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THE 2004 PRESIDENTIAL AWARDEES FOR EXCELLENCE IN MATHEMATICS AND SCIENCE TEACHING

HEARING

BEFORE THE

COMMITTEE ON SCIENCE
HOUSE OF REPRESENTATIVES

ONE HUNDRED NINTH CONGRESS

FIRST SESSION

APRIL 14, 2005

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THE 2004 PRESIDENTIAL AWARDEES FOR EXCELLENCE IN MATHEMATICS AND SCIENCE TEACHING

THURSDAY, APRIL 14, 2005

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

The Committee met, pursuant to call, at 10:13 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 2004 Presidential Awardees for Excellence in Mathematics and Science Teaching

Thursday, April 14, 2005
10:00 a.m. – 12:00 p.m.
2318 Rayburn House Office Building (WEBCAST)

Witness List

Joyce Dodd
Bryson Middle School
Simpsonville, SC

Cynthia Cliche
Homer Pittard Campus School
Murfreesboro, TN

Cassandra Barnes
Oregon Trail Elementary School
Clackamas, OR

Lonna Sanderson
Will Davis Elementary School
Austin, TX

Pita Martinez-McDonald
Cuba Elementary School
Cuba, NM

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HEARING CHARTER

COMMITTEE ON SCIENCE
U.S. HOUSE OF REPRESENTATIVES

The 2004 Presidential Awardees for Excellence in Mathematics and Science Teaching

THURSDAY, APRIL 14, 2005
10:00 A.M.—12:00 P.M.
2318 RAYBURN HOUSE OFFICE BUILDING

1. Purpose

On Thursday, April 14, 2005, the House Committee on Science will hold its annual hearing to hear from teachers on how the Federal Government can help improve K–12 math and science education. Five elementary school math and science teachers will testify before the Committee. They are in town this week to receive the 2004 Presidential Award for Excellence in Mathematics and Science Teaching, the Nation's highest commendation for K–12 math and science educators. At the conclusion of the formal hearing process, the other awardees, who will also be in attendance at the hearing, will be given the opportunity to make brief statements on the subject of K–12 math and science education. Their comments will be entered into the official hearing record.

2. Witnesses

Joyce Dodd teaches sixth grade mathematics at Bryson Middle School in Simpsonville, SC. Ms. Dodd has more than 30 years of teaching experience.

Cynthia Cliche (rhymes with fish) teaches first grade mathematics at Homer Pittard Campus School in Murfreesboro, TN. Ms. Cliche is also a college level Math Methods instructor for Middle Tennessee State University. Ms. Cliche has more than 20 years of teaching experience.

Cassandra Barnes teaches third grade mathematics at Oregon Trail Elementary School in Clackamas, OR. Ms. Barnes has 10 years of teaching experience.

Lonna Sanderson teaches third grade science at Will Davis Elementary School in Austin, TX. Ms. Sanderson is a National Board Certified Teacher with more than 30 years of teaching experience.

Pita Martinez-McDonald teaches fourth grade science at Cuba Elementary School in Cuba, NM. Ms. Martinez-McDonald has more than 30 years of teaching experience.

3. 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 stated, "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.

Today, U.S., educators, researchers, policy-makers and the general public use the National Assessment of Educational Progress (NAEP), a congressionally-mandated project of the National Center for Education Statistics at the U.S. Department of Education (ED), to determine what students know and can do in various subject areas. While NAEP does not, and is not designed to, report on the performance of individual students, it does compare student achievement in states and other jurisdictions and track changes in the achievement of fourth-, eighth-, and twelfth-graders over time in mathematics, reading, writing, science, and other content areas.

In mathematics, the 2003 NAEP results (the latest report available) found the performance of fourth and eighth graders increased steadily from 1990 to 2003, and the average scores in 2003 were higher than in all previous assessments. More encouraging, some of the lowest-performing students made the greatest improvements. The proportion of African-American and Hispanic fourth graders reaching the basic achievement level—the level of minimum competency—in mathematics rose from 36 to 54 percent and 42 to 62 percent respectively. It was also notable that these achievements occurred while higher-scoring students also made gains, although at a somewhat slower rate.

This represents real progress, but many U.S. students are still not proficient in mathematics. While the 2003 NAEP showed an increase in the proportion of students reaching the proficient level, only 32 percent in grade four and 29 percent in grade eight were able to do so and even smaller proportions were able to reach the advanced levels. In addition, while the 2003 NAEP did not assess students in grade 12, the 2000 NAEP found that 35 percent of twelfth graders were below the basic achievement level in mathematics, reinforcing the concern that achievement falters as students progress from middle school to high school.

In science, the 2000 NAEP (the latest report available) showed that the average scores of fourth and eighth graders were essentially unchanged from 1996 while the scores for twelfth graders declined by three points—a significant decline. Specifically, in 2000, only 29 percent of fourth graders scored proficient or better as did 32 percent of eighth graders and 18 percent of twelfth graders. Worse, scores for American Indian students in eight grade and white students in twelfth grade fell from 1996 to 2000.

For a comparative perspective on education in the U.S. and in other industrialized nations, the U.S. uses the Trends in International Mathematics and Science Study (TIMSS), an assessment given every four years, to provide participating nations with information on their students' understanding of math and science. The 2003 TIMSS, issued in December 2004, showed that the absolute scores of U.S. fourth and eighth grade students improved. However, while the relative rank of U.S. eighth graders improved, the rank of fourth graders dropped. U.S. students performed in the middle ranks of students in mathematics (in which students from about 35 nations were tested), and somewhat higher in science (in which students from about 15 nations were tested). U.S. students did not lead in any category.

The 2003 TIMSS did not assess 12th graders but another international assessment, the Program for International Student Achievement (PISA), showed American 15-year-olds performing below the international average in mathematics literacy and problem-solving.

While U.S. undergraduate and graduate education remains the envy of the world, the interest of, and the participation by U.S. students in science, technology, engineering and math is declining. In fact, 25–30 percent of entering freshmen express an interest in science and engineering, but less than half complete a science or engineering degree in five years. As the number of U.S. science and engineering students declines, our dependence on foreign students grows. According to NSF's *Science and Engineering Indicators* (2002), the percentage of foreign-born individuals among scientists and engineers in the U.S. is growing at all degree levels, in all sectors, and in most fields. Especially high percentages are found in engineering (45 percent), computer sciences (43 percent) and mathematics (30 percent).

Issues in K–12 Education

Over the years, education research and successful reform initiatives have underscored the importance of having a qualified teacher. Yet, in response to impending teacher shortages, particularly in mathematics and science, many states have allowed individuals without the appropriate background to teach. In fact, the Department of Education's 2004 "Condition of Education" report 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. Not surprising, high school students in high minority and high poverty public schools fared even worse with more science and mathematics courses taught by out-of-field teachers.

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—a change that may limit some able teachers from exercising their professional knowledge and discretion, making teaching less inviting to those most qualified.

To achieve the twin goals of improving education and narrowing the achievement gap, *No Child Left Behind*—President Bush's comprehensive K–12 education law—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.

At its center, *No Child Left Behind* seeks to hold schools accountable for the progress of their students by requiring annual testing for all students in grades 3–8 in reading and math and by ensuring that all students make "annual yearly progress" toward proficiency in these subjects, the prime measure of success under the law. Failure to do so results in a school being identified as "needing improvement," which triggers various interventions, such as choices for parents and corrective actions. In addition, states are required to have academic-content standards in place for science by the 2005–2006 school year and, beginning in 2007–2008, states will also have to test in science at least once in each of the 3–5, 6–9 and 10–12 grade spans. But science test results will not be counted as a factor in determining whether a school or district is making adequate yearly progress unless states voluntarily decide to impose that step.

While many have credited the new law with the improvement in student achievement on national and international assessments, others have complained that the reliance on testing has resulted in "teaching to the test" and "dumbing down the curriculum." In addition, while the science requirements under *No Child Left Behind* have placed a renewed emphasis on the subject, including the design of new tests and the reform of science courses to align them to state standards, many believe that the more immediate pressures in reading and mathematics will keep science at the margins of education.

National Science Foundation (NSF) K–12 Education Programs

Math and Science Partnership Program

No Child Left Behind also called for the creation of a new Math and Science Partnership Program at NSF to bring together higher education, school systems and businesses. Ultimately, Congress created two complementary programs: one at NSF and one at ED. 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 ED program allocates funding on the basis of population and poverty to all 50 states, which then compete the funding to math and science partnerships at the local level.

The Administration's fiscal year 2005 (FY05) budget attempted to zero out the NSF program and transfer the remaining $120 million to ED. The Science Committee opposed the move in its FY05 Views and Estimates. In relevant 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.

This transfer was ultimately rejected by the Congress. While the President's FY06 budget request did not renew the call for the transfer, it requested only $80 million to meet existing obligations under the NSF program. Further, the request increased funding for the ED program and made clear that no new NSF grants would be awarded in FY06.

Elementary, Secondary, and Informal Education

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. Fund-

ing for Elementary, Secondary and Informal Education at NSF—a division of the Education and Human Resources Directorate—totaled approximately $181 million in FY05. The President's FY06 budget request provides only $141 million. The committee expressed its concern in its FY06 Views and Estimates. In part:

> The Committee is especially disturbed by the proposed cuts in NSF's Education and Human Resources (EHR) Directorate. Since 1950, NSF has been tasked with strengthening math and science education programs at all levels. Yet under the budget proposal, the overall investment in education at NSF would drop from $841.4 million in FY05 to $737 million in FY06 (down 12 percent). Much of the decrease would occur in the Elementary, Secondary, and Informal Education (ESIE) account, which would drop from $182 million to $141 million....
>
> NSF's education programs are unique in their capacity to develop new and improved materials and assessments, create better teacher training techniques and move promising ideas from research to practice. The Committee fears that disinvestments in this area will deprive states, school districts and schools of the tools and ideas they need to achieve the goals of the *No Child Left Behind Act.* NSF's EHR programs should receive at least level funding in FY06.

Presidential Award for Excellence in Mathematics and Science Teaching

In 1983, President Reagan signed into a law a program establishing the Presidential Award for Excellence in Mathematics and Science Teaching to identify outstanding science and mathematics teachers in kindergarten through 12th grade. The program, which is administered by NSF, 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. In fact, 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: (l) elementary mathematics, (2) elementary science, (3) secondary mathematics, and (4) secondary science, with the secondary groups including middle, junior, and senior high school teachers. The award now alternates yearly by grade level. This year, the award will recognize teachers of grades K–6, with one elementary math and one elementary science awardee from each state.

Teachers applying for the award must be nominated. Anyone may nominate a teacher (self-nominations, however, are not accepted), and then 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 have had the privilege of having breakfast this morning with our presidential awardees, and what a pleasure it was to start off the day with them.

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 here today would say the same thing.

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 in a scientifically literate society that will support 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 the most critical component in the whole system are our nation's teachers. 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 to make this an annual event.

Let me say how refreshing it was for the first time—we talk a lot about education, we talk a lot about teaching. We ought to do more listening, and I can't think of a better group to listen to than the people before me, not just those of you who are on the panel, but all of those educators that you represent who are so dedicated and so devoted.

You would think that this kind of hearing would be happening all of the time, but unfortunately, that 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 education system. And let me tell you something. We talk about education. Everybody in this town likes to talk about the importance of national security. This is a national security issue of the highest order, educating our young people, particularly in the math and science disciplines. And if you want to be encouraged about the opportunities for careers, because everybody expects the same thing, you work hard, you do what mom and dad or your preacher or your priest or your rabbi tells you to do, you get good grades, and you come out and say, "Here I am world." If there are no job opportunities, all of that seems to be for naught. I will tell you, in my area alone, in central New York, they are trying to hire 1,200, not 12, not 112, but 1,200 engineers. I had meetings yesterday to talk to these people about them. Workforce development, there isn't a Member of Congress who doesn't face that. Every time I go back home to talk to the business leaders, they say, "We have got to develop a better-educated workforce." And I say, "You are right." And I wish I could bring all of those captains of industry down here to listen to this panel.

I am excited about your presentation, as I am every year. And you will see Members of Congress coming and going, because quite

frankly, while a lot of people are under the misunderstanding that Members of Congress don't work very hard, I can tell you they work very hard. And Members of Congress are not just on a Committee, like this Science Committee, as important as it is, they are on defense committees and committees dealing with foreign policy and agriculture and education, a whole wide range of subjects. So people come and go because they are jockeying their schedule, and you will see Members come in and go out. It is not because of any lack of interest. It is because they are all someplace doing something. Woody Allen says, "Everybody has to be someplace." Well, here we are. And boy, I am happy to be here. And I am happy to be here to introduce you to my associate in this venture, my partner, the Ranking Minority Member, Mr. Gordon of Tennessee.

[The prepared statement of Chairman Boehlert follows:]

PREPARED STATEMENT OF CHAIRMAN SHERWOOD L. 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.

And who will do the educating? Parents, surely, and, for better or worse, the popular culture. But most critical are our nation's teachers. That's 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 then to make the hearing an annual event.

You'd think that this sort of hearing would be happening all the time, but, unfortunately, that's 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, but those who have been recognized as the best. So we're 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 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 want to join you in welcoming all of these outstanding teachers to our meeting today.

In Washington, we are often not very brief, and we don't worry about duplication, but when we occasionally do, we say we want to associate ourselves with the remarks of the, whomever it might be, and I certainly want to associate myself with the remarks of our Chairman, who really summed up my feelings and most folks' feelings here about the importance of the job that you do, because you really are the men and women that serve on the front lines with

K–12 in math and science. And as a son of two teachers, I admire the skill and the dedication of all of you outstanding teachers. And I want to extend my very sincere congratulations to all of you.

And I would particularly like to acknowledge and congratulate one of our witnesses, my constituent, Ms. Cynthia Cliche from Homer Pittard Campus School in my hometown of Murfreesboro, Tennessee. In addition to teaching the first grade, Cynthia is a Math Methods instructor at Middle Tennessee State University, also my alma mater, so as you can see, there is some overlap here.

There is no more important job—and also I had nothing to do with this election. There is no more important job than the one these teachers perform every day. Their efforts inspire the next generation of scientists, mathematicians, and engineers who will make the discoveries and create the technological marvels of the future.

And today, the Science Committee has the privilege of hearing from some of the best math and science teachers in the Nation, and 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. And I would also appreciate hearing about your experiences with federally-sponsored teacher professional development programs and the activities that resulted in new, and hopefully improved, teaching materials. This is particularly important to us right now, because many of us are concerned that the current science—or not only on the Science Committee, but throughout Congress, we are very concerned that the fiscal year 2006 budget contemplates a significant reduction in the programs that support K–12 science and math education. So I hope that you are going to give us some ammunition to combat the folks that want to do that.

