I am an advocate of testing because it causes students to be accountable for their education. Until this year, in Texas, high school science students have not faced any formal assessment in high school. In previous years, science testing was limited to the 4th and 8th grades. Under the next TAKS system, students are required to pass a l0th and 11th grade science skills test to graduate. While our testing system is not perfect, it is the first step in holding students and teachers responsible for their science education. With these pressing requirements, each with a built in level of accountability, few teachers have the luxury of participating in the federal programs. I am a major advocate of partnerships in education, and the National Math and Science Partnership program seems to promote excellent opportunities for affiliations between secondary and higher education. Collaboration needs to work in two directions: horizontally, between teachers of the same discipline and vertically between the educators who teach our students have before us and the professors our students will face after us. I am fortunate enough to participate in the GK–12 program at Baylor Medical School. This National Science Foundation funded program partners a high school science educator with a working scientist. We work together throughout the year developing innovative curriculum for my students. Last semester, my Advanced Placement biology class teamed up with the Advanced Placement Psychology class to learn about the nervous system. Through the GK–12 program we were able to work in conjunction with an actual neuroscientist, Dr. Daniel Plas who spent two weeks team teaching our class. The students participated in brain

and eye dissections, learned the physiological effects on the brain and tested their sensory systems, all with the support and guidance of a true expert in the field. Aside from the level of expertise Dan brought to our nervous system unit, and other format experiences we have shared throughout the year, Dan serves as a model for students interested in science. He is a tangible example of what a career in science can look like and he has been able to share his personal road map of becoming a scientist with my students. As exciting as the National Math and Science Partnership sounds, it involves a level of initiative on my end that I am hard pressed to meet at the end of the day. I certainly hope that part of the Federal Government's approach to supporting science education is the continued funding of excellent local, well organized programs like the GK–12 program.

I think the Federal Government is on to a good thing, offering educators a consistent, well thought out, overview for success in science education. The National Science Education Standards are a perfect example of what the Federal Government can contribute to science education. They succinctly outline the concepts that all our students should understand in science. They are the solution for lack of consistency we face at the district and state level in science education. By incorporating a process of collaboration between science educators and creating a repository of effective science techniques and including a set of professional standards (in addition to the content standards), the National Science Education Standards could serve as the foundation of effective science teaching. Coupled with the continued financial support of the federally funded National Science Foundation programs, the Federal Government sets high standards for science educators. I commend the Committee on Science of the U.S. House of Representatives for convening these hearings, for giving science and mathematics teachers an opportunity to voice our opinions and suggestions and for having the foresight to tackle the reform of science education.

BIOGRAPHY FOR GAIL BROMILEY-MCGEE

EDUCATION

Trinity University, San Antonio, TX, 1985–1989, Bachelor of Science in biology; Secondary Teaching Certification in biology

University of Texas at Austin, Austin, TX, 1989–1992, 124 post-graduate hours in biology, zoology and botany

PROFESSIONAL EXPERIENCE

Carnegie Vanguard Nigh School, Houston, TX, August 2003–Present
Biology Teacher

- Teach Advanced Placement Biology and Pre-Advanced Placement Biology to gifted and talented students
- Implementing the latest computer technology for student use

DeBakey High School for Health Professions, Houston, TX, August 1999–May 2003
Science Department Chair and Biology Lead Teacher

- Served as Science Department Chair, responsible for coordinating budgets, science fair, vertical alignment
- Elected, by peers, to Shared Decision Making Committee charged with approving major decisions on campus
- Taught Advanced Placement Biology (five classes) and Pre-Advanced Placement Biology (one class)
- Motivated over 50 students each year to take and succeed on the Advanced Placement Exam
- Integrated technology and cutting edge research in teaching methods
- Advisor for National Honor Society
- Founding sponsor for the DeBakey Environmental Club

Houston Independent School District, Houston, TX, October 2002–Present
Test Question and Model Lesson Writer

- Selected to write the district snapshot test questions for TAKS preparation
- Selected to write Model Lessons for Project Clear, Houston Independent School District's biology curriculum
- Trained lead biology teachers from the district on Project Clear Model Lessons

Texas Education Agency Gifted and Talented Performance Standards Discipline Committee
Discipline Committee Member, Austin, TX, January–June 2000

- Developed the specific requirements and assessment of the Texas Distinguished Achievement Program (DAP) original research project measure
- Developing a criterion-referenced performance assessment system to determine Texas students' specific indepth knowledge and skills
- Developed performance standards, criteria for assessment, scoring rubric, assessment tasks and evidence of validity

St. Pius X High School, Houston, TX, August 1996–May 1999
Science Department Chair and Science Teacher

W.T. White High School, Dallas, TX, August 1993–January 1994
Biology Teacher

HONORS AND AWARDS

Presidential Awards for Excellence in Math and Science Teaching (2004). Recognized as the outstanding science teacher from the State of Texas; invited to attend a week of recognition events in Washington, DC, including an award ceremony, a Presidential Citation, meetings with leaders in government and education, sessions to share ideas and teaching experiences, and receptions and banquets to honor recipients.

Carnegie Vanguard High School Teacher of the Year (2003–2004). Recognized as a skilled and dedicated teacher.

Texas Academy of Science Educator of the Year (2004). Recognized by an organization of college and university professors of Texas.

PROFESSIONAL ORGANIZATION MEMBERSHIP

National Association of Biology Teachers

National Science Teachers Association

Texas Association of Biology Teachers

American Zoo and Aquarium Association

PROFESSIONAL ACTIVITIES/RESPONSIBILITIES

Rice University Workshop for High School Teachers of the Gifted and Talented (Summer 2003). Presented multiple sessions on strategies to encourage gifted and talented student success in science classrooms.

National Science Foundation Graduate Teaching in K–12 Education Program (2002 and 2003). Partnered with a Baylor medical student to develop biology curriculum and activities.

Houston Teachers Institute Program Fellow (2001). Wrote curriculum unit "How Much Science is in Science Fiction?"; one of three units to be published in the 2002 Houston Teacher Institute Program.

Houston Independent School District Project Clear Biology. Coordinator for DeBakey High School for Health Professions and Carnegie Vanguard High School.

Houston Independent School District Mentor Training (18 hours). Supervised DeBakey science teacher.

M.D. Anderson Cancer Center Summer Workshop for Science Educators (140 hours, Summer 2001, Summer 2003).

The Human Genome Project Institute from Wright Center at Tufts University (50 hours, Summer 2000).

Rice University Gifted and Talented High School Student Institute (18 hours, Summer 2001).

Rice University Advanced Placement Institute (105 hours, Oct.–Feb. 2001, Sept. 2000, June 1999).

Supervising Teacher Training. Supervised University of Houston student teacher (Spring 2001).

University of Texas at Brownsville Advanced Placement Institute (June 2000).

March 14, 2004

The Honorable Sherwood Boehlert
Chairman, Science Committee
2320 Rayburn Office Building
Washington, DC 20515

Dear Congressman Boehlert:

Thank you for the invitation to testify before the U.S. House of Representatives Committee on Science on March 18th for the hearing entitled *The 2003 Presidential Awardees for Excellence in Mathematics and Science Teaching: A Lesson Plan for Success*. In accordance with the Rules Governing Testimony, this letter serves as formal notice that I received no federal funding directly supporting the subject matter on which I testified, in the current fiscal year or either of the two proceeding fiscal years.

Sincerely,

Gail Bromiley McGee

Chairman BOEHLERT [continuing]. We might have forgotten the date and the directions, it is August 28. The wedding will occur—you take 270 North, go on to 80 West. Mr. Cushner, you will be next. But, before you start, the Chair will relinquish the seat to the distinguished gentleman from Michigan, the Chair of the Subcommittee on Research—and I will be back in a while—Mr. Smith.

STATEMENT OF MR. JASON CUSHNER, TEACHER, EAGLE ROCK SCHOOL AND PROFESSIONAL DEVELOPMENT CENTER, ESTES PART, COLORADO

Mr. CUSHNER. Okay. Thank you very much. It is an honor to be here. And Representative Boehlert, not only do you—do we want you to do the wedding, but could you do the catering also?

Okay. So who I am is someone who has made a career out of working with students who have found success elusive. My last school was a school for students who had dropped out or somehow had been unsuccessful in school, and I currently am teaching in a public school that is considered low performing with about 3 percent meeting the standards in math.

I teach math through art, through rock climbing, through building a boat, through—we built the low-income health clinic, and through different ways that will engage these students. And I have

also mentored teachers in how to work with students who have found success elusive in math.

What I have found works is, one, engaging the students in using math as a lens to understand the world and things that interest them. So when I did the math around rock climbing, we studied math, physics, geology, environmental science, and used math and science as a lens to understand the world around them, so they were brought into learning whatever we were doing, and we got to go rock climbing in the afternoons.

The other thing is, like, when math is a discreet series of concepts, it doesn't make sense and it is not interesting. When they are complex problems, it is interesting and it is challenging, the students find it difficult and perceive themselves as they can't solve these problems. But, when given the support to solve these complex open-ended problems, it transforms the way they view their relationship to math, often the way they view their relationship to academics, and often the way they view themselves, and can really cause a transformation of person.

The class that I taught that I videotaped for this award was called "Is Democracy Fair?", where we used math as a lens to look at different ways of representing the people to decide which is best, and which is a fair way to represent the people, and it is a huge and difficult question. But the students grapple with it and then found math as an important tool to understand, like, how do we represent our people.

So some of the things that the Federal Government has done that have made a huge difference in math education: one is when the National Standards of Math came out from NCTM in 1989, they funded research projects to develop curriculum along with those standards. Those curriculums are wonderful. One of them, Interactive Mathematics Program, or IMP, I piloted and helped revise and did the professional development. And that gave me—like, it was a teacher-developed curriculum and teacher-developed workshop. They really made a profound difference in how my colleagues teach math and develop students in inquiry-based learning.

Supporting efforts like that has made a huge difference in math education for those people willing to take that on. And even if we don't teach that curriculum now, but I did a class where we built a boat and used math as different parts of doing that. But doing those workshops funded by NSF helped me develop ways to use in these other classes that I teach, like building a boat: develop scale, surface area, lots of the tools that we needed for that project.

One of the other questions is "what is impeding math and science education, both for teachers and students?" I think some of the things impeding students are there—they have a—there is a stigma associated with math that is socially acceptable. It is not very socially acceptable to say I can't read. It is a common conversation to say I can't do math or I hate math. And then many of the things, like, they have a culture where math isn't important around them and in their families, in—with some of the students that I work with. And then, also, they have certain unmet physical and emotional needs.

And for the teachers, I think sometimes they come from a paradigm of teaching math as traditional and not based on research

and what works. And also, I feel like they are sometimes so burdened by this list of content they need to teach, they don't have time to teach—or develop the projects that really engage students and develop their thinking skills to go along with the content that is really valued by standards.

And also, I do want to say I think it is crucial that teachers and schools are held accountable to performing well. I have found with some of the parts of No Child Left Behind, it has been more restrictive than helpful in doing what we have been trying to do. I know, for me, at our school—like, my school, people are working very hard to work their students. We have made huge gains in literacy. But we haven't been able to find math teachers, so I appreciate all the efforts you guys are doing to bring more teachers into math and science.

But right now, I have been told I need to stop teaching the way that I do that got me this award to teach a Princeton Review curriculum which we paid handsomely for, I am sure, to get our students ready for the test. My district says there is not—it is not only my district that does it, but they feel like their hands are tied because they need to do well on a test to keep the certain amount of federal funding, and they want to do well, so I feel like we need to find a better way of dealing with some of these issues.

So what can be done? I feel like the key thing that can be done to improve teaching and education for students is really getting teachers working in small grass root groups to change teaching of our students, because I feel like when we work as teachers and researchers, it is much more powerful than when the research is handed down to us. So what—thank you. So if you guys could somehow fund small collaborative groups of teachers to improve our practice, like us working together—like, the needs of my students are different than those in Texas, than those in Maryland, and those in Alaska, and we could work to really deal with the specific needs and bring out the brilliance that our students have.

Also, I think that it would be a much stronger form of accountability for teachers because tests are something in the distance. I find tests sometimes hinder teachers work doing innovative things, and the people who are great teachers, because there are some of those, it doesn't make a difference, but if we were working together and sitting in each other's classrooms—it is pretty intimidating to have another teacher in your classroom, but that really causes you to do your best and not just talk the talk but really walk the walk. So if we could have teachers work collaboratively and sit in each other's classrooms to help improve practice, I think that would be the greatest thing we could do for education.

And I feel like just like you guys funded the curriculums along with the standards, that was really—that math and science really pioneered that movement in education. I feel like math and science could once again pioneer educational practice by building these strong collaborative groups among teachers as accountability and professional development.

Thank you guys for having us here, and thanks for listening to teachers. It makes—it feels really good.

