

A Tool to Encourage and Enhance Parental Involvement in and Community Support of Education

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The First Day Foundation is incorporated as a not-for-profit 501(c)3 organization, promoting greater family involvement in education through the First Day of School "Holiday" Campaign, including year-round communication and national networking efforts. In the past quarter, the foundation has received contributions from the following:

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- The Windham Foundation
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- Celine Sullivan
- Matthew Rubin

Thank you to all for your generous support!

INSIDE  
First Day successes in California, Illinois,  
New York—and more about family involvement  
in and community support of education.

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FIRST DAY FOUNDATION  
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NEWSLETTER NO. 11

First Day on the Road

- March 3 -6, **American Association of School Administrators**, San Francisco, California. Presentation and Exhibit.
- March 18-21, **National Association of Elementary School Principals**, New Orleans, Louisiana. Exhibit.
- March 25-27, **Association for Supervision and Curriculum Development**, New Orleans, Louisiana. Exhibit.
- March 30, **National Coalition of Partners in Education**, Washington, D.C. (Contact: Sue Ferguson at 703-359-8973).
- April 1-4, **National School Board Association**, Orlando, Florida. Exhibit.
- May 3-4, **Conference Board Business and Education Conference**, New York, New York. Presentation.
- June 24-27, **National PTA Convention**, Chicago, Illinois. Exhibit.
- July 9-12, **National School Public Relations Association**, San Antonio, Texas. Presentation and Exhibit.
- November 2-5, **National Middle School Association**, St. Louis, Missouri. Presentation and Exhibit.
- November 13-17, **National Association of Partners in Education**, Houston, Texas. Exhibit.



FIRST DAY FOUNDATION

The First Day of School "Holiday": Time off for working parents to attend First Day of School Programs for Parents — a gentle and effective tool to build appropriate family involvement in and community support of education.

The First Day Campaign offers FREE Do-It-Yourself Planning Kits, and other support materials and services to participating schools.

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FIRST DAY NEWSLETTER

FEBRUARY, 2000  
ISSUE NO. 11

First Day Firsthand  
Freeport, Illinois

Project Success Backs  
First Day Events

15th in a series of First Day Stories

Freeport, Illinois parents have always accompanied their children to their First Day of School in kindergarten — at least long enough to get them registered and see them settled into their new surroundings.

But in 1999, the First Day of School took on broader scope and a whole new meaning when Freeport schools, from kindergarten through middle school, hosted a round of First Day Programs for Parents which got everyone buzzing with excitement about the year ahead.

"At first, many of the parents were surprised to be asked to come for the First Day," says Linda Brown, County Coordinator of Project Success for

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First Day Firsthand  
Queens, New York

Teachers See Potential  
From the Start

16th in a series of First Day stories

When Sonia Osorio James, a school-community facilitator at the Ronald H. Brown Community School - P.S. 155 in Queens, New York, approached the teachers at her school with the First Day of School Holiday idea, their immediate response was "We can do this!" And that's the way the program planning

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Stu Hurd, Bennington Town Manager (standing, second from left) with employees from accounting, the assessor's office, water resources, and the police department — just a few of the working parents on the town payroll who participated in First Day 1999.

First Day 2000

Getting Employer Support for  
your First Day "Holiday"

We use the word "Holiday" somewhat tongue-in-cheek, but with a purpose, both to make First Day of School activities attractive to parents and to remind employers that allowing working parents time off (unpaid, paid or flex-time) is a vital component of any community's First Day of School programs.

The First Day of School will never be a formal "holiday" like Memorial Day or the

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**First Day Firsthand - Illinois**  
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**Stephenson County.** "They expect to come for kindergarten, but after that are used to saying their goodbyes at the bus stop or maybe the school's front door. **This year, we opened that door wide, turned up the music, and invited parents in for school like they'd never seen it before."**

Project Success coordinated First Day activities in six schools in Freeport, concentrating their efforts at the Jones Farrar Early Learning Center and the Carl Sandburg Middle School. "These are the biggest transition years," explains Linda, "coming into kindergarten and coming into middle school. Parents and students are understandably concerned about what's in store for them. We saw the First Day of School "Holiday" concept as a way of turning these feelings positive right away.

"By inviting parents to join their students for an orientation which we designed to be positive and fun, **we helped everyone get started on a high note.** Once they were in the school, and once they saw what a great attitude the staff had, it was a big relief to parents and students."

Project Success's purpose is, quite simply, to ensure that all

children will succeed in school. A statewide program launched by Illinois Governor Jim Edgar seven years ago, Project Success has parent liaisons placed in every school. Their function is to identify needs of families, staff and students, and then to do whatever they can to meet those needs. **"We do a lot to enhance school activities, and a big part of that involves getting parents into the school and comfortable with their children's teachers,"** says Linda.

On the First Day of School 1999, Project Success helped enhance school activities by working with teachers, parents and local businesses to create a celebration that would get everyone off on the right foot for the year ahead. "Many local businesses donated refreshments and door prizes, parents helped to prepare and serve the food, teachers put together activities for parents which would help orient them to their children's classrooms, school administrators distributed calendars, and Project Success handed out packets of fliers from various social service programs, providing valuable resources to parents.

Prior to the First Day of School, Project Success had worked alongside Freeport's Coalition for a Safe Community to plan a back-to-school block party

at Martin Luther King Community Services. With representatives from the police department, health department, YWCA and other community organizations, the Coalition purchased 700 backpacks which they loaded with school supplies and made available to any student attending the party. "This was a party for everyone," says Linda, "not just for those students who couldn't afford to buy a backpack.

**"It was our way of showing them that the entire community was behind them; the entire community cared about their success."**

First Day of School 1999 gave the community of Freeport a chance to work together for their children's benefit. It also helped teachers and administrators send another important message, according to Linda.

"By getting parents past some of the nervousness and apprehension that goes along with the start of a new school year," Linda says, "we were able to deliver the message that their continuing involvement is critical to their children's success. We want to get parents into the schools. **Just as important is helping parents bring school into the home, to let their children know that they value education and that they're willing to do whatever it takes to help them succeed throughout the year.**" ☺

**Family Friendly Schools: Where Positive Culture Rules!**

**What does it mean to be a Family Friendly School?**

To **Steve Constantino**, President of the organization so named, **Family Friendly Schools** open the door to greater parental and community involvement and engage students in supportive relationships with one another. In so doing, they give strength and new meaning to the word "family."

Formed three years ago, Family Friendly Schools is a small group of dedicated educators who are busily spreading the message that **for schools to be successful, all who are affiliated with them must take responsibility for contributing to a positive school culture.**

"Many of the diagrams you see show interlocking circles which include schools, families, and community all working together on behalf of the student," says Steve. "And it's important to acknowledge how these relationships contribute to students' success. Our approach just takes it one step further, and so our diagram adds students as another circle, equally important in the mix of constituencies needed to transform school culture."

Steve is the principal of Stonewall Jackson High School in Manassas, Virginia. With 2200 students from all walks of life, where 25 different languages are spoken, his school

is as culturally and economically diverse as they come. By emphasizing the importance of parent, teacher and student investment in achieving a healthy school climate, he and his staff have been able to turn around what was once a "problem" school into one where the great majority of students go on to college and where school violence and other serious discipline problems are almost nonexistent.

Given the successes at Stonewall Jackson, and at other schools which have adopted the Family Friendly Schools approach, Steve is eager to spread the word through participation in conferences and speaking engagements at schools across the country. Steve's colleagues in this effort include a school principal with a background in quality management, a nationally acclaimed motivational speaker, and an executive director who is busy with fundraising and publicity efforts.

"We see the First Day of School Holiday as one more spoke in the wheel that we are all a part of" says Steve. "Each of us is working to build better

relationships because we realize that's what matters most for real education to happen. And that means better relationships between parents and parents, parents and teachers, teachers and students, students and students, and finally between students and parents. When we combine First Day of School Programs for Parents with our own student-to-student Freshman Orientation Program, then add in other boosters throughout the year to keep the positive momentum flowing, we're really on the right track."

To learn more about the work of Family Friendly Schools and/or to set up a program in your own community, call

**1-800-658-6082** or contact Steve directly at **703-794-0803;**

check out the web site at [www.familyfriendlyschoools.org](http://www.familyfriendlyschoools.org);

contact by e-mail at [const14@ibm.net](mailto:const14@ibm.net);

or send a snail mail request to: **Family Friendly Schools**  
13080 Brookmead Drive  
Manassas, VA 20112 ☺

First Day Firsthand -  
New York

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continued to unfold, from the first meetings last January to First Day of School 1999 in September.

"Our motto at this school is Children First," says James. "Since a lot of the work I do involves building strong relationships between parents, school, and community for the sake of the children, my principal, Ruth Winfree, thought I'd be the natural one to follow through. I was excited about it from the start, and the teachers all saw the potential in this program. **Everyone in the school got involved in making First Day happen as it did,** from publicizing what we were planning, to stuffing folders with information for parents, to getting our building ready and preparing the food."

Ronald H. Brown School encompasses pre-kindergarten through sixth grade, and has a total of 900 students. In their first year presenting First Day of School Programs for Parents, they had approximately 200 parents participate, and are already planning how to increase those numbers in 2000. **"This was a great start,"** says James, "and we were encouraged by how many parents from the upper grades responded to our invitation. As word spreads in the neighborhoods, we're sure we can attract still more."

Editor/Writer:  
Amy Swisher, RiverRun Communications  
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Susan P. Huggins & Company

First Day of School 1999 began with teachers meeting parents and students in the school yard and ushering them into the building for breakfast at 8 a.m. in the cafeteria. Children were served as usual, while parents went through a breakfast buffet, then sat down to eat with their students. After breakfast, they all went to the classrooms together, where teachers took attendance (including parents in the ritual), then spent the first hour of the day reviewing their hopes and plans for the year ahead.

**Each teacher had prepared a packet of information for the parents, including developmentally appropriate guidelines for things parents could do at home to support their child's education.** They distributed these packets, answered parents' questions, and also let them know how they could contribute to the life of the school through their volunteer efforts.

**"Since First Day, our turnout at PTA meetings has increased to about 100 parents during the day and 100 parents during the evening,"** reports James. "We'd already had a strong organization, and First Day made it that much stronger. In addition to PTA participation, though, **the most direct increase in parent volunteerism I can point to are the five new parents who have signed on to tutor children who need extra help.** They came in on the First Day and have been enthusiastic about the school ever since."

To promote First Day of School 1999, James sent out post-

cards, advertised on TV bulletin boards, and went around the neighborhood during the summer passing out fliers. She also provided to parents letters which they could give to their employers, requesting a few hours off at the beginning of the school day.

"The word was out there, but as with anything new, it takes time for it to become a habit — an expected start to the new school year," says James. "To encourage even more participation in First Day 2000, we have posted a graph which we'll use to track our numbers over time. This suggestion came from a parent who thought it would be a great way to get people talking."

As a community school, Ronald H. Brown has always been open to parents, and teachers have always welcomed their participation throughout the year. By providing a format for celebrating the start of the year, the First Day of School Holiday strengthens that tie. **"Teachers' and parents' response to this first effort was 'Great idea, we should always do this!' So they're already planning for next September. With school and community spirit like that,"** says James, **"we've got a real winning team here."** ☺

Illinois Fatherhood Initiative Allies With First Day

Picture greater parental involvement in education, and the first image to come to mind is a mother going into her child's classroom to volunteer or helping with homework or attending a PTA meeting or baking brownies for a class fund-raiser.

For the past three years, **David Hirsch, President of the Illinois Fatherhood Initiative (IFI),** has been working to broaden that perception to include more dads. **And this year, he and his organization are forming a strategic alliance with the First Day Foundation as a way of promoting greater involvement by fathers in their children's education.**

The Illinois Fatherhood Initiative — which has enjoyed the backing of the State of Illinois, City of Chicago, Archdiocese of Chicago, Chicago Public Schools, Chicago White Sox, Sears, Illinois PTA, and numerous corporations and community organizations — has been actively spreading the message that fathers' involvement is crucial to children's success in school, at

home, and in the community.

In partnership with the Chicago White Sox, they have sponsored an annual "father of the year" essay contest which, in 1999, involved 69,000 first through twelfth grade essayists, 4,000 teachers at 800 schools, and 1,000 volunteer evaluators. IFI publishes some of the winning essays in a booklet entitled "Me and My Dad," and also publishes the award winning "Faces of Fatherhood Calendar," the "Illinois Fathers' Resource Guide," and a quarterly newsletter. "We see the First Day of School Holiday as a natural fit with our objectives," says Hirsch.

"One of its hallmarks is the emphasis it places on employers granting parents time off from work to come into school with their children. This is particularly key to getting more fathers involved, as almost all of them work outside the home."

Hirsch learned about the First Day of School Holiday at a meeting of the Partnership for Family Involvement in Education

(a program of the U.S. Department of Education). "Menahem Herman, Staff Coordinator with the Department of Education, told me about what the First Day Foundation was doing," said Hirsch, "and I was excited about the chance this gave us to collaborate. There are a lot of organizations now working to promote greater parental involvement in education. When we can find ways to combine our efforts, we can enjoy the synergy and can better leverage our time and resources."