And I would also be interested in hearing about the experiences that the expert teachers here this morning have had with the National Science Foundation-supported education programs and what value they would place on these programs.

Again, I want to congratulate not only our witnesses but all of you here today, you outstanding teachers, for contributions that you are making yourself to our country, but more importantly, really, for the inspiration in all of those apostles that you are sending out to help others.

Thank you very much.

[The prepared statement of Mr. Gordon follows:]

PREPARED STATEMENT OF REPRESENTATIVE BART GORDON

Mr. Chairman, I am pleased to join you in welcoming the many outstanding teachers present in our hearing room this morning.

Our witnesses, and 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.

As the son of two teachers, I admire the skill and dedication of these outstanding teachers and extend my warmest congratulations to each of them.

I would particularly like to acknowledge and congratulate one of our witnesses, and my constituent, Ms. Cynthia Lynn Cliche from Homer Pittard Campus School in Murfreesboro, TN.

She is a graduate of Ball State University and received a Master's degree from Berry College.

In addition to teaching first grade math, she is a Math Methods Instructor at Middle Tennessee State University.

There is no more important job than the one these teachers perform every day. Their efforts inspire the next generation of scientists, mathematicians, and engineers, who will make the discoveries and create the technological marvels of the future.

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 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 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.

This is a matter of particular interest to the Science Committee as we contemplate the FY 2006 budget request for the National Science Foundation, which recommends substantial reductions in the programs that support K–12 science and math education activities.

I would be interested in hearing about the experiences the expert teachers here this morning have had with NSF-supported education programs, and what value they would place on these programs.

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.

Chairman BOEHLERT. Thank you very much, Mr. Gordon.

[The prepared statement of Mr. Inglis follows:]

PREPARED STATEMENT OF REPRESENTATIVE BOB INGLIS

Thank you, Mr. Chairman, for the opportunity to congratulate these teachers who have demonstrated such excellence in their fields. You all represent the future of our nation. By teaching our children in the basic skills of math and science, you are sowing the seeds of a competitive workforce.

I'm sure that there are Members of this committee who can speak more intelligently about the work you do, including Ms. Hooley, the Ranking Member of the Research Subcommittee, who is a former teacher. I am looking forward to hearing more from you about the magic you work in the classroom, stirring interest in science and mathematics. I'd like to take this time to talk a little about the future.

A few months ago, I spoke to an executive for General Electric. When I asked him if he had enough qualified engineers to fill his research jobs, he said "No." He could hire 300 tomorrow if they were available. He said we need more qualified and inspiring teachers. There just aren't enough teachers to train the future scientists and engineers his company needs.

GE is not alone. The Department of Labor estimates that there will be six million job openings for scientists, engineers, and mathematicians by 2008. Sixty percent of new jobs will require a solid mathematical background. Think about auto mechanics: they need to be able to read graphs, understand timing diagrams, and reset microprocessors.

But we're not on a path to fill those six million job openings. We're only producing 60,000 engineers per year, compared to over half-million per year in China and India. I fear that our lack of investment in science and math education is creating an innovation gap between our country and emerging economies. We must not sit idly by and slip into obscurity.

That's why I'm pleased that we're highlighting your work today. Your ability to impart passion is a gift. We all have a story of how a great teacher changed the way we thought, not just about the subject matter, but about the world. Those present are acknowledged as our nation's greatest teachers, and our greatest resource for reaching our children with the message: math and science are essential to your future success.

I'm eager to hear your suggestions of how we can help you do your job better, and how we can help other teachers become inspirers.

[The prepared statement of Mr. Costello follows:]

PREPARED STATEMENT OF REPRESENTATIVE JERRY F. COSTELLO

Good morning. I want to thank the witnesses for appearing before our committee to discuss elementary and secondary math and science education. For years, the Science Committee has been actively conducting hearings on reform of elementary and secondary education to better student performance and has produced quality legislation to reverse a trend of inadequate interest and training in the science, math, engineering, and technology fields. Today's hearing continues this effort and gives us the opportunity to honor a group of teachers that have been recognized for their excellence as math and science teachers, and to discuss factors influencing recruitment and retention of math and science teachers.

I continue to be concerned that our students are far behind in math and science issues. Failure to engage more elementary and secondary students in these subjects has the direct effect of decreasing the number of math and science undergraduates and, consequently, graduate students. It is important to provide stimulating and challenging math and science education programs for all students in order to foster a leads to the development of a less-informed, less-discriminating citizenry. My wife, who is the Assistant Superintendent of the Regional Office of Education in St. Clair, County Illinois, often reminds me that at the front lines of any reform efforts are teachers. High teacher turnover creates a continual demand for new teachers, and those teachers require teacher professional education and development. Having a qualified teacher in every classroom is a significant contributor to student success and ensuring a superior education.

As Congress debates the Budget Resolution for Fiscal Year 2006, we must remember how important and critical these initiatives are for students to be competitive in math and science nationally and internationally. Each year, we have this hearing to bring us closer to resolving a fundamental problem that continues to plague our education system. I commend the Science Committee's commitment to improving teacher recruitment and retention so we can increase student interest levels and their knowledge and understanding of these valuable subjects, and I welcome our panel of witnesses and look forward to their testimony.

[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. I also want to congratulate the teachers who are here before us as witnesses today on their outstanding accomplishments.

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. Teachers also strive to give voice to their legitimate professional, economic and social aspirations. They strengthen the institutions in which we work, improve the quality of the services we provide, bring together all members to assist and support one another and promote democracy, human rights and freedom, 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 for teachers, like the ones who are here today, that 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.

[The prepared statement of Mr. Davis follows:]

PREPARED STATEMENT OF REPRESENTATIVE LINCOLN DAVIS

Congratulations to all of the recipients of the 2004 Presidential Award for Excellence in Mathematics and Science Teaching. This award is the Nation's highest prize for K–12 math and science educators.

Math and science education is important for the prosperity and international competitiveness of our nation. Our ability to develop faster computers, better research tools, more sensitive medical diagnostic equipment, and more fuel-efficient engines depend on what we do now to produce future scientists and engineers. We must foster a creative spirit and love of math and science in kids today.

The work of teachers everywhere inspires these future generations. Great educators, such as those being honored here today, are planting seeds in the minds of bright, curious, young students. These teachers' days are long, their charge is great, but their influence is powerful.

In Tennessee, two teachers were selected for this highest honor in K–12 math and science education. One of them, Ms. Beverly Ramsey, is from Viola, Tennessee, and teaches at West Elementary School in McMinnville. I would like to extend special congratulations to her. I am certain that Ms. Ramsey's energy and love of science are infectious in her classroom and have inspired many young scientists.

I commend the important work that all of you are doing and am grateful for this forum to recognize you today.

[The prepared statement of Mr. Carnahan follows:]

PREPARED STATEMENT OF REPRESENTATIVE RUSS CARNAHAN

Mr. Chairman and Mr. Ranking Member, thank you for holding this positive hearing today.

I am pleased to welcome our exemplary panelists and awardees, Joyce Dodd, Cynthia Cliche, Lonna Sanderson, Cassandra Barnes, and Pita Martinez-McDonald. Also, I want to give special recognition to the two awardees from my home State of Missouri, Russell Gramer and Gail Underwood.

Thank you for agreeing to speak to the Science Committee today, and more importantly, thank you for your hard work and outstanding commitment to serving our nation's children.

Clearly, our nation experiences setbacks in recruitment of teachers in mathematics and science as well as declining student performance in the same subject areas. Today's testimony is a breath of fresh air at a time when we find no simple solutions to either of these problems.

Please know that this body is committed to finding the policy solutions best suited to improve student performance in math and science. We have much to learn from all of you and I look forward to your testimony.

[The prepared statement of Ms. Jackson Lee follows:]

PREPARED STATEMENT OF REPRESENTATIVE SHEILA JACKSON LEE

Chairman Boehlert, Ranking Member Gordon,

I want to thank you for organizing this important hearing with these teachers who exemplify all that is right with our nation. Truly, teachers are among the Americans who give the most and ask for the least in return. They are true public servants and it is on their shoulders that our hopes as a nation really rest. It was the great educator and civil rights leader Mary McLeod Bethune who said: "We have a powerful potential in our youth, and we must have the courage to change old ideas and practices so that we may direct their power toward good ends." Clearly, the young students we teach today will be the leaders of industry that our nation will depend on in the not too distant future.

Let me congratulate all the 2004 Presidential Awardees for Excellence in Mathematics and Science Teaching. Let me especially congratulate my fellow Texans in the room: Ms. Lonna Sanderson from Austin, TX and Ms. Kathy Skinner from Grapevine, TX, both of you have made the great State of Texas proud with your achievement. All the Members of this committee will agree that Math and Science are two subjects we simply can not ignore in our youth. Our nation has declined over the years in these vital subject areas and it is to our long-term detriment. Our nation has been known throughout the world as one of innovation and discovery, however we may not be able to hold this distinction unless we can continue to inspire our youth to push the boundaries of what is possible.

I am especially concerned about the issue of minorities in math and science. Minorities are under-represented at every level from elementary to graduate school. Lack of preparation in science among under-represented minority groups in the early elementary grades undermines enrollment and success in secondary-level school programs and, ultimately, in college and career choices later in life. In fact, To achieve "parity"—minorities in engineering comparable to their representation in the general population—we would have to produce by 2010 an average of 25,000 per year. Today, universities graduate just over one-third that number.

As the Nation's economic base shifts increasingly toward technology, participation and achievement in science and mathematics among minority students become increasingly important. Unfortunately, minority students, those who form the most rapidly growing portion of our school-age population, are the ones that are most left out of science and mathematics. By not studying these subjects, both the minority students and the United States as a whole stand to lose. The minority students are depriving themselves of many career choices, including the skilled technical and computer-oriented occupations as well as access to high salaried occupations. Further, a basic understanding of science and mathematics is essential for all students, not only those pursuing careers in scientific and technical fields. Adequate preparation in science and mathematics enables students to develop intellectually and socially, and participate fully in a technological society as informed citizens. The United States can meet future potential shortfalls of scientists and engineers only by reaching out and bringing members of under-represented minorities into science and engineering. America's standing and competitiveness depend on it.

Truly, the areas of math and science are essential to our youth as well as to the health of our nation. Young Americans will be the future leaders and innovators not only for our nation, but for the world. It was author Luella F. Phean who stated: "Youth is not a time of life, it is a state of mind. You are as old as your doubt, your fear, your despair. The way to keep young is to keep your faith young. Keep your self-confidence young. Keep your hope young." I am confident that all the teachers we have here today give that spirit of encouragement to all their students and our nation will only be richer for it.

[The prepared statement of Mr. Matheson follows:]

PREPARED STATEMENT OF REPRESENTATIVE JIM MATHESON

Mr. Chairman, Ranking Member Gordon, I appreciate the opportunity to participate in today's hearing. The quality of math and science education in our country is an important consideration, and one of the best tools that we have in making improvements is the examination of current, successful classroom teachers.

In that vein, I wanted to briefly recognize two of my constituents, both of whom are 2004 Presidential Awardees for Excellence in Mathematics and Science Teaching.

Ms. Carol Skousen is a teacher at Twin Peaks Elementary School in Holladay, Utah. She is noted for being an excellent classroom teacher. The principal of her school notes that she demonstrates concern for each individual child, "sensitivity with which she listens and (concern) in responding to inquiring minds."

The second individual is Ms. Jennifer Buttars. She teaches in the Jordan School District in Utah and she was awarded the mathematics prize for our state.

Both of these teachers exemplify the excellence in education that should serve as a model for our school system. They have devoted considerable time to improving their classrooms and ensuring that their students truly benefit from their energy and devotion to this profession.

I am very pleased that both Ms. Skousen and Ms. Buttars are here today for this important hearing. Thank you, Mr. Chairman.

Chairman BOEHLERT. Our witness list is very distinguished.

Joyce Dodd teaches sixth grade mathematics at Bryson Middle School in Simpsonville, South Carolina. Ms. Dodd has more than 30 years of teaching experience. You have already been introduced to Cynthia Cliche who teaches first grade mathematics, and had the good judgment to go to Mr. Gordon's alma mater, at Homer Pittard Campus School in Murfreesboro, Tennessee. Ms. Cliche is also a college-level Math Methods instructor for Middle Tennessee State University. She has more than 20 years of teaching experience. Cassandra Barnes teaches—oh, now wait. I am not going to

introduce you, Ms. Barnes. I am going to yield to Congresswoman Hooley for an introduction.

Ms. HOOLEY. Thank you, Mr. Chairman.

And again, congratulations to all of you and for what you do every day.

Ms. Barnes teaches grade school in Clackamas County, my home county, and it is wonderful what she does and that you are with us today. Thank you for being here. As technology continues to advance and improve at our workplace, it places more stress on math and science. Ms. Barnes inspires her students every single day in math and science. And it is really important because so much of that is the future of our country. It is the foundation of our new jobs, and so we are delighted that you are with us today.

And again, congratulations to all of you.

Thank you, Mr. Chair.

Chairman BOEHLERT. Thank you very much.

And for the purpose of an introduction, the Chair recognizes Mr. McCaul of Texas.

Mr. MCCAUL. Thank you, Mr. Chairman.

First, I want to congratulate all five of you. In my view, you have the most important job in the world. You are the educators that shape the future of America, and I want to thank all five of you for that.

It is my honor to introduce to you Lonna Sanderson. She is from Texas, my home state, and she is from my hometown of Austin. She is also, more importantly, a constituent of mine, and I probably shouldn't say this, but she did vote for me, which I was glad to hear backstage. And I had—unlike the Ranking Member, I had everything to do with her nomination.

Just kidding.

She is a third grade teacher at Will Davis Elementary School in Austin independent school district. She is in her fifth year at Will Davis, but she has been an elementary school teacher in Austin independent school district for 25 years. In 2000, Ms. Sanderson was recognized as a national board-certified teacher, an achievement she considered the high point of her career until now, when now she is receiving the Presidential Award for Excellence in Science and Mathematics Teaching. Ms. Sanderson is a person who is capable of great accomplishments. And this is just what she is achieving by giving Texas' young students a world-class education in math and science, an achievement we need more of in this Nation to cultivate and raise more scientists and engineers in this country, more home grown. I wish that every math and science teacher could be as gifted as Ms. Sanderson and the rest of the recipients of this great honor from President Bush. For innovative use of technology in the classroom is truly a model for the Nation.

Mr. Chairman, I look forward to working with you and the Science Committee to find ways to address America's teacher shortage and to keep kids excited about the great possibilities of math and science academics.