[The prepared statement of Mr. Cushner follows:]

PREPARED STATEMENT OF JASON CUSHNER

Thank you for honoring me with the opportunity to speak with you today.

I have made a career out of teaching math to those who believe they can't do math. I have worked at low-income public schools, as well as a tuition-free private school for students who were previously unsuccessful in school. I have taught math through creating art, building a health clinic, climbing rocks, studying genetics, and investigating democracy. I have not only taught students, but I have also trained new teachers in how to teach math effectively, creatively and experientially.

Effective math education empowers students and teachers with knowledge, critical thinking skills, creativity, and passion for the complex problems encountered in real life. I've found that what works for struggling students is using math as a lens for understanding things that interest them. For example, I taught a class called *Rockin' Road* that centered around rock climbing. Through this ten-week field course, students learned math, geology, physics, environmental science, and literature as we traveled through Colorado, Utah, and Wyoming. Another critical piece to what works for students learning math is to give them complex, open-ended problems and the support to solve them. In my classroom, I never give answers. The students propose solutions and critique each other until they come to consensus in the same way that real mathematician and scientists operate. In the class which I videotaped for this award, *Is Democracy Fair?,* the students used math to choose which government systems are most representative of the people.

The Federal Government's primary role in improving math education should be to provide structures that support math teachers in regulating and developing their own field, education. After the National Council of Teachers of Mathematics wrote their National Math Standards in 1990, NSF funded the development of curricula in line with those standards. The Interactive Mathematics Program (IMP) was one such curriculum in which I was trained and that I piloted in my classroom. It is an exceptional curriculum for developing problem-solving skills and imparting content knowledge, and has been a key resource in the various innovative courses I have taught. It gave me the tools to develop curriculum to fit into courses such as *Building a Boat* in which students designed and constructed a wooded canoe, learning scale, surface area and volume, and dimensional analysis. IMP's success is attributable to two factors: first, math teachers themselves developed it; and second, IMP incorporates teacher-designed professional development to train math instructors in the curriculum. Teachers have described the IMP training and curriculum as the source of their classroom's transformation from a teacher-centered lecture to a student-centered problem-solving environment. I want to thank the NSF for this program and strongly encourage the continuance of such initiatives.

Despite such successful federal initiatives as IMP, there are still many limits to student and teacher achievement in math. Students are limited by their own fears and insecurities about math; by their unmet emotional and physical needs; and by classroom social environments that are hostile to learning and achieving in school. Teachers are limited by having to deliver courses loaded with so much content that not enough time remains for conceptual and thinking skills, as well as by having to participate in professional development that is often inapplicable to their daily classroom experience. Both teachers and students may try to create a learning environment in facilities that are so rundown and uncomfortable that they may be unsafe. In addition, teachers struggle to be voices speaking a different message in a culture that regards science and math as a collection of discrete facts rather than a method of investigating and representing the world.

Another limit to student and teacher achievement is recent legislation and regulations which place too much emphasis on testing and not enough on learning. There certainly needs to be accountability for federal funds spent on education. Overall however, the No Child Left Behind Act is hindering education more than it is helping it. I personally have had to curtail the type of teaching that earned me recognition as a finalist for the Presidential Award. When I was in an independent school free from federal legislation, my courses were innovative and my students soared. Now, I am constrained by testing and have had to spend the last four weeks in my classroom teaching a test preparation curriculum designed by the Princeton Review. They were paid handsomely by my school district, an urban school district without enough money for textbooks. We nonetheless feel forced to allocated resources to test prep rather than instruction because the tests are high stakes for the school district retaining control over innovative programs in which we believe. There are far better ways to provide exceptional education for all and to create a professional environment in which teachers are held to high expectations for classroom instruction and development of practice.

So what can the Federal Government do? Attract and retain good math teachers and then support us in doing our jobs. Contrary to popular belief, salary is not the primary factor keeping good math teachers away from schools. Rather, it is the lack of professional stimulation. I personally have spent so much time participating in "professional development" workshops where outsiders to my field come to tell me what to do. I am happy to learn from others, but I often find that these "experts" are unable to give me information that I can use in my classroom. A far more effective use of my time would be to work with my colleagues to develop our practice in such a way as to respond to the real needs of our students.

My recommendation of the single most important step the Federal Government should take to improve math and science education is to sponsor small teacher groups working together to improve practice. In other words, support structures in which teachers work together to develop and refine their curriculum and instruction. This action would accomplish the goal of making the profession more fulfilling to teachers, as well as providing the most effective forum for critique and evolution of practice to benefit students. In addition, *such programs would hold teachers accountable for doing high quality work,* since teachers would consistently be observed and evaluated by their own colleagues. Supporting such programs would address the issues I previously mentioned as limiting students and teachers, because teachers would choose to address the issues most impacting their own classrooms. Every classroom across the country has different needs and issues to address.

One such model initiative is presently being sponsored by the Colorado Council of Teachers of Mathematics, and is based on research from the Third International Math and Science Study (the TIMS Study). In this curriculum development model, which is the established norm in Japan, teachers work in small groups to develop curriculum and practice. Small groups of teachers convene to define a particular issue or problem they share in instruction (for example, ensuring that students understand the applications of logarithms). Then they work together to design lessons addressing that issue. Finally, all the teachers in the group pilot the new unit in their own classrooms, periodically observing each other's practice to critique the unit and refine it.

This "teachers as researchers" model allows teachers to address the issues that are truly present in their classrooms and curricula. It also keeps teachers fresh and creative, giving them regular opportunity to practice the thinking and problem-solving skills necessary for good math and good teaching. Moreover this model incorporates the type of pre-service and in-service training I have found to be most helpful as a teacher: getting plenty of classroom time with plenty of observation and feedback. This also holds teachers accountable to their peers for delivering quality learning in their classrooms. This authentic accountability by teachers for teachers will allow teachers and schools to improve teaching and learning, not just how they talk about teaching and learning. Finally, this model complements the findings of a TIMSS follow-up study by James Hiebert that showed that instructional technique, especially the kinds of questions teachers ask students, is more important than the actual curricula taught.

In order for math education to work for all students in our county, a major shift across the entire profession is necessary. Such cultural change requires evaluation and improvement at the level of daily practice. To this end, the Federal Government should support structures that encourage evolution of practice.

Thank you again for giving me this opportunity to speak with you and for affirming the invaluable perspective of classroom teachers in this discussion. I look forward to the future growth that will come from our continued collaboration.

BIOGRAPHY FOR JASON CUSHNER

Jason's teaching career was not predictable. He did not excel in high school. In college, he found a love for math and majored in it. When he graduated in 1992, there were few jobs available, so he ended up tutoring math, traveling through Europe, and teaching English in Turkey, where he discovered his love of teaching. On his return to the States, he enrolled in Colorado College's Teaching Certification and Master's Program and taught in public schools in Colorado Springs. He then got a position at Eagle Rock School and Professional Development Center in Estes Park, Colorado. Eagle Rock is a tuition-free, residential school for students who have been previously unsuccessful in school. During his six years at Eagle Rock, Jason taught many innovative courses, including *Building a Boat, Physics and Calculus,* and *Rockin' Road,* a summer field-course in which students traveled throughout Colorado, Utah, and Wyoming studying math, geology, physics, environmental science, and literature around the theme of rock climbing. He was also the dorm parent for fourteen teenagers in one of the student houses. This past year, Jason moved to

Providence, Rhode Island and has been teaching math at Feinstein High School, one of Providence's small public high schools.

Throughout his teaching career, Jason has focused on how to make math education work for all students. To this end, he has published numerous articles, including an article for the Colorado Council of Teachers of Mathematics (CCTM) newsletter on how to use portfolios to assess student learning, and an article for *Mathematics Teacher* on how to design and implement a service-based math curriculum. Other publications include curriculum books for *Rockin' Road* and *Community Problem Solving*. He has presented at several conferences around the country, including CCTM's Annual Conference, the National Service Learning Conference, and the Association of Experiential Education International Conference. He has also served as a representative on the CCTM board and was honored as Outstanding Math Teacher in Colorado in 2001. He enjoys trail running and rock climbing, and is engaged to be married this summer to Sarah Bertucci, a science teacher whom he met when they taught Physics and Calculus together.

3/12/04

The Honorable Sherwood Boehlert
Chairman, Science Committee
2320 Rayburn Office Building
Washington, DC 20515

Dear Congressman Boehlert:

Thank you for the invitation to testify before the U.S. House of Representatives Committee on Science on March 18th for the hearing entitled *The 2003 Presidential Awardees for Excellence in Mathematics and Science Teaching: A Lesson Plan for Success*. In accordance with the Rules Governing Testimony, this letter serves as formal notice of the Federal funding I currently receive.

I received no federal funding directly supporting the subject matter on which I testified, in the current fiscal year or either of the two proceeding fiscal years.

Sincerely,

Jason Cushner

Mr. SMITH [presiding]. Mr. Cushner, thank you very much. And as we continue our Math and Science Partnership Program—and I am hopeful that that will stay in the National Science Foundation rather than being moved someplace else—I think it is important that part of that goal be to look at what successful teachers are doing and how they are doing it.

Ms. Wendy Ehnert is a teacher at Austin Lathrop High School in Fairbanks, Alaska. Ms. Ehnert.

STATEMENT OF MS. WENDY EHNERT, TEACHER, AUSTIN E. LATHROP HIGH SCHOOL, FAIRBANKS, ALASKA

Ms. EHNERT. Thank you very much. Mr. Smith, Ranking Member Gordon, and Committee Members, well, I bring you greetings from Fairbanks, Alaska, land of dog mushing, Northern Lights, and great schools. Thank you for your invitation to speak here for a few minutes.

I am a science teacher at Lathrop High School in Fairbanks, Alaska, and in my 16 years of teaching, I have had the opportunity to teach students from Minnesota, from the Czech Republic, and from Alaska, both rural and what we call urban in Alaska. And although the backgrounds of these students have varied, the qualities of teaching have not.

There are many different styles of teaching, and trends come and go, as we all know, in the field of education, but I think one of the main qualities of good teaching is the ability to excite the student about the topics that they are learning. To me, this means that a teacher has to maintain his or her own level of excitement. And if you think back to the days of your learning in the classroom, think back to the teachers that made a big influence on your learning, and they were the ones who loved their subject matter and were able to convey that excitement to those of you sitting on the other side of the desk.

I want to focus my remarks this morning on how teachers can maintain that level of excitement. And for science teachers, this can occur through, I think, four different venues: opportunities and research for the teacher, for their students, opportunities for professional development and advancement, and recognition of good work. And I think the Federal Government, through funding and leadership, can really be an important part of this mission.

One of the great things about teaching science is there are so many things to learn. I have been fortunate to be able to participate in many federally funded programs that have allowed me to broaden my science content knowledge and research background. I received funding through NIH and NSF to do molecular biology research with minority Alaska students and teachers, recover and analyze dinosaur bones, learn computer modeling software, and collect and analyze algae samples from a Coast Guard ice cutter near the Antarctic continent. I am able to share these experiences with my classes, and this not only serves to personalize the topics, but also to allow the students to see the amazing opportunities in research.

My students have been lured into research themselves by opportunities through the National Junior Science and Humanities Symposium, which is co-funded by the Army, Navy and Air Force; and also the International—I am sorry—the Intel International Science Fair, which is partially sponsored by the U.S. EPA. Many of the mentors with whom my students have worked over the years, and this is principally from the University of Alaska Fairbanks, have had funding from NSF and NIH, and have generously shared their money and expertise with my budding scientists.

Not only do the students get excited about what they are doing, but I also have a chance to learn about research in that field of study. Opportunities such as this for my students are very satis-

fying for me as I watch them become scientists as they do the research. These opportunities in research often sway students of many talents into choosing science as a career.

I want to tell you about one of my former students, Sarah, who was a very talented writer. She was a good musician. She was a great public speaker. And she was an overall good student. As a requirement of my biology and chemistry classes, she had to do an independent research project, and she ended up taking those projects to the State Science Fair. She was awarded a first and a second place in the two years she participated, and participated in the International Science Fair. She has now—I believe largely because of that experience—chosen a career in science and is doing her Ph.D. in molecular genetics at Vanderbilt University. So it is really exciting to me to see the results of those kinds of opportunities.

Time for professional development and collaboration with other teachers is an important part of maintaining teacher motivation and excitement. One of the challenges of teaching in Bush, Alaska, in a small town of 600 people, is the isolation of schools and teachers. This is the case, also, in many western states where the schools are widespread. We have a hard time, then, getting time for collaboration.

When we moved into Fairbanks from the Bush, I heard about a project called POLARIS, which was Project On Leading Alaska's Restructuring In Science, and I participated and immediately saw the value of long-term projects connecting 80 to 100 science teachers from five different school districts. This was a project that was funded by NSF. During my time in this project, we met 12 days each year over a four-year period, and we learned about current research in good practices in teaching science. We developed our content knowledge. We were able to share successful lessons, and we were able to discuss ideas with colleagues. It is an incredibly valuable experience that kept me thinking ahead to new strategies and constantly reevaluating my practices.