First Day will be working alongside the Illinois Fatherhood Initiative to involve more Illinois schools, and more Illinois dads, in First Day of School 2000. In the meantime, IFI invites persons interested in learning more about their programs to contact them at:

**Illinois Fatherhood Initiative**  
PO Box 06260  
Chicago, IL 60606  
Call toll-free, 1-800-996-DADS  
or in Chicago, 312-648-3062  
E-mail: [dads@4fathers.com](mailto:dads@4fathers.com) ☺

Let Us Know You're On for 2000!

If yours will be a participating First Day school in 2000, or if you've already presented a First Day of School Holiday program and are planning to do so again, please contact the First Day Foundation office so we can keep our Honor Roll up to date. Thank you!

Call us toll-free at  
**1-877-FIRST DAY**  
local calls: **802-447-9625**  
e-mail: [firstday@sover.net](mailto:firstday@sover.net)

## First Day 2000

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Fourth of July, for one thing because first days of school differ from state to state and district to district. But the concept of working parents taking off part or all of this most important day, to accompany their children to school, is catching on nationally. (In 1999, First Day's third year, nearly 400 schools in 35 states hosted First Day of School Programs for Parents, and more are quickly coming on board for First Day 2000!)

"We all know the need for parents taking more responsible roles in their children's education," says Terry Ehrich, President of First Day Foundation and Publisher of Hemmings Motor News. "And we, as employers, can help schools get working parents involved in ways that help teachers teach and children learn."

The First Day of School "Holidays" make us all partners for education when employers throughout the community allow working parents paid or unpaid leave or flex time to attend First Day Programs for Parents and start building positive relationships with their children's teachers that set a positive tone for the rest of the year.

"The First Day of School is the one day each year when forming positive parent-teacher relationships is both most important and most achievable," adds Ehrich.

### Making the Approach

Until they begin to approach employers directly, many new First Day organizers — whether school

administrators, teachers, or community volunteers — are hesitant to ask them to grant release time. They may feel that it is too much to ask, may be concerned that they will be turned down, or may simply prefer to leave responsibility for the request up to the parents who wish to participate.

In our experience, though, most employers are eager to support this initiative when it is presented to them. In First Day's first year, when the idea was tested in 11 schools in the Bennington, Vermont area, 124 employers agreed to participate, including the local hospital, every bank in the community, town government, retail operations, and manufacturing plants. This final number represented a positive response rate of about 95%. (The few employers who turned down the opportunity to support their working-parents-staff in this way generally cited insufficient time to get an OK from distant corporate headquarters).

### Employer Perspectives

**Stu Hurd, Bennington's Town Manager** (responsible for 80 full-time staff), is a strong supporter of the First Day of School Holiday. "Anytime you can do something for your employees which they find meaningful, they appreciate it all the more," he said. "That first year, I had to secure the Select Board's approval. Many board members are employers as well, and they were happy to support giving town staff two hours off for First Day of School Programs. Since then, it's become a tradition."

If town-employee parents want more than two hours off on First

Day, they can take some personal or vacation time. "A good portion of our working parents take advantage of this benefit," said Hurd, "as do grandparents, aunts and uncles, and other family members who wish to attend school and be part of the First Day celebrations taking place throughout our community."

"And two hours doesn't really hurt the work day. Our employees make sure their work stations are covered, and they may stagger the times they take off to ensure that everyone gets a fair turn to participate. When people value a benefit like they do this one, they do what they must to make sure it goes smoothly."

Across the country, **Glenn Woerz of Woerz Marketing in Salinas, California**, added that it had been an honor to participate as an employer in Salinas's First Day of School Holiday in 1999.

"What a dynamic way to involve parents, teachers, administrators and students in the back to school experience," he said. "Whether a child's perception of this first day was one of excitement, anxiety or concern, the parents who participated had the comfort of knowing that the educational process was a team effort."

"The long journey toward graduation is a shared commitment and responsibility," stressed Woerz. "This fresh approach gives concerned businesses the opportunity to instill in their employees the sense of importance and value of a quality education and the importance of supporting their children throughout the journey."

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## First Day 2000

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"For those in the business community concerned about the lack of scholastic aptitude of some of their job applicants, this is one way to get involved and make a difference. We look forward to seeing more businesses and more schools join this family involvement program."

### Learning From Others' Experiences

The First Day Foundation provides free Do-It-Yourself Planning Kits to schools and communities getting started with First Day of School celebrations, including tips for involving area employers.

Whether First Day organizers choose to contact employers directly or to produce sample letters for parents to present to their employers, acknowledging the business community's desire to support this effort is all part of what helps to make the day a notable one.

"Actually being in school on the First Day, during the daytime when school is in session, is a dramatically different experience than evening open houses or ice cream socials," says Terry Ehrich. "Family members can see their student's teachers in action, and get a more complete sense of the school culture and climate."

"It also draws a lot more

attention to the need for family involvement in education, when the First Day of School is important enough to mark as a 'Holiday'. This experience leaves an impression far stronger than most evening programs — on the parents, the teachers, and the students. Employers who support their employees' participation get a big payback in staff gratitude."

For more information on how to organize your First Day of School Holiday 2000, contact the First Day Foundation office toll-free at 1-877-FIRST DAY or 802-447-9625. E-mail to: [firstday@sover.net](mailto:firstday@sover.net) or snail mail to: PO Box 10, Bennington, VT 05201. ☐

## ASCD Survey: 75% Call for More Family Involvement in Education

The Association for Supervision and Curriculum Development (ASCD) recently conducted its annual Issues Survey to which more than 4,400 of its members responded. A six point scale was used, with one meaning "least important" and six meaning "extremely important." The issues ranking highest were:

1. Teaching students how to find information rather than memorizing information. (84% of respondents rated this statement with a 5 or 6).
2. Encouraging more family involvement in schooling. (75% of respondents rated this statement with a 5 or 6).

Results of this survey will be used by the ASCD as it develops positions to be considered for adoption by ASCD's Board of Directors at the annual conference in New Orleans at the end of March. ☐

***The First Day Foundation provides free Do-It-Yourself Planning Kits to help schools and communities use the First Day of School to build a foundation for year-round family involvement and community support.***

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# First Day Holiday Do-It-Yourself Planning Kit



**FIRST DAY  
FOUNDATION**

[www.firstday.org](http://www.firstday.org)

AN EASY GUIDE for teachers,  
administrators, and friends of education

HOW TO plan, prepare and present  
First Day of School Programs for Parents,  
custom tailored to your school and community

FREE to participating schools and communities

file: education

TO: HRC  
FROM: Shirley Sagawa  
RE: Education Trust research  
DATE: February 1, 2000

Here is Education Trust's recent study on high performing schools in low-income communities. I've also appended the list of 43 New York schools that were in the study.

# Dispelling the Myth: High Poverty Schools Exceeding Expectations

1999

Report of the Education Trust in Cooperation With The  
Council of Chief State School Officers and Partially Funded  
by the U.S. Department of Education

## **Dispelling the Myth: High Poverty Schools Exceeding Expectations**

### **SECTION 1: A Survey of Top Performing, High Poverty Schools**

"We take all of the excuses off the table and have committed ourselves to working with the kids that walk through the door."

-- Principal, Thayer Elementary, Kansas

In 1994, the U.S. Congress made sweeping changes in Title I, the largest of the federal government's elementary and secondary education programs. As originally designed, the law supported efforts by high poverty schools to give their low-achieving students extra help in mastering the most basic skills. The reauthorized Title I pressed participating schools and states to set their sights higher. Indeed, the goal of the new law was an audacious one: to get all students—poor and rich, minority and white—to the same high academic standards.

Congress is now preparing to reauthorize this program once again. During the coming two years, members of key legislative committees and those who advise them will be faced with an important decision: do we continue along the path that we started down in 1994, or do we strike off in another direction?

Some are already beginning to argue that the law isn't working. Achievement as measured by NAEP, overall, isn't up, or isn't up by much. And many Title I schools have continued doing essentially what they were doing before the new law took effect.<sup>1</sup> Maybe we should simply give up, some critics say, and admit that schools will never be able to get poor kids to meet high standards.

But we see too many successful high poverty schools to throw in the towel on their educational futures. If poor kids can't achieve at high levels, why are the students in Hawley Road Elementary School in Milwaukee, 80% of whom are poor, knocking the top off of their state's assessment in reading? And why, too, are the students in Sierra Vista Elementary School in Reno, Nevada, over half of whom are poor, achieving at the highest level on their state's assessment in mathematics? Why, indeed, are students in the highest poverty schools in eight entire states, performing higher in mathematics than the average student in all the other states?

Before anybody—including members of Congress and educators in high poverty schools—gives up on poor kids or on Title I, they need to take a careful look, as we have, at schools that are successfully serving poor children. In the practices of those schools, as well as in their essential spirits, there are many lessons for those of us who hope for more schools like these in the future.

That's what this report is all about: mining the experiences of those who dispel the myth that poor kids can't learn and are proving it everyday through their work in top performing, high poverty schools.

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<sup>1</sup> See 1998 report from Citizens Committee on Title I.

In the fall of 1998, the Education Trust constructed and administered a survey of 1,200 schools that had been identified by the states as their top scoring and/or most improving schools with poverty levels over 50%. The work had partial support of the Council of Chief State School Officers (CCSSO). We sought to highlight the success stories of Title I as well as identify characteristics that seem to contribute to high academic achievement among low-income students. The U.S. Department of Education asked the Education Trust and CCSSO to report out their findings. The results are reported in these pages.

The 366 elementary and secondary schools responding to the survey serve student populations that are largely poor. They come from 21 states. They operate in rural isolation and in urban overcrowding. They serve every racial and ethnic group in the country as well as those who come to school with little or no English. Over half the students in these schools are from low-income families; in many of them, poor students comprise over three quarters of the school population.

The survey data reported by the schools' principals were for the 1996-97 academic year. Many of these schools produced results that exceed the best efforts of their suburban counterparts. All of them have met one of two significant criteria: (1) "high performing," that is, among the ten highest performing high poverty schools on state assessments in reading and/or mathematics; or (2) "most improved," that is, among the ten biggest gaining schools on state assessments in reading and/or mathematics.

This is not to say that all the schools in this study have met their goals. Most, by their own admission, recognize that they still have much to do to get their students to the same high academic levels as their peers in affluent schools. Nonetheless, these schools warrant attention for showing gains when too many schools have bought the myth that such progress is not possible with poor children. Their success is revealed by their position at the top of the pack in their states.

Their experiences as reported in this survey should interest both policymakers and fellow practitioners. While no single instructional technique, no particular textbook, no curriculum could be credited with producing these schools' gains, one dominant theme did emerge from the survey. All of these schools are unusually focused on high academic expectations for their students.

Standards undergird each of the six findings in this report. In addition, the findings seem to validate the policies promoted by the 1994 Title I law. In general, we found that these top performing, high poverty schools tend to:

- ***Use state standards extensively to design curriculum and instruction, assess student work, and evaluate teachers.*** A full 80% of the high-performing, high-poverty schools reported using standards to design instruction. Similarly, the successful schools in this study were using standards to assess student work and evaluate teachers.

- ***Increase instructional time in reading and math in order to help students meet standards.*** A 78% majority of top performing, high poverty schools reported providing extended learning time for their students. This time was primarily focused on reading and math.
- ***Devote a larger proportion of funds to support professional development focused on changing instructional practice.*** Changes in the 1994 law require schools to provide for thorough professional development for teachers in high poverty schools. The schools in this study seem to be moving faster than their less successful counterparts to comply with this provision. As important is that the focus of professional development seems to be centered on helping students meet specific academic standards.
- ***Implement comprehensive systems to monitor individual student progress and provide extra support to students as soon as it's needed.*** Four out of five of the top performing, high poverty schools had systematic ways to identify and provide early support to students in danger of falling behind in their instruction.
- ***Focus their efforts to involve parents on helping students meet standards.*** In these schools, traditional roles for parents as fund-raisers are giving way to activities that address parents' knowledge of standards, encourage their involvement in curriculum and involve them in reviewing students' work.
- ***Have state or district accountability systems in place that have real consequences for adults in the schools.*** Nearly half of the principals in these schools were subject to some kind of sanctions if their students fail to show measurable academic improvement.

Not every school in this survey reported having all six of the above characteristics in their programs; most, in fact, had some in various combinations. In addition, we made no attempt to make conjectures about the relative effectiveness of these characteristics. This survey was structured purely to elicit information about the types of practices top performing, high poverty schools engage in. The findings represent the school characteristics that showed up over and over again in the survey responses.

We believe that, even at face value, this information should alert policymakers and educators to policies that seem to hold the most promise for the education of poor children. At the same time, we recognize the limitations of a survey such as this. For this reason, we will be exploring these findings in greater depth in the second phase of this project.

The next section offers a discussion of the six major findings listed above. Sections 3 and 4 follow with an overall profile of the schools responding to the survey and a description of our methodology.

## SECTION 2: The Findings

“What it takes is this: Putting kids first and believing all kids can learn. Lots of hard work, a committed staff, trust, compassion and clear standards for behavior and performance.”