And I would like to end with a quote that appears behind me, because I think it says everything about your profession: "For I dipped into the future as far as human eyes could see and the vision of the world and all of the wonder that would be." That is

what you provide for the youth in the United States and in America, and I thank you for it.

Thank you, Mr. Chairman.

Chairman BOEHLERT. Thank you. And eloquently said.

And our final witness is Pita Martinez-McDonald. She teaches fourth grade science at Cuba Elementary School in Cuba, New Mexico. She has been a teacher for 30 years.

Just let me tell you one of the great challenges that we face in our jobs here, challenge us every single day, you know them all, but one of the greatest challenges I faced was three weeks ago when I was going to go out and have dinner with my eldest daughter who lives in suburban Virginia. And she said, "Dad, do you mind spending a little extra time, because I want you to help Palmer," that is my 13-year-old grandson, "with his homework?" And boy, I started to sweat immediately. I was afraid it was going to be math or something where I am—as it turned out, we had a very pleasant evening, because his assignment was to develop a bill to introduce before Congress and convince his classmates that it should pass. And so that made the challenge a little easier. But boy, I was almost ready to get my Rolodex out and start calling you, Ms. Martinez-McDonald. But thank you very much for being here and for being facilitators for this committee.

What we will do is include your entire statement in the record at this juncture, or as you complete your summary of the statement. We would ask that you summarize your statement. The Chair is not going to be arbitrary, but we shoot for, whether it is outstanding teachers or Cabinet officers, we ask for a summary of five to six minutes or so, and that allows more time for us to give questions.

But before we do anything, just let me say on behalf of the whole Committee, and I would ask that you join me in a standing ovation for you, our nation's best.

Just let me tell you something. We don't start all of our hearings with standing ovations for the witness panel.

Ms. Dodd, you are up first.

STATEMENT OF MS. JOYCE W. DODD, BRYSON MIDDLE SCHOOL, SIMPSONVILLE, SOUTH CAROLINA

Ms. DODD. Thank you.

It is indeed my honor to address this committee today and a very humbling experience to speak on behalf of my colleagues. The single most important step that I think the Federal Government should take to improve math and science education in this country involves steps taken to improve pre-service and in-service training for the teachers of mathematics in elementary and middle schools. When math teachers in these classrooms do not have a strong background in mathematics, that deficit will definitely impact both the content and the process of what they are teaching, the how and the what.

I am one of these teachers who found herself teaching mathematics in a middle school by walking in the door with an elementary education certificate. My job as a home economics teacher was phased out due to budget cuts. I was determined to become the best math teacher that I could be. I took stock of the situation, and

I knew that I was a good teacher. I called a friend of mine who happened to be the district math coordinator, and I asked her how could I fast track my knowledge in mathematics. She gave me two pieces of advice, which I followed.

The first piece of advice was to join the National Council of Teachers of Mathematics (NCTM). That organization produces high quality teaching materials. It publishes a magazine that connects math teachers with the best practices and the best math teachers in the country. It is the organization that changes the direction of the way math is taught in America. Mathematics is a science, and as such, it is a growing, evolving discipline.

The math content that I teach my sixth graders needs to prepare them for life in the future. This shift in math content is often misunderstood by many people, including math teachers. Math is so much more than adding two plus two and getting four or teaching a child to struggle through division of two digits into three-digit numbers. Those are operations, and they can easily be done on a calculator. You can get that at any Wal-Mart for less than $10. My job is to put the power behind the calculator and help that child reason, "Is the answer correct? Does it make sense?"

NCTM also sponsors top quality educational programs for teachers. I have benefited from these programs. I participated in a four-day seminar called "T3," teachers teaching teachers technology. This course enabled me to become proficient using a graphing calculator. I would suggest that this course is an excellent course as a model for NSF to fund programs such as this. The carrot for me was, of course, learning to be proficient with the graphing calculator, but even more importantly, I got a free graphing calculator. Teachers will work for free stuff. What an incentive.

The second piece of advice that my friend gave me was to take as many math content classes as I could. Now I was extremely fortunate. At the time, the place that I was working, which was Greenville, South Carolina, our district had the foresight and it took the funding to finance courses for middle school teachers who lacked secondary certification in mathematics to take higher level math classes. Not every teacher in the country can be that fortunate.

These were especially valuable courses, because they were taught using best practices. That meant that my college professor, Dr. Celia Adair, was teaching me as an active learner. That meant that I had an opportunity to use technology to discover answers. I was making sense of mathematics myself. I could think back to the way Celia taught our class to make model lessons for my own students, because we all tend to teach the way we were taught. So if we want teachers to be able to teach children actively, we need to let those teachers experience learning from that standpoint.

In closing, I would again reiterate that probably the best use of federal funds is to sponsor in-service training for the teachers we already have in the classroom and, just as importantly, pre-service teachers. We know what makes good learners. We know they need to be active. We need to expect our higher education institutions to be turning out teachers that can teach children using active learning strategies.

Thank you.

[The prepared statement of Ms. Dodd follows:]

PREPARED STATEMENT OF JOYCE W. DODD

It is indeed an honor to address this committee and a humbling experience to speak on behalf of my colleagues today. The single most important step that the Federal Government should take to improve math and science education in this country is to improve *pre-service* and *in-service* training for teachers of mathematics in elementary and middle schools. When math teachers in these classrooms do not have a strong background in mathematics, that deficit impacts both the content and the process (the "what" and the "how") of their teaching.

I am one of these teachers who found herself teaching mathematics in a middle school classroom using an elementary teaching certificate. My job in home economics was phased out due to budget cuts; I was determined to become the best math teacher that I could become. Taking stock of the situation, I knew that I was a good teacher. I called the district math consultant, who was a former colleague, to seek guidance as to how to "fast track" my own math education. She gave me two pieces of advice, which I followed.

The *first piece of advice* was to *join the National Council of Teachers of Mathematics.* This organization produces high quality teaching materials and publishes a magazine that connects math teachers with other math teachers. It is *the* organization that helped change the direction of the teaching of mathematics in this country. Mathematics is a science, and like any other science, it is growing and evolving.

The math content that I teach needs to prepare my students for life in the future. The shift in math content is misunderstood by many people, including math educators. Math is so much more than adding 2 + 2 or dividing a three digit number by a two digit number. These operations can be easily done with a calculator. The key to using this technology, which came be purchased at Wal-Mart for under $10, is to know if the resulting answer is reasonable, i.e., "Does it make sense?"

At this point, I would like to briefly explain the *mathematics standards* that, I believe, should be pervasive in elementary, middle and high schools throughout this country. Five categories form the *content area* of mathematics: numbers and operations, algebra, geometry, measurement and data analysis, and statistics. What makes these standards "come alive" and give meaning to students is the incorporation of the *process standards.* These standards include problem solving, representation, communication, connections, and reasoning and proofs.

In order to incorporate the process standards students need to be "actively engaged" in math. *Active learning* has students solving problems and discussing solutions. Students are able to justify their work to one another and to the teacher.

I challenge my students who want to become better at math to do what the NCTM logo suggests, "Do Math." It is my job as their teacher to create situations where this happens.

NCTM also sponsors courses for teachers through various grants. I attended one such course taught in our district, T^3. This acronym stands for teachers teaching technology. This course enabled me to become proficient with a graphing calculator. I would suggest that NSF could use this as a model for funding courses for teachers. The teacher that attends these courses receives free technology—in my case a free graphing calculator—that can be incorporated in her classroom. What an incentive!

The *second piece of advice* was to take as many courses in mathematics as I could. I was fortunate to be in a district that had an initiative to improve the content knowledge of mathematics teachers in the middle school who lacked a degree in secondary mathematics education. Not all teachers work in a district that gives this much foresight and financial support to mathematics education. This is where the Federal Government could sponsor teacher education courses.

These were especially valuable courses because the courses were taught with the use of "hands on" lessons that integrated technology in each lesson. The college professor in these classes was modeling the way that I should develop my own lessons. These courses also made connections within the field of mathematics. I could "see" the way math should be taught. My college professor was the model that I could duplicate in my classes. I think it is extremely important to have teachers view other teachers that are actively engaging students in learning. We all tend to teach the way we were taught. The implication here is that teacher preparation classes as well as teacher in-services should employ the teaching practices we desire teachers to use in their classrooms.

In closing, I would like to say that the knowledge for improving math education in this country already exists. However, there is a gap in the *dispersal of this information.* Programs that foster "best teaching" practices will have children actively engaged in mathematics. The Federal Government could be on the forefront of this

dispersal of information by sponsoring courses for the teachers of mathematics. The rewards for participation in these courses could take the form of stipends, graduate credit or free equipment for the classroom. A single teacher of mathematics will influence an astonishing number of students. The profit from this investment would be astronomical!

BIOGRAPHY FOR JOYCE W. DODD

- Graduated in 1972 from Indian University of Pennsylvania with a degree in Home Economics Education.
- Began teaching career in Greenville, South Carolina—teaching home ec. at an inner city public school, Beck Middle School.
- Beck Middle School provided the opportunity to work with regular students as well as a diverse group of children with disabilities—both mental and physical.
- Internalized the philosophy that children learned best when actively engaged with the content.
- Began teaching 6th grade math in 1994.
- Joined NCTM (National Council of Teachers of Mathematics) allowing for growth in the mathematics education profession.
- Updated math education by taking numerous courses in the field of mathematics education—courses that supported the NCTM standards for teaching mathematics, courses that updated technological knowledge and courses that strengthen pedagogical skills.
- Obtained National Board Certification in the Area of Adolescence Mathematics.
- Became math chairman at current location, Bryson Middle School—promoted vertical teaming, horizontal grade level math teaming which lead to a unified math program at Bryson Middle School.
- Worked with other teachers in my district in to create two middle school math curriculum guides each reflecting the NCTM standards.
- Married to a high school science teacher.
- Mother of twins graduating college this year—one like her parents will begin teaching, her brother will pursue a graduate degree in a science related field.

April 12, 2004

The Honourable Sherwood Boehlert
Chairman, Science Committee
Suite 2320 Rayburn House Office Building
Washington, DC 20515-6301

Dear Congressman Boehlert:

Thank you for the invitation to testify before the U.S. House of Representatives Committee on Science on April 14 for the hearing entitled, *The 2004 Presidential Awardees for Excellence in Mathematics and Science Teaching*. 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,
Joyce Wolfe Dodd
Presidential Award in Mathematics (2004)

Chairman BOEHLERT. Thank you very much.
Ms. Cliche.

STATEMENT OF MS. CYNTHIA L. CLICHE, HOMER PITTARD CAMPUS SCHOOL, MURFREESBORO, TENNESSEE

Ms. CLICHE. Thank you for allowing me this opportunity to speak before the U.S. House of Representatives Committee of Science. Special thanks goes to Chairman Sherwood Boehlert for his support and Ranking Member Bart Gordon, my Representative from Tennessee. This is such an honor, and I appreciate this committee's efforts in giving teachers time to discuss topics which are so important to our children's future.

As you have heard, Campus School is a unique school in Murfreesboro, because we are the lab school with Middle Tennessee State University, so it allows me the opportunity to teach the Math Methods course and work with pre-service teachers.

Our students benefit from the involvement of the pre-service teachers, but also in turn, the pre-service teachers benefit from working with our students. For instance, several years ago, my class, working with the biology department, five pre-service teachers, and parents built an outdoor pond and butterfly garden to enrich our first grade curriculum. The next year, several EFG, Educating Future Generation, teachers, including myself, built an extensive nature trail with many more gardens and features around the school. This trail provides many opportunities to develop hands-on math and science lessons outside the classroom. It is this

type of activity that can incorporate the National Council of Teachers of Mathematics, NCTM, principles for education and learning.

I believe the six NCTM principles: equity, curriculum, teaching, learning, assessment, and technology provide a solid mathematical foundation for all students, and they should be emphasized, funded, and applied in every classroom in the United States.

Equity sets high expectations for all students, regardless of gender, race, and ability. Every child needs to be given the opportunity to learn. Sometimes so much emphasis is given to the lowest achievers that other children are allowed to plateau in their learning. Teachers need to provide enrichment opportunities for our higher ability students while implementing the remedial strategies for our struggling students. We should never give up on any student.

The mathematics curriculum needs to focus on the five content standards: numbers and operations, geometry, data analysis and probability, measurements, and algebra. These standards provide the content for mathematical teaching. In addition, lessons need to be hands-on and provide the opportunity for meaningful learning. Too many teachers use only a textbook in their elementary classrooms because the administration feels it is the easiest and most effective way to teach children. Years of research and experience, however, show that this is simply not true. Students need to use manipulatives and problem-solving techniques to encourage active learning. Look into an effective teacher's classroom and the children are engaged, talking, and learning. Long gone are the days of ditto papers and everyone sitting quietly at their desk.

Teaching requires educators to understand what students know and how to challenge them to learn it well. Every child deserves a great teacher, and a great teacher teaches the whole child. In addition, great teachers increase their learning of mathematics and improve their ability to implement an effective curriculum in their classroom. They can do this by learning from students and colleagues and engaging in professional development and self-reflection. NCTM, as well as other national organizations, provide regional and national conferences to help achieve that goal. Often, it is extremely difficult for teachers to obtain funding to attend the professional conferences that keep them up-to-date with current teaching practices. Professional development needs to be encouraged and funded for all teachers. After 25 years of teaching, it is apparent to me that there is still so much more to learn. Our teachers, like our children, should be lifelong learners.

Emphasis also needs to be placed on creating a positive work environment for teachers. If a teacher feels appreciated and empowered to make decisions in his or her classroom, it will positively affect student achievement.

At the same time, we need to make the teaching profession more attractive to our top students. As a university math methods instructor for the past 15 years, I have seen the quality of teacher candidates decline. Teachers are being hired that would not have been given an interview 10 years ago, and our brightest young adults are choosing careers with higher salaries and more benefits. My own niece wanted to be a teacher and this year, upon entering

high school, decided to go into the business field simply because of the salary and the time commitment.

Learning requires students to truly understand mathematics and to actively build knowledge from new and prior experiences. Materials and supports are key to active learning, and our focus should be on understanding as well as procedural skills. Some of my proudest moments are when my students return to visit the classroom. They always remark about the physical features such as it looks smaller or have you moved your desk. But then they always talk about a special activity that took place. It might be the "Measure Me" doll that they have made that was the same birth weight as they were or the tree that they planted along the trail. Active learning enables a child to develop a concept in a meaningful way.

Assessments should support the learning of important mathematics and furnish useful information to both teachers and students. Assessment should be ongoing throughout the school year and teachers should be using various forms of evaluation. A lot of attention and funding is focused on standardized pencil and paper tests given once a year, but teachers need to use a variety of tools such as journals, portfolios, and interview to learn about their students.