Teaching is a great career with many intrinsic rewards, but often few opportunities for public recognition, and programs such as the Presidential Awards for Teaching Excellence in Teaching Science and Mathematics, National Board Certification, Fulbright Teacher Exchange Program, all serve as motivators, I think, for allowing public venues—motivators of teachers by allowing public venues for recognition of good teaching.

My parents raised me to take advantage of many opportunities that were available to me, and I think I have been able to do that during the course of my career. They also told me to be thankful for those who are responsible for those opportunities, and so I would like to take this time, once again, to thank you for all of the programs from which I, and other teachers, have benefited, and encourage your continued support for those programs. Your support of legislation providing funding is, of course, important, but there are also things that don't cost any money that you could do.

Ms. JACKSON LEE. Oh, my.

Ms. EHNERT. Do I have your attention? Next time you are back in your home school district, visit a school science fair, or send a certificate of congratulations—send certificate of congratulations to

the high school students and their teachers that have done well in science fairs and symposium. Form an education advisory group to allow practitioners some input into legislation affecting them. Help to return science to a national priority like it was in the '60's.

Nothing catches the interest of the public like space exploration. This Committee has a rich history of supporting NASA, work for which you should be commended. President Bush, in a speech at NASA headquarters in January, said completion of the International Space Station and manned missions to the moon, and eventually to Mars, was a priority. These projects are incredible opportunities for us to teach integrated science, and nothing catches the interest of the public like space exploration.

I encourage your continued support for, and promotion of, scientific and educational outreach efforts of NASA. Continue your efforts to promote public awareness of the results and future possibilities of the Human Genome Project, alternative energy research, and other leading edge projects. Let us get the citizens of the United States excited about science again.

Your support of opportunities in research for both teachers and students, professional development, recognition of work well done, and a public relations campaign to promote public interest in science research, all contribute to maintaining levels of excitement and commitment in teachers. Thank you, once again, for the work you have done in these areas, and that encourage and reward efforts of good teachers across the country, and thank you for giving me the opportunity to testify today.

[The prepared statement of Ms. Ehnert follows:]

PREPARED STATEMENT OF WENDY EHNERT

Chairman Boehlert, Committee Members:

Greetings from the teachers of Fairbanks, Alaska—land of dog mushing, Northern Lights, and great schools. Thank you for your invitation to speak for a few minutes this morning.

My name is Wendy Ehnert. I am a science teacher at Lathrop High School in Fairbanks, Alaska. In my 16 years of teaching, I have had the pleasure to work with students from rural and suburban Minnesota, small, remote villages in Alaska, a gymnasium in a city in the eastern Czech Republic through my participation in the Fulbright Teacher Exchange Program, and in Fairbanks, a city in the interior of Alaska. Although the backgrounds of these students have varied, the qualities of good teaching have not. There are many different styles of teaching, and trends come and go in the field of education. But I think that one of the main qualities of good teaching is the ability to excite students about the topics being studied. To me, this means that a teacher must maintain his/her own level of excitement about learning. Think back to your days in the classroom. What teachers were most influential in your education? I'll bet it was someone who loved their subject matter, and was able to convey that excitement to those of you sitting on the other side of the desk. I want to focus my remarks this morning on how a teacher can maintain that level of excitement year after year. For science teachers, this can occur through opportunities in research for the teacher and their students, opportunities for professional development and advancement, and recognition of good work. The Federal Government, through funding and leadership, can be an important part of this mission.

One of the great things about teaching science is that there are so many things to learn! I have been fortunate in being able to participate in many federally funded programs that have allowed me to broaden my science content and research background. I have received funding through NIH and NSF to do molecular biology research with minority Alaska teachers and students, recover and analyze dinosaur bones from the Colville River in northern Alaska, learn computer modeling software to analyze complex systems that change over time and collect and analyze algae

samples from a Coast Guard ice cutter in the Southern Ocean near the Antarctic continent. I am able to share these experiences with my students in the classroom. This not only serves to personalize topics students are learning in class, but also allows students to see the amazing opportunities available to them in scientific research.

My students have been lured into research by the opportunities provided through the National Junior Science and Humanities Symposium (co-funded through the U.S. Army, Navy and Air Force) and the Intel International Science Fair (partially sponsored by the U.S. Environmental Protection Agency). Many of the mentors with whom my students have worked over the years (principally those at the University of Alaska Fairbanks) have funding from NSF or NIH, and have generously shared their money and expertise with my budding scientists. Not only do the students get excited about what they are doing, but also I have a chance to learn more about research in that field of study. Opportunities such as this for my students are very satisfying to me as I watch my students become scientists during the course of the project. These opportunities to do research often sway students of many talents into choosing a career in science over other fields of study. One of my former students, Sarah, was a very talented writer, musician, public speaker and overall good student. As part of the requirements for my biology and chemistry courses, Sarah did independent research projects that she was able to present at the Alaska State High School Science and Engineering Fair. In the two years she participated, she won first and second places overall, and was awarded a trip to the International Science and Engineering Fair each year. Largely due to the success of her research projects, Sarah chose a career in science, and is now a Ph.D. student in molecular genetics at Vanderbilt University. She is just one example of the many students who have been encouraged through these programs. It has been very exciting to me to see such positive results from these endeavors.

Time for professional development and collaboration with other teachers is an important part of maintaining teacher motivation and excitement. One of the challenges of teaching in Bush Alaska is the isolation of schools and teachers. This is the case in many western states where schools are spread out over large distances. This makes collaboration among teachers a challenge. When we moved to Fairbanks and I heard about POLARIS (Project on Leading Alaska's Restructuring in Science), I participated and immediately experienced the value of a long-term project connecting 80–100 science teachers from five different school districts. This project was funded by NSF. During my time in this project, we met 12 days each year over a four-year period learning about current research in good practices in teaching science, developing our content knowledge, sharing successful lessons and discussing ideas with colleagues. It was an incredibly valuable experience that kept me thinking ahead to new strategies and constantly evaluating my practices.

Teaching is a great career, with many intrinsic rewards, but often few opportunities for public recognition. Programs such as the Presidential Awards for Excellence in Teaching Science and Mathematics, National Board Certification and the Fulbright Teacher Exchange program all serve as motivators for teachers by allowing venues for public recognition of good teaching.

My parents raised me to take advantage of as many opportunities as were available to me, and I think I have been able to do that during the course of my career. They also taught me to be sure to thank those responsible. So, I would like to take this time to thank you for support of all the programs from which I and other teachers have benefited, and encourage your continued support for these programs. Your support of legislation providing funding is, of course, important, but there are also things that don't cost any money that you can do to support teachers and students through your interest in their good work. Next time you are back in your home district, visit a school science fair or send a certificate of congratulations to the high school students and their teachers that have done well in science fairs and symposia. Form an education advisory group to allow practitioners some input into legislation affecting them. Help to return science research to a national priority like it was in the 1960's. Nothing catches the interest of the public like space exploration. This committee has a rich history of supporting NASA, work for which you should be commended. President Bush, in a speech at NASA Headquarters in January, set completion of the International Space Station, manned missions to the Moon, and eventually manned missions to Mars as priorities. Space science is a great vehicle for teaching integrated science. Although these projects carry a large price tag, the value of exciting a generation of students who become interested in pursuing careers in science and math as a result of these projects is immeasurable. I encourage your continued support for and promotion of scientific and educational outreach efforts of NASA. Continue your efforts to promote public awareness of the results and future possibilities of the Human Genome Project, alternative energy re-

search, and other leading edge projects. Let's get the citizens of the United States excited about science again.

Your support of opportunities in research for both teachers and students, professional development, recognition of work well done and a public relations campaign to promote public interest in science research all contribute to maintaining levels of excitement and commitment in teachers. Thank you once again for the work you have done in these areas in support of programs that encourage and reward efforts of good teachers across the country, and for giving me this chance to testify before you here today.

BIOGRAPHY FOR WENDY EHNERT

Formal Education

Master of Arts in Teaching Biology, University of Alaska Fairbanks, (Cum. GPA: 4.00), 1995.

Bachelor of Science, University of Minnesota College of Education, (Cum. GPA: 3.56).

Majors: Life Science, Junior High/Middle School Science, 1986.

Teacher Certification

National Board Certification in Adolescence and Young Adult Science, 11/99.

Alaska Advanced Teaching Certificate in Adolescence and Young Adult Science, 11/99.

Teaching Experience

Science teacher (AP Biology, chemistry, biology, Introductory Physical Science, 7th grade life science), Fairbanks Northstar Borough School District, Fairbanks, AK, 8/95–present.

Fulbright Exchange Teacher (biology), Gymnazium Hejcin, Olomouc, Czech Republic, 8/01–6/02. I taught four different biology classes in English to 220 Czech students (ages 14–20).

Science teacher (biology, chemistry, Introductory Physical Science, earth science, 7th and 8th grade science), Frank A. Degnan High School, Bering Strait School District, Unalakleet, AK, 8/90–6/93.

High school science teacher (biology and IPS), Mound-Westonka High School, Mound, MN, 8/87–6/89.

Junior high science and math teacher, LeSueur, MN, 10/86–6/86.

Awards, Grants and Professional Organization

Participant in an NSF-funded, research and educational experience in the Southern Ocean and Antarctica, 12/99. I authored a daily journal that was posted on the Internet (via satellite) and conducted research on phytoplankton.

Grant coauthor and coordinator for an interdisciplinary project, "DNA Analysis of Evidence at the Scene of a Simulated Burglary—An Interdisciplinary Activity." AP Biology students ran DNA fingerprinting analysis of "evidence" left at the scene of a simulated crime. The unit was done in cooperation with the American Government and American Legal System classes. Fall, 1997 and Fall, 1998.

Grant coauthor and coordinator of the Minority High School Student Research Apprenticeship Program (later renamed MASTER), a biomedical research program for minority high school students and their teachers at UAF funded by the National Institutes of Health, 1994.

Member of the National Association of Biology Teachers, National Science Teachers Association and Alaska Science Teachers Association.

Participant in POLARIS (Project On Leading Alaska's Restructuring In Science), an NSF-funded grant dedicated to updating teachers in research and current practices, 1995–1999.

Participant in CC–Sustain, an NSF-funded grant in which participants learned about System Dynamics, and specifically the use of the computer modeling program, STELLA , 6/97.

Professional Service

Founder/coordinator of the Fairbanks High School Science Seminar Series, a project in which university professors and other experts provide evening lectures 3–4 times each year for interested high school students, 1998–2003.

Member of the organizing committee of the Alaska State High School Science Symposium, 1996–present.

Mentor for high school students doing independent research projects, 1989–present.

Reader for National AP Biology exams, 1999–2001, 2003.

Alaska State Science Fair Chief Judge and Alaska Science Symposium Judge, 1994–97.

Hobbies and Interests

Dog mushing, running, racquetball, and gardening.

March 12, 2004

The Honorable Sherwood Boehlert
Chairman, Science Committee
2320 Rayburn Office Building
Washington, DC 20515

Dear Congressman Boehlert:

Thank you for the invitation to testify before the U.S. House of Representatives Committee on Science on March 18th for the hearing entitled *The 2003 Presidential Awardees for Excellence in Mathematics and Science Teaching: A Lesson Plan for Success*. In accordance with the Rules Governing Testimony, this letter serves as formal notice of the Federal funding I currently receive.

I received no federal funding directly supporting the subject matter on which I testified, in the current fiscal year or either of the two preceding fiscal years.

Sincerely,

Wendy M Ehnert

Wendy Ehnert

DISCUSSION

Mr. SMITH. Ms. Ehnert, again, thank you very much. We are going to now proceed to the questions and responses from the witnesses. I would hope we would try to have both the questions and the responses somewhat brief because this is the Nation's highest commendation for K–12 math and science educators. Any of you could have been at the witness table, and what we plan to do is pass a microphone around after the question and answer period to

have any teacher that would like to make some additional comments to the Committee make those comments. And with the leave of the Committee, I am going to ask Mr. Ehlers to make his comments. He is leaving and then going to return.

Mr. EHLERS. Thank you, Mr. Chairman. I apologize. I will be very brief, but I have to leave to accept an award on behalf of the city I live in, but I will be back as soon as I can. This has been the most fun I have had in a long time. I spent 22 years doing what you are doing every day, and I have got to tell you, it was a lot better than what I am doing right now.

But I certainly appreciate your coming here, and want to congratulate you. I also just want to comment, Mr. Roland, the business of understanding how a Xerox works may be more important than you realize. There was a case of a woman who gave—asked an intern to get some more paper for her—to bring another ream of paper. He came back and said "the cabinet is empty," and she said, "well, just go get some from the Xerox machine." And he didn't come back for a long time. Finally, she went to look and he had put a blank sheet of paper in the machine and punched 100 in order to get 100 sheets of paper.