Principal, Strafford Elementary, New Hampshire

The Education Trust analyzed the survey data to identify common characteristics of top performing, high poverty schools; to determine how they used Title I funds; and to identify common policies and practices that contribute to student success. In general, we found that the top performing schools were quickest to use state standards to guide their efforts to raise student achievement, as the new Title I law intended. Standards formed the basis of the dominant characteristics and practices in the schools responding to the survey.

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### **Top Performing, High Poverty Schools Report Extensive Use of Standards to Design Curriculum and Instruction, Assess Student Work and Evaluate Teachers**

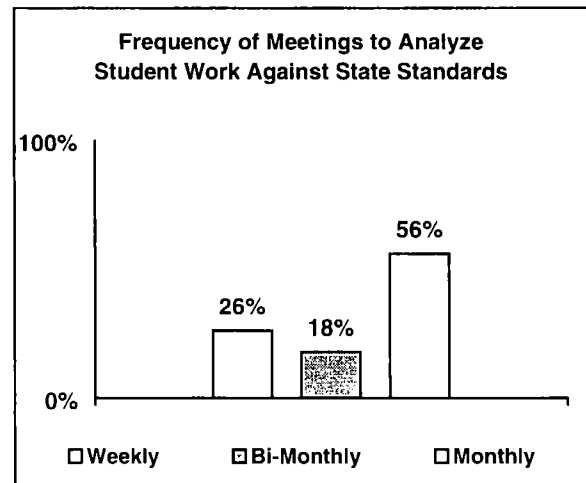
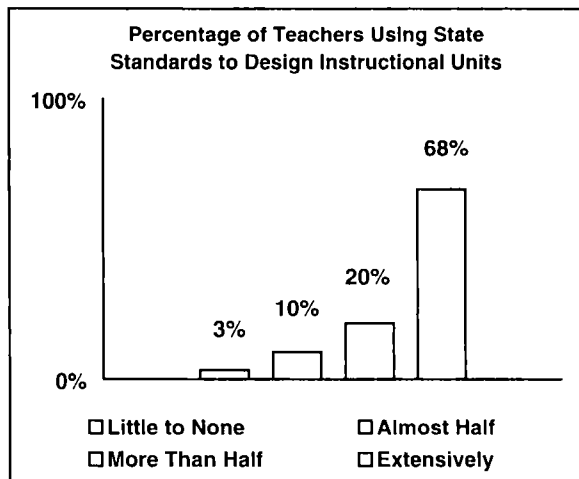
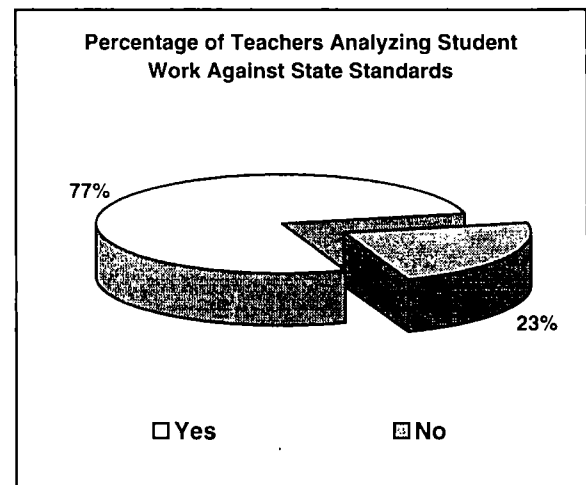
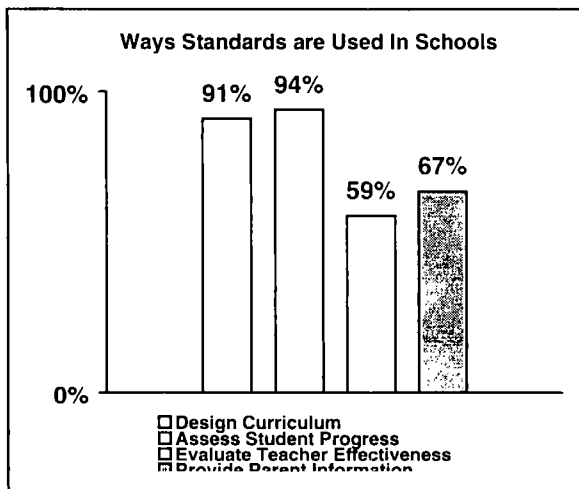
The most significant finding of the Education Trust survey was the extent to which top performing, high poverty schools are using standards to guide school activity. A full 80% report that standards are used extensively in their schools to design curriculum and instruction. Nearly every school in our survey — 94% — uses standards to assess student progress with 77% offering regular mechanisms for teachers to analyze student work against state standards.

The 1994 Title I law was designed to make sure that poor students were held to the same high expectations as their peers in more affluent schools. To this end, the law promotes a system of challenging academic and performance standards for all students in the state. In order to receive Title I funds, schools have to measure the academic growth of low-income students using the same standards and assessments administered to non-Title I students.

This strategy seems to be paying off in the top performing schools in this survey. These schools have become places where all classroom activity is aligned with the state standards. The principal of East New York Transit Tech, for example, credits standards as being one of the most important factors in the school’s ability to increase achievement. Other factors include the recognition among the faculty that all students must meet higher standards and their willingness to work together toward this goal.

Standards also inform teacher evaluations in the top high-poverty schools, 59% of which reported using standards to gauge teacher effectiveness. The Arthur P. Momot school in New York is an example. Momot’s administration focuses instructional staff evaluations on standards implementation based on classroom observations. The evaluations include a look at standards in setting goals and as a basis for teacher portfolios. Arthur P. Momot also provides peer coaching to help teachers strengthen their capacity to teach to the standards.

All the states in this survey have a system of standards and assessments in place. However, evidence from around the country shows that state standards are not a universal presence in day-to-day classroom practice. The top performing, high poverty schools in this survey suggest that the explicit use of state standards in planning and evaluating curriculum, instruction and student work can have a significant impact on raising the achievement of low-income students. Using standards to evaluate teacher effectiveness can further strengthen the alignment of practice to student results.



**Top performing, high poverty schools increase the instructional time in reading and math in order to help students meet standards.**

The 1994 Title I reauthorization encouraged schools to increase the amount and quality of instructional time to help accelerate the gains of low-income students. A 78% majority of the schools surveyed provide extended learning time that emphasizes core academic subjects, especially reading and math. Research has shown that early mastery of these skills is crucial to learning in other subjects. Students who fail to become proficient readers face an uphill struggle to keep up with increasingly demanding texts and vocabulary. Similarly, students lacking a strong foundation in math often find themselves lost in the high-level high school courses necessary for success in college and work.

The extra time devoted to making sure low-income students are solid in the basics shows in better results for the schools in this survey. Parkview Elementary in Wisconsin credits its emphasis on the basics—reading, math, writing and science—as being integral to the high academic achievement of their students. Lake Agassiz Elementary in North Dakota offers an expanded ten-month experience for K-1 children at risk of academic failure. They credit this program for the considerable gains they show with participating students.

Middle and high schools in this survey also reported adjusting schedules in order to provide students with extended opportunities to develop reading and math skills. In New York City, for example, East New York Transit Technical school restructured its school day with block schedules for math and science, a Copernican model for English and social studies and an extra ten-week cycle to provide extra help in improving students' literacy skills. Of all the schools in the survey, 86% reported an increase in the time spent on reading, and 66% report having increased the amount of time students spend studying math.

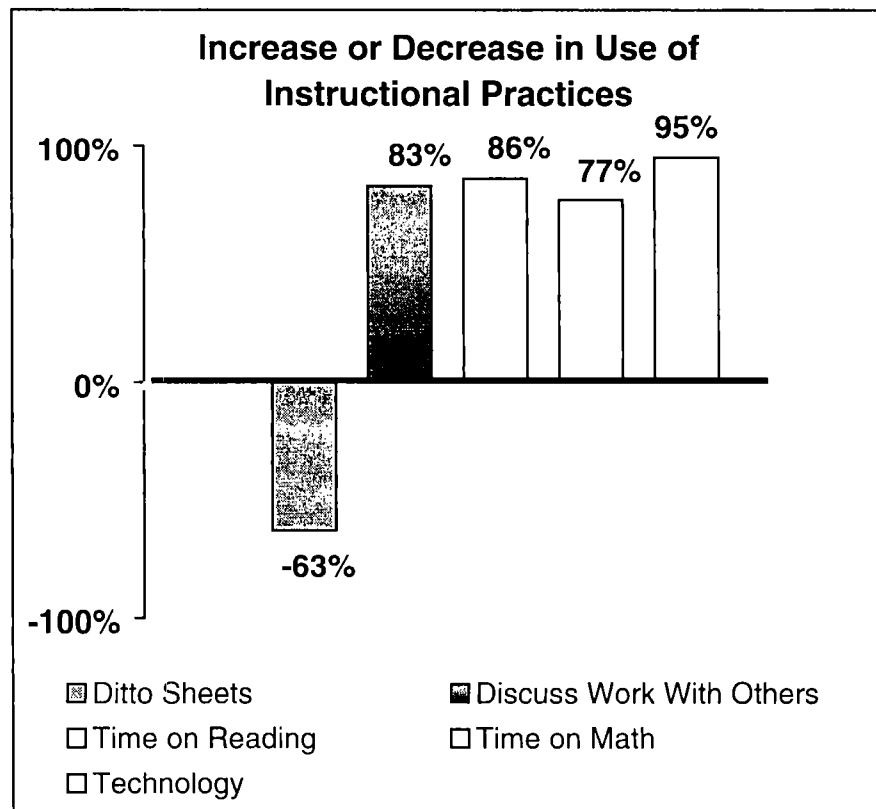
The survey also elicited information about the amount of time devoted to particular practices. Recent research has shown relationships between various instructional practices and student achievement scores on the National Assessment for Educational Progress (NAEP).<sup>2</sup> An analysis of the eighth-grade mathematics assessment, for example, show a negative relationship between the routine assignment of ditto sheets and students' test scores. On the other hand, students who discuss work with other students were shown to also have higher NAEP scores. For these reasons, our survey asked principals whether the amount of time their students spent on specific instructional practices had increased or decreased during the past few years.

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<sup>2</sup> The Education Trust, *Education Watch 1998*, pps. 16-18. Analysis of NAEP 1996 Math Survey Tables.

Overall, among survey respondents, nearly two-thirds (63%) report a decrease in the use of ditto sheets. On the positive side, 83% of the schools reported increasing the amount of time students spend discussing work with others. These data indicate that the top performing schools are moving away from low-level instruction, exemplified by the routine filling out of bubbles on ditto sheets. Rather they seem to be developing higher-order skills by offering students more time for discussion of the subject matter. In addition, 95% reported an increase in the use of technology.

The efforts of these schools respond to the recognition by our nation's leaders that students and schools need to maximize the time spent on teaching and learning the core academic subjects and developing higher order skills if our low achieving children, particularly those from low-income families, are to meet the nation's educational goals.



**Top performing, high poverty schools are spending larger proportions of Title I dollars on professional development.**

Changes in the 1994 law require schools to provide for thorough professional development for teachers in high poverty schools. There is growing recognition that teachers need time to understand new state standards and to develop strategies for teaching them to poor and minority students. The top performing schools in this study seem to be moving fast to comply with the Title I provision.

Our survey revealed that a full third of the top performing schools were dedicating more than 10% of their Title I dollars to professional development. In comparison, two recent national studies of seven large urban districts estimated that expenditures on professional development ranged from 1.8% to 5.7% of the local school budget.<sup>3</sup> Even New York City's District 2 — a school district well-known for attributing its student gains to significant increases in professional development—devotes only slightly more than 5% to professional development.<sup>4</sup>

As important as investing funds, according to our respondents, is making sure that professional development is focused on the implementation of standards and students' needs. Wrote the principal of Nathaniel Green Middle School in Rhode Island: "Over the last few years we have focused our professional development activities toward teaching to standards and modeling our classroom assessment more in line with our state assessments."

Bemiss Elementary in Spokane, Washington, uses the majority of its Title I funds to fund two literacy and two math instructional facilitators to provide regular in-class professional development, study sessions and grade level meetings. Thayer Elementary in Wyoming uses its Title I funds to provide early literacy training staff development to improve the teaching of reading and writing. Thayer's program restructures the teaching of reading and writing in the elementary grades using high-quality children's literature, provides intensive staff development, uses research-based methodology and measures the program's success using validated instruments.

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<sup>3</sup> Miller, B., B. Lord and J. Dorney, *Staff Development for Teachers*, Education Development Corp., and D. Moore and A. Hyde, *Making Sense of Staff Development*, Designs for Change, Chicago, cited in CPRE Policy Briefs, June 1995.