Finally, technology is an essential tool in teaching and learning mathematics. Our children need to leave our classroom technology literate. In fact, even my first graders have their calculators in their desks ready to tackle the "big numbers" that occur when they are solving some higher level thinking problems. They also have several opportunities during the day to go online and work on websites bookmarked to enhance their learning of mathematics. So many schools lack the funds to give their students this opportunity.

As lawmakers, the decisions you make will impact the future of our children. Thanks so much for your continued dedication in this area. With the challenges our nation faces today, we need talented, well-educated children with the ability to solve the problems of tomorrow.

[The prepared statement of Ms. Cliche follows:]

PREPARED STATEMENT OF CYNTHIA L. CLICHE

Thank you for allowing me this opportunity to speak before the U.S. House of Representatives Committee of Science. Special thanks go to Chairman Sherwood Boehlert for his support and Ranking Member Bart Gordon, my Representative from Tennessee. This is such an honor and I appreciate this committee's efforts in giving teachers time to discuss topics which are so important to our children's future.

My name is Cindy Cliche, and I teach first grade at Homer Pittard Campus School in Murfreesboro, TN. Campus School is the laboratory school for Middle Tennessee State University, and it allows me the unique opportunity to teach a math methods course and to work with pre-service teachers.

Our students benefit from the involvement of the pre-service teachers, and they, in turn, benefit by working with our children. For instance, several years ago my class, working with the Biology Department, five pre-service teachers, and parents, built an outdoor pond and butterfly garden to enhance our curriculum. The next year several EFG (Educating Future Generation) teachers including myself built an extensive nature trail with many more gardens and features around the school. This trail provides many opportunities to develop hands-on math and science lessons outside the classroom. It is this type of activity that can incorporate the National Council of Teachers of Mathematics (NCTM) principles for education and learning.

I believe the six NCTM principles—equity, curriculum, teaching, learning, assessment and technology—provide a solid mathematical foundation for all students, and

they should be emphasized, funded and applied in every classroom in the United States.

Equity sets high expectations for all students, regardless of gender, race, and ability. Every child needs to be given the opportunity to learn. Sometimes, so much emphasis is given to the lowest achievers that other children are allowed to plateau in their learning. Teachers need to provide enrichment opportunities for our higher ability students and implementing remedial strategies for our struggling students. We should never give up on any student!

The *mathematics curriculum* needs to focus on the five content standards: numbers and operations, geometry, data analysis and probability, measurement, and algebra. These standards provide the content for mathematical teaching. In addition, lessons need to be "hands on" and provide the opportunity for meaningful learning. Too many teachers use only a textbook in their elementary classrooms because the administration feels it is the easiest and most effective way to teach children. Years of research and experience, however, show that this is simply not true. Students need to use manipulatives and problem solving techniques to encourage active learning. Look into an effective teacher's classroom and the children are engaged, talking and learning. Long gone are the days of ditto papers and every child sitting quietly at a desk.

Teaching requires educators to understand what students know and how to challenge them to learn it well. Every child deserves a great teacher and a great teacher teaches the whole child. In addition, great teachers increase their learning of mathematics and improve their ability to implement an effective curriculum in their classroom. They can do this by learning from students and colleagues and engaging in professional development and self-reflection. NCTM, as well as other national organizations, provides regional and national conferences to help achieve that goal. Often, it is extremely difficult for teachers to obtain funding to attend the professional conferences that keep them up-to-date with current teaching practices. Professional development needs to be encouraged and funded for all teachers. After twenty five years of teaching, it is apparent to me that there is still so much to learn. Our teachers, like our children, should be life long learners.

Emphasis also needs to be placed on creating a positive work environment for teachers. If a teacher feels appreciated and empowered to make decisions in his/her classroom, it will positively affect student achievement.

At the same time we need to make the teaching profession more attractive to our top students. As a university math methods instructor for the past fifteen years, I have seen the quality of teacher candidates decline. Teachers are being hired that would not have been given an interview ten years ago, and our brightest young adults are choosing careers with higher salaries and more benefits. My own niece wanted to be a teacher until she became a senior in high school. Now she intends to go into business so she can make a bigger salary. Young people want to be able to justify the cost of an education with the potential salary. As more of my teaching colleagues begin to look at retirement, this concern over the lack of quality, committed teachers becomes alarming.

Learning requires students to truly understand mathematics and to actively build knowledge from new and prior experiences. Materials and support are key to active learning, and our focus should be on understanding as well as procedural skills. Some of my proudest moments are when my students return to visit the classroom. They will remark about the physical features, such as: *how the room looks smaller* or *have you moved your desk.* Then they always reminisce about a special activity. It might be the "Measure Me" doll that they made which was their exact birth weight or the tree they planted along the nature trail. Active learning enables a child to develop a concept in a meaningful way.

Assessments should support the learning of important mathematics and furnish useful information to both teachers and students. Assessment should be ongoing throughout the school year and teachers should be using various forms of evaluation. A lot of attention and funding is focused on a standardized pencil and paper test given once a year, but teachers need to use a variety of tools such as journals, portfolios, and interviews to learn about their students.

Finally, *technology* is an essential tool in teaching and learning mathematics. Our children need to leave our classrooms technology literate. In fact, even my first graders have their calculators in their desks ready to tackle the "big numbers" that might occur while we are solving some higher level problems. They also have several opportunities during the day to go online and work on websites bookmarked to enhance their learning of mathematics. So many schools lack the funds to give their students this opportunity.

As lawmakers, the decisions you make will impact the future of our children. Thanks so much for your continued dedication in this area. With the challenges our

nation faces today, we need talented, well-educated children with the ability to solve the problems of tomorrow.

BIOGRAPHY FOR CYNTHIA L. CLICHE

Education:

Berry College, Rome, Georgia—Master's, Graduated May 1985

Ball State University, Muncie, Indiana—BS, Graduated May 1980

Teaching Experience:

Homer Pittard Campus School (Murfreesboro, TN); First Grade, August 1990–Present

Homer Pittard Campus School (Murfreesboro, TN); Sixth Grade, March 1990–August 1990

Bellwood Elementary School, (Calhoun, GA); Kindergarten, October 1979–May 1989

Professional Service:

Math Methods Instructor, Middle Tennessee State University

Clinical Instructor for the Elementary and Special Education Department at Middle Tennessee State University

Professional Organization:

Member of National Council of Teachers of Mathematics (1993 to present)

Presenter at 2005 National Conference (Anaheim, Ca.)

School Committees:

Chairperson for the Healthy School Index, Campus School (Spring 2003)

Chairperson for the Technology Committee, Campus School

Member of the Curriculum Committee

April 14, 2005

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2320 Rayburn Office Building
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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,

Cynthia L Cliche

Cynthia Cliche

Chairman BOEHLERT. Thank you very much. Are you still teaching the times tables?

Ms. Barnes.

STATEMENT OF MS. CASSANDRA BARNES, OREGON TRAIL ELEMENTARY SCHOOL, CLACKAMAS, OREGON

Ms. BARNES. Good morning. I would like to take this opportunity to speak to you about what has made a difference in my continued professional development as a teacher, which, in turn, makes a difference for my students.

When I began teaching, an experienced colleague and I attended a typical one-day workshop designed to give teachers ideas to take back to their classrooms. At the end of the day, I was bored stiff, and I regretted the $200 I had spent to attend the conference. I complained to my colleague, who responded, "Well, I figure if I walk away with one good idea to take back to the classroom, it was worth it." And I thought about that, and honestly, at first, I thought, "Oh, well, okay. I didn't realize that was the way it worked. You are just supposed to take one little thing back." And the more I thought about it, the less sense it made, because I thought, "Would it be reasonable for me to teach an entire day with the goal of one tiny thing making sense to children?" No. And addi-

tionally, the format of the presentation, such as the one I had attended, didn't fit with what I believe about how we learn. Most of these one-day workshops consist of "expert" teachers telling us how they do what they do, and we are just supposed to go do it. And as attendees, we weren't required to think or discuss or apply any of the content. I was definitely not an engaged learner.

So 12 years, and numerous professional development opportunities later, I consider myself to be more of an informed consumer. I now have high expectations of my continuing education coursework. I expect professional development opportunities to challenge my thinking, to require me to reflect deeply on my practice, and above all, result in improved learning for my students. These things don't happen in a fun, easy, six-hour workshop.

Effective professional development for teachers, much like deep learning of content for school children, takes time. It must be long-term with opportunities to apply new learning in the classroom and then reflect on the impact with colleagues. It involves planning, implementing, and reflecting on student outcomes with our peers, asking ourselves and each other hard questions like, "Why didn't that work? What do I need to change? What student-based evidence can I use as data to support my conclusions?"

For elementary math teachers, professional development might be additional college-level course work in mathematics, taught by professors implementing teaching practices, such as those outlined by the National Council of Teachers of Mathematics. Many of us were taught mathematics in much the same way as the early workshops I attended were taught. An expert, the teacher, told us what and how to think, and we were supposed to do that and think that way. And many teachers are now aware that we need to relearn mathematics the way our students are learning mathematics, constructing models, testing conjectures, discussing our ideas. Deepening our own understanding of the mathematics we teach will allow us to better meet the needs of our students.

Supporting the professional development of pre-service and in-service teachers is crucial. I believe in high standards for all students. I believe all children can learn mathematics with understanding. I believe that the National Science Foundation funded, standards-based curricula are improving math education for students across the country. However, I know that the difference for kids lies in the hearts and minds of the teachers who implement the curricula and standards. If the Federal Government wants to take steps to improve math and science education for our children, they need to focus energy and resources on providing high quality professional development for our teachers.

In addition to participating in practice-based professional development opportunities, something that has made a difference for both me and my students is the modeling provided by mentor teachers.

When I began teacher preparation course work, I already had schema in place for what this job of teaching is all about. As a student, I had already spent years learning what teachers and students did. My early memories of mathematics in an elementary school classroom were doing multiplication problems on the chalkboard, and there was always a winner in this exercise. The winner

was the person who solved the problem exactly like the teacher told her to, who finished first, and who got the right answer. I also remember being told stories about borrowing eggs from the teacher next door, and apparently that had something to do with subtraction, but at the time, I was pretty confused. But I figured my college classes would clear all of that up for me.

What I did not know then was that much has changed since I was in elementary school. Research now tells us that students learn best when given time and opportunities to construct their own understanding of concepts with invented procedures leading to deeper understanding rather than imitating a procedure demonstrated by a teacher.

One might expect that my college course work provided opportunities for me to review and consider current research about teaching. Unfortunately, this was not the case. However, I was lucky enough to be influenced very early in my career by a truly masterful teacher.

As a pre-service teacher, I was assigned to spend two days per week in Mr. Wong's third grade classroom. I was told that this teacher was an excellent math teacher, and I thought, "Oh, good. This is where I will learn how to tell the egg story and how to explain multiplication clearly so kids don't forget which number to put on top," but I wasn't prepared for what I experienced in this classroom.

First of all, I never heard Mr. Wong telling anyone how to do anything. The students were doing all of the talking. They discussed and debated mathematical ideas. They used models and manipulatives to explain their thinking. They asked themselves and each other questions. Wrong answers were made public and used as sites for learning. I was amazed by the conversations kids were having. Well, I decided rather quickly that borrowing eggs did not matter. I wanted to know how to get my students to talk and think like Mr. Wong's students.

The time I spent in that classroom helped me to re-invent my idea of what learning looks like. I learned that kids can do amazing things as long as the teacher has some things in place. Teachers need to create a culture of collaborative inquiry, where students trust themselves and each other to make sense of important ideas. Teachers and students must learn to honor disequilibrium as an intricate part of learning. Teachers must present children with engaging, non-routine tasks, while asking questions that help misconceptions to surface, rather than "explaining away" any misunderstanding.

[The prepared statement of Ms. Barnes follows:]

PREPARED STATEMENT OF CASSANDRA BARNES

Good morning Committee Members and esteemed colleagues. My name is Cassandra Barnes and I teach second grade in Milwaukie, Oregon. I have been teaching for 12 years in North Clackamas School District, which serves suburban students just outside Portland. I would like to take this opportunity to speak to you about what has made a difference in my continued professional development as a teacher, which in turn makes a difference for my students.

When I began teaching, an experienced colleague and I attended a typical one-day workshop designed to give teachers ideas to take back to their classrooms. At the end of the day, I was bored stiff and regretting the $200 I had spent to attend the conference. I complained to my colleague, who responded, "Well, I figure if I

walk away with one good idea to take back to the classroom, it was worth it." I thought about that comment many times. Honestly, my first thought was, "Oh. Okay. I didn't realize that that was how it was supposed to work." The more I thought about it, the less sense it made. Would it be reasonable for me to teach for an entire day with a goal of each child taking away one small thing? No. Additionally, the format of presentations such as the one I had attended did not fit with what I believe about how we learn. Most of these one-day workshops consisted of "expert" teachers telling us how they did what they did. As attendees, we were not required to think, discuss, or apply any of the content. I was definitely not an engaged learner.

Twelve years and numerous professional development opportunities later, I consider myself an informed consumer. I now have expectations of my continuing education course work. I expect professional development opportunities to challenge my thinking, require me to reflect deeply on my practice, and above all, result in improved learning for my students. These things do not happen in a fun, easy, six-hour workshop.

Effective professional development for teachers, much like deep learning of content for school children, takes time. It must be long-term, with opportunities to apply new learning in the classroom and then reflect on the impact with colleagues. It involves planning, implementing, and reflecting on student outcomes with peers, asking ourselves and each other, "Why didn't that work? What do I need to change? What student-based evidence can I use as data to support my conclusions?"

For elementary math teachers, professional development might be additional college level course work in mathematics, taught by professors implementing teaching practices such as those outlined by the National Council of Teachers of Mathematics. Many of us were taught mathematics in much the same way as the early workshops I attended were taught. An expert told us what and how to think, and we were to go do just that. Many teachers are now aware that we need to re-learn mathematics the way our students are learning mathematics. Constructing models, testing conjectures, and discussing our ideas. Deepening our own understanding of the mathematics we teach will allow us to better meet the needs of our students.

Supporting the professional development of pre-service and in-service teachers is crucial. I believe in high standards for all students. I believe all children can learn mathematics with understanding. I believe that the National Science Foundation funded, standards-based curricula are improving math education for students across the country. However, I know that the difference for kids lies in the hearts and minds of the teachers who implement the curricula and standards. If the Federal Government wants to take steps to improve math and science education for our children, they need to focus energy and resources on providing high quality professional development for our teachers.

In addition to participating in practiced based professional development opportunities, something that has made a difference for both me and my students is the modeling provided by mentor teachers.