So, with that, I will leave and I will be back as soon as I can.

Mr. SMITH. Gentleman from Minnesota, Mr. Gutknecht.

Mr. GUTKNECHT. Well, first of all, let me tell everybody that Dr. Ehlers not only is a member of this committee, but he is also a physicist with a sense of humor as you already know. Matter of fact, once in a while, he wears a pin that says, "As a matter of fact, I am a rocket scientist," so——

I, just again, want to welcome all of you and thank you for coming. I apologize that we here in Washington—you may not know this, but our staffs tend to schedule meetings on top of meetings, so you will see members coming and going. I have to leave as well, and I apologize for that, because I agree with what Dr. Ehlers said; this has been one of the most interesting and entertaining panels we have ever had before this committee, and so I thank you for that.

I happen to believe that two of the most important words in the English vocabulary, in terms of the results that you get in life, are, first of all, the word "attitude," and the second word is "enthusiasm." And what we have seen this morning are really good examples of both. Tremendous attitudes and an enthusiasm for the subjects which you are trying to teach. I might add that the most important four letters in the word "enthusiasm" are the last four: i-a-s-m, and they represent "I am sold myself." And I think if you are going to be a good teacher, you have to have a good attitude and you have to have enthusiasm.

And I guess the question, and I am not sure, and I think in some respects Ms. Ehnert sort of answered this question in her testimony. But I guess the question we always have is what can we do, from a federal perspective, to motivate teachers, because I think we have heard a little bit of how we can sometimes, you know, through the best of intentions, maybe de-motivate some teachers out there. But are there some things other than having events like this—and I think some of the other things that were mentioned—any ideas that you can share with us individually that we might be able to

do from our perspective, or from a federal policy perspective—to encourage better attitudes and more enthusiasm?

That is a tough question. You may not want to jump in, but if you have any ideas, we would love to hear them.

Mr. CUSHNER. I will give it a shot. So, one, I agree with the recognition as wonderful, and I don't think necessarily, like, more pay is something that really—you know, more money is always good, but I don't think that affects the attitudes of teachers as much as really—often they feel like they are not respected as a profession.

I love teaching. I love working with kids, and many people are in it because they do, but they feel, like, a loss of power. I think one of the biggest things we do is empower teachers, just as teachers we want to empower students to do great things in the world, we also want to be empowered to do great things in our profession. And so, the more that you can do to create groups where teachers are working to improve what is going on in the profession, it really gives us a sense of accomplishment, and really, like, stimulates our thinking. And I think that makes us feel better and gets us excited about solving the problems that we are dealing with in education.

Ms. EHNERT. I know one thing that I didn't get a chance to mention that you have done. I think through your direction at NSF there is a component of all NSF grants, it is my understanding, that has to include K–12 education, and so they are seeking us out and looking for opportunities in which to include us, and that has really been very, very helpful. And I think things more on that nature where you—there is a directive that you can have this money, but you have to share the wealth a little bit, and that has really been very helpful.

Ms. MCGEE. I guess we will all try. I think that an understanding of the profession of education has to kind of trickle down in the sense that, you know, one of the nice things about being here with my esteemed colleagues behind me is that we understand each other and we understand why we do what we do. And sitting here in front of you, I think the one thing that I hope that you walk away with is that we want to share that with you, and the more opportunities that we have to do that, the better. I was really impressed—I think all of us here are tremendously grateful for the National Science Foundation and the funding and the initiative that they have in the programs that they have developed, because what they have done is they have given us an opportunity to have our voices heard by a variety of people.

As in working with higher education university professors, when they get a chance to sit down and to talk with us, they are impressed and motivated to try and do more for science educators in the secondary, and even in the primary level. And so I think it has to be a little bit of a grass roots thing, but we have been given an opportunity to be able to talk to the people who make a difference in the whole process of education. And again, I think that trickles down.

The fact that you are sitting here listening to us is powerful, not just to us, but to others, and the more opportunity that we have for that to occur, I think the more our message is heard. So thank you.

Mr. SMITH. Mr. Roland, a short comment?

Mr. ROLAND. Sure. As Gail said, that grass roots is a very efficient way of empowering teachers directly.

Mr. SMITH. In Congress, we call the—essentially the Vice Chairman of the Committee the Ranking Member, but Mr. Gordon.

Mr. GORDON. Thank you, Mr. Chairman. This has been a very informative hearing and I thank you for being here. I wish that we had the ability to extend this to a week-long seminar and we could cancel the other meetings and bring all the Members of Congress in. I think we would all be much better informed.

As I mentioned earlier, I am the son of two teachers and I taught briefly myself, and I think if there was a magic wand that we could do on the federal level, it would be to reduce the student-teacher ratio. I don't know what we could do that would be more important.

Many of us have proposed for some years that we have a program similar to putting the 100 additional—100,000 additional policemen on the street, to put 100,000 additional teachers in the classroom with federal help. That would, in turn, lower the teacher-pupil ratio, but none of us in the minority have been successful in convincing the majority that is the best thing to do. Maybe, if you agree, you might want to discuss that as you make your rounds.

But we are limited here today, so I want to focus more on federal programs. I think Ms. McGee was very helpful in talking about the repository and the network. These are things that, in tough budget times, could be done, it should be done, and I want to look into that more. And so, I really would like to get your thoughts on what are the, you know, the federal programs that are working, in terms of helping you with your professional development or materials, and what isn't, and what we need to change, and if you want to vent a little bit about No Teacher Left Behind, you can do that while you are at it.

So, why don't we—we always start at this end, so why don't—we will start at Alaska this time.

Ms. EHNERT. Well, I guess the last program that I spoke of was really, really a helpful program. It was a limited grant. I think it ran four years. It was a three-year grant and we had one year that was an extension, and that was just a great thing, especially in Alaska. At that time, this was really kind of as the Internet was just beginning to be used in the classrooms and teachers were starting to use it, and so——

Mr. GORDON. This was National Science funded?

Ms. EHNERT. It was, yes. It was funded by the National Science Foundation as a—and I don't know under what the—you know, what the scope of the proposal was, but it was——

Mr. GORDON. Let me just ask in general. Have people been pleased with the National Science Foundation?

Ms. EHNERT. Yeah, yeah.

Mr. GORDON. Thank you. As Mr. Smith pointed out earlier, there——

Mr. SMITH. We should somehow let the record show that.

Mr. GORDON. Yeah. As Mr. Smith pointed out earlier, I am sure it is a good faith effort. They are trying to shift much of this to the Department of Education, but many of us, in a bipartisan manner, feel that the National Science Foundation has done a good job and

should continue. And so I hope that you will also communicate that while you are here, because that is going to be a battle. That—you know, again, the Administration wants to move it to the Department of Education. It looks like there is more money being spent in Education, but there is not. It is just a shift, and so please help us to communicate that.

Ms. EHNERT. I can't tell you how critical that is, because what is so powerful about having the National Science Foundation play a role in education is that they are scientists first, and, you know, I think that having that science perspective is so critical in being able to understand what worked for them. You know, we were addressed by a Nobel Laureate in Physics at the Science Summit from the Secretary of Education, and you know, what he said was really powerful. You know, that you have to remember how you got here and who got you here. And I think that scientists don't forget that the way the educators do.

And so you do a disservice to the field of science by trying to combine it with the Education. The National Science Foundation has a really—an excellent approach to education, and I think that is something they never forget as being critical.

Mr. SMITH. One of our jobs here is to make tough choices between limited resources and unlimited needs, and it is rewarding for us to hear that some programs are working well and that the money is being spent well. And so, again, I would suggest to you that as you make your rounds, and as through your groups, that you communicate you are not social scientists or political science teachers, but you still know this is the way the process works, and hope you will communicate back to the Members of Congress that you are going to be talking with now or later about the importance there. I guess we will just—does anybody else want to make a quick statement and then we better move to the next questioner?

Mr. CUSHNER. I will. Two things. As far as federal programs, definitely professional—NSF-funded professional development and curriculum has made a huge difference, both with based on the standards with, like, IMP [Interactive Mathematics Program], and also the—I worked with this program called Kimsec Astronomy which helped create—teach astronomy in a way that was really hands-on, very physical, that a lot of my students who struggle in school really related to. And then also you asked about No Child Left Behind, and both—I talked about how the task hinders us. I feel like those—like, we are trying to improve education. It is like trying to increase the weight in a cow, or, yeah, increasing the weight of a cow by weighing it more often. We are not improving the practice, which is what needs to be done. And, also, highly qualified folks are so much on content and not so much on practice where I feel like that is where we need the grass roots movement where we have teachers working with teachers to improve practice.

Mr. GORDON. And Mr. Chairman, if I could just real quickly. You have mentioned these programs. Now how easily accessible are they? I mean, you are award winners. You are going to be more aggressive in seeking out this information and trying to get the grants. If you are not an award winner but maybe could be or should be—just, I mean, if you are a regular teacher out there, do you know about this information?

Mr. CUSHNER. Well, I can answer that——

Mr. GORDON. And if not, what do we need to do better to make these—make this—the various federal programs and National Science Foundation information more available?

Mr. CUSHNER. Well, the IMP matrix that was developed with NSF funds has now been taken over by Key Curriculum and they are producing it. It is being adopted by more and more districts—school districts throughout the country, so I think that is great. But one of the things that made a difference that NSF did is, not only did they fund development of the curriculum, but they funded professional development by teachers, for teachers to go along with it, because teachers really——

Mr. GORDON. And how do you know about it? I mean, how——

Mr. CUSHNER. Right.

Mr. GORDON [continuing]. If this got to Coalmont, Tennessee, you can get anywhere.

Mr. CUSHNER. Right.

Mr. GORDON. So I mean, it must be out there, but, you know, how do you know about it? How did you know about this?

Mr. CUSHNER. Mostly it has been word of mouth from other teachers, and like, one teacher in the district will talk to another one and then talk to the administration about getting it, and sometimes they have been helpful in getting that in, and sometimes it has not been successful.

Mr. GORDON. We need to do a better job somehow of making that available. Thank you for indulging me in that extra time there.

Mr. SMITH. Yeah. Just as a reminder, NSF has a web site where these are reported, and Ms. Ehnert, the broader impact statement that is part of all the grants ends up being reviewed on that web site. I will take my five minutes now, and I guess having a wife who was a teacher and two—a daughter and a daughter-in-law who are teachers, they have instilled in me maybe that a quality teacher sometimes is more important than the particular knowledge, and so I wanted to ask you that question.

If you have a choice, and of course, you would rather have a combination, but if you had the choice of somebody that—a teacher that has a—whatever—a Master's degree in Physics or whatever, or a teacher that loves teaching, that loves their students, that was willing to do the work hard on the lesson plan for the next day, what is more effective, and starting with you, Mr. Roland, and just, maybe, going down the list.

Mr. ROLAND. The thing is that is a great question. When I walk into my classroom and I look around at those students, I tell them it would be arrogant of me to think that I am the most intelligent person in this room. I would—I would be happy to find myself in the top 50 percent. They are wonderful, and it is not my knowledge that—I learned as much as I can, but it is my ability to communicate that enthusiasm, I think, that motivates them.

Boy, it is a—teaching is an art. It is not a science. No, it is a science, too. You may want to talk to them.

Mr. SMITH. Yeah. Ms. McGee?

Ms. MCGEE. I taught for five years at Magna High School for Health Professions and as a biology teacher, I was very spoiled. My students were very interested in what I had to say. But what I saw

happen over and over again is that individuals from professional fields—doctors and researchers from medical schools, et cetera—would decide to take a break and teach, and they would come into the classroom with very lofty ideas and certainly a mastery of the content and they would flounder and they would leave by Christmas. And what a travesty that is.

And the answer is really very simple. I think that each of them could have survived and could have become very good teachers, but they didn't ever get the opportunity. They thought that teaching was easy and that the hard part was knowing the information, and I think it may be the opposite way. Certainly, the audience that you see in front of you, we are probably all here because we do have the passion and we do make the effort to be involved in all those National Science Foundation activities and opportunities, but we do that because we love what we do, first and foremost.

I mean, we—I would—I speak for the group, I think, in saying that we consider ourselves teachers first and foremost and then mathematicians and scientists as a luxury. And so that is why one of my recommendations to you was that as good as your content standards are at the national level, there is hardly anything at all in terms of professional standards, you know. And again, there is no point to reinventing the wheel. There are teachers who know how to do this right, and if you give them an opportunity to share their methods and their ideas and their philosophies to people who are interested and eager to learn, they get an opportunity——

Mr. SMITH. I suspect it does make somewhat of a difference if you are teaching advanced calculus or advanced biology——

Mr. MCGEE. Indeed.