<sup>4</sup> Panasonic Foundation

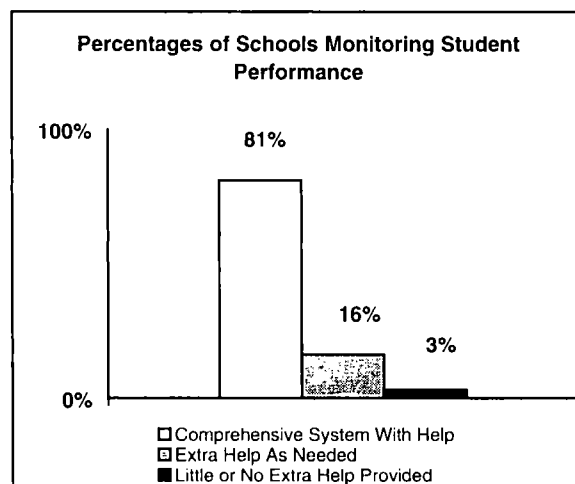
## **Top performing high poverty schools have comprehensive systems to monitor student mastery of standards and provide extra support to those who need it.**

Title I emphasizes the use of standards as a strategy for all kids to reach high standards. A key component of this is the requirement that schools monitor the progress of each student and provide appropriate support. The vast majority of respondents — 81% — report that they have in place a comprehensive system for monitoring student progress and providing early support to students in danger of falling behind in their instruction.

Monitoring systems are effective means for providing ongoing analysis of student achievement data. When used for diagnostic purposes, achievement data enable schools to provide immediate help to struggling students and to move them on quickly once they have demonstrated mastery. The Terrell Wells Middle School in Texas identifies students who need extra support and offers help for individual students or groups that includes 40 minutes of daily tutorial. Several schools make weekly progress reports to parents to elicit their help in monitoring student mastery of standards.

The West Bourbon Elementary School in Kansas uses its Title I funds for instructional support staff to assist students who fall below the mastery level. Students are then reassessed to measure improvements in their progress towards standards. Victor Ornelas Elementary School, also in Kansas, analyzes pre- and post-test data by subjects and adjusts its teaching strategies to meet students' specific learning needs.

The push-pull of monitoring progress and providing extra support helps schools to stay on top of the development of each of their students. In this way, they can make sure that no student will fall through the cracks.



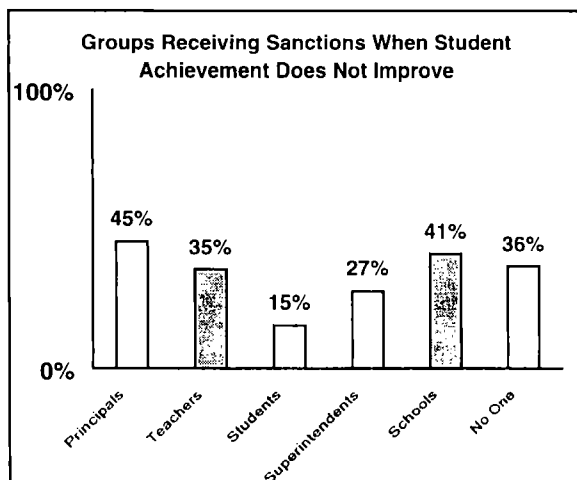
## Top performing, high poverty schools have state or district accountability systems in place that have real consequences for adults in the schools.

The 1994 Title I law for the first time held high poverty schools accountable for the academic achievement of their students. Recent developments in some states, notably Texas, North Carolina and Kentucky, show that accountability for results is related to improvement in student achievement. Policymakers hoped that by emphasizing student results and attaching strong accountability provisions for school districts, they could allow school systems the freedom to devise their own strategies for getting there.

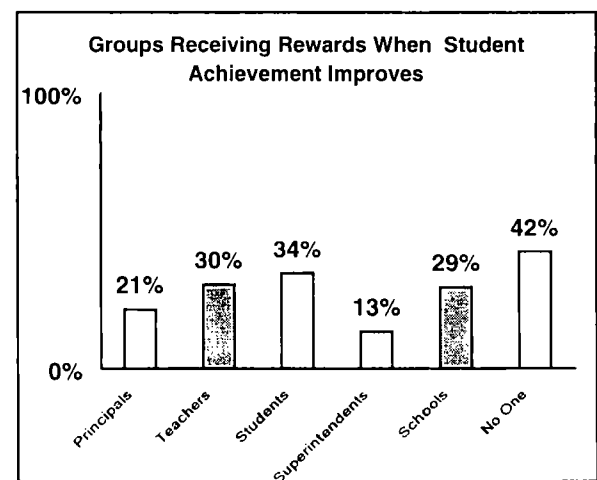
Title I accountability is far from fully realized. *Education Week's Quality Counts 1999* reports that just 31% of states have systems to hold schools and principals accountable for student performance. Only 20% of the states have these mechanisms for teachers and 24% hold entire school districts responsible for showing students gains.

Accountability for student achievement is an important characteristic of our pool of top performing schools in that nearly two-thirds of the respondents reported that they were operating within systems that held adults responsible to some degree. A full 45% of our respondents reported that accountability took the form of strong sanctions for schools and principals. Similarly, 35% of the high poverty schools in our survey report that teachers are held responsible for student achievement.

One in three schools report there are rewards for students when they improve, and somewhat fewer than one in three teachers receive rewards when their students post gains. A higher percentage of schools, 42%, report no rewards for improving student achievement. Overall, the respondents reported clearer and more frequent sanctions for adults than for students and fewer rewards for adults in these schools.



Note: Schools had the option to check more than 1 selection. This explains why the percentages exceed 100.



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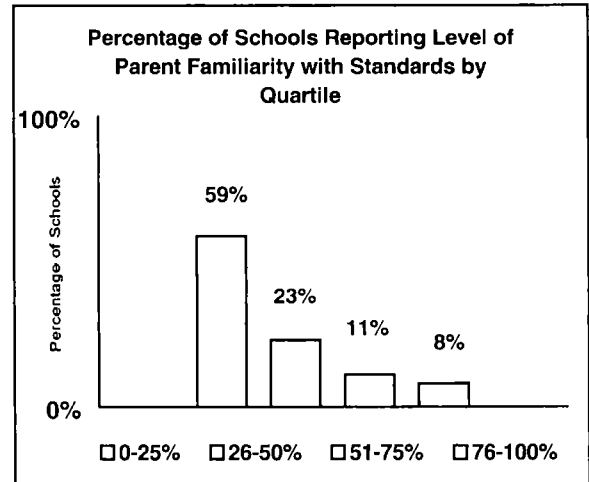
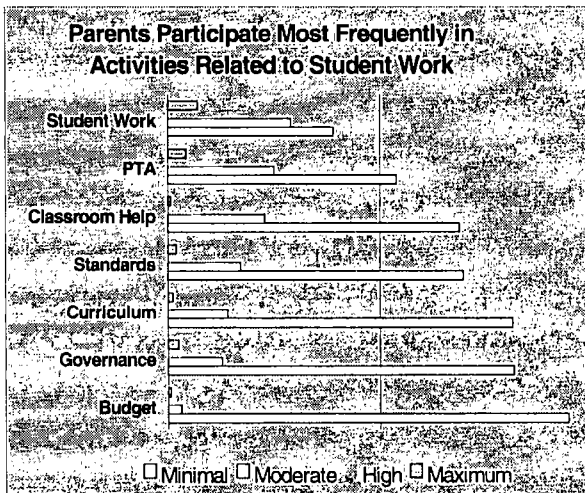
## Top performing, high poverty schools focus their efforts to involve parents on helping students meet standards.

Since its inception in 1965, the Title I legislation has supported parent involvement. Traditionally, local and districtwide parent councils were involved either in monitoring how the district spent Title I funds or in governance. This involvement was in keeping with the emphasis on "inputs"—the investment of resources as opposed to "outcomes" or student results—in the Title I law before the 1994 reauthorization.

As the graph below indicates, parent activity in top performing high poverty schools indicates that these schools are increasingly focusing their parent involvement efforts toward areas that most directly affect student achievement. In these schools, traditional roles for parents as fundraisers are being expanded to include processes to help parents improve their knowledge of standards and their understanding of student work.

Nearly one in three schools in this survey reported that 25-50% of their parents were involved in processes to help them understand the quality of student work; one in four said that 50-75% of their parents were involved in processes to help them understand student work.

It appears that this group of top performing, high poverty schools is moving in the direction encouraged by the 1994 law which encouraged schools to involve parents in more academic areas of their children's schooling.



### **SECTION 3: Survey Schools At A Glance**

The Title I program provides funding to nearly every school district in the country. The breadth of the program's reach is illustrated by our survey respondents who represent every major region of the country, with the largest representation from the South at 47%; 26% from the Midwest; 15% from the Northeast and 12% from the West. The respondents range from small town America (62%) to some of the nation's largest urban areas (38%).

The majority of the schools are neighborhood schools that accept all of the children in their attendance area (67%). The next largest segment is schools with open enrollments that accept children from throughout the school district (30%). True to the origins of the Title I legislation, elementary schools make up the largest number of respondents.

The 1994 reauthorization gave schools more flexibility to establish schoolwide Title I programs, and 79% of respondents took advantage of that opportunity to allow all of their students to benefit from the program. The reauthorization also sought to place more budgetary control of Title I funds at the school-building level, and 56% of the schools surveyed reported having control over all of their Title I dollars.

The schools have an average enrollment of 509 students and are led by principals who have served on average 4 ½ years at the school. The average school had a student enrollment in excess of 60% white; 17% African American; 13% Latino; 2% Asian; and 4% Native American. The average limited English proficient (LEP) population is 10%.

### **SECTION 4: Methodology**

In spring 1998, the Council of Chief State School Officers (CCSSO), in collaboration with the Education Trust, asked the chief state school officer of every state to voluntarily participate in a project to identify top performing, high poverty schools. Twenty-one states agreed. The project targeted schools that served student populations in the 50-75% poverty range and the 75-100% poverty range.

Each participating state submitted a list of its top performing, high poverty schools based on assessment results in reading and mathematics administered at the elementary, middle and high school level. The schools were further categorized as either High Achievement or Most Improved. The High Achievement category included the top 10 scoring high poverty schools in terms of student performance. The Most Improved category included those schools who had made the greatest increases in assessment scores over a two-year period. The survey yielded a list of 1,200 top performing, high poverty schools representing every region of the country.

The results of the CCSSO project were compiled into a database for analysis by the Education Trust. The next step required linking the Education Trust top performing schools database to the U.S. Department of Education's public schools locator database to obtain mailing addresses for each of the 1,200 schools.

The Education Trust then designed a survey that was mailed to each of the 1,200 schools in October 1998. The survey (Appendix A) focused on discovering the strategies these schools utilized to increase achievement. By mid-November 1998, 366 schools responded to the survey. The results were coded, entered and analyzed and comprise the content of this report.

While we sought to survey "high performing" high poverty schools, each state determines the rigor of its state assessment. Therefore, state-by-state comparisons cannot be made regarding the level or content of student achievement. We urge readers of this report to bear these factors in mind in interpreting the results.

## **SECTION 5: Conclusion**

A survey such as this one offers a glimpse into what separates these high poverty schools from others who are not showing the same amount of progress. The one aspect that pops out from the responses is the extent to which state standards inform the work of top performing schools and raise the adults' expectations for their students. The respondents told us that they use standards to design instruction, assess student work, and evaluate teachers. Standards also provided the framework for professional development of teachers. They guided the monitoring of student progress and helped schools target the kinds of extra support struggling students needed to become proficient. Parents, by and large, were increasingly more active in the academic aspects of school life than in governance and budgets. Making adults accountable for making sure that their students meet standards was another factor that showed up in these schools.

But a survey can only begin to piece together a picture of what makes schools work. The findings have raised several questions that the Education Trust believes warrant further investigation. For example, we don't know how professional development dollars are spent or what happens in teachers' meetings to examine student work. The survey only offers clues about the overall impact of Title I dollars.

The Education Trust intends to pursue some of these questions over the coming months. This survey has been invaluable in helping us surface promising practices and, most important, pinpointing schools where they are making these practices work for poor students. Our next task is to find out why they work, so we can share these lessons with policymakers and educators who care about the education of poor children.