When I began teacher preparation course work, I already had schema in place for what this job of teaching is all about. As a student, I had already spent years learning what teachers and students did. My early memories of mathematics in an elementary school classroom were of doing multiplication problems on the chalkboard. There was a winner in this exercise. The winner was the person who solved the problem exactly like the teacher told her to, who finished first, and who got the right answer. I also remember being told stories about borrowing eggs from the teacher next door. Apparently that had something to do with subtraction, but at the time I was pretty confused. I figured my college classes would clear all that up for me.

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Not every pre-service teacher has an opportunity to spend time in such a classroom. In my opinion, my experiences in Mr. Wong's classroom were pivotal. I had a picture of what was possible for my students. It soon became clear to me that the role of models and mentors in the training of pre-service teachers could influence the beliefs and practices of new teachers in a way that college course work could never do.

I have been blessed to benefit from high quality professional development and mentoring relationships that have helped me to define what I believe is best for children. My experiences have convinced me that if we want to support our school children and help them to achieve, we need to support our teachers.

April 14, 2005

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

Dear Congressman Boehlert:

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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,

Cassandra Barnes

Chairman BOEHLERT. Thank you very much.

Ms. Sanderson.

STATEMENT OF MS. LONNA SANDERSON, WILL DAVIS ELEMENTARY SCHOOL, AUSTIN, TEXAS

Ms. SANDERSON. Thank you all for the opportunity to talk to you. We really appreciate it.

Imagine that you are eight years old.

Chairman BOEHLERT. Can you get the microphone a little bit closer?

Ms. SANDERSON. Sure.

Imagine that you are eight years old. You enter room 408 at Will Davis Elementary School in Austin, Texas for the first time. "This is it. Projects. Hmm." You have heard that there are lots of projects in third grade, but what about science. Will there be science projects? There she is, the teacher. What is that she is wearing? A lab coat? There is writing all over it. Look, kids' handprints, kids' writing. What does it say on her sleeve? "Science rules."

Now, imagine you are that same third grader and it is May. You think back over your year of projects and learning, and here is what you remember.

Your Invent Austin project. You noticed a problem. Perhaps your dad doesn't like to eat cereal from a box, because all of those broken bits and crumbs get soggy and really mess up his milk. Perhaps your parents have yelled at you when you wiped your ketchup-laden hands on the car seat while you were inhaling your fast food dinner on the way to soccer practice. You decided to invent something to solve your chosen problem. You did research to find out if there was already a solution to the problem. There wasn't. You made a model. It didn't quite work, so you made another, and maybe several more, until you finally had one that worked. A plastic cereal box with a sifter at the bottom and another section under it with a trapdoor to empty the crumbs. Now dad is happy. A ketchup pocket that is attached to the front of the fries container so all you have to do is squirt your ketchup into the pocket and dip your fries in, one at a time. Voila. No messy hands. You did market research to see if people would buy your invention and how much they would be willing to pay for it. You created an advertising plan. This whole time, you kept an inventor's log of all of your work. Finally, you wrote up your invention and drew a labeled diagram of it. You submitted it to be judged, and you won a medal. Was that your favorite project? Or was it another one?

When learning about sound, you used drinking straws to make reed instruments. You devised a way to make the instruments play different pitches, but the hardest part was getting that reed to work when you blew on it. But you did it. And your teacher said you could take it out to recess to play it. Maybe all of that noise in the classroom was making her a little crazy, but, hey, it was all her idea to do this project.

But don't forget about making that electromagnet. Who would have thought there could be so many ways to make it stronger? More winds of the wire, thicker wire, but would using a thicker core make it stronger? And then you used your electromagnet to

make model telegraphs, and you sent messages from your group of students to another group. Now that was cool.

Oh, what about those bean plants? We all thought that bean seeds would need soil, water, and light to sprout. Boy, were we wrong. They sprouted just fine in a covered container that had a wet coffee filter in it. Then that teacher asked us if we could continue to grow these bean seeds without soil. We said, "No way." But she taught us about hydroponics, and then we put the plants in a hydroponics unit, and they grew, and they grew, and they bloomed, and they made beans.

That is not all. Ouch. Those crayfish can pinch. But it doesn't hurt much. We observed them and learned all about their physical structures and adaptations. We watched them and wrote about their behaviors. Whoa. Look at that crayfish back up with its tail tucked under when we reached toward it. Was it trying to scare us off when it reared up with its pinchers spread whenever we came near? Yeah. That is one of its behavioral adaptations. Another time, we put two crayfish together to see what they would do. Oh, my goodness. That little one attacked the big one and pinched off its leg. "But don't worry," our teacher said, "it will grow a new one."

Well, tomorrow is the big day, the day all partner groups show their PowerPoint shows about a planet to our parents. We learned a lot about each planet and the sun and about making presentations using PowerPoint, how to create a background, insert pictures from the Internet, how to add sounds, and how to use transitions discriminatingly, as our teacher suggested, so that our audiences wouldn't get dizzy watching fade-ins, box-outs, cover-downs, and all of those other ones in one show. But when she wasn't looking, we tried all of them.

Ah, it has been quite a year. Yes, there really were lots of projects in third grade, and boy oh boy, science really rules.

Now, this picture of third grade science is quite different from what I experienced when I was in third grade long ago. But it is also quite different from what my students' parents experienced not so long ago. Why is third grade science not taught by just reading a textbook? Because students learn science by doing science, just as real-world scientists do. How is it possible to have this kind of science teaching and learning?

Give teachers the science equipment and supplies they need, give them and students access to technology, preferably in their classrooms and in a computer lab, and give teachers the training they need to learn how to teach science.

In my school district, we have a dual science adoption, a textbook and kit-based units. We have a science resource center where the kits are housed, refilled with supplies after each use, and then delivered to schools on a schedule. We use our textbooks to supplement our learning and to learn about topics that aren't in our kits, such as the planets. My district also subscribes to a video-on-demand service, so that when my students read about the characteristics of the sun, I can pause during the reading lesson and show a two-minute video clip about sun flares, sunspots, and prominences. I have four computers in my classroom for students to use, and we also can use our computer lab when we all need to

do research or prepare presentations. Teachers in my district are required to take training on all of the kits we teach. During these training sessions, we participate in many of the activities that we will use with our students, and we learn important tips, such as how to pick up a crayfish without getting pinched. Teachers also have access to many technology training sessions ranging from learning the operating system of our computers to using programs such as Inspiration and PowerPoint. Because of these advantages, I am able to successfully teach science and to guide my students further along the path of inquiry. After all, in third grade, science rules.

[The prepared statement of Ms. Sanderson follows:]

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Ah, it's been quite a year. Yes, there were lots of projects in third grade. And, boy oh boy, "Science REALLY Rules!"

Now, this picture of third grade science is quite different from what I experienced when I was in third grade, long ago. But it's also quite different from what my students' parents experienced not so long ago. Why is third grade science not taught by just reading a textbook? Because students learn science by doing science, just as real world scientists do. How is it possible to have this kind of science teaching and learning?

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BIOGRAPHY FOR LONNA SANDERSON

I currently am a third grade teacher at Will Davis Elementary School in the Austin Independent School District. I teach all academic subjects to my students. (By far their favorite subject is science!) This is my fifth year at Davis, and it is my twenty-fifth in the Austin School District. I have also taught at Graham Elementary, where I taught sixth grade and fourth grade, at Rosedale Elementary, where I coordinated a Global Education Magnet Program, and at Winn Elementary, where I taught fourth grade. Prior to making my home in Austin, I taught in Winder, Georgia and Colbert, Georgia (both third grade); in Whitehall, Michigan (kindergarten and third grade); and in New Martinsville, West Virginia (Title I Math and sixth grade).

I received my undergraduate degree in education from East Carolina University in Greenville, North Carolina in 1969 and my Master's degree in education from the University of Georgia in 1973. I became a National Board Certified Teacher in 2000. This was the greatest honor of my career—until I was named a Presidential Award for Excellence in Mathematics and Science Teaching Awardee!

April 14, 2005

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 Committee on Science of the U.S. House of Representatives on April 14th for the hearing entitled "***The 2004 Presidential Awardees for Excellence in Mathematics and Science Teaching***." In accordance with the Rules Governing Testimony, this letter serves as formal notice of the federal funding I currently receive in support of my research.

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,

Lonna Sanderson

Lonna Sanderson

Chairman BOEHLERT. Thank you very much.
Ms. Martinez-McDonald.

STATEMENT OF MS. PITA MARTINEZ–McDONALD, CUBA ELEMENTARY SCHOOL, CUBA, NEW MEXICO

Ms. MARTINEZ-MCDONALD. These are very hard acts to follow.

Anyway, what I would like to do is paint a picture of my teaching and my students.

I teach in Northwestern New Mexico, a rural area. My students are Navajo, Hispanic, and Anglo. And because our setting is bordering the Navajo checkerboard area where every other section of land is Navajo and private land, we have sort of a unique setting. My school district covers 1,800 square miles. Many of my students travel two hours on the bus one way. That is K–12. Often, because our school district has the only high school in the area, what families tend to do is they—high school students have to go to the Cuba schools, but middle school and elementary students can go to Bureau of Indian Affairs (BIA) schools. But since parents have a choice, students tend to school hop. So we have students that attend our school for first to second grade. They go back to the BIA schools. They come back to us. If they get in trouble, they change

from school to school. Paperwork often doesn't follow them until the middle of the year. Perhaps you might have no background information on a student. So we have a lot of diverse problems that we have to deal with every day.

Some of the things that have really improved my teaching and things that have helped me become a better teacher are RSI programs, Rural Systemic Initiative (RSI). The Northern Network of Rural Schools is a consortia of 27 school districts in the northern area. And they have supported us in offering professional development training. One thing that I think is very important and lacking in many elementary schools is that elementary teachers do not see themselves as teachers of science and math. They see themselves as teachers of reading. And until we get over that hump of teaching everything, we need to integrate literacy into science and math. We need to choose textbooks very, very carefully so that we are addressing the needs of students.

Another activity besides the RSI is in 1981, the New Mexico Museum of Natural History and Science was participating, and I believe it was an NSF-funded grant to strengthen rural science education. And as part of that program, they came into our schools and several schools within the rural areas and truly worked with us and found the needs that we had. It was a sustained effort. My colleagues talked about one-day workshops. I think these—what we are calling now are drive-by workshops are not the answer to improve education in the classroom. We need sustained efforts, follow up. We need teachers gaining content in math and science so that they can have confidence in what they are teaching to their students. I think so often that teachers not only feel that they don't know enough science and math to go beyond the textbook, that they really don't know to go beyond the textbook. We focus on reading. Reading is everything, and it is everything, but we really have to see ourselves as teachers of science.

One of the questions that was given to us before our hearing is what is the biggest impediment that I see to my teaching in education. And one of them—I mean, I think the main thing is poverty. The students that I teach, for the most part, are 99 percent free and reduced lunch. My students are ELL, English language learners. They have languages other than English in the home. And even students that have English as their only language, on our tests that we give them, they are not even proficient in English.

Each day, I try to choose lessons that hook into culture and into the lives of my students so that I can use that as the support to help them unravel the tangle of life that they see before them and they don't understand. In your packets, I believe you got an article about one of the communities that buses their children into the Cuba schools that just received water, not water in the homes, but a central location where they, the families, can go and get water and then bring it to their home. I mean, these are daily struggles that my children deal with, not all of them, but enough, probably one-third. And they often go home to no electricity. How can a student do homework if there is no electricity?

I think that when we think about our students and how we can improve what we do for them, we have got to see where they live.

I think that immigrants that come to America have the American dream. They know that they can go out and make a better life for themselves and their families, but students of poverty who live in America have lost the American dream. I think that through using math and science that we can use that as a hook to give them that dream back.

Thank you.

BIOGRAPHY FOR PITA MARTINEZ-MCDONALD

- 1973—BA, University of New Mexico
- 1981—MA, Antioch University

Teaching

- 31 years teaching Cuba Independent Schools, Cuba New Mexico. Grades 3, 4, 5 and multi-age 3/4/5 class and 4/5 class.

Other

- Lead consultant, Northern New Mexico Network for Rural Education-Rural Systemic Initiative Ghost Ranch Teacher Institute (I set up a week long science professional development workshop for K–8 grade teachers. This workshop provides teachers with content knowledge and hands-on activities to strengthen science teaching.)

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Sincerely,

Pita Martinez-McDonald

Pita Martinez-McDonald

DISCUSSION

Chairman BOEHLERT. Thank you very much. Thank all of you.

The Chair recognizes the distinguished Chairman of the Subcommittee on Research, Mr. Inglis.

Now let me explain. He was not tardy. This is an excused absence, because he was down at the White House in an important meeting, and he got up here as soon as he could.

The Chair recognizes him.

Mr. INGLIS. Thank you, Mr. Chairman. And thank you for the excused absence, too. That is very helpful. With these teachers here, I would be worried, otherwise I would be marked on my progress report.

It is wonderful to be here and to welcome and celebrate the work of these teachers. You will understand, Mr. Chairman, why I am particularly excited to welcome Joyce Dodd from Bryson Middle School in Simpsonville, South Carolina. It is wonderful to have you here. We are very proud of you and very thankful for the work that you do with our middle school students.

And there is a facility not far from Bryson Middle School in Greenville County that is the General Electric turbine plant that employs about 2,600 people, 1,000 of them are engineers. They have a wonderful technology—a number of technologies, but one of them involves coal gasification and the ability to take pollutants out of the coal before it is burned in their turbines.

The reason I mention that is I was visiting there recently, and I asked one of the executives if they had enough engineers. And he said, "No. We could hire 300 more if we could just get them." Now what that tells me is we have got a challenge. And the solution is sitting before us: people who can inspire and make science and math real to students. I am a lawyer, and one of the things about legal education that makes it a little bit easier is that it is—there are always stories. In a good law school, the first thing you do is start reading cases, and a case is a story. It tells about a person and what happened to them and then how the law resolved their problem.

One of the challenges, seems to me, about math and science is making it real. And so the teachers that are sitting before us are people who have the passion for making it real. And when you make it real and relevant, you make it so people want to learn, and students get the passion for math and science.

It is important to note that General Electric is not alone. The Department of Labor estimates there will be six million job openings for scientists, engineers, and mathematicians by 2008. Sixty percent of the new jobs will require a solid mathematical background. And of course, we have got a significant automotive cluster in our district, and when you think about it, the work on the car, even the auto mechanics, will need to be able to read graphs, understand the timing diagrams, and to set and to reset microprocessors. All of that involves the work that you are preparing your students to do.