Mr. SMITH [continuing]. As opposed to exciting students in the first, maybe, eight grades or something. Mr. Cushner?

Mr. CUSHNER. Thank you. I do think content knowledge is important, and there is no doubt in my mind that passion and enthusiasm for teaching makes a huge difference. It is most important to make any difference for those students' lives. Like for them to take the risk to push themselves and learn difficult material, they have to have a safe and loved for environment and they have to be interested in it. So yeah, passion and enthusiasm makes it. I mean, just being around these people here makes me inspired to learn science, so——

Mr. SMITH. Ms. Ehnert?

Ms. EHNERT. Well, I don't think I have much extra to add, except that I do really—you need both certainly content and enthusiasm, but I always think it is very cool and really motivates my students when I tell them I don't know the answer to the question I have just asked them, and they are kind of amazed. And I say, well, you know, there are a lot of things I don't know, and that is why I am helping you to develop these skills so that you can figure them out and I can go to your Nobel Prize winning ceremony. Please remember me, Wendy Ehnert, Fairbanks, Alaska, so that you can send me an invitation.

Mr. SMITH. Briefly the other area that I am concerned with is greater involvement of parents. Any tricks of the trade that you might pass on to us that you have discovered in reaching out to get

the parents more interested and involved? Starting with you, again, Mr. Roland?

Mr. ROLAND. Sure. I ordinarily—I send home assignments for my students to teach their parents. That is—it doesn't cost anything, and they—the students become teachers to their parents and families.

Mr. SMITH. Okay.

Mr. ROLAND. And that seems to work.

Mr. SMITH. Ms. McGee?

Ms. MCGEE. And that is interesting because I do very similar things that—many of the long-term projects that we do are—purposefully have an element of parental involvement. My classes, we develop a newsletter that we send home to our—to their parents and so that they can see what they learned, and—but I think you are right. I think it is one of the gaps that we need to bridge, because certainly the parents have a motivated interest in their students to begin with, and if we can tap into that, then we would have a tremendous resource that I don't know enough of us are using.

Mr. SMITH. Mr. Cushner?

Mr. CUSHNER. I would say I teach some of the most amazing and talented kids in the world and their parents don't support them in education. I can't even get a hold of some of their parents. But, I think one thing that would help is for some of the other schools to provide translators or multi-lingual people to help support us in talking to—a lot of my parents don't speak English, and I need help communicating with them to get them involved. Thank you.

Ms. EHNERT. And the only thing that I could just add is use of the Internet has been incredible. I mean, it has—you know, people say, oh, well, I don't like email, but it is really helpful, and as Jason suggested, it is difficult sometimes to get a hold of parents, and just being able to send them a quick message has really helped our communication, I think.

Mr. SMITH. Thank you. Mr. Honda?

Mr. HONDA. Thank you, Mr. Chairman, and to our folks here in front, the teachers. Thank you very much. I am a classroom teacher, too. I taught high school science, and my wife's been a lifelong kindergarten teacher, and it is refreshing, thank you, to hear folks who say that parents and teachers are not—I mean teachers and students are not problems, that we need help in order to do our job better. It is refreshing to see the folks see teaching as a calling, and also have not lost their fire and their determination to be with young people, and I really appreciate that. I want you to know that. Sitting up here and working under the dome here in D.C. can sometimes be pretty frustrating when you know that people out there are doing the best that they can with the resources that you receive, under pressures, under expectations that are imposed upon you, including un-funded mandates and all that sort of stuff.

It seems to me that this is a great process for us to start on the way to creating bills rather than having you come up and respond to what it is that happened to you. You see, and so being teachers, I suspect you also understand the difference between a food chain and a food web. Politics and pedagogy are a food web. What we do in politics in one area will affect you eventually in some form or

fashion, and I would advise and just counsel, as a teacher—a classroom teacher—that when the—when bills start to form and the political process starts to form, that classroom teachers get involved at the local level with your local legislators immediately at the get go and send a couple of messages like, you know, we are here to do the right things with our kids, but support us by not promoting and continuing un-funded mandates and, you know, and fulfill the promise that you have had at the federal level right down to the local level.

And that, you are right, you know, content is important and how you go about doing that is critical, but the support that you need is even more critical as classroom instructors, and I heard that very loudly and clearly from your comments about constantly learning. Assuming that you don't know more than the youngsters, assuming that you are there to facilitate a lot of things so that the youngsters can learn to learn, and that failure is not something that is bad. I mean, our scientists fail more than they succeed. And, so, I think that is the kind of message that policy makers have to understand to create policy that is precise and elegant and is more effective for you as classroom teachers, and, you know.

I don't have any questions. I just have commendations to you, and I want you—to let you know that through your organization, it is very important to work the organization, but just as important on an individual basis just because of your experience on a daily basis to sit down with policy makers at the local level—us—at home, and demand that we give you that time to understand how to shape that policy from home to here and back home. And, as a classroom parent and as a parent, I thank you. Thank you very much.

Mr. SMITH. From—I am needed in the International Relations Committee, and I am going to try to return, but turn the Chair over to the Chairman of the Subcommittee on Environment, Technology, and Standards, the Honorable Vernon Ehlers, from the State of Michigan. And thank you all again if I am not able to get back.

Mr. EHLERS [presiding]. Okay. Just by coincidence, it happens to be my turn to ask questions. I assure you that is accurate. I—it is just such a delight to have you here, and I am not talking just about the four witnesses, but to have a room full of people interested in math and science education is wonderful. I spent a lot of my time jaw boning colleagues and giving speeches to other groups, and it is so nice to have a receptive audience. And so, I simply want to thank you for what you have done.

My experience was many years ago as a young professor of physics and very concerned about what was then called scientific illiteracy. I would simply ask myself what can I do to make a difference, and so I started a special course—since teachers had to take a physical science course, I started a special course for them which not only taught physical science but how to teach physical science, and all the lab equipment came from elementary school programs that had—that used equipment, so that when they got out in the schools, they might have a chance of finding a piece of equipment that will look familiar and say, yes, I can do this, be-

cause I found in my work with teachers, one of the greatest problems was lack of confidence in their ability to teach it.

And I have—I have never criticized teachers because I have had so many teachers who do not teach science well but want to teach it well and don't know where to start, and so I think our responsibility as the Federal Government, and as the National Science Foundation, is to provide pre-service and in-service training for teachers to give them the confidence to teach science. And I always try to instill in them confidence in my classroom by not hesitating to say I don't know when they ask me a question, and said let us see if we can find out.

I have a couple of questions—specific questions I wanted to ask you. Two questions, and I will just go down the line after asking them. First of all, teacher retention in math and science, particularly in the high schools is a major problem. Over 60 percent of the teachers teaching math and science in junior high and high school have neither a major or a minor in a science, and yet when we get good people, they tend to leave primarily because they make better money elsewhere. I am interested in your opinions of the causes of that turnover, and, secondly, on solutions.

I have suggested a merit pay. It is—no, it is not merit pay. It is extra pay simply to meet the market, and I have always found it strange that when we look—while we live in a country that is built on the free enterprise system and providing incentives, and employers always meet the market for someone they want to hire, somehow we have this idea that teachers should all be the same and the market has nothing to do with how much they should be paid. I would like your opinion on that and other things we can do to keep good teachers in the classroom.

The second question is, as you all know, the Third International Math and Science (TIMS) Study, which is so often quoted, shows us that we are doing reasonably well at fourth grade—still not great, but reasonably well, but our 12th grade students are not doing well in math and science compared to other countries. And I would be interested in your opinion on—of the reasons for the fall-off. So, we have always been going left to right from our point-of-view, this time I am going to go left to right from your point of view, so Ms. Ehnert, would you start?

Ms. EHNERT. Thank you Dr. Ehlers. First of all, I think you are right in saying that if a teacher leaves the profession, it is—well, it is probably for a number of reasons, but, of course, financial issues are a consideration, and one of the problems that I see is that one of the ways that you can improve your salary and education is to leave the classroom, and that is a shame. And, so, if there is some way to—I think your suggestion of some kind of bonus or whatever that could be given to those teachers who have shown that they have done a good job, that would be a very helpful thing because right now, as it is, you know, you get to the top of the salary scale and you want to increase your pay, and then you end up being an administrator and then you are out of the classroom. And in some ways, that is good, but it is not always the best for the students, I think. But, I would really like to address the TIMS issue.

I did teach in the Czech Republic for a year, and I think I have a perspective on the education system in Europe. Having done that, I was able to go to Germany and talk to some people there, and to some people that taught in Hungary, and some of the countries in Central Europe. Those schools that are being tested, I believe, are testing the top students. They are not testing everybody and that is really the problem.

We here in this country believe in education for all, and we are trying our best, as Jason has very eloquently suggested, to get everybody and to really hook everybody, and they are not doing that over there. I mean, they definitely stratify, and the students that are being tested are those that have been selected, and their education system is quite different in that respect. And so I think it is really comparing apples to oranges because by the time the students get—fourth grade students, everybody is tested in Europe, as well as here, and then as they get to eighth grade, they are weeded out a little bit more over there, and when they are in tenth grade and 12th grade, they are even more selected. And so, I think it is really—it is an unfair comparison.

Mr. EHLERS. Mr. Cushner?

Mr. CUSHNER. Thank you. Waiting to see what happened with the applause. Okay. So for the first one, to keep teachers, I think, yeah, money is good, and also, I think, like, it is exciting to try and make a robot do something, or get a man on the moon, and I think we need to create, like, teachers as researchers and that type of development in teachers so it is just as exciting to figure out how do you get this group of students to learn or understand the Pythagorean Theorem, or how volume works, or derivatives, just like it is trying to get something to happen. So I think really promote programs that get teachers as researchers where they can have maybe one foot in the classroom, then also some time out to develop good practice among their colleagues, and make that a fascinating part of the job, so they can really make it feel like a strong profession and they are involved in the research and making an impact.

And, as far as the TIMS Study, I think—one of the follow-up studies on the TIMS Study, I think, was done by—I think it is James Hebert—compared a lot of the high-performing countries to the United States, and all these factors like curriculums, technology, how they ask questions, classroom size, and, like, most of those factors didn't make a difference, but the one thing they noticed in math—this is specific to math—is most of what was happening in the American classrooms, even if they had, like, discovery-based or more alternative curriculum, is most of what the students were doing were definitions and follow algorithms and there wasn't a lot of, like, the higher order thinking skills.

And I think it is a cultural practice that has happened a lot here in math in this country is that is what math is. And, so, we need to work on some grass roots efforts to kind of change that paradigm of what teaching math is. It is not just knowing the Pythagorean Theorem. It is not just being able to know those definitions, but how can we understand the concept, how can we do investigations, and really understand in depth what these things are and how do we apply under real situations.

Mr. EHLERS. Thank you. And let me just interject here. I didn't mean to imply that teachers should be paid the same they could get from a software company, because there are a lot of other rewards of teaching, but there are—when they can earn double somewhere else, that is a serious temptation, so there has to be an accommodation. Ms. McGee?

Ms. MCGEE. I think potentially the answer to both of your questions is that, at least in science, it feels very disjointed. I am given a list of objectives that I have to teach to my students, far too many to get through in a year to begin with, and there is no significant tie between those objectives. And I think that that is initially a problem that causes teachers to leave because I am so bogged down in the details of these objectives, I don't get an often—enough of an opportunity to do the stuff that I love.

You know, and for me, I have personally made the decision that my classroom is going to be about the things that are important, hopefully not just to me, but to my students as well. You know, maybe I am compromising to a certain extent those objectives and the testing and what not. Again, I am spoiled because my students are gifted and talented, so they are going to pass the test, so I have that luxury. But, I think that the reason why we lose many of our teachers is because our system of accountability is based, at least in my district, on two things: test scores and attendance. And I don't know how much—I mean, certainly teachers have a role in that, but, you know, there are certainly other aspects that we could be held accountable for and be rewarded for.

In our district, we call it incentive pay, and as a critical shortage science teacher, I do get an additional stipend, you know, and that certainly does keep me where I am. But, I also think that disjointed feature of our curriculum segues into your second question about our students and their—how they lose their ability.

Again, there is—I have 26 objectives that I have to share with my students. Of those, 17 are on our Texas Assessment and Skills Knowledge test, and there is no rhyme or reason to which ones are on there. Again, in looking at the A–Plus countries that did really well, in our summit that we were at, they showed that, in the United States, we have all 26 of those at every level, and in countries that are succeeding in science education, in first grade, they tackle one science concept, and two in second grade and three in third grade, and so I think they probably build upon each other, which is something that we are really severely lacking, even in the national standards, you know, that—when you think about learning, what happens is it is literally a connection between neurons.