# Top Performing Schools Directory



## New York

**Assessment:** New York State Pupil Evaluation Program Test (Grades 3 & 6); Grades Regents Examination (Secondary)  
**Proficient:** Score at or above the state reference point, but below mastery level (Grades 3 & 6); Not available, Secondary)



**CHOIR ACADEMY OF HARLEM**  
2005 MADISON AVE, NEW YORK, NY 10035  
212-289-3481 04 - 11

### High Achievement

Reading: 106 (56.3)

### Most Improved

Reading Year 1: 13 (50.3) Reading Year 2: 106 (56.3)

Enrollment: 282  
LEP: 0 to 10% Title I  
50-74% Poverty  
Whites: 1  
African Americans: 95  
Latinos: 3  
Native Americans: 1

**FASHION INDUSTRIES HIGH**  
225 W 24TH ST, NEW YORK, NY 10016  
212-255-1235 09 - 12

### High Achievement

Reading: 41 (56.3) Math: 35 (58.7)

### Most Improved

Reading Year 1: 40 (50.3) Reading Year 2: 41 (56.3)

Enrollment: 201  
LEP: 11 to 20% Title I  
75-100% Poverty  
Whites: 5  
African Americans: 27  
Latinos: 61  
Asians: 7



**HOSTOS LINCOLN ACADEMY**  
475 GRAND CONCOURSE, BRONX, NY 10451  
718-518-4333 09 - 12

### High Achievement

Reading: 68 (56.3)

### Most Improved

Reading Year 1: 29 (50.3) Reading Year 2: 68 (56.3)

Enrollment: 267  
LEP: 11 to 20% Title I  
50-74% Poverty  
Whites: 1  
African Americans: 23  
Latinos: 74  
Asians: 2  
Native Americans: 1

**LACKAWANNA HIGH**  
550 MARTIN RD, LACKAWANNA, NY 14218  
716-827-6727 07 - 12

### High Achievement

Math: 46 (58.7) Reading: 55 (56.3)

### Most Improved

Math Year 1: 32 (52.7) Math Year 2: 46 (58.7)

Enrollment: 5  
LEP: 0 to 10% Title I  
50-74% Poverty  
Whites: 70  
African Americans: 20  
Asians: 10

# Top Performing Schools Directory



## New York



PS 38

350 VERMONT ST, BUFFALO, NY 14213  
716-888-7060 PK – 08

### High Achievement

Math: 58 (20.3)

### Most Improved

Math Year 1: 20 (26.8) Math Year 2: 58 (20.3)

Enrollment: 726  
LEP: 11 to 20% Title I  
75-100% Poverty  
Whites: 13  
African Americans: 50  
Latinos: 36  
Native Americans: 1



SCHOOL 46

250 NEWCASTLE RD, ROCHESTER, NY 14610  
716-288-8008 KG – 06

### High Achievement

Math: 95 (58.5)

### Most Improved

Math Year 1: 56 (45.5) Math Year 2: 95 (58.5)

Enrollment: 373  
LEP: 0 to 10% Title I  
50-74% Poverty  
Whites: 44  
African Americans: 45  
Latinos: 8  
Asians: 2  
Native Americans: 1



SYLVAN-VERONA BEACH COMMUNITY  
RT 13, VERONA BEACH, NY 13162  
315-762-4404 KG – 06

### High Achievement

Grade: 6  
Reading: 100 (86.1) Math: 50 (20.3)

### Most Improved

Math Year 1: 27 (26.8) Math Year 2: 50 (20.3)

Enrollment:  
LEP: 0 to 10% Title I  
50-74% Poverty  
Whites: 100

TALENT UNLIMITED HIGH  
317 E 67TH ST, NEW YORK, NY 10021  
212-879-6866 09 – 12

### High Achievement

Reading: 65 (56.3)

### Most Improved

Math Year 1: 12 (52.7) Math Year 2: 31 (58.7)

Enrollment:  
LEP: 0 to 10% Title I  
50-74% Poverty  
Whites: 9  
African Americans: 48  
Latinos: 40  
Asians: 3

Legend:



The Education Trust Logo denotes schools that have exceeded their state's average score in reading and/or math.  
( ) The number in parentheses is the state average score.

## New York



**ALBANY ELEMENTARY**  
1151 ALBANY ST, UTICA, NY 13501  
315-792-2150 KG - 06

### High Achievement

Reading: 100 (85.6)

Enrollment: 510  
LEP: 0 to 10% Title I  
50-74% Poverty  
Whites: 68  
African Americans: 19  
Latinos: 13



**ARTHUR P. MOMOT**  
60 MONTY ST, PLATTSBURGH, NY 12901  
518-563-1140 PK - 05

### High Achievement

Reading: 100 (85.6)

Enrollment: 460  
LEP: 0 to 10% Title I  
50-74% Poverty  
Whites: 86  
African Americans: 9  
Latinos: 4  
Asians: 1



**GREAT NECK ROAD ELEMENTARY**  
1400 GREAT NECK RD, COPIAGUE, NY 11726  
516-842-4000 KG - 05

### High Achievement

Reading: 100 (85.6)

Enrollment: 492  
LEP: 11to 20% Title I  
50-74% Poverty  
Whites: 38  
African Americans: 30  
Latinos: 30  
Asians: 2



**HAMILTON ELEMENTARY**  
20 OAK ST, MOUNT VERNON, NY 10550  
914-665-5050 KG-06

### High Achievement

Reading: 100 (86.1)

Enrollment: 508  
LEP: 0 to 10% Title I  
50-74% Poverty  
Whites: 89  
African Americans: 8  
Latinos: 2  
Asians: 1



**HOLMES**  
365 DUPONT AVE, TONAWANDA, NY 14150  
716-874-8423

### High Achievement

Math: 83 (58.5)

Enrollment: 508  
LEP: 0 to 10% Title I  
50-74% Poverty  
White: 89  
African American: 8  
Latinos: 2  
Asians: 1

## New York

IS 237 RACHEL CARSON  
46-21 COLDEN ST, FLUSHING, NY  
718-353-6464 07 - 09

### High Achievement

Math: 47 (58.7)

Enrollment: 290  
LEP: 21 to 30%  
50-74% Poverty  
Whites: 10  
African Americans: 10  
Latinos: 22  
Asians: 58

NEWTOWN HIGH  
48-01 90TH ST, ELMHURST, NY 11373  
718-592-4300 09 - 12

### High Achievement

Math: 39 (58.7)

Enrollment: 639  
LEP: 31 to 40%  
50-74% Poverty  
Whites: 7  
African Americans: 8  
Latinos: 61  
Asians: 24



PS 161  
330 CROWN ST, BROOKLYN, NY 11225  
718-756-3100 KG - 05

### High Achievement

Reading: 100 (86.1) Math: 75 (20.3)

Enrollment: 413  
LEP: 0 to 10% Title I  
75-100% Poverty  
Whites: 1



JEFFERSON ELEMENTARY  
BAILEY RD, MASSENA, NY 13662  
315-764-0292 KG - 06

### High Achievement

Reading: 100 (85.6)

Enrollment: 363  
LEP: 0 to 10% Title I  
50-74% Poverty  
Whites: 100



PS 139 THE REGO PARK  
93-06 63RD DR, REGO PARK, NY 11374  
718-459-1044 KG - 06

### High Achievement

Math: 40 (20.3)

Enrollment: 916  
LEP: 31 to 40%  
50-74% Poverty  
Whites: 40  
African Americans: 4  
Latinos: 16  
Asians: 40



PS 171 PATRICK HENRY  
19 EAST 103RD ST, NEW YORK, NY 10029  
212-860-5801 PK - 06

### High Achievement

Math: 30 (20.3)

Enrollment: 561  
LEP: 0 to 10% Title I  
75-100% Poverty  
Whites: 1  
African Americans: 49  
Latinos: 49  
Asians: 1

## New York



PS 192

4715 18TH AVE, BROOKLYN, NY 11204  
718-633-3061 PK - 05

### High Achievement

Math: 77 (58.5)

Enrollment: 438  
LEP: 31 to 40% Title I  
75-100% Poverty  
Whites: 32  
African Americans: 5  
Latinos: 44  
Asians: 19



PS 200

1940 BENSON AVE, BROOKLYN, NY 11214  
718-236-5466 PK - 05

### High Achievement

Math: 83 (58.5)

Enrollment: 938  
LEP: 21 to 30%  
50-74% Poverty  
Whites: 40  
African Americans: 1  
Latinos: 12  
Asians: 27



PS 214 CADWALLADER COLDEN

31-15 140TH ST, FLUSHING, NY 11354  
718-461-4055 KG - 06

### High Achievement

Math: 50 (20.3)

Enrollment: 626  
LEP: 0 to 10%  
50-74% Poverty  
Whites: 14  
African Americans: 9  
Latinos: 37  
Asians: 40



PS 70 INDIAN PARK ACADEMY

76 BUFFUM ST, BUFFALO, NY 14210  
716-828-4800 03 - 08

### High Achievement

Reading: 100 (85.6) Math: 68 (58.5)

Enrollment: 273  
LEP: 0 to 10% Title I  
75-100% Poverty  
Whites: 45  
African Americans: 52  
Latinos: 3

THE RENAISSANCE

36-41 28TH ST, LONG ISLAND CITY, NY 11106  
718-937-1463 04 - 08

### High Achievement

Math: 34 (58.7)

Enrollment: 135  
LEP: NA  
50-74% Poverty



SCHOOL 16

759 N BROADWAY, YONKERS, NY 10701  
914-376-8340 KG - 06

### High Achievement

Reading: 100 (86.1)

Enrollment: 372  
LEP: 0 to 10% Title I  
50-74% Poverty  
Whites: 21  
African Americans: 42  
Latinos: 32  
Asians: 5



# Top Performing Schools Directory



## New York



**SYLVAN-VERONA BEACH COMMUNITY**  
RT 13, VERONA BEACH, NY 13162  
315-762-4404 KG - 06

### High Achievement

Grade: 3  
Reading: 100 (85.6)

Enrollment:  
LEP: 0 to 10% Title I  
50-74% Poverty  
Whites: 100



**WATSON WILLIAMS ES**  
107 ELMWOOD PL, UTICA, NY 13501  
315-792-2167 KG - 06

### High Achievement

Reading: 99 (85.6)

Enrollment: 527  
LEP: 0 to 10% Title I  
75-100% Poverty  
Whites: 30  
African Americans: 56  
Latinos: 10  
Asians: 4



**CLINTON V. BUSH ELEMENTARY**  
150 PARDEE AVE, JAMESTOWN, NY 14701  
716-483-4401 KG - 04

### Most Improved

Math Year 1: 29 (45.5) Math Year 2: 79 (58.5)

Enrollment: 339  
LEP: 0 to 10% Title I  
50-74% Poverty  
Whites: 86  
African Americans: 7  
Latinos: 6  
Native Americans: 1



**THEODORE ROOSEVELT**  
OGDEN ST, BINGHAMTON, NY 13901  
607-762-8283 PK - 05

### High Achievement

Reading: 98 (85.6)

Enrollment: 438  
LEP: 0 to 10% Title I  
75-100% Poverty  
Whites: 62  
African Americans: 25  
Latinos: 7  
Asians: 6



**WOODROW WILSON**  
287 PROSPECT ST, BINGHAMTON, NY 13905  
607-763-8442 KG - 05

### High Achievement

Reading: 98 (85.6)

Enrollment: 537  
LEP: 11 to 20% Title I  
75-100% Poverty  
Whites: 72  
African Americans: 14  
Latinos: 7  
Asians: 7

**EAST NY VOCATIONAL & TECHNOLOGY HIGH**  
1 WELLS ST, BROOKLYN, NY  
718-647-5204 09 - 12

### Most Improved

Math Year 1: 9 (52.7) Math Year 2: 18 (58.7)

Enrollment: 368  
LEP: 0 to 10% Title I  
75-100% Poverty  
Whites: 1  
African Americans: 75  
Latinos: 22  
Asians: 1  
Native Americans: 1

### Legend:

 The Education Trust Logo denotes schools that have exceeded their state's average score in reading and/or math.  
( ) The number in parentheses is the state average score.

## New York



**GOV. GEORGE CLINTON**  
100 MONTGOMERY ST, POUGHKEEPSIE, NY 12601  
914-451-4600 PK – 05

### Most Improved

Reading Year 1: 43 (79.5) Reading Year 2: 89 (85.6)

Enrollment: 365  
LEP: 11to 20% Title I  
75-100% Poverty  
Whites: 18  
African Americans: 80  
Latinos: 2



**LAUREL PARK ELEMENTARY**  
SWAN PL, BRENTWOOD, NY 11717  
516-434-2464 01 - 05

### Most Improved

Math Year 1: 31 (45.5) Math Year 2: 76 (58.5)

Enrollment: 448  
LEP: 11to 20% Title I  
50-74% Poverty  
Whites: 21  
African Americans: 24  
Latinos: 53  
Asians: 1  
Native Americans: 1

**LOUIS D. BRANDEIS HIGH**  
145 W 84TH ST, NEW YORK, NY 10024  
212-799-0300 09 – 12

### Most Improved

Reading Year 1: 6 (50.3) Reading Year 2: 21 (56.3)  
Math Year 1: 16 (52.7) Math Year 2: 27 (58.7)

Enrollment: 838  
LEP: 31 to 40% Title I  
50-74% Poverty  
Whites: 2  
African Americans: 36  
Latinos: 62



**NORTH ELEMENTARY**  
400 WEST NORTH ST, GENEVA, NY 14456  
315-781-0489 KG – 05

### Most Improved

Math Year 1: 33 (45.5) Math Year 2: 72 (58.5)

Enrollment: 591  
LEP: 11to 20% Title I  
50-74% Poverty  
Whites: 57  
African Americans: 22  
Latinos: 19  
Asians: 2



**PS 150**  
40-01 43D AVE, LONG ISLAND CITY, NY 11104  
718-784-2252 KG – 06

### Most Improved

Math Year 1: 9 (26.8) Math Year 2: 22 (20.3)

Enrollment: 894  
LEP: 41 to 50% Title I  
50-74% Poverty  
Whites: 1  
African Americans: 37  
Latinos: 58  
Asians: 38

**PS 150 CHARLES JAMES FOX**  
920 E 167TH ST, BRONX, NY 10459  
718-328-7729 PK – 06

### Most Improved

Reading Year 1: 46 (83.7) Reading Year 2: 79 (86.1)