Of course, the challenge, as we know on this committee, is that we are not exactly on the path to filling those six million jobs I just mentioned. We are only producing 60,000 engineers per year com-

pared to over a half a million per year in China and India. That is a challenge for us. And I think it is worth celebrating what you are doing, because I really do believe that you are the solution to this, our challenge of meeting the need for people prepared for math and science. And so I am happy to join my colleagues in congratulating you.

Chairman BOEHLERT. Thank you very much. I do appreciate that.

You are all experienced. You all are professionals in this. And Ms. Barnes, you mentioned in your testimony that you need engaged learners. I hope you sensed that we are engaged learners up here, because I have watched my colleagues, and I have had a lot of experience in this business. And I will tell you, whether they are Nobel laureates or people from the business world or high-level officials from the Administration, more often than not, if I sort of glance left and right, I see colleagues reading something or checking their blackberries or something, it is not because they are not really paying attention or interested in the subject matter, it is just that there are a lot of things on their docket. I have looked left and right and you have got us in the palm of your hand. Thank you for doing an outstanding job.

Ms. Dodd, you were the first to have mentioned, but several others mentioned, the National Council of Teachers of Mathematics. Is that something that everyone belongs to teaching math?

Ms. DODD. Unfortunately, it is not. One of the reasons is the membership costs. And it is unfathomable to me why $78 would stand in your way of joining such a valuable organization, but at our school, I know—we have 12 math teachers, and I know that we don't have too many members.

Chairman BOEHLERT. Well, you know, I had previous history in the real world out there in the business community, and if something was considered important to my job, I put it on my expense account.

Ms. DODD. I don't have one.

Chairman BOEHLERT. No, no, no. But what I am suggesting is more and more we have got to think about all of the additional costs for teachers. And you know, we have, for the first time, a tax deductibility for $500 I think it is out of out-of-pocket expenses of teachers. What is it? $250? Well, it should be $500. All in favor, say aye. Aye. It passes. But $250. It is the first time ever. It is recognition that—every educator that I have talked with tells me, but particularly elementary and secondary education, because the universities, they do much better by the faculty. But they say they have a lot of out-of-pocket expenses, whether it is first or second grade buying construction paper, you name it. And so this is something we could do. Is—would you be—would that be an eligible item on the deductibility or the—all right. Good. So maybe you better share that with your colleagues. I can guarantee you we will work up to $250. But——

Ms. DODD. Well, let me mention this. It is a little—I think it is relevant. I am the mother of a prospective first grade teacher, and she was home over spring break, and I took her to the teacher supply store in Greenville. We were there about two hours, and my

out-of-pocket expense for her classroom was about $350 just for the supplies in her hands that she needed to teach her students.

Chairman BOEHLERT. I know, and I mean, it just—a lot of my best friends are teachers. But they tell me this all of the time. And so I mean, I am always asking questions, and then I play the student and try to learn from that and try to translate that into some meaningful action here in Washington. And I might say that we are all partners in this endeavor. You don't have an opponent of that tax provision up here, and we are all of the same mind. We want to increase it, and I pledge to you and all of your fellow educators that we will continue that effort.

I am just curious, Ms. Martinez-McDonald, two hours on a bus. And in rural America, that is on the long end, but I mean, kids are spending a lot of time on buses coming and going. Is that productive time, and is there any way that educators are thinking about—I am not trying to add to your burden, but how do you use that time most effectively?

Ms. MARTINEZ-MCDONALD. It is definitely not a productive time. In fact, we have kindergarten students riding on buses with high school students, who are not modeling good behavior.

Chairman BOEHLERT. I understand.

Ms. MARTINEZ-MCDONALD. A lot of the travel is on dirt roads. I mean, I had one of my students that comes from this community that just got water, and she said, "We are late today because we got stuck in the mud, and we all got to get out and push." And I think about my own children getting out of the bus and pushing it. And you know, she was thrilled. They were happy. Everybody was fine. But I don't think people really understand what some of these rural communities are dealing with. How can these students come to school and think about school when they are dealing with so much in their own lives? It is hard to get above and beyond that.

We have, as a district, in the past, some of the wacky ideas that we have come up with was perhaps getting, like, big buses that have pull-down computers, so that they could access lessons or information on the Internet. We, at one point—I don't know that it was ever instigated, but they were talking about adding TVs to all of the buses so that they could have distance learning. But then what level do you target? How do you—who maintains that? Who produces the productions for the kids to watch?

Chairman BOEHLERT. Yeah. Yeah. Yeah.

Ms. MARTINEZ-MCDONALD. I mean, it was—it is just so many different facets that——

Chairman BOEHLERT. I would imagine in your situation a high percentage of those students are eligible for the school lunch and school breakfast program.

Ms. MARTINEZ-MCDONALD. Ninety-nine percent free and reduced.

Chairman BOEHLERT. Is that a possibility to productively use that time to start on the bus with the breakfast or something? Or when they get to school, do they——

Ms. MARTINEZ-MCDONALD. They come from such a diverse——

Chairman BOEHLERT. Yeah.

Ms. MARTINEZ-MCDONALD.—setting, and what most of our students do is they walk sometimes a mile or two miles to the bus

stop. They get one bus that takes that group of children to another bus stop. Then they——

Chairman BOEHLERT. To a hub.

Ms. MARTINEZ-MCDONALD.—get on—yeah, to a hub, essentially. Then they move to the hub and then come into school.

Chairman BOEHLERT. Well, they better get used to it at this age, because we are all going to hubs for one——

Ms. MARTINEZ-MCDONALD. Right.

Chairman BOEHLERT.—place or another.

Ms. MARTINEZ-MCDONALD. Right.

Chairman BOEHLERT. Yeah.

Ms. MARTINEZ-MCDONALD. Right.

Chairman BOEHLERT. But boy, we can't really come to appreciate the great challenge faced by an educator in your circumstances.

Ms. MARTINEZ-MCDONALD. Well, another——

Chairman BOEHLERT. The kids are tired by the time they get to school.

Ms. MARTINEZ-MCDONALD. Exactly. And we have huge issues with attendance. How do you get kids—I mean, how do we get our kids to school?

Chairman BOEHLERT. Yeah, well, it is a——

Ms. MARTINEZ-MCDONALD. I mean, if it is four o'clock in the morning, you are getting up out of bed. You are riding your bus. And then it doesn't make it to school because of the mud or the road conditions.

Chairman BOEHLERT. Well——

Ms. MARTINEZ-MCDONALD. You know, all of that effort is wasted.

Chairman BOEHLERT. The red light is on for me, too, and I follow it as well as I ask my colleagues to follow it as well as we ask the witnesses to follow it.

Let me congratulate you all for the nice manner in which you have summarized your statements. I mean, you each had five minutes and you have stuck pretty close to it. So I appreciate that.

Let me give a tip before I go to Mr. Gordon.

Take this down. There is a website that I will invite you to go to. It is *www.baseballhalloffame.org.* And the reason that I mentioned this at the breakfast meeting, the baseball hall of fame, I have—which is in my Congressional District, and it is part of my passion for life, baseball, but they—I had helped them secure funding for a long-distance learning program using the Internet creatively. And you know, baseball is a game where, if you are really a fan, you are a stats freak. You want to know batting averages and everything else, and you want comparisons. And the baseball hall of fame devises a very creative program that is available on the Internet, and it might be a source for all of you in the classroom to just take a look at it and see if it is worthwhile to add to your curricula, because, you know, some third graders say, "Boy, I know my favorite player is batting .328." You know, how did he find that out? You know.

Well, use it.

Mr. Gordon.

Mr. GORDON. Thank you, Mr. Chairman.

And I also want to thank the witnesses for those very good statements.

And I would like to ask if any of you have used any materials in developing a lesson plan that you received from any federal agency, like the National Science Foundation or NASA. And if so, how did you learn about it, and how helpful was it?

Ms. Martinez-McDonald.

Ms. MARTINEZ-MCDONALD. Recently, I have been teaching an astronomy space science course, and I have used a lot of the NASA online materials and downloadable materials. They have been invaluable. They have given me resources that I wouldn't have access to in the first place. And then we have also used our—we recently used DTT monies to buy a portable lab for our classroom so that students could get on the incredible NASA site and access the information and their links about the universe, and they were all able to create what we call "webbie books" and download pictures and information from—that we—from the NASA site and other sites that they linked to their site.

Mr. GORDON. Well, let me just ask the panel and also everyone in the back. Raise your hand if you have used, again, NASA or NSF for materials. And of those, has anyone—have they been helpful? Have they been beneficial? Okay. Well, let me make this recommendation. As I mentioned earlier, two things. One, everyone on this panel or this committee, on a bipartisan basis, is very supportive of the National Science Foundation and the K–12 math formula. You know, I am sure that the President is not anti-math and science, by any means, but they want to cut this program by half. And so I hope that when you are there at the White House today, again, they are not mean, ugly folks, but they probably just don't understand the importance and how helpful this has been. I hope that you will use this opportunity to convey that.

Let me also say, as a father of an only child, four-year-old daughter, the motto around our house is that girls rule and boys drool. And what I would like to do is just take a quick moment, both personally and professionally, to get the panel's suggestions. I am sure you have been following the national discussion, I think it is more a discussion than a debate, as to women's aptitudes in science and math and the lack of women at the later stages in that field and also, maybe potentially a part of that is some reticence that we understand that girls have in class to ask questions, and all of that sort of thing.

So one, I would like to see, you know—or just what are your thoughts about that, and both—what are you seeing and what do you think we should do about it?

Ms. DODD. I have to answer that one.

I am the mother of a set of twins, a boy and a girl, who both excel in math and science. So I know that if there is any difference, it is cultural. It is—I don't think it exists. I noticed that in my math class, I don't see a difference between the girls and the boys. On the math team that we took to competition to Clemson, we had half girls and half boys that participated in that. So we had an even amount. Wasn't that your question?

Mr. GORDON. Well, I am sorry. What I have seen or written on that area is some of the assumptions are that women—it is not a matter of not having the ability and that——

Ms. DODD. Right.

Mr. GORDON.—the top levels, you know, they are as good or better than any men. But you know, it is sort of a—it is a bell curve—not a bell curve. I guess it would be a U curve, in that there are, overall, not as many that are as interested. Again, are you finding that? Again, if you are not, that is great. And if you are, what do we need? How do we address it?

Ms. DODD. Again, I am saying I am not finding that.

Mr. GORDON. Okay.

Ms. DODD. Our math council is sponsored by an engineering society. And it is a very challenging competition. We had as many girls as boys participating.

Mr. GORDON. Good. Well, does anybody else have any—do you concur or have any different experiences or any suggestions?

Cynthia?

Ms. CLICHE. I think you see that later. We are all elementary teachers, and I think at the elementary level, the boys and the girls, you know, they are—it is not that extra peer pressure. I think that comes in when they start hitting middle school and high school and all of a sudden, for some reason, it is our culture or society that there is different expectations for boys than girls. And I think that comes later in life. I don't feel like I see it as much in elementary school as I think if you asked someone in the high school level. I think they are going to see that more so at the junior high level.

Mr. GORDON. Well, with the deficiencies that we have in mathematicians and engineers, we certainly can't waste, you know——

Ms. CLICHE. And I—again, I think it is that—how are we treating them? You know. How is society perceiving, you know—what—when you are looking at society, and you are looking at magazines, and you are looking at media, what are you seeing out there? Are you seeing girls portrayed as especially gifted in science and math? I am looking at my high school years, when I was in high school, and in our calculus class, there were two females, and the rest were males. You know, something happens there. I was never treated as if I were different. I was very fortunate. Either that, or I just didn't get it. One or the other. So—but something is happening there where the girls are getting the perception that there are other things more important, such as—and I don't want to, you know, stereotype anybody, but there are other things, once they get into high school, the dating and the boys and somehow it is—you know. I think that is where you are going to see it more. In elementary school, my children are gung ho. My girls and my boys.

Mr. GORDON. If I could just finish up on that.

Ms. CLICHE. Okay.

Mr. GORDON. In terms of what we can deal with, I guess, here, in the NSF and in the NASA materials, is it presented in a way that is, you know, neutral, or is it—should there be something to have women more out front or—I mean, is there anything within the NSF or NASA that we can do to create this more positive image? Or is it already there? Are you satisfied with it? You are satisfied with what is going on there? Okay. Thank you.

Chairman BOEHLERT. Thank you.

And I would just point out a couple of things to the gentleman. And you need role models. I mean, if we are talking about—I am

the father of three daughters and a son, but role models. I would point out, and I am sure you are not going to miss this opportunity, that when the Shuttle returns to flight, the Commander of that Shuttle is going to be Eileen Collins, the first time in history a woman commanded a Shuttle. She has piloted. The pilot is the number two person. The Commander runs the whole show. A graduate of a community college in upstate New York went on to the university and became a distinguished scientist and a distinguished military career, a colonel in the U.S. Air Force, and now she is one of the leading astronauts and will be commanding that Shuttle.

And the second thing, all of the engineering societies report the same thing constantly, and boy it is music to our ears. On the one hand, the negative part is there is such a shortage. We need more. But on the positive side, more and more young women are looking at careers in engineering. And that is exciting, because there are wonderful opportunities out there.

The Chair recognizes Mr. McCaul.

Mr. MCCAUL. Thank you, Mr. Chairman.

Not to play one-upsmanship, but I am—I have four girls in my family, so the girls do rule in my house. There is no question about that. But I did get a tour of the Johnson Space Center last week, and it is phenomenal what they are doing out there. And I encourage you to—I was glad to see the showing of hands of all of you who utilize what they have to offer, including, I was told to get astronauts out to some of the schools to energize our young people to get involved in math and science. And I think any time you get an astronaut to come talk to your kids, that is going to be a home run.

So I wanted to talk really briefly, in 1983, President Reagan appointed a Blue Panel Commission that released "A Nation At Risk." In the report, it states, "If an 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." And that was a fairly disturbing finding. I think we have made progress, but I think we can do a lot better. I would be interested to hear your input on how we can do better.

But since Ms. Sanderson is a constituent of mine and supporter, I want to put her on the spot. As you know, in our hometown of Austin, we are very fortunate to have a lot of high tech in the area. We are the home of Dell Computers, Applied Materials. We have a presence there. And I was really intrigued by your innovative use of technology in the classroom. And I was hoping you could maybe elaborate on how you use the technology as a tool to get the children interested in learning, because as Mr. Inglis had talked about, when I talk to these high tech companies, they want to import more and more scientists. In fact, they asked us for 20,000 visas so we could import scientists from India and China. And it is just astounding to me that we can't do that in our own country.

So maybe—I know it is a very broad question, but if you could elaborate on, perhaps, getting children interested in this area of technology. Were the jobs—you know, we have the jobs, but we just can't find the people in our own country to fill them.