You have to have a neuron connect to one that—an idea that—or a piece of knowledge that already exists. It is a connection. Why isn't education like that? We have got to be able to take concepts that are abstract to students and tie them to concepts they already know. That is happening at the teacher level and very little anywhere else. I mean, it is not dictated in national standards or performance standards or any of them.

Mr. EHLERS. Thank you. Mr. Roland.

Mr. ROLAND. Yeah, this doesn't really have anything to do with that, but I thought of it and I thought you might like it. A testing—tests are to education what quarterly reports are to a business, and

if that is all the investor looks at, there are very creative ways to improve your bottom line, but it ends up resulting in accounting scandals eventually. I just thought that was neat, so I shared it.

But, for the teachers, do you know what? It isn't my pay that makes me go back, although my children like the paycheck. I would do it for free. I would pay my district to do what I do. Don't tell them. Don't tell payroll. But it is because I love the success, and I think that the doctors and the lawyers that come into the classroom are not experiencing the success. If they experienced the success, they would claw for it.

One of the reasons I have experienced success is I was able to see good teaching. You know how often we get to see another teacher teach? Never. We never get to see—I had to see it on video, people like Paul Hewitt and other physics people teach. One thing that our county has done is they have done courses—but I got to teach some courses like you did. Those teachers that you taught—those elementary school teachers, I bet they loved science from then on, because they learned how to be successful by learning from your mentoring in that course. One of the courses that I taught for Hopkins, Bill Barnes, who is also a—he is an award winner this year, too. He was my student, and he had—I attribute his success entirely to that class that I taught him.

This summer, I get to teach a summer institute to elementary school teachers, and if you don't see another teacher teach well, you don't know how to teach. So if you can make things—and make these people see other teachers teach well, it helps a lot, that modeling. Thank you.

Mr. EHLERS. Well, with that humility, you are entitled to become a Member of Congress. I thank you all. Next, please to recognize Dr. Burgess from Texas.

Mr. BURGESS. Thank you, Dr. Ehlers. I think, just like Mr. Honda, I probably don't have a question. I want to be very brief because I do want to hear—we are going to run out of time and I want to hear your questions from the audience. I would just like to say to Mr. Roland, don't disparage the bear feeders. When I was in eighth grade, Roger Grote did a very efficient job of feeding this little bear and I was halfway through medical school before I ran out of steam, and by that point, the State of Texas had so much invested in me, I wasn't allowed to become a carcass at the side of the road. It does work, but that was back in the '60's and things were different then.

I just want to say thank you to all of you for coming here this morning. Thank you for what you do. As a physician one time, I was one of those doctors who went into the classroom. I never went back until, as a Member of Congress, an opportunity arose to teach several political science classes, and for whatever reason, I found that much easier, perhaps because I didn't know as much about it. But, it was much easier to teach those classes than it was to speak effectively to students on my field of medicine. So, again, thank you for what you do. Thank you, the rest of you, for being here through this long hearing this morning and listening to soliloquies by both Mr. Honda and me.

We have a saying up here in Washington that with 435 of us on the House side, that everything may have been said, but not every-

one has had a chance to say it yet, so I appreciate you staying around and listening to my chance.

Mr. EHLERS. Gentleman yields back his time. Next, I am pleased to recognize another Texan, Congresswoman Eddie Bernice Johnson.

Ms. JOHNSON. Thank you, Mr. Chairman, and allow me to apologize for being in and out. We have so many things scheduled at the same time. I would like to ask your unanimous consent to file my statement.

Mr. EHLERS. Without objection, so ordered.

Ms. JOHNSON. Thank you very much. And to say to the teachers I don't think there is any profession more important than teaching. I am from a district that has the number one high school for science and engineering and calculus, and one of the ways they got there is to have engineers to come in from Texas Instruments and that has brought it to be a bit more real for them, but I know there is some opposition to bringing sometimes professions—professionals that are not teachers into the classroom. I would like you to react. Give me your opinion of how you see that.

Ms. EHNERT. It would be a great partnership, I think, to have the professionals and the educators working together. That is what I would see as being just a fantastic dream world.

Ms. JOHNSON. Thank you.

Mr. CUSHNER. I agree. It is a great idea, and when I have done it, there have always been a few students that have really gotten inspired, and some of those people have even stayed connected with those mentors into, you know, future relationships. It has made a difference in that student's life, so I think it is a great thing.

Ms. MCGEE. Yeah, I have the luxury of participating in the GK–12 program, another National Science Foundation program that brings—partners scientists and science educators, and it was great. Aside from the formal units that we did, our neuroscientist would visit about once a week, and my students are so funny, they will—you know, at the end of the day or at the beginning of the day, "well, where is Dr. Dan? Dr. Dan is not here today." You know, they loved the connection with a real scientist, and they got an impression of him as a person, and they got an idea that they could do that, that they could be him, and that was really powerful. And, I think it is something that maybe we don't have enough of an opportunity to do with our students.

Mr. ROLAND. It is what watching an NBA game does to our Gator basketball team.

Ms. JOHNSON. I am sorry, I missed it.

Mr. ROLAND. They get to see what is out there. It gives them the vision, and it is—that has always done that.

Ms. JOHNSON. So all of you think——

Mr. ROLAND. That is good.

Ms. JOHNSON. All of you think it is a good idea to enhance your classes with someone from the profession. It makes it more real to the students. Is that a common thought? Thank you very much. I appreciate that, because my school—one of my school districts is wrestling with that now—of bringing in professionals, and many of the teachers have reservations about it. And I don't mean necessarily to replace them, but to enhance the scales.

Tell me why many of the good teachers leave the schools. Give me your opinion, I guess. You are still there, so you can't——

Mr. CUSHNER. Okay. I would say, one, they feel like it is not respected as a profession, or, you know, that they can get more respect doing that, and more money off in doing something else. And, also, I would say, for some of the people that I have worked with that have left, they just feel burdened by dealing with some of the emotional and behavior issues of students. Like, their passion about math or science or whatever their field is, and they are not prepared to deal with the behavior and some of the psychological issues that happen in students' lives, because you can—there are many days where I would feel it would be more appropriate for me to have a degree in psychology than math.

Ms. JOHNSON. Yes.

Ms. MCGEE. I think just to second that, also the bureaucracy and the paperwork. I mean, I am obviously probably preaching to the choir, but, you know, in public education, we have got so many levels of accountability, so many different criteria and groups to be able to accommodate, and the paperwork that goes along with that, and the requirements that go along with that are, you know, sometimes very difficult to keep up with, and a lot of people, you know, throw their hands up in the air because that aspect of the job, the accountability aspect of the job is so focused on those areas that there isn't a lot built into the system for creative teaching and success with students.

Mr. EHLERS. Anyone else?

Ms. JOHNSON. You hadn't thought about it? Okay.

Mr. EHLERS. Okay.

Ms. JOHNSON. How is my time?

Mr. EHLERS. You had expired.

Ms. JOHNSON. Thank you very much.

Mr. EHLERS. If you had something urgent, I would let you go on longer. Okay. Gentlewoman's time has expired. Now, Mr. Honda has asked for time to make another comment, and I have never—I am not about to say no to a constituent of Arnold Schwarzengger, so Mr. Honda, it is your turn.

Mr. HONDA. Thank you, Mr. Chair. My daddy said that when a teacher ceases to be a student, he ceases to be a teacher, or she ceased to be a teacher, and this is what I am hearing right now is that you want to be able to continue to learn. And I think Mr. Roland's comment was when was the last time we were able to watch each other teach and how great that would be. Ms. McGee suggested a need for creating a national web site to facilitate collaboration among math and science teachers, and perhaps other teachers, too. I guess the question would be what opportunities would POLARIS have for collaboration with other sites and other teachers currently in your school districts, or in your state or nationally? And how would the application of technology today facilitate that so that you have that opportunity to share, learn from each other, watch each other, things like that? Would you comment on that for me, please.

Mr. ROLAND. Put random web cams in on classrooms. Then anyone could watch.

Ms. MCGEE. I don't know, he may be on to something, because I really do believe that having that opportunity to be able to see professionals that are good at what they do is going to only make the field better, and the Internet is incredible for that. I mean, I think that, you know, we are as—I think we all are working hard to incorporate technology in our classrooms. Our students are, you know, above and beyond us in that sense, and just an example for you that I had mentioned is a web site called Access Excellence. It is run by the institute—the Health Institute, and what they have done is they have asked science teachers to share their good ideas. And, so, if I am struggling for a good idea or a novel way to teach a traditional concept, I type it in on Access Excellence and I come up with three or four ideas that, you know, master teachers have developed. That is powerful. I wish there was more of that.

Mr. CUSHNER. Yeah, I second what Ms. McGee said, because I think we are busy people, and sometimes it is hard to find time to research many different sites to find the connections we want, the curriculum we want, the technology we want, and so if there was one centralized place for teachers, where we could say, like, this is what we are teaching, and get lessons, get connections to experts who might come in in our region, all those things. I think that would be a huge help to teachers in general.

Ms. EHNERT. One successful program that I have been involved in that is not part of the Federal Government, but it might be a model for it is the Advance Placement classes. The College Board runs a listserv and I am on the AP Biology Teachers Listserv, and that is a great thing, because things come up and there is a subject line that says cell respiration and then I can go in and if I think——

Mr. HONDA. Yeah.

Ms. EHNERT [continuing]. That might be something I am interested in, it is a question about a lab, or, you know, does anybody know how long DPIP lasts once you mix it up? You know, something like that, and it is really helpful and I have copied a lot of those emails and saved them, and they have been really, really helpful. So maybe specific listservs of interested teachers.

Mr. HONDA. It seems like the application of technology would, as in business, you can just collapse this world right into real-time. Classrooms could be next to each other or be with each other. I know there would be some concerns in terms of privacy and stuff like that, but, you know, as an ex-principal, always wondered about the classroom whose doors are closed, and so I think that we will pursue your ideas, and hopefully you will keep in contact with us on that idea, and just feed us with that information. To all of you again, I really do thank you for your love.

Mr. EHLERS. The gentleman yields his time back. Let me make a few wrap-up comments. We were going to have an open mic session. We are supposed to wrap-up at 12. I will extend that to 12:15, so those of you who want to make a comment, think about what you want to say. We will have a gentleman with a roving mic. Let me just make a few wrap-up comments first.

The comment that was made about the testing—or several comments about testing—I am also on the Education Committee, and we are watching very carefully the implementation of No Child

Left Behind. As you probably know, Mr. Cushner, the Department of Education has relaxed the testing requirement for certain classes of students. That may or may not help you, but that is one of the results of our constant keeping in touch with the problems. I have developed a theorem during my legislative career. In fact, I developed it almost the first year in the state legislature—that for every bill passed, you create the need for two more. This is not just a full-employment scheme. That is the way it happens, because whenever you take a bold step such so No Child Left Behind, you know there are a lot of things that you can't anticipate. Things are going to go wrong.

So we on the Education Committee need to hear from you, so don't hesitate to send me or your Congressman or any member—any other member of the Education Committee your comments so we can get them into the net. I also want to—the comment that I think probably the most important thing you are doing, teaching math and science, is teaching critical thinking, teaching children how to think and teaching children how to learn.

I happen to think, although it is not unique to math and science teaching, I believe that math and science teaching, based partly on Piaget's theory that you accommodate more than you assimilate in the math and science, compared to other subjects. I think math and science has a particularly important role to play there, and I have given speeches around the country on which I simply comment that the jobs of the future are going to require a basic understanding of the concepts of—and principles of math and science, and if we don't emphasize math and science in today's elementary and secondary education, we are doing a huge disservice to the kids there because they are going to have more difficulty finding a decent job in the future.

And I am not talking about engineers and scientists. I mean, that will happen, too, and we have to do better than we have been, but the average job is simply going to become more and more complex and requires the analytical skills which students learn in your classes. So, bless you for what you are doing.

I attended a conference in education recently at which one of the speakers was someone who taught in elementary school, secondary school, was a principal, a superintendent, then superintendent of a district, and now heads a foundation. She obviously knew a great deal about it, and I said what would you do to try to improve math and science teaching in the school. And her first answer was I would let the teachers share—go into each others' classrooms and observe and arrange the schedules so they had free time to do it. I found it interesting that was her highest priority.

I want to remind you of something that I managed to get in the bill that we got passed to create the program that NSF now has, and that was the concept of a master teacher, although we called it something else because some groups objected to using the term master teacher. But, in my experience in working with elementary schools—and I taught two NSF institutes myself many years ago—but going in the schools, working with them, observing what happened, I found that the single biggest factor in the success of a program was having what I call a go-to teacher, because if the guppies die, or the beans don't grow, or equipment breaks, the average

teacher doesn't have the time, and sometimes doesn't have the background to take care of the problem. And my experience was if there wasn't a go-to person, the program would just gradually fade over a period of years, and then the principal would say, "Hey, it is not worth all the trouble," and that was the end of an inquiry-based program. Whereas if there was a go-to person, they could just go and say, "Hey, my guppies died." "Oh, no problem. I will get you some more," and they are there the next day. Programs succeed very, very well.