Enrollment: 721  
LEP: 11to 20% Title I  
75-100% Poverty  
African Americans: 13  
Latinos: 87

## New York

PS 18  
118 HAMPSHIRE ST, BUFFALO, NY 14213  
716-888-7030 KG – 08

### Most Improved

Math Year 1: 11 (45.5) Math Year 2: 49 (58.5)

Enrollment: 705  
LEP: 31 to 40% Title I  
75-100% Poverty  
Whites: 15  
African Americans: 24  
Latinos: 60  
Asians: 1  
Native Americans: 1

PS 204  
108-110 W 174TH ST, BRONX, NY 10453  
718-583-6636 KG – 05

### Most Improved

Reading Year 1: 34 (79.5) Reading Year 2: 81 (85.6)

Enrollment: 458  
LEP: 21 to 30% Title I  
75-100% Poverty  
Whites:  
African Americans: 32  
Latinos: 68

### PS 28 TRIANGLE ACADEMY



1515 SOUTH PARK AVE, BUFFALO, NY 14220  
716-828-4777 03 – 08

### Most Improved

Reading Year 1: 41 (79.5) Reading Year 2: 87 (85.6)

Enrollment: 474  
LEP: 0 to 10% Title I  
75-100% Poverty  
Whites: 40  
African Americans: 51  
Latinos: 8  
Asians: 1  
Native Americans: 1

### PS 72 LORRAINE ACADEMY



71 LORRAINE AVE, BUFFALO, NY 14220  
716-828-4809 05 - 08

### Most Improved

Reading Year 1: 45 (83.7) Reading Year 2: 95 (86.1)

Enrollment: 300  
LEP: 0 to 10% Title I  
50-74% Poverty  
Whites: 48  
African Americans: 50  
Latinos: 1  
Native Americans: 1

SCHOOL 16  
759 N BROADWAY, YONKERS, NY 10701  
914-376-8340 Grade: 3

### Most Improved

Reading Year 1: 42 (79.5) Reading Year 2: 84 (85.6)

Enrollment: 372  
LEP: 0 to 10% Title I  
50-74% Poverty  
Whites: 21  
African Americans: 42  
Latinos: 32  
Asians: 5

TO: Shirley Sagawa  
6-6244

From: Ann O'Leary

**facsimile transmittal**

Tamra M. Boyd, Symposium Editor  
Stanford Law and Policy Review  
Crown Quadrangle  
Stanford, CA 94305-8610  
SLPR Office: (650) 725-0670  
Home: (650) 497-7915

To: Ann O'Leary Fax: (202) 456-2878

From: Tamra Boyd Date: 03/07/00

Re: Stanford Law and Policy Review Pages: 6

CC:

☒ Urgent ☐ For Review ☐ Please Comment ☐ Please Reply ☐ Please Recycle

**Notes:**

Ms. O'Leary,

Thank you so much for your assistance in getting Mrs. Clinton's contribution to our journal. Specifically, we are seeking a short piece of 500-1000 words that introduces our symposium topic "Education Reform: Examining Alternatives to Traditional Public Education."

As you requested, I have attached summaries of the articles we will be publishing in this symposium, along with sample introductions others have written for past issues of Stanford Law and Policy Review.

As we discussed on the phone yesterday, we will need to have a draft from you by Monday, March 13, 2000. If there is any way we can assist you further, please feel free to call me at (650) 497-7915. Also, could you please send me a brief email ([tamra@stanford.edu](mailto:tamra@stanford.edu)) to confirm that you received this fax and will be able to write the piece? Thank you so much, and I look forward to working with you.

To: Beed

Then mailed - winner of Power prize

Public - private partnerships

Public - private partnerships

## **INTRODUCTION TO STANFORD LAW AND POLICY REVIEW**

### ***Education Reform: Examining Alternatives to Traditional Public Education***

A school where children have to move when it rains to avoid the leaking roof. Another where teachers are in such short supply that classrooms are bursting at the seams. Yet another where students pass through the corridors without mastering the basics at each grade -- and where some pass all the way through graduation reading at the third grade level.

Too often these are the images that Americans associate with public education. In my travels around the country, I certainly have seen some schools with all these challenges. But more and more, I see public schools that live by the rule pasted on a wall at Public School #1 in Manhattan, "All children can learn...No Exceptions...No Excuses." This revolutionary and profound statement challenges us to redouble our efforts to make quality public education a reality for every child. But, how? That is the question at the heart of this journal.

I know from personal experience that education reform is hard work. When he was governor, my husband asked me to chair a committee in Arkansas aimed at improving the educational system there. I traveled to school districts and met with all kinds of groups of people. And I saw the need for higher standards and stronger systems of accountability.

My husband was one of the co-chairs of the historic Education Summit a few years later, when the President and all of the Governors came together to commit to national education goals and higher academic standards for all children. Ten years later, we are starting to see results of this push for higher standards. A recent study of education reform in North Carolina -- which has one of the best track records of improving achievement and closing racial achievement gaps -- shows us that putting in place high academic standards does work, particularly for disadvantaged students. This commitment has paid off on the national level, too. Last year, our nation's reading scores were up for the first time in all three grade levels that are tested, our achievement scores for math and science were up, and the SAT and ACT scores continued to increase each year for the past five years.

Now because we have seen these signs of success, we have a much better idea of what to do to help fulfill the possibility of every student and a much better idea of what more we need to do to help all public schools put in place real reforms.

The next stage of educational improvement must include a commitment to teacher quality, a renewed focus on accountability, and opportunities for real public school choice for parents and students.

Children cannot learn to high standards if they are not taught to high standards. Research shows that the most important in-school factor for improved academic achievement is quality teaching. Today, fully one-quarter of our secondary school teachers do not even hold a minor in their main teaching field and, in our poorest school districts, often the majority of the new teachers are not fully certified. If we are to expect more from our children, we need to demand more for our teachers. Teachers should be fully certified in the subject for which they will teach, they should

be provided with real opportunities for growth and professional development throughout their careers, and they should be respected and valued with higher salaries.

Children cannot learn in schools that year after year having failing grades – low academic achievement, high absenteeism, and too few qualified teachers. It is critical that we put strong accountability plans in place to identify low-performing schools, help those schools turn around, and if they do not turn around take corrective action.

Children also need to learn in the environment that is right for them. We need to do more to create more competition, more challenge, and more encouragement within the public school system. Parents need more choices in selecting their public schools. Charter schools and magnet schools can provide this choice and can invigorate entire school districts into action. By giving schools greater flexibility and freedom, they can experiment with new approaches and still be held accountable. Charter schools are empowering teachers and helping citizens feel obligated to once again be part of the education commitment.

Just as we are today just beginning to see the fruits of standards reforms of a decade ago, we cannot expect to see the results of today's efforts tomorrow. Only a sustained effort, involving all parts of the education system, policymakers at every level of government, communities, businesses, and families can ensure that every child receives the quality education he or she deserves. Quick fixes – like vouchers – won't work. Together, we need to roll up our sleeves and do the hard work necessary to make every public school world class. Our children deserve no less.

***Stanford Law & Policy Review***

**Volume 11:2, Spring 2000**

***Education in the New Millenium:  
Examining Alternatives to Traditional Public Education***

**Clint Bolick, *Institute for Justice***

Mr. Bolick assesses the various, promising reform efforts that have been developed to respond to the failure of the nation's public school system to deliver quality educational opportunities to America's children. In addition to discussing other specific reform efforts, Mr. Bolick discusses the Milwaukee Parental Choice (MPC) Program, the nation's first school choice program targeted to inner-city, low income families. He argues that the MPC for the first time ever, will transfer control over public education funds from bureaucrats to parents, and force the public schools to compete for low-income students and the resources they command.

**Dr. Stephen Gessner, *Director of Programs, Institute for the Academic Advancement of Youth, Johns Hopkins University***

Dr. Gessner assesses the dangers and limitations of the various reform efforts. He notes that the reform effort is more rooted in ideology and political considerations (vouchers) and gives incredible control to small local groups of non-educators (charter schools). Finally, Dr. Gessner proposes in their place a more rigorous approach to teaching and learning based on national standards for content and for teachers as well as rigorous on-going assessment.

**Dr. Judith Johnson, *Acting Assistant Secretary for Elementary and Secondary Education, United States Department of Education*, and Alex Medler, *United States Department of Education***

Dr. Johnson and Mr. Medler describe the U.S. Department of Education's efforts to support the expansion of public school choice, focusing specifically on charter schools. They review findings from recent Department of Education research projects and use these findings to discuss the role of charter schools in serving low income and minority students, and students with disabilities. They also provide policy recommendations for state- and district-level education leaders.

**Dr. F. Howard Nelson, *Senior Director of Research at the American Federation of Teachers***

In this article, Dr. Nelson looks at the roots of private business' interests in public education and evaluates the application of private management strategies and analysis to this area. The article concludes by comparing private industry's growing role in public education with its role in the healthcare industry.

**Adele Robinson, *Education Policy Analyst***

Ms. Robinson assesses the impact of private school tuition tax credits on education reform. She

argues that tax credits for private school tuition are poor education policy and poor tax policy. Tax credits, she argues, fail to benefit the low income and working families, due to factors such as accountability for student achievement, and the inability of private schools to comply with civil rights laws.

**John F. Witte, *Professor at the University of Wisconsin-Madison***

Professor Witte will both describe what is essential to preserve our existing education system and outlines the possible alternatives for the future of American education. He argues that the foundations of the American education system must be protected, specifically free and public education, financing free and public schools, and an excessive investment in education.

**Amy Stuart Wells, *Professor at the UCLA Graduate School of Education and Information Studies***

Professor Wells draws on the data from the UCLA Charter School Study of ten school districts in California to explore what happened when a 1992 California law allowed for the creation of hundreds of charter schools and assigned local school districts responsibility for holding these schools accountable. Using data from interviews with district officials, including administrators and school board members, as well as the principals or directors of charter schools, Professor Wells explores issues of accountability for California charter schools.

**Dave DeSchryver**

Mr. DeSchryver reviews the impact and improvements that charter schools have on public education. He argues that charter schools have had a "ripple effect" on other public schools, and have paved the way for systemwide improvement of public education. He concludes that strong charter school laws are necessary to continue this positive trend.

PHOTOCOPY  
PRESERVATION

file: religion in  
schools



**U.S. Department of Education**  
**Washington, D.C.**

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*How Faith  
Communities  
Support Children's  
Learning in Public  
Schools*

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# RELIGIOUS EXPRESSION IN PUBLIC SCHOOLS:

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## A STATEMENT OF PRINCIPLES

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Public  
Schools  
&  
Religious  
Communities

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A FIRST AMENDMENT GUIDE

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*Congress shall make*

**A Parent's**

*no law respecting an*

**Guide to**

*establishment of religion*

**Religion**

*or prohibiting the free*

**in the**

*exercise thereof; or*

**Public**

*abridging the freedom*

**Schools**

*of speech, or of the press,*

*or the right of the people*

*peaceably to assemble,*

*and to petition the*

**National PTA**

*Government for a redress*



**FIRST AMENDMENT CENTER**

FUNDED BY THE FREEDOM FORUM

*of grievances.*

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# A Teacher's Guide to Religion in the Public Schools

*amendment*

*A Teacher's Guide to Religion in the Public Schools*  
is published by the First Amendment Center.

The guide has been endorsed by the following organizations:

American Association of School Administrators  
American Federation of Teachers  
American Jewish Committee  
American Jewish Congress  
Anti-Defamation League  
Association for Supervision and Curriculum Development  
Baptist Joint Committee on Public Affairs  
Catholic League for Religious and Civil Rights  
Christian Educators Association International  
Christian Legal Society  
Council on Islamic Education  
National Association of Elementary School Principals  
National Association of Evangelicals  
National Association of Secondary School Principals  
National Council of Churches of Christ in the U.S.A.  
National Council for the Social Studies  
National Education Association  
National PTA  
National School Boards Association  
Union of American Hebrew Congregations  
Union of Orthodox Jewish Congregations of America

For more information, please contact:



**FIRST AMENDMENT CENTER**  
FOUNDED BY THE FREEDOM FORUM

1207 18th Avenue South Nashville, TN 37212 (615) 321-9588

[www.freedomforum.org](http://www.freedomforum.org)

For additional copies, call

1-800-830-3733 and request Publication No. 99-F02.



THE SECRETARY OF EDUCATION  
WASHINGTON, D.C. 20202

*"Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof; or abridging the freedom of speech, or of the press; or the right of the people peaceably to assemble, and to petition the Government for a redress of grievances."*

*First Amendment to the  
U.S. Constitution*

December 17, 1999

Dear Principal:

For many years one of the most sensitive and controversial matters that has divided Americans when it comes to public education has been the issue of religion in public schools.

Many Americans, unfortunately, came to believe that the 1962 Supreme Court decision disallowing state-sponsored school prayer meant no religious expression at all was permitted. They were mistaken, but little was done to fully inform concerned parents that the 1962 Supreme Court ruling did not preclude individual students, in their personal capacity, from expressing their religious faith. As a result, a great misunderstanding grew up over time and the issue of prayer and religious expression in public schools became increasingly divisive and polarizing.