Ms. SANDERSON. In my classroom, we use technology just as a tool. It is not ever used for entertainment, but you only use the computers when you need to use them. We use videos that enhance our learning, that teach something that we need to learn. And the students are free to use those pieces of technology whenever they need them. I mean, they don't even ask. They just get up and go use it, and they sometimes have to wait, because somebody else is on the computer, and you better not go to the bathroom, because you are going to lose your spot.

But as far as getting them interested in jobs, third graders are already interested in all of those jobs. I don't know what the problem is in keeping their interest in those jobs. I don't know what we can do about that.

Mr. MCCAUL. And that is what the report seemed to indicate, that the younger ages, they do quite well. It is when they get to K–12 is where you start to see the decline.

Ms. SANDERSON. All of the third grade girls and boys love science and math, and if they don't love math, I make them write "I love math" on their papers, because some of them have math phobia, and it is boys and girls. And if they have math phobia, by the time they leave my classroom, hopefully they love math, because they have written "I love math" all year.

Mr. MCCAUL. And I guess to keeping their interest in the older years, I don't know what the answer, quite honestly, is to that. I know that, you know, a lot of the schools in our area are fortunate enough to get technology donated to the schools——

Ms. SANDERSON. Right.

Mr. MCCAUL.—and I don't know if that is true for the other teachers on the panel, but I think that does peak an interest as well.

Are there any other comments on this issue?

Ms. MARTINEZ-MCDONALD. I would like to add to that.

I think it goes back to—I think all of the people in this room, science and math are foci for their classrooms. But I don't think, generally, in many classrooms, that that is the case. I think elementary teachers feel that they don't have enough background knowledge and content knowledge. And so many students get science, especially science, after everything else is done. They have done social studies. They have done everything else. And then, if they get an hour of science a week, I think that would be a regular occurrence in many classrooms. And I think that is where we need to give elementary teachers, especially, that background knowledge so that they feel confident so that we can get children involved in science all of the way through elementary schools, so that they, when they get to the middle schools and high schools, they feel confident that they have got the background that they need and then they can progress. It is not just catch-up. I think that is what many students are doing when they get to middle school and high school. They are going, "Oh, I don't know this. I don't know that." And it is because they haven't had a good foundation in elementary school.

Mr. MCCAUL. There is—it is not a priority on the curriculum, and the teachers don't have the right background. Is that what I am hearing?

Ms. MARTINEZ-MCDONALD. Yeah.

Ms. SANDERSON. In Texas, that is not true. We give a science test in fifth grade now, so it is a big priority to teach science. And that is maybe one advantage of giving a state standard test in sciences that it makes it a focus for the school districts to make sure that all of the kids do learn it, because the test tests what they have been taught from second grade through fifth. So if the second grade teachers don't do their job, then the fifth grade students won't know what is on the test.

Mr. MCCAUL. Well, that is good to hear.

Ms. SANDERSON. But—so, I mean, in spite of the disadvantages of having to give all of these tests, there are some possible advantages to them.

Mr. MCCAUL. Yeah.

Ms. DODD. I would like to add that I think one place that we could impact a difference is in our teacher training programs. I think when we send our kids to college, and if they choose education, their math class and their science class should be compatible with that of math and science majors. It shouldn't be a special course, elementary ed., that if you change your mind you can't use that for anything. What does that tell us about the content of that course? And I think that is an easy fix, and I think we need to hold responsible for that. And I think that, oftentimes, elementary teachers feel they don't have the background when they, indeed, could have had the background.

Mr. MCCAUL. Well, I see my time has expired, but I do want to thank the panel for everything you do and praise, you know, the work that you are doing. It is so important.

Thank you, Mr. Chairman.

Chairman BOEHLERT. I thank you.

The Chair recognizes Ms. Hooley.

Ms. HOOLEY. Thank you, Mr. Chair.

I would like to also welcome Heather Combs from Oregon today. Again, congratulations to all of you.

I want to start out with Ms. Barnes. You talked about Mr. Wong's classroom. And I would like to know, in the professional and development workshops and in-service training that you have participated in, what percentage is focused on this kind of collaborative learning that you experienced in Mr. Wong's classroom?

Ms. BARNES. Well, I would say now that I am, you know, an informed consumer——

Ms. HOOLEY. Yeah.

Ms. BARNES.—I won't stay in a professional development setting where it is not going to meet my needs. So the courses that I register for and stay for——

Ms. HOOLEY. Yeah.

Ms. BARNES.—are classes where all of the teachers who are participating are actively engaged, and they are asking to reflect on their practice, and they are asking to—they are being asked to consider new research in education and how they can use that information to change learning for the students in their classrooms.

I would say that, besides the fact that Mr. Wong painted a picture for me of what is possible for students——

Ms. HOOLEY. Yeah.

Ms. BARNES.—he also gave me a lot of direction in what is high-quality professional development, how does that look, and how does that carry over into your practice. But it is something that—I just feel extremely fortunate that I was able to have this experience early on in my career, because I have many colleagues throughout my district and state that the first time they take a course like the ones I am talking about, they are just so energized and overwhelmed and saying, "This is amazing. This is great. I have needed this for all of these years." There is just maybe not enough to go around. It is—for the people who plan the professional development that works, it is hard work for those people, just like teaching the way that we believe is hard work for us.

Ms. HOOLEY. But my question is, and any of the rest of you can answer this as well, how often do you find the in-service training or the professional development with that kind of energy and that actively engaged? I mean, are those hard to find or are those common anymore?

Ms. BARNES. Yeah, I think if you know where to look, then you can find it.

Ms. HOOLEY. Now wait a minute. If you know where to look, but if—I mean, if there is a list of things that a teacher can go to for in-service training or for professional development, how hard is it to find those really good professional development courses?

Ms. BARNES. See, I guess I have learned to look at who the presenters are. You know, if it is a professional development opportunity that was developed by, you know, the EBC, or there is a local organization—non-profit organization, a couple in Portland, actually, that I know that if I take a course, it is going to be high quality. And there are some that I know I need to steer away from them. But I think when you are a beginning teacher, you need to have somebody tell you.

Ms. HOOLEY. How would you know? Yeah.

Ms. BARNES. You need to have a mentor to say, "You know what? Don't spend your money there."

Ms. HOOLEY. Okay. And then—and anyone else can talk about that that wants to, because I would really like to know how hard that is to find one of those classes.

And the second question I have is, if there is one thing the Federal Government could do to particularly grade school teachers to get them excited about math and science and teaching math and science in their classroom—because I know a lot of teachers have a phobia against math and science—what would be the one thing we could do to entice teachers to be involved, grade school teachers, in math and science and to sort of get rid of that phobia? What would that be?

Ms. CLICHE. I guess I will answer.

Ms. HOOLEY. Okay.

Ms. CLICHE. And I have been talking. It is great having so many colleagues around, so of course, knowing I was going to be here today and representing them, I did get a lot of input——

Ms. HOOLEY. Good.

Ms. CLICHE.—and I think I have gotten some input for that question.

Ms. HOOLEY. Good.

Ms. CLICHE. One thing that we have kind of thought about is it would be great if we had a math and science specialist in each elementary school, because I think that is almost like having your professional development right there. I think, you know, when I started teaching, I almost felt isolated, that I was the only one that thought this way, that taught this way. And then, as I started branching out and meeting other colleagues that taught and thought that way, it really helped me. So if you have a math and science specialist, maybe, in the elementary school, not just at the county, because there are so many schools now in an area, that could come in and actually do some of the lessons and do some of the teaching and help you and find the professional development that you need that is important to you that you see. I think that would be a great step.

Ms. HOOLEY. Okay. Any other comments?

Ms. SANDERSON. In our school district, we use investigations in data, time, and space, which is a pretty innovative math program, but we have used it for several years. And it was funded through a government grant. I am not sure if it was Eisenhower or NSF or—it is NSF?

Ms. HOOLEY. NSF.

Ms. SANDERSON. And it was a—and part of the grant process was there had to be a professional development component. Therefore, every teacher in the district has to go through professional development to learn how to teach it. And then you become comfortable with teaching it, if you weren't comfortable with teaching math, other than through a textbook. So if the government requires, in all of its grants, that there be a professional development component and they actually have—they collect data on this professional development every time we have one. So I think that just requiring that makes sure that the districts then provide quality professional development to ensure that the teachers aren't phobic about it. And we have the same thing for our science. We are required to have science training before we can teach the kits. They won't even send the kits to our school until we have the training.

Ms. HOOLEY. Thank you.

Chairman BOEHLERT. Thank you.

The gentlelady's time has expired.

The distinguished Vice Chairman of the Full Committee, Mr. Gutknecht.

Mr. GUTKNECHT. Thank you, Mr. Chairman. And thank you for having this hearing. I want to thank the panelists for being here today. I think this is an important hearing, and it is something that when you look at the test score numbers from around the world and you compare ours to international scores, this has probably already been mentioned, we do very well in the elementary grades. By eighth grade, we are starting to lose ground, and by the time they get to twelfth grade, American students score pretty poorly. And we still haven't really gotten our arms around why.

I do, however, believe that success leaves clues. And if you look at what is happening at universities and in many communities every summer, there are baseball camps, there are basketball camps, and there are football camps. But I don't see enough science camps, and I don't see enough math camps. And I think there has

to be a way that we can encourage our universities, encourage private enterprise, and frankly, with a little bit of help from the National Science Foundation and federal and state taxpayers' dollars, we ought to be able to encourage more of that. And that is just my editorial comment. And everywhere I—we are doing some of that in my district, but I must confess, not nearly enough.

But the real question I wanted to get to is that we have—for example in the town that I live in, Rochester, Minnesota, we have a very large number of people who have advanced degrees in math and science, and that is because we have a little medical practice that was started by two brothers by the name of Mayo, and we also have the top research facility for IBM. We built the world's fastest supercomputer now in Rochester, Minnesota. But several years ago, there was an outreach program to try and encourage more of these people with advanced degrees in math and science to serve either as mentors or some of them who had retired early or for one reason or another to be able to teach. And I will be diplomatic. The teachers unions took a somewhat dispassionate view of that whole idea. Now I know that there are several states that have alternative certification programs, and I would like, Ms. Dodd, for example, you started out, I think you said, teaching home economics, and you moved into math. How difficult was it for you to get recertified, because the problem is we have Ph.D.s in mathematics and they can't teach mathematics at the local high school?

Ms. DODD. I am glad you asked me that question. And that is probably one of the reasons I have pursued this particular nomination or award was because I wanted to validate my worth as a mathematics teacher.

I was very lucky to be able—because I really, honestly, believe that being a teacher is essential, but I don't want to diminish the need for content. And I am a middle school teacher. I see myself more as a middle school teacher than an elementary teacher. This is one of the few times I am not with my buddies, the high school teachers. Normally, that is who I am with. And I think content is essential. But I think it is easier to teach a person content sometimes than it is to teach them how to teach.

So I think that retooling and retraining existing teachers who desire to be in a mathematics classroom is a really good investment, and I have a national board in early adolescence mathematics, which requires content knowledge. And I absolutely do not want to diminish the necessity of content knowledge if you are going to teach mathematics. I have to know what comes after sixth grade math. It will affect how I teach math. Knowing my high school friends, knowing that it is more important that my kids understand fraction operations to be successful in algebra than it is integers was very helpful to me in preparing my children. My buddy on my team is a science teacher who was an engineer. So he is coming to our school from an alternative program, also. He is a dynamic teacher. He has the heart of an engineer, but the mind of a teacher. He sponsored a robotics club with our school, and we actually got to state competition. And so I absolutely welcome alternatives.

I was accepted in the math community and given a chance to grow, and I think that, as teachers, we need to accept people from outside communities and give them a chance to grow.

Mr. GUTKNECHT. Thank you.

Ms. DODD. So I agree with them.

Mr. GUTKNECHT. Anybody else want to comment on that, on the ability of people from the outside to come in and be able to at least contribute?

Ms. MARTINEZ-MCDONALD. I would like to share an experience that I have had. New Mexico has various labs, and a few years back, all of the labs had what was called the Cyad program where they coupled scientists in the field and retired scientists with schools, and they came into our schools once or twice a month. They provided background knowledge and content as well as activities in the classroom and supported us. Unfortunately, the program was phased out, but I found that very helpful, because it was somebody that I knew I could call for support. They would be in the school. They got to learn kids. They realized that having the science had nothing to do with the teaching. And they provided the science that I lacked, so that I could do the teaching that——

Mr. GUTKNECHT. Thank you very much.

Chairman BOEHLERT. Thank you.

Mr. Davis.

Mr. DAVIS. Mr. Chairman, thank you very much, and Ranking Member, for having the hearing today and certainly the five panelists who have given great testimony and all of the members from throughout the different states that are here to join and participate in the activities you have had since Sunday, and I think will probably last through this coming Saturday.

I grew up in a rural area. My first school was a one-teacher school where we walked. It started in 1948. As you look at the teaching in 1948, it was basically three "R"s. I graduated from high school in 1962, and when I graduated from high school in 1962, I had heard a young man a year earlier, or a year and a half earlier, say, "We will send a man to the moon and then safely return him by the end of this decade." And there was no science being taught about how we go to the Moon in 1962 or in 1948 when I started with school. We have seen a tremendous change and a huge amount of knowledge that has occurred since both my wife and I went to school at a place called York High School in Jamestown. It was built by a fellow by the name of Sergeant Alvin C. York from Pall Mall, where I currently live today and where I was born and raised. When he dedicated that school, he said, "I dedicate this school to the children of Pall Mall, so they can enjoy the liberating influences of an education denied me in my youth." Liberating influences of an education that he was denied as he traveled throughout the world during World War I and became a great hero for America, a movie of which has been made of his life. We see in someone who had the vision to be sure that education became a part of our lives.

I applaud each of you in this room for how you are imparting to our young individuals. I have—as my wife and I watched our children go to school, we realized how much more education and knowledge was available to be taught to them than she and I had

obtained or were taught when we were going through school. We now watch our five grandchildren, of which four of those are in school, two in Murfreesboro, our oldest grandson, who will be 15 on August the 1st, is an eighth grade graduate there last year, and Alexa is still there at McFaden. But we see such a change in education and teachers so committed. My wife teaches second grade. She taught first grade for 14 years. My daughter, Lynn, teaches in the school systems in Bart Gordon's District. All of my children live in Bart Gordon's District for some reason. They can't vote for their daddy. And I have a son-in-law that teaches, and my oldest daughter actually teaches home-schoolers. But the two children I just mentioned go to public schools at McFaden and Murfreesboro.