And I hope we—I hope the NSF use of that program as part of the Partnership Program is successful. I want to also remind you that we have a Partnership Program in the Department of Education, too, which is run through the State Departments of Education. Make sure your teachers and administrators are aware of that as well.

Once again, thank you very much for all you have done. You have contributed immensely to our collective knowledge, and your spirit and enthusiasm is infectious. And as I said, this is the most fun hearing we have had in a long time.

However, we now have 17 minutes for open mic, and Kevin's over there, so we have lots of hand. You can ask questions or make statements, whatever you want.

Ms. NEWSOME. I am Lynne Newsome from Delaware. I wanted to address——

Mr. EHLERS. Please give your name, for the record, and your home.

Ms. NEWSOME. Lynn Newsome, Wilmington, Delaware. I wanted to address a communication issue that when one participates in an NSF project, do the other people know about it? We had 19 districts combined for an NSF project, and every single K-to-5 teacher was trained, 6 to 8 are being trained right now, and every teacher did know about it, and I think that is the principle investigator's duty to set up a hierarchy or some way of making sure that, not only does everyone know about it, but everybody participates so every child gets an equal opportunity. So that is done to my knowledge in any that I have participated in.

So the gentleman to your right was the one who had asked that question, if you could tell him.

Mr. EHLERS. Thank you.

Ms. FOOTE. Actually—all their questions—okay.

Mr. EHLERS. Yeah, all of your questions, comments, and so forth will go on the record, and that is why we need your name and location.

Ms. FOOTE. Nancy Foote, F-o-o-t-e, from Phoenix, Arizona. There is currently a program in place which addresses both having a go-to teacher and having a way for disseminating information and programs, like NSF programs. It is through the National Science Teacher Association——

Mr. EHLERS. Yeah.

Ms. FOOTE [continuing]. And it is called "Building a Presence in Science." I would like to see Congress expand that to include math, but also expand it to include the community college system which is currently pretty much untapped by the high schools in terms of improving the availability for teachers to be in contact with other

expert teachers, and also to have your go-to teacher. You know, my goldfish died, what do I do? Or, is there a workshop that you know about this specific subject, or perhaps I don't know very much about covalent bonding. I have got to do a lesson in it, can you give me a suggestion? And it is all through that organization. It works very well, so I would like to encourage that to be expanded. Thank you.

Mr. EHLERS. Good suggestion, and if you are not a member of the National Science Teachers Association, you should be. And, also, if you are math teachers, join the Mathematics Association.

Mr. BRASSER. Kevin Brasser, B-r-a-s-s-e-r, from Iowa. I would just like to thank you for this opportunity. I think, if I could sum up my colleagues here, I think, with the struggle of No Child Left Behind and all the little intricate parts of it, the more you can bridge with teachers face-to-face at the state level, and at the national level, ask us what we think, ask us what we feel. We will tell you. And although a lot of you have science backgrounds, we are in the trenches. We will help you. We will do whatever we can to help this thing come to fruition. And, also, our forefathers, way back, based the entire government on help from God, and I am asking you for your prayer for us as teachers in the classroom, and our students, and we will pray for you at your level to do what is right for our country and our education.

Mr. EHLERS. Sounds good. Sounds like you are going to get help. Well, we exchange prayers and God bless you. Thank you.

Ms. GODINE. Heather Godine from York, Pennsylvania. I decided to become a teacher because I received a Paul Douglas Teachers Scholarship to pay for my college education. Please continue to support programs that recruit and give people tangible rewards for deciding to become teachers.

Mr. EHLERS. Thank you.

Ms. ENGLISH. Hello. My name is Janet English, E-n-g-l-i-s-h, from California. Thank you so much for your generous support and your words of support for us. And, NSF taught me how to teach. I got my formal education in content, but NSF-funded projects in the summer taught me how to teach, and wonder, and learn, and learn how to be a good teacher, so please continue supporting it because I think it is a fantastic opportunity for us.

Secondly, I think that we have to address what the Internet has added to us in the last five years. We have the Library of Congress at our fingertips in the classroom. It is fantastic. Do you really want our kids to learn just facts, or do you want to teach them how to think. The Internet's there. We teach them how to research and teach them how to think. It is fantastic.

Another thing, as far as keeping teachers, there was a NRC, National Research Council, project called Defense Investment Re-initiative—or Initiative—back in the late '90's. Maureen Shiftlet was the person in charge of that. They were able to double the retention of teachers—of new teachers in inner city classrooms in Los Angeles, science teachers, from 40 to 80 percent after two years. I think that is worth looking into. It was basically a big mentoring model, but these are displaced scientists and engineers. A fantastic program. Very, very successful.

And the last thing is that we all, as the first teacher said, the wonder and the inquiry and we all engaged in what he was doing. He was up on his chair. We were right there on the edge of our seats with him. It is fantastic. I don't know how many of you do, but I don't read things I am not interested in. I have to be interested in it to want to learn more, and teaching like that absolutely gets us involved. Inquiry is wonderful.

In the middle school, if we don't give the kids structure, it only works for about three weeks until they start needing more direction. I think it is worthy to come back and say all these projects we are doing, researchers are doing a wonderful—but the teachers know what works with kids, and let us go from the bottom up, if you want to put it that way. I hate to say it, but it is true, from the trenches back up. These kids are fantastic. They learn. They want to learn. They want to be successful. There are some topics that absolutely lend themselves toward inquiry: buoyancy, density, laws of motion. Give us the permission to do that and not squish their curiosity, and ours, by testing us to death. Let us get those units available for, you know, two or three great units a year, and then let us develop what things we need to know and balance those things, because that is what hasn't been done.

One of the things that gets teachers out of the classroom and frustrated and disillusioned is the big pendulum swinging back and forth, and no one buys into it anymore. They say, "well, there it goes again." So, if you empower the teachers to be part of that process and feed you the information so we know what to research, that would be a huge change for us as teachers.

Mr. EHLERS. Good observation. I have noticed that the education profession is afflicted by fadism. There is always the latest fad, and I appreciate your comment on that. Let me also interject. All of you are saying such nice things about the NSF. I have a huge annual fight trying to get money for the NSF from the Congress, so talk to your Congressman. You don't have to talk to me. I am converted. But go out and talk to your own Congressman and get to know them and say, "Look, this is a great operation. Increase the funding." Yes, ma'am?

Ms. AUDETTE. Yes, we will. We will talk every day. This may be the only time we get to talk to you.

Mr. EHLERS. Yeah. Well, that is that.

Ms. AUDETTE. I want to take the minute——

Mr. EHLERS. Could you identify yourself?

Ms. AUDETTE. Oh, I am sorry. Louise Audette, A-u-d-e-t-t-e, mathematics in Connecticut. And I want you to remember that you had maybe one hour of energy from four incredible teachers, and I want you to remember that if you had 180 days of this energy, that these children would become, and will become, some of the greatest citizens in our country. So I want you to take this energy that they have shared with you and don't walk away and forget about us. And, to keep the energy and keep the thoughts of education as your priority for us. Thank you.

Mr. EHLERS. Thank you. It has been my priority before you were even born, so——

Mr. CANTLEY. Okay. My name is Tim Cantley, C-a-n-t-l-e-y. I teach at Sacred Hearts Academy in Honolulu, Hawaii. One thing

that has not been mentioned that I am a little surprised at, which I think supports everything everybody has talked about what will keep teachers in. What has kept me in is encouragement, support, and appreciation. I get those from my building principals. The building principal controls everything, if they wish to. Besides training for teachers, I think continuous training for building principals and school principals will be a big help. Thank you.

Mr. KREDIT. Harlan Kredit, Washington State. I have been in this business for over 42 years and I love what I am doing, but I come to a place like this with my fellow teachers here and get energized with what is happening. Anything that I could possibly do to get the rest of my colleagues, the rest of the people in our district to come to this would be appreciated. If I were the boss, I would say of all the 50 states here, here is what has to happen. Every one of you people, and I will give you five years to do it on a rotation basis, you will attend some kind of a convent. You will write a one-page report. You will send that to every parent and every school board member in your district, and furthermore, and then to the State Board of Education and, if we do not receive those in a timely fashion, we will withhold your funds. We need extreme measures to make sure other people, other teachers, can do what we are doing here today.

Mr. MCCOLLUM. Timothy McCollum, M-c-C-o-l-l-u-m, from Charleston Middle School in Charleston, Illinois. The first session that my wife was able to attend as my guest, she looked around and commented on something that I see everyday in my school. She said, "this is the largest percentage of male teachers I have ever seen," and if there is anything that we can encourage and need your help to encourage, is not only more teachers entering math and science, but particularly more male teachers for the very reason that Mr. Cushner was talking about the emotional issues that we deal with everyday with our students. With the changing nature of the family, a smaller and smaller percentage of our children are in homes that have a positive male role model. The males in the school so often are the only positive male role model, and I hope we continue to promote that.

Mr. EHLERS. Thank you.

Ms. MOORE. Wendy Moore, M-o-o-r-e, from Vermont. I wanted to speak a little bit about No Child Left Behind and the mandatory testing for science that needs to take place by 2007. I know some states are working to develop those assessments right now, and I just want to speak, actually, very highly about what our state has done. It has been a collaboration of some really talented science teachers and scientists to put together a real authentic assessment of science, in terms of inquiry, developing constructed responses, tasks, and performance-based tasks. But, recently, there has been pressure to take this part of the test out because it costs too much, and I really want to emphasize that if we want authentic assessment, we need to fund it.

Mr. EHLERS. Thank you.

Ms. BARNETT. Joanne Barnett from Ozark, Missouri. And Barnett, B-a-r-n-e-t-t. I am actually an elementary ed major, and when I was getting ready to graduate, the man at the Placement Office said, "you know, if you took a couple hours of math, you

could teach junior high math," and I said, "great, just what I never wanted to teach," because I was not a strong math student. But, I will tell you that with professional development, you can learn to love math and become a great teacher. And, I would like to applaud my state, Missouri, because we have put in the Missouri Math Academy, and it is for teachers who love to teach but don't feel confident about their mathematical abilities, and we look at deeper content, instructional strategies, and I would like to see something like that in place across America. It is in regards to John Glenn's report to the Nation about how academies should be held across the state where teachers are paid to come. So many teachers have to supplement their incomes in the summertime with teaching summer school, and if they can go to professional academies and be paid for that, we can just have a nation full of great teachers and successful students.

Mr. EHLERS. Thank you.

Ms. JUMONVILLE. Marilyn Jumonville from Louisiana. That is J-u-m-o-n-v-i-l-l-e. I would like to echo what my colleagues have said about NSF and applaud NSF, and I would like for you—to encourage you to applaud those who fund those projects that are long-term projects. A week will not change the way a teacher teaches. We need long projects that do that, and we need some type of follow-up. And I would encourage that the projects are—those teachers who have been identified as excellent teachers, to help with those follow-ups and go into the classrooms during the academic year and support the teachers as they try to change the way they change. That is not an easy thing to do, and I think those teachers supporting them throughout the year would be an excellent way to do that.

Mr. EHLERS. Yeah.

Mr. KREUTZ. David K-r-e-u-t-z of Burlington, WI. Some people brought up about principals and superintendents and stuff getting involved. I could not do what I do if my principals and superintendents just didn't say do it. I have been in places where they just said these are what you got to teach, and this is how you got to do it. I left. I went somewhere else where they said let me hear your ideas. Do these wonderful things, and then we developed these partnerships and, heck, I spend most of my time talking to all these people about the partnerships that I want to do with them in bringing in those businesses in the areas who have the monies to not just throw at you and say, well, we throw it at you, now we want a press release, but we throw it at you and we want you to come back on a quarterly basis and sit down and we want to follow how this program is going to increase and how we are going to bring our professionals in and support you. And, I don't teach one class that doesn't have a partnership or multiple partnerships, and I think we all should go in that direction, but that is my opinion, of course.

Mr. EHLERS. I can see a lot of you want to speak yet. I will stick around. I can go without lunch, so we will go until 12:30, if necessary.

Ms. LITTLEJOHN. Patty Littlejohn from Tennessee, L-i-t-t-l-e-j-o-h-n. I would just like to mention, because the conversation today is on science and how to get better science scores, and how to get

more students interested in going to the science fields. I think it has to start back in elementary school, and when we start, as middle school teachers—I am a seventh grade science teacher—I find that so many kids have not had science in elementary schools because there is such an emphasis now with No Child Left Behind on reading, language, arts and math, that there is not time in the week to teach science. It is not being taught. So I think we have got to take—I know that by 2007, science will be on the AYP [Adequate Yearly Progress], but until then, we have got to do something to make sure science is not deleted from our elementary curriculums.