In the last few years, new and promising efforts have been made to end this division about the proper place of religion in our nation's public schools. Educators, religious leaders of many faiths, and civil libertarians have worked together to review Supreme Court and other court decisions. In the process, these dedicated Americans have come to a new and deeper understanding of the proper place of religion in America's system of public education.

Leaders on both sides of this debate have lowered their voices, retreated from the polarizing language of the last three decades, and worked diligently together to find a new common ground. This effort is in the best tradition of our nation's Founding Fathers and reflects a wonderful respect for the basic idea that is America – that we are free people who protect our freedoms by respecting the freedoms of others who differ from us.

These educators, religious leaders, and civil libertarians see our nation's Bill of Rights as something more than a piece of dry, old parchment on display in our National Archives. They recognize that each generation must do its part to explain fully how the First Amendment protects the rights of students to express their religious faith and/or their freedom of conscience.

It is in that spirit that I am sending you a set of guidelines that you can use to inform students, parents, teachers, and other members of the community about the proper way to treat religion and religious topics in our nation's public schools. The guidelines cover a broad range of topics from how to teach about religion to how to properly develop partnerships with community-based groups, including faith-based organizations, as part of a broad effort to improve education in our public schools.

The guidelines clearly indicate that the religious rights of students and their right to freedom of conscience do not stop at the schoolhouse door. President Clinton may have said it best:

“ For more than 200 years, the First Amendment has protected our religious freedoms and allowed many faiths to flourish in our homes, in our work place and in our schools. Clearly understood and sensibly applied, it works.”

The essence of all of these guidelines is the balanced nature of the First Amendment regarding religious expression that is rooted in two basic and equally important principles. First, schools must protect the right of individual students, in their personal capacity, to express their religious faith, or to speak about religious matters, to the same extent they are permitted to engage in nonreligious expression, or to speak about nonreligious topics.

Second, schools must refrain from government-sponsored religious activities, and from adopting or expressing any preference for or against religious expression by students speaking in their personal capacity.

Teachers, principals, and others in authority in a school must give students the same right in their personal capacity to engage in religious activity and discussion, as they have to engage in any other comparable activity. For example, students may read their Bible or other scriptures, say grace before meals, or pray before tests to the same extent they may engage in comparable, nondisruptive activities.

At the same time, school officials may not endorse or favor religious activity or doctrine, coerce participation in religious activity, or seek to impose their religious beliefs on impressionable children. Public schools may teach about religion – for example, in classes on history, music, the arts, or comparative religion, the Bible (or other scripture)-as-literature, the role of religion in history – but public schools may not provide religious instruction.

In protecting students from government-sponsored prayer, the First Amendment also shields students of all faiths from any effort by a majority faith to define how religion should be expressed in a public school. The right to engage in personal voluntary prayer or religious discussion free from discrimination does not include the right to have a captive audience listen, or to compel other students to participate. We are a nation of many religious faiths and we must be vigilant in protecting the right of all students to express their religious faith in their own way, in addition to expressing their freedom of conscience not to participate in religious activities.

Some have suggested that the federal government has been an enemy of religion. I believe otherwise. I know that President Clinton and Vice President Gore have gone out of their way to encourage the growing effort to find a new common ground regarding religious expression in our nation's public schools. I am pleased to be part of this effort as well.

After more than 30 years of division on this most sensitive of subjects, I believe we are finding a positive way to bring people together and that's good for education. I hope public officials, at all levels of government, will support this growing effort to find common ground and retreat from the

Page 4

polarizing language of the past. Our public schools should not be the public space for a war on values but the public space where we educate our children, help them to build good character, and teach them about the many freedoms, including the freedom of religion, that are embodied in our nation's Constitution.

All of the documents in this packet are freely available from either the U.S. Department of Education or the Freedom Forum First Amendment Center. The full text of all of these publications is available through the U.S. Department of Education's Web site ([www.ed.gov](http://www.ed.gov)). I encourage you to read these documents carefully and make them available to teachers, other staff, parents and students. Thank you for your cooperation.

Yours sincerely,

A handwritten signature in black ink that reads "Dick Riley". The signature is stylized with a large "D" and a long, sweeping underline that extends to the right.

Richard W. Riley

Public schools, and the programs operated in partnership with them, can neither foster religion nor preclude it. Our public schools must treat religion with fairness and respect and vigorously protect religious expression as well as the freedom of conscience of all students. Volunteer mentors and tutors must uphold these constitutional protections when assisting children in the public school setting. In doing so, public school programs reaffirm the First Amendment and enrich the lives of their students.

**Resources from the U.S. Department of Education (1-877-4ED-PUBS)**

- *Religious Expression in Public Schools: A Statement of Principles*
- *How Faith Communities Support Children's Learning in Public Schools*
- *Faith Communities Joining Local Communities to Support Children's Learning: Good Ideas*
- *Guidelines for Volunteers and Mentors Participating in Partnerships with Faith-based Communities*
- *Yes, You Can: Establishing Mentoring Programs to Prepare Youth for College*

Information about the Partnership for Family Involvement in Education can be found at <http://pfie.ed.gov> or via e-mail at [Partner@ed.gov](mailto:Partner@ed.gov).

**Resources from the Freedom Forum First Amendment Center (615-321-9588)**

- *Public Schools & Religious Communities: A First Amendment Guide*
- *A Teacher's Guide to Religion in the Public Schools*
- *A Parent's Guide to Religion in the Public Schools*

For a list of organizations that can answer questions about religious expression in public schools, consult *Religious Expression in Public Schools: A Statement of Principles*, pages 11–12.



**Guidelines for School Officials, Volunteers and Mentors Participating in Public School Community Partnerships**

Children and schools gain a great deal when every part of a community comes together to support education. This is why we encourage the growing partnership efforts between our nation's public schools and families, community groups, faith-based communities and employers. In 1994, U.S. Secretary of Education Richard Riley began the Partnership for Family Involvement in Education (PFIE) with 40 organizations. Today, close to 6,000 groups and organizations are part of this dynamic and growing effort.

Every part of the community can do its part to encourage adults to take time out of their busy schedules to support the work of our nation's schools. Faith communities can be important participants in these partnerships. For example, members of faith communities can act as tutors and mentors to help children learn to read and write. They can also work with other members of the community to ensure the safety of children in positive after-school activities.

However, it is not appropriate for members of faith communities to use their involvement in public schools as an occasion to endorse religious activity or doctrine or to encourage participation in a religious activity. Adults who choose to volunteer in public schools must respect both the rules established by the school and the strong constitutional protections that children have from becoming a captive audience.

In August 1995, U.S. Secretary of Education Richard Riley, in consultation with Attorney General Janet Reno and at the direction of President Clinton, released guidelines entitled *Religious Expression in Public Schools: A Statement of Principles*. These guidelines were released again in June 1998, and most recently in December 1999. In his original cover letter to these guidelines, Secretary Riley pointed out that the guidelines for religious expression in public schools reflect two basic and equally important obligations of the First Amendment.

"First, schools may not forbid students acting on their own from expressing their personal religious views or beliefs solely because they are of a religious nature. Schools may not discriminate against private religious expression by students, but must instead give students the same right to engage in religious activity and discussion as they have to engage in other comparable activity... At the same time, schools may not endorse religious activity or doctrine, nor may they coerce participation in religious activity....[t]he right of religious expression in school does not include the right to have a 'captive audience' listen, or to compel other students to participate."

When members and leaders of faith communities volunteer in schools or volunteer to work with students and their families, they should and must act with the same understanding of the First Amendment as school officials have. A volunteer's faith may have motivated him or her to participate in the school volunteer program, but the Constitution does not allow the volunteer to infringe on the religious freedom and beliefs of the students being helped.

An adult who acts as a mentor may not, for example, seek in any way to encourage or discourage the religious faith of the student whom they are mentoring for educational purposes. Suggestions on the best ways to recruit, screen and support mentors can be found in *Yes You Can: Establishing Mentoring Programs to Prepare Youth for College*, a 1998 publication produced by the Department.

A religious leader who is asked by school officials to participate in crisis counseling should respond to the direct concerns of the students at a time of great sensitivity. At the same time, a religious leader cannot use the occasion to proselytize on behalf of his or her own faith or encourage a student to attend the following week's service.

When public schools develop partnerships involving religious communities they must do so with particular care. The following is a helpful checklist for school officials and members and leaders of faith communities who are developing or participating in educational partnerships. This checklist should be seen and used as a companion piece to *Public Schools & Religious Communities: A First Amendment Guide* (see Resources below). These guidelines only address partnership programs that are jointly sponsored by faith-based community groups and public schools. They do not apply to programs run solely by faith-based communities.

**Partnerships Involving Public Schools  
And Faith-based Communities**

Public schools forming partnerships including faith-based communities should consider and adhere to the following in developing and supporting such activities:

**Things to Do:**

**Make sure the program has a secular purpose.**

**In selecting partners remain neutral between secular and religious groups and among religious groups.**

**Select student participants without regard to the religious affiliation of the students.**

**Make sure any jointly sponsored activities provided within the partnership program, wherever located, are purely secular.**

**Make sure any space used for the program is safe and secure for the children.**

**Make sure any space used by the public school for instructional purposes is free of religious symbols.**

**Put the partnership agreement in writing.**

**Things Not to Do:**

**Do not limit participation in the partnership, or student selection, to religious groups or certain religious groups.**

**Do not encourage or discourage student participation with particular partners based on the religious or secular nature of the organization.**

**Do not encourage or discourage students from engaging in religious activities.**

**Do not condition student participation in any partnership activity on membership in any religious group, or on acceptance or rejection of any religious belief, or on participation in, or refusal to participate in, any religious activity.**

**Do not reward or punish students (for example, in terms of grades or participation in other activities) based on their willingness to participate in any activity of a partnership with a religious organization.**

**VOLUNTEERS NEED TO BE REMINDED**

Volunteers always need to be thanked for their willingness to volunteer their time to help children learn. At the same time, it is very important to remind volunteers from faith communities that the purpose of any partnership is educational and secular in nature, not religious, and that volunteers must respect the very strong First Amendment rights of students. Remind volunteers:

**Do not pray with the students and families or encourage them to pray during your volunteer session with them.**

**Do not preach about your faith to the children and their families while conducting your educational activity.**

**Do not prohibit or discourage speech or other activity simply because of its religious content or nature.**

**Do not infringe on the rights of students and their family members to speak about religion or to say a prayer or to read a Scripture, provided it is within the reasonable limits of rules for orderliness, talking, and congregating that are set for other speech and activities.**

September 26, 2000

MEMO

TO: JOEL JOHNSON  
NANCY MCFADDEN  
LORETTA UCELLI  
THURGOOD MARSHALL  
KAREN KULLMAN  
JAKE SIEWERT  
BETHANY LITTLE  
MELANNE VERVEER

*2 Announcements*

FR: KRIS BALDERSTON

RE: GLENN REPORT RELEASE

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Attached is a copy of the bipartisan Glenn Commission Report on math and science that will be released tomorrow at 10 am at the National Air and Space Museum. As you will see, it notes that US students are losing ground in math and science.

Tomorrow, Glenn will open up the program and Secretary Riley will respond and turn it over to a principal who will turn it over to Intel's Craig Barrett who will announce a \$500 million private sector initiative to train teachers.

EMBARGOED UNTIL  
9/27/2000 10:00am EDT

# ***Before It's Too Late***

*A Report to the Nation from The National Commission  
on Mathematics and Science Teaching  
for the 21st Century*



EMBARGOED UNTIL  
9/27/2000 10:00am EDT

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## *Before It's Too Late*

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# ***Before It's Too Late***



*A Report to the Nation from the National Commission  
on Mathematics and Science Teaching for the 21st Century*

# Letter of Transmittal

September 27, 2000

Richard W. Riley  
Secretary of Education  
U.S. Department of Education  
Washington, DC 20202

Dear Secretary Riley:

On July 20, 1999—the 30<sup>th</sup> anniversary of the first landing on the moon—you announced the appointment of the 25-member National Commission on Mathematics and Science Teaching for the 21<sup>st</sup> Century. In your charge to the Commission and its eight ex officio members, you asked us to investigate and report on the quality of mathematics and science teaching in the nation, directing us to consider ways of improving recruitment, preparation, retention, and professional growth for mathematics and science teachers in K–12 classrooms nationwide. You reminded us that, three decades after a historic achievement, “we need to set the stage for advancement in mathematics and science for the next thirty years.”

It has been my privilege to chair the Commission, and I am pleased to report to you, on behalf of its members, that we have completed our work. With this letter, we transmit to you our report, *Before It's Too Late*, which summarizes our findings. It presents to both the Department of Education and the American people a set of ambitious goals for improving mathematics and science teaching and specific action strategies for achieving each of them.