So there has been such a change from the three "R"s to what we have today and the challenges that we have had. Growing up in a rural area, Ms. Martinez-McDonald, is a challenge. The bus left my home at six o'clock for the eight o'clock school. I was the first on the bus and my sisters and brothers were, because my mother and father had actually drove the bus. One of them would. Each morning, we would change at the elementary school and then go up the mountain to Jamestown.

So as we look at trying to change or to improve how we teach our students and how we teach our young men and women, our young students, the children that we are teaching, I know that that is a tremendous challenge for you. Math and science was something that was always—it was—it seemed to be away from my grasp, but I always wanted to reach out and be a part of science and math. I applaud your efforts, how you impact the lives of future generations of this country. And I don't agree that America has got the worst education system in the world. We absolutely are the only Nation in the world that has the economic strength that we have and the military strength that we have. No nation can even equal us. And why? It is because of educators like you in this room and throughout our systems throughout the Nation. Oh, we can complain and we can talk about areas where we need to improve, and we should always strive to do that, but because of you, America is where it is today.

I tell young students, when I visit them in schools, that you can have a Maserati, I don't know what that is. That is a fine car, they say, or you can have the biggest mansion in the world, and if you can't economically continue to fund it, you will lose all of those assets you think you have. But an education is an asset that you never can lose, and you can always use that. And you are the ones who make that happen.

I have a teacher here today from a rural area similar to where I grew up, Ms. Beverly Ramsey, from the West Elementary School. She is actually from Viola, which is about the same size as Pall Mall where I grew up in Fentress County. And I applaud her and congratulate her, as each of you should be congratulated, for being able to win the competition, and I am sure it is pretty stiff, to be here today.

My question, and I am about to run out of time, is this. How has "No Child Left Behind" impacted your ability to teach? Do either of you want to answer that? And here is why I ask that. Here is why I ask that. I think we have to look at achievability of each stu-

dent and be sure that that child is not left behind. And if we don't place an achievability as well as accountability, we could never reach an accountability level. So how has it impacted?

My time is running out, I guess, so that is—we——

Chairman BOEHLERT. Your time has run out. But just let me say that I think we all embrace the subject and the theme that no child should be left behind. And let me point out, we are spending more on education in America than ever before in the history of the Republic, and we need to spend more. It is a very wise investment.

Mr. DAVIS. Saved by the bell.

Chairman BOEHLERT. Yeah.

Here is what happens. We are going to have a series of votes now, so we will go next to Dr. Bartlett, a Ph.D., I might add, Dr. Bartlett who is deeply and passionately interested in this subject matter.

And then I think if he can keep to the five-minute limit, we will get to Mr. Honda, and then we are going to have to end this, because we will go over for a series of votes, and we can't keep you around all day. And it might be a half-hour to 45 minutes before we can get back, and that would be disruptive.

So Dr. Bartlett.

Mr. BARTLETT. Thank you very much.

I want to apologize for a schedule that tries to cram five days of work into less than two days this week, which meant that at 10 o'clock this morning, I was supposed to be in four places at once. So I am glad that I am finally able to get here.

In another life, I spent 24 years as a teacher. I worked for a number of years as a scientist. And I have had a growing concern about two things in our country, both of which are culture-driven. One of them is our inability to attract enough students to science, math, and engineering. As an example of the portent for the future, we graduate about 70,000 a year. The Chinese graduate 200,000 a year, roughly three times more than we. And India graduates 150,000 a year, a bit more than twice what we graduate. And that is to say nothing about the fact that about half of all of the graduate students in science, mathematics, and engineering in our country are Chinese and Indians. So the discrepancy is even bigger than that.

I am very much concerned that for the short-term, this poses a real threat to our economic superiority. We will not continue to be the world's premier economic power if we can not attract enough high-quality students to science, math, and engineering. And by the way, the bright, young minds in our country today are increasingly going into what I tell them are potentially destructive pursuits. They are becoming lawyers and political scientists.

And you know, I have two questions. The first staff-generated question has to do with the fact that our kids don't start out behind. In the fourth grade, they are about on par with students in the rest of the world, and in the eighth grade, not so bad, and by the twelfth grade, they have fallen way behind. In a recent survey, worldwide, we were very thankful for Sri Lanka and Cyprus, because they were the only two, out of 21 countries, I think, whose students fared worse in science, math, and engineering than ours did. You know, you get what you appreciate in a society. And I will

believe that our culture is changing when the White House invites academic achievers and appreciates them the way we appreciate athletic achievers in our country. And you know, when you are calling bright young men in our schools "geeks" and "nerds" and pretty girls won't date them, and when pretty girls have to play dumb so that they can get a date, don't you think that this sends the message that there may be something wrong in our society that we have got to change our culture?

So I am very much concerned about two things.

One is what do we have to do so that we can attract more bright, young people to these careers? And what do we have to do so that we are doing a better job of educating? It is awfully tough to take a student from high school, who is at the bottom of the barrel in comparison with students from most other industrialized countries, and then to turn out a really quality graduate from our graduate schools. What can we do to attract more, and what can we do to make sure that we have—that we do a better job? Because it is not our kids that are failing, it is we who are failing. They start out okay, and the longer they go to school, the worse they get. Doesn't that send a message?

And by the way, Mr. Chairman, the 24-year fall in SAT scores follow the 24-year increase in the size and influence of the federal Department of Education. Do you think there might be a cause-effect relationship? I won't ask you to answer that question.

But my two questions, what do we have to do to attract more, and what do we have to do to do a better job of training them?

Chairman BOEHLERT. Identify yourself, if you will, for the record.

Ms. JONES. I am Linda Jones, and I am from Alabama.

Our state has undergone a lot of changes recently. Of course, with "No Child Left Behind," and elementary teachers, especially in the K–3 area, we have focused so heavily in reading and making sure that our children are on target, and it has cost us, I think, in the science area. And we have also focused heavily in the math. But in Alabama, we have been looking at changing how we teach. And a lot of times, we are so squeezed into the afternoon to teach the math and science, that we don't take the time, or we don't have the time, to lay out all of the manipulatives and the things that turn children on and help them understand the concepts and really know what they are doing. Instead of just being able to add, why are we adding and really what are the concepts behind it.

We are working on what we call an arts program, or a testing program that will test the science. I am getting a little nervous here, having to stand. I have to take a deep breath.

But one of the things that we are working on is AMSTY, and AMSTY is a math and science and technology program. And the first step that we are having to do is go back, take our teachers, and retrain them, train them in stepping back instead of being the teacher, just be a facilitator and putting out the manipulatives and letting the students work with those manipulatives and discover new ideas themselves. And that takes retraining. And it takes time. And then it takes supplies. I did not have the supplies that the——

Chairman BOEHLERT. It takes resources, too.

Ms. JONES. That is right.

Chairman BOEHLERT. We are just running very short on time, and I want to give Mr. Honda the opportunity to have a few observations.

So thank you very much for that intervention.

Ms. JONES. Thank you.

Chairman BOEHLERT. Mr. Honda.

Mr. HONDA. Thank you, Mr. Chairman and Ranking Member. I appreciate this forum, and let me tell you, as a school teacher myself, I appreciate what it is that you do. I am a science teacher. I taught high school, so I had to wait for your work to be done. My wife, since 1965, was a kindergarten teacher, or what I say, "kindegarten" teacher. And as her husband for many years, I have to get used to the word "no" more than once. She couldn't ever say "no" once. She says, "No, no, no."

Having said that, I would like to associate myself with all of the comments that the Chairman and the Ranking Member had shared with you.

But just to let you know that we understand what it is that you have to do on a daily basis, such as put up with more policies that policy-makers pass and place upon your shoulders without the due compensation, or having assumed that compensation will be there once we pass a law. We need to hear your voices constantly saying, "No unfunded mandates. If you are going to make a promise, please keep them." This committee is one of the most bipartisan-focused committees that there is. We understand, also, that math and science, in itself, are not the only curricular activities that go on in a classroom and that integration and not compartmentalizing math and science is critical, too, and that is what K–6, K–8 folks do, and they do that well. We just haven't figured out, on a national basis, how to put together teacher training programs that have a degree, a professional degree that recognizes that.

Another thing is that I think we understand the distinction between parity and equity. You are given funds to deal with things in the concept of parity, but we say equity. And ADA is parity, not equity, because you know that each child has needs and each child has different kinds of needs and different amounts of money that would support that child's access to equal opportunities in education. So we understand that. And our struggle is to try and figure out how we keep in touch with you so that we translate your experiences into public policy, your insights into public policy, so that it is more, if you will, elegant. And you need to keep in touch with us, almost on a daily basis, with every one of the 435 Members of Congress to make sure that public policy does reflect your needs, because as a teacher, I know that things get put on top of you saying, "There is too much fat." You know, "There are places to cut. We don't know why you can't manipulate or manage your budget." And once we start cutting, at the end of the year, after all of the cuts, the school closes, kids graduate, kids get promoted, and people say, "Hmm, there must be more fat out there."

We understand that that isn't the case, that instruction is something that you need to invest in and that the investment is something that is realized, not only in math and science, but music, which is probably the paramount expression of math and science.

And so I just want to get on my soapbox and let you know, as teachers, that you are a cornerstone of this democracy. Don't give up the ship. Keep fighting for these youngsters. And we are going to do our part here in Congress to make sure that we back up our words with the kinds of efforts that you need in your classrooms.

So thank you very much.

And Mr. Chairman, thank you.

Chairman BOEHLERT. What an eloquent closure to this very productive hearing. Thank you so very much, Mr. Honda. And thank all of you. Now the clock says we have about three minutes and 20 seconds to get from this building over to the Capitol in order to vote.

Thank you, once again.

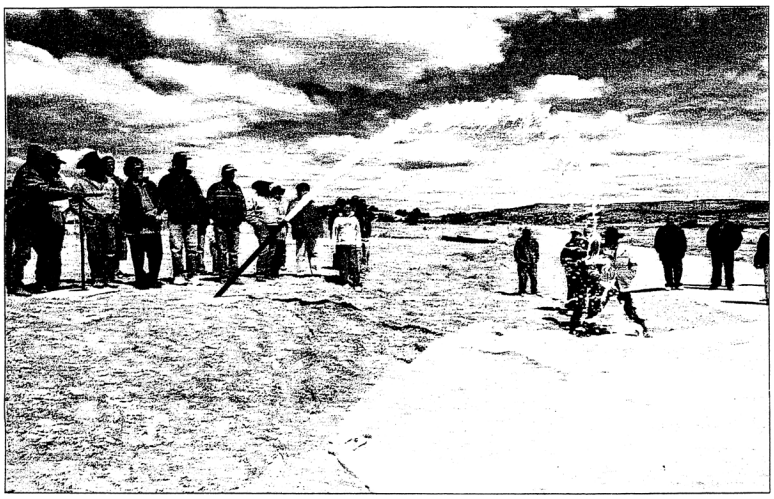
Mr. HONDA. I need a hall pass.

[Whereupon, at 11:55 a.m., the Committee was adjourned.]

Appendix:

Additional Material for the Record

PIPELINE THRILLS COMMUNITY



ROBERTO E. ROSALES / JOURNAL

Running water is the big new thing in Rincon Marquez, southwest of Torreon, where residents celebrated with an arching spray from their water line's clean-out valve.

Finally, Water

Residents of Navajo Village Overjoyed To Have First Water Line

BY LESLIE LINTHICUM
Journal Staff Writer

RINCON MARQUEZ — James Hasdale took a gulp from a plastic cup, smiled and said, "Good water."

Others in a crowd of about 100 people gathered around a spigot and cheered as a flood of clear water came splashing onto the ground.

For the first time since people settled in these sandy hills, water was flowing in the little community of Rincon Marquez on the eastern skirt of the Navajo reservation.

And no one complained about getting wet.

Instead, they clapped and shouted and planned water balloon fights and made jokes. "April showers." "Pray for rain." "You're all wet."

The occasion for all the good cheer on the last day of March was the completion of a 15-mile water pipe, finally putting an end to an hour-long round-trip drive for the residents of Rincon Marquez and nearby Anthill to get water for drinking, cleaning and taking care of livestock.

With 55-gallon water barrels sitting behind her, 10-year-old Nicole Chavez waits at her grandmother's house for water balloon fights to begin.

Most Americans take for granted that they can turn on a faucet and get water. But one in four homes on the Navajo reservation has no running water, and it has been a faraway dream for the 700 or so people who live in hogans, mobile homes and block houses scattered in this corner of McKinley County.

The new water line — a $1 million U.S. Department of Agriculture project — brings residents part of the way there. The water line doesn't extend to individual homes, but it allows everyone to fill their water tanks at 33 cents a gallon from a central watering station many miles closer to home.

How big of a deal is that?

Tony Joe loads three 55-gallon barrels into the back of his pickup at least once a week and bumps down the dirt road into Torreon (15 miles) and fills them with water.

Then he bumps home, distributes the barrels to the houses in his family compound, and all 20 members of his extended family fill up buckets and jugs for drinking, taking sponge baths, doing household chores and watering the horses.

SEE **WATER** ON **PAGE B5**

ROBERTO E. ROSALES/JOURNAL

Louise Apachito, 89, prepares to cut the ceremonial ribbon officially opening a new water station. She recalls when residents used horses and wagons to collect rain water from rock pools around the countryside. Her family has been driving an hour round-trip to get water for her.

Water Line Appreciated

from **PAGE B1**

Those baths are taken by the light of gas lanterns. The people who live here have no electricity, either.

"It's like living the cowboy way," Joe said.

One day, Joe hopes for a water line that will come out to his house, making the faucets work and allowing him to put in a shower and a toilet.

But on Thursday he was all smiles.

"This is something that we dreamed about," he said, "that really came true."

While the bill for the water pipe was paid by the federal government, the community did its best to help. Townspeople put on a fry bread and Navajo taco sale that netted $91.64.

On Thursday there was more food — mutton stew, corn mush, beef brisket and potato salad — served up in the only public building in town, the Rincon Marquez Community Church.

The church sits on the side of a dirt road and shares a driveway with the spiffy new watering station.

Andrew Robertson, the engineer for the Santa Fe company that handled the project, slipped a plastic card into the water station before lunch Thursday and activated the machine for the first time.

Water — what Navajo call *tó* — came pouring out, water games were played and Robertson got a soaking.

Louise Apachito lives directly behind the shiny new water station, and she has a unique perspective on this modern development.

She's 89, and she relies on her children and grandchildren to fill her bright blue water barrel and chop her wood, and she remembers a time when there were no wells or water lines anywhere nearby, and no one had gas stoves.

She remembers going on horseback to slick rock outcroppings in the hills to collect water that had pooled after a rain.

"Life is hard here. Life is tough here," said LaVern Wagner, who grew up in Rincon Marquez and now represents the community on the Navajo Nation Council. "But," she said, "we learn to adapt."