Mr. EHLERS. Thank you.

Mr. RYAN. Mark Ryan from Minnesota, M-i-n-n-e-s-o-t-a. Can't spell our state. I am one of those mid-life professionals who changed my career to come to teaching. I was a scientist through training and became a teacher at the age of 45. It is a great route to take, and I encourage people to do that, but it is not an automatic. I could not step into a classroom and begin teaching. I remember my first day to this day. My—what on Earth am I doing here? What makes me think I can do this?

The standards and the regards of teachers as professionals, I believe, is at serious risk in this country. We are vilified. We are identified as enemies. We are the fault for so much of the evils that tend to be in education. We catch it, and I don't think that is deserved. I am, quite frankly, insulted by the proposal to create the Super Teacher program where scientists can automatically become a teacher and be paid $100,000 a year and be called a Super Teacher.

That, to me, is insulting to these many, many people and to the thousands of teachers who work every day to the best of their energy to try and educate children. The National Science—the National Board Certification Program—I am a member of that—one of the most tremendous professional development things I have undertaken, an analysis—a self-evaluation and analysis of my teaching, my interaction with the class, improved my teaching more than anything else ever has.

I would encourage you to try, in some manner, to support and promote programs such as that to raise the professional standards of teachers to the professional level at which they truly are.

Mr. EHLERS. Thank you. I notice—excuse me just a moment—I notice a number of you are not very accessible to Kevin, so if you want to ask a question, you can step to the sides where he can more easily reach you.

Ms. PETERSON. Hi.

Mr. EHLERS. Go ahead.

Ms. PETERSON. Donna Peterson, P-e-t-e-r-s-o-n, from South Dakota. I started out my career as a science teacher, and I switched to math, so I have seen it from both sides, and I love both. And I did get some very early training with the National Science Foundation, and I do think it made a tremendous difference in my teaching career, and I know I don't have to sell anybody in the room on the National Science Foundation, but I have taken the challenge on today that when I get back to South Dakota, of contacting my Members in Congress to—I am going to call both of my

senators, and I would just like to challenge all of my fellow teachers. I think if all of us would do that, and make it a priority, when we get back in the first two weeks to either send them an e-mail, call them, or communicate in some way that, as a force, we might have some influence for the National Science Foundation, and so I would just like to challenge all of you to do that with me.

Mr. EHLERS. Thank you.

Ms. MARSHALL. Hi, I am Heather Marshall, M-a-r-s-h-a-l-l, and I represent Georgia mathematics, and a little bit off the topic of speaking about math and science in specific, I would like to address the tremendous burden that I have for at-risk students. I also serve as the at-risk coordinator for my middle school, and while there are federal programs to help students who are identified as special education, meaning they have an IQ below 70, or there is a serious discrepancy of 20 IQ points or more between two content areas, there is nothing for the slow learner that has an IQ of 72, and it is—with student support teams and the processes that each of our states has to support those, it is just not enough, and I am just wondering if you can entertain that idea to try to develop some type of federal support for those students, because I feel like they are just falling between the cracks, and those are the kids that are dropping out. Thank you.

Mr. EHLERS. Okay. Thank you. To your left.

Ms. PINNER. Aloha. My name is Pascale Creek Pinner. I am from Hawaii. I am from the big island, and so we are isolated. I teach in a school that has six elementary schools coming into my middle school, five of the six are in corrective action. That is difficult for us. It is hard for us to make changes, but I will tell you that one of the things we are doing which is helping us is utilizing our Title I funds, and we would not be able to do a lot of what we are doing in our school right now without those funds. So I personally would like to thank you for making sure that somehow those funds continue to happen. They are three times our school budget, and they provide for us para-professional teachers in our classrooms, so when I have a class of 34, I have another adult in there to help me do labs. They provide extra help in the special ed arena as well, because those kids are often mainstreamed into science first, and so I would just really like to see that continue, because many of our rural areas that are isolated have these kinds of populations. Those are the kids that are not making AYP. Those are the kids that need your help. So, thank you very much.

Mr. EHLERS. Miss, is Mr. Case your Member of Congress?

Ms. PINNER. Yes.

Mr. EHLERS. He is also on the Education Committee.

Ms. PINNER. I will be contacting him.

Mr. EHLERS. Good.

Mr. SITZMAN. I want to thank you for giving up your lunch. I know many of us give up our lunches many-a-time. My name is Dan Sitzman from Omaha North High School, Nebraska. A number of years ago, I was in a liberal arts college in Minnesota, and my professor said, you know, there is an NSF-sponsored activity for teachers. I want you to participate in it, and I started off as an undergraduate participating in a program like that. And, after that, I always sought out those opportunities, and I am here today be-

cause of NSF-sponsored activities and Eisenhower-sponsored activities that provided that professional development and continue to provide that professional development. Currently, in our district, we have an NSF-sponsored program that is a community of learning for excellence in math and science, and I am now involved with that, as well as with our "Building a Presence" leadership to provide those opportunities, to provide the content, and to help translate those professional development standards that are present in the National Science Education Standards, so that teachers can better teach and better serve our students. So I want to thank you for your time and giving up your lunch for listening to all of us.

Mr. EHLERS. No problem. Thank you.

Ms. NEWING. I am Angela Newing from Ann Arbor, Michigan. Two comments I have. One is about No Child Left Behind. While I feel that districts should be held accountable and there should be some measure to—something to measure their success in helping students be successful and proficient in math and science, in our state, we were just spared from—in mathematics, our state benchmarks. There is a new, revised version that just came out in December, and teachers did not serve on the Committee to develop these state benchmarks or standards, and, for example, as an eighth grader, an eighth grader is now going to be expected to be able to write an equation for a quadratic function, find the—where they actually cross the x-axis. At sixth grade, they are going to be expected to be able to write linear equations for any type of real world application. These skills, right now, are taught—the linear equation was taught in eighth grade, and how to find quadratic equations and how to use that is a tenth grade skill they have to do. But, this is being moved down for two years. But this is what our—two—our MEEPS Test at—that is our Michigan test—in two years, we are going to be measured by that.

They are creating the test now based on those benchmarks that we are going to be graded on, and funding will be provided for based on those benchmarks. Textbook companies only have the opportunity to create the books to now meet those standards, but yet we are going to be graded based on that. I just think that is a travesty, and I told my teachers that if I got an opportunity, I will make sure I have said something about that.

Secondly, I just want to say as we address the achievement gap and we talk about African-American and Latino students, they lack role models. As we were talking about male role models, we definitely need to see more African-American and Latino role models in those schools in math and science, and that will help to increase African-American and Latino students interest in math and science and help them to achieve better, as well as giving—provide them with resources in their communities more to do that. We want to be enrolled in rigorous classes and courses, not always remedial courses. They need to be enrolled in—I am sorry—they need to enroll in rigorous courses, but you can't just throw them into rigorous courses without support. So if you can find a way to provide funding that would give support to these tutoring systems or other programs that will help them be successful in a rigorous course that will help in closing our achievement gap.

Mr. EHLERS. Thank you.

Ms. SWENSON. Virginia Swenson, S-w-e-n-s-o-n, from Iowa. There are two areas that have not been addressed. One is the NASA Teaching Program. NASA also does an excellent job of teaching math and science teachers, and we need not forget them also.

The second thing is you asked why our teachers are leaving the profession. I am finding out that a lot of the teachers that are leaving our profession in—or that—my area is, "Gee, you are doing a good job so we are going to add another additional class to you," so rather than teaching four classes, you are now going to be teaching six different classes. And, you know, your classroom can have an additional four or five chairs in it, so rather than teaching 15 students in your classroom, we are going to increase it to 40.

So I think those are two areas that the paperwork, talking with the parents in the evenings, and trying to prepare for six or seven or eight different classes a day, will make you tired and will make you leave the profession. Thank you.

Mr. EHLERS. Thank you. I have learned the hard way that those who do good work get more work.

Ms. WENDY SMITH. I am Wendy Smith from Wyoming, and I wanted to address the No Child Left Behind. I think we are doing a huge disservice to our special education students with this program. A lot of them are going to be left behind because of the program.

Mr. EHLERS. Thank you. We are—we got word that we absolutely have to be out of the room by 12:30 because another hearing is coming in. They have to get the room set, so let us—we have time for about two more, then I want to wrap up.

Mr. ISAAK. Steve Isaak, Las Vegas, Nevada, I-s-a-a-k. I just want to say thank you. Also, thank you to NSF. They are one of the few organizations that fund good curriculum and then field test it and get teacher feedback, and that has been some of the greatest professional development I have had. I have seen it close the achievement gap between rich and poor and the cultural groups, and I think—I would encourage you to strongly recommend the textbook companies, which drive many of our classes, do the same things. If we don't test them, how do we know they work? And then we just perpetuate failure. Thank you.

Mr. EHLERS. Thank you.

Ms. EMMA SMITH. Emma Smith, S-m-i-t-h, Utah. I just wanted to thank you for this opportunity because I feel the support, and, for me, that is the key in teaching. A brain surgeon has one individual they are working on at one time, and they have a key group of nurses, anesthesiologists around them, so I, for me, feel that the key for retention is support and the idea of team teaching. So, thank you.

Mr. EHLERS. Thank you. Last——

Ms. RAZIANO. Kathy Raziano, R-a-z-i-a-n-o, from Louisiana. I think one of the things that would keep teachers in the profession is a really good mentoring program which would provide the support. We have a good program in Louisiana, but there is a time problem with the teachers who are being mentored meeting with their support teacher. It adds an extra two or 3 hours to the day, sometimes, which makes it very difficult for teachers.

And I would also like, since I have got the microphone, to reiterate what several people have said. We were teaching science by inquiry. We are trying to teach students to think. You are on the Science Committee. You know that science has expanded so much where there is no way we can teach them all of that. We can just teach them how to find out about it and how to think, but that is not the way they are being tested, and I would hope that when we are developing these tests in No Child Left Behind that we will test what we are teaching rather than test for facts. Thank you.

Mr. EHLERS. Thank you. With that, we will wrap it up with just a few closing comments. First of all, the textbook issue, that is a major problem and, unfortunately, is not under the control of the Congress to any extent, but I hope you will continue to work through your states on that particular issue. Is there anyone here from NSF? Anyone here? I would like to have you stand, please, and I would like everyone to give them a rousing thank you. They do a great job with very little resources, and very little appreciation, as very few government employees get much appreciation. But thank you.

Ms. JACKSON LEE. Mr. Chairman?

Mr. EHLERS. Thank you for what you do. Yes, Ms. Jackson Lee?

Ms. JACKSON LEE. Running miles in hallways, I just wanted to—coming from the Homeland Security Committee—I just wanted to thank all of you for your presentation. You have our doctor in the chair, and I know that he has encouraged you, because those—these are his roots, math and science. Let me just say, Ms. McGee, I understand that you have applauded the testing process in Texas, and we all want accountability, but I do want to add that I am very proud that what you have generated is not only accountability, which we all can agree or disagree on in terms of testing, but excitement and energy, and the desire of our students to learn.

And so I hope that this committee will learn from each and every one of you about what we need to do to continue to encourage our students to be enthusiastic about learning math and science, because I do believe it is the work of the 21st Century and I invite all of you all to get in line for your ticket to Mars, to the Moon, and to be the next wave of commercial space travelers as we encourage and promote NASA and its vision, and the national vision, for space exploration. Thank you all very much, and forgive me for getting here, but I wanted to say thank you publicly, and if I could get back to class, I would, but I am learning from you every day. Thank you very much.

Mr. EHLERS. Thank you. I have two very quick comments. First of all, the testing and the science assessment, keep an eye on that at your state. I spent 30 percent of my time in the last four years working on trying to get that science testing part into No Child Left Behind. There are people who think it should be removed, so we need your support to keep it in, and to make sure that the tests are fair and adequate, and they can be your lever to improve teaching and getting more—greater resources in your state.

Ms. JACKSON LEE. Mr. Chairman? It is—just here—I don't know if I had said—I was not here, so I will not prolong it, but I will just simply say that I hope in the course of questioning, we also emphasize the importance of diversity with respect to——

Mr. EHLERS. Yes.

Ms. JACKSON LEE [continuing]. Our inner-city schools, the rural schools, Hispanic and African-American children who have lower numbers of interest and participation in math and science. I commit—and commend all of our teachers to find that effort, or to expand that effort and reach out into our students in that area. That is one of the areas that we are working on in this committee.

Mr. EHLERS. Yes.

Ms. JACKSON LEE. Thank you.

Mr. EHLERS. That was covered shortly before you arrived.

Ms. JACKSON LEE. Thank you very much.

Mr. EHLERS. And final comment, don't forget the parents. The interest and involvement of the parents is the key factor. Thank you again very, very much for being here. I appreciate it.

[Whereupon, at 12:35 p.m., the Committee was adjourned.]