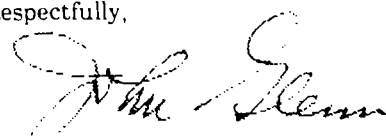
We trust that we have been faithful to your charge. As we have listened to the presentations of scholars, deliberated over the studies of outstanding researchers, and attended to the experience of dedicated administrators and teachers, we have learned much. Our assumptions have been called into question. Our individual views have been tempered by the perspectives of colleagues whose judgment we have come to respect, even in disagreement. As we have sought to understand today's problems in mathematics and science education, we have also worked to uphold a constant vision of high-quality teaching as the irreducible minimum for creating tomorrow's solutions.

We believe that the issues and concerns raised in our report can be understood, addressed by, and potentially unite policymakers, teachers, the business community, parents, students, and private citizens alike. The goals and action strategies we suggest may be seen by some as too great a reach, by some as not bold enough. We are convinced, however, that if they are ignored, our children and our nation will soon pay the high price that always accompanies apathy.

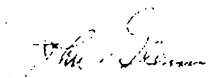
Each member of the Commission, through this letter, expresses appreciation for your leadership in having brought this diverse group together to examine an issue that has pivotal significance for our country as we embark on a new century and millennium. It is our collective and earnest hope that you will continue that leadership by encouraging widespread discussion of our views and suggestions, and by urging appropriate action based on our findings and recommendations.

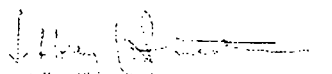
Finally, we offer our profound thanks for having provided us with this opportunity to serve our country—and our children—as members of this Commission.

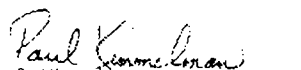
Respectfully,

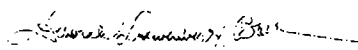


John Glenn, Commission Chairman

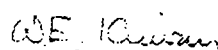
  
John Glenn  
Commission Chairman

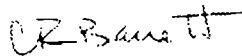
  
Jeffrey Himmelstein  
Adjunct Professor of Biology, William Patterson University (NJ)

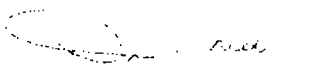
  
Paul Kimmelman  
Superintendent, West Northfield School District No. 31 (IL)

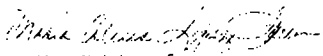
  
Deborah Loewenberg Ball  
Arthur F. Thurnau Professor of Mathematics Education  
and Teacher Education, University of Michigan

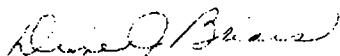
  
Rush Holt  
U.S. Representative, New Jersey

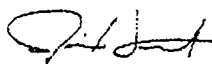
  
William E. Kirwan  
President, The Ohio State University

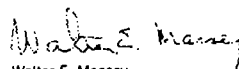
  
Craig R. Barrett  
President and CEO, Intel Corporation

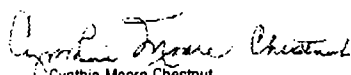
  
Iris T. Metts  
Superintendent, Prince George's County Public Schools (MD)

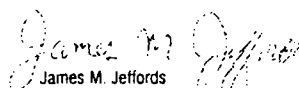
  
Maria Alicia Lopez-Freeman  
Executive Director, California Science Project

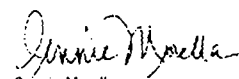
  
Diane J. Briars  
Mathematics Director, Pittsburgh Public Schools

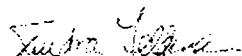
  
James B. Hunt Jr.  
Governor, North Carolina

  
Walter E. Massey  
President, Morehouse College

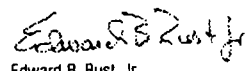
  
Cynthia Moore Chestnut  
State Representative, Florida

  
James M. Jeffords  
U.S. Senator, Vermont

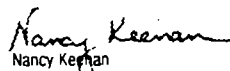
  
Connie Morella  
U.S. Representative, Maryland

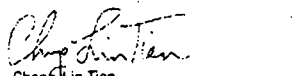
  
Sandra Feldman  
President, American Federation of Teachers

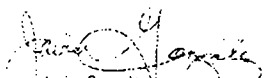
  
Anne Jolly  
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Edward B. Rust, Jr.  
Chairman and CEO, State Farm Mutual  
Automobile Insurance Company

  
James E. Geringer  
Governor, Wyoming

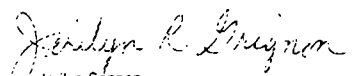
  
Nancy Kerhan  
Superintendent of Public Instruction,  
Montana Office of Public Instruction

  
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University Professor and NEC Distinguished  
Professor of Engineering, University of California Berkeley

  
Javier Gonzalez  
Mathematics Teacher, Pioneer-High School (CA)

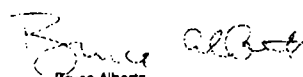
  
Edward M. Kennedy  
U.S. Senator, Massachusetts

  
Dennis Van Roekel  
Secretary-Treasurer, National Education Association

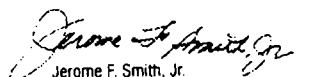
  
Jerilyn Grignon  
Technology Instructor, Menominee Indian Junior High School (WI)

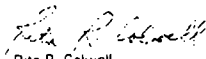
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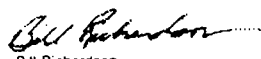
Richard W. Riley, U.S. Secretary of Education

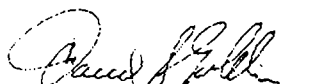
  
Bruce Alberts  
President, National Academy of Sciences

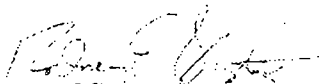
  
Neal Lane  
Assistant to the President for Science and Technology Policy  
Office of Science and Technology Policy

  
Jerome F. Smith, Jr.  
Chancellor for Education and Professional Development  
U.S. Department of Defense

  
Rita R. Colwell  
Director, National Science Foundation

  
Bill Richardson  
U.S. Secretary of Energy

  
Daniel S. Goldin  
Administrator, National Aeronautics and Space Administration

  
Rodney E. Slater  
U.S. Secretary of Transportation

# Commission Members

# Foreword



*This report makes only a few straightforward points, but it makes them urgently and insistently.*

**First**, at the daybreak of this new century and millennium, the Commission is convinced that the future well-being of our nation and people depends not just on how well we educate our children generally, but on how well we educate them in mathematics and science specifically.

From mathematics and the sciences will come the products, services, standard of living, and economic and military security that will sustain us at home and around the world. From them will come the technological creativity American companies need to compete effectively in the global marketplace. "Globalization" has occurred. Economic theories of a few years ago are now a reality. Goods, services, ideas, communication, businesses, industries, finance, investment, and jobs—the good jobs—are increasingly the competitive currency of the international marketplace.

Among the first things Americans watch every morning on TV is the global marketplace at work. The quotes not only from Wall Street itself, but also from the Nikkei, Hang Seng, and Hong Kong exchanges, followed in turn by those of Frankfurt, Zurich, and London—along with reports on the status of the yen, peso, and Eurodollar—all reflect investment flows of hundreds of billions in

assets around the world. Times have changed. In an integrated, global economy, whose key components are increasingly knit together in an interdependent system of relationships, will our children be able to compete?

Beyond the world of global finance, mathematics and science will also supply the core forms of knowledge that the next generation of innovators, producers, and workers in every country will need if they are to solve the unforeseen problems and dream the dreams that will define America's future.

**Second**, it is abundantly clear from the evidence already at hand that we are not doing the job that we should do—or can do—in teaching our children to understand and use ideas from these fields. Our children are falling behind; they are simply not "world-class learners" when it comes to mathematics and science.

The Third International Mathematics and Science Study (TIMSS) tested the students of 41 nations. Children in the United States were among the leaders in the fourth-grade assessment, but by high school graduation they were *almost* last. Here at home, the National Assessment of Educational Progress basically substantiates our students' poor performance.

In short, our children are losing the ability to respond not just to the challenges already presented by the 21<sup>st</sup> century but to its potential as well. We are failing to capture the interest of our youth for scientific and mathematical ideas. We are not instructing them to the level of

competence they will need to live their lives and work at their jobs productively. Perhaps worst of all, we are not challenging their imaginations deeply enough.

**Third**, after an extensive, in-depth review of what is happening in our classrooms, the Commission has concluded that the most powerful instrument for change, and therefore the place to begin, lies at the very core of education—*with teaching itself*.

The teaching pool in mathematics and science is inadequate to meet our current needs; many classes in these subjects are taught by unqualified and underqualified teachers. Our inability to attract and keep good teachers grows. As a result, newer, technologically oriented industries are having trouble finding enough qualified employees from among those teachers' students. Worse, creativity atrophies and innovation suffers.

We are of one mind in our belief that the way to interest children in mathematics and science is through teachers who are not only enthusiastic about their subjects, but who are also steeped in their disciplines and who have the professional training—as teachers—to teach those subjects well. Nor is this teacher training simply a matter of preparation; it depends just as much—or even more—on sustained, high-quality professional development.

**Fourth**, we believe that committing ourselves to reach three specific goals can go far in bringing about the basic changes we need. These goals go directly to issues of quality, quantity, and an enabling work environment for teachers of mathematics and science. For each goal, we offer

specific action strategies for achieving that particular goal, ideas on who should implement them, and how. Specifically, we offer suggestions on how to:

- ❖ *Establish an ongoing system to improve the quality of mathematics and science teaching in grades K-12;*
- ❖ *Increase significantly the number of mathematics and science teachers and improve the quality of their preparation; and*
- ❖ *Improve the working environment and make the teaching profession more attractive for K-12 mathematics and science teachers.*

The goals we set before the American people in this report will not be easily attained, nor will the action strategies we offer be readily implemented. Most other nations have a national education system that can change direction more rapidly than our K-12 system, which is operated by nearly 16,000 independent school boards. Even when the majority of board members are firmly dedicated to good education, it is still a difficult job to change direction when needed.



The task to which we call the American people is therefore not an easy one. Nor will our goals be met at bargain-basement rates. But we believe we have a well-focused view of the needs facing our country and its youth, and that we have identified the right starting points for preparing them to meet their future. We are just as strongly convinced that the downstream cost of not turning this problem around will be exponentially higher than the cost of beginning to solve it now.

But rising to great challenges is a part of our national character—not only in such arduous deeds as breaking the bonds of the planet itself, but in the daily work of equipping each new generation to meet new responsibilities. The last time we turned a century, our schools rose to the challenge of educating the nation's youth to meet the demands of an industrializing economy. We succeeded in the equally formidable task of integrating millions of immigrants from around the world into a dynamic culture without precedent in history.

Now history presents us with a yet more pressing demand. We are being called upon to capitalize on the changes wrought by two great revolutions: rapid economic globalization on the one hand and the expansion of information-based technologies on the other. In this light, we can take heart from American history's most profound lesson: Our ability, as a people, to uncover the liberating opportunities concealed within daunting tasks is what defines the American genius.

In the end, then, the message of this report is a simple one. The time has come to move from the information and analysis we have gathered to the resolution we need. We are summoned to answer a stark question. As our children move toward the day when *their* decisions will be the ones shaping a new America, will they be equipped with the mathematical and scientific tools needed to meet those challenges and capitalize on those opportunities?

These are our children, and the choice is ours. We know what we have to do: the time is now—*before it's too late.*

\* \* \* \* \*

*The Commission sincerely appreciates the confidence that Secretary Richard W. Riley placed in us, and hopes that our report is a worthy and useful product in guiding our nation's students to world-class performance.*

*Special thanks are due to our Executive Director, Linda P. Rosen, whose lifelong experience in mathematics education was vital to our work, and whose direction of the labors of the Commission through long hours on a day-in, day-out, yearlong basis was exemplary and crucial to our work.*



# Executive Summary

*In an age now driven by the relentless necessity of scientific and technological advance,*

the current preparation that students in the United States receive in mathematics and science is, in a word, unacceptable.

Recent reports of the performance of our country's students from both the Third International Mathematics and Science Study (TIMSS) and the National Assessment of Educational Progress (NAEP) echo a dismal message of lackluster performance, now three decades old; it's time the nation heeded it—*before it's too late.*

Four important and enduring reasons underscore the need for our children to achieve competency in mathematics and science: (1) the rapid pace of change in both the increasingly interdependent global economy and in the American workplace demands widespread mathematics- and science-related knowledge and abilities; (2) our citizens need both mathematics and science for their everyday decision-making; (3) mathematics and science are inextricably linked to the nation's security interests; and (4) the deeper, intrinsic value of mathematical and scientific knowledge shape and define our common life, history, and culture. Mathematics and science are primary sources of lifelong learning and the progress of our civilization.

Beyond the disturbing news that our young people are not performing well enough in mathematics and science to take firm command of their own futures, five major factors have begun to coalesce that

make this a particularly opportune time to focus on strengthening mathematics and science education: (1) reform efforts have sharply focused the attention of the American people on education as a public issue; (2) the nation now has a surplus of resources to invest in education; (3) a coming demographic shift in the teaching force—two thirds of which will be retiring in the next decade—offers an unparalleled chance to plan for and make changes at the core of education itself; (4) our schools can now put to work what educators have learned in the past generation about curriculum, high standards, effective teaching, assessment, and how children learn; and (5) the rising generation of college graduates is once again showing an interest in teaching as a profession. The nation must capitalize on the convergence of these factors to improve mathematics and science teaching in the United States. We need to act now, *before it's too late.*

The primary message of this report holds that America's students must improve their performance in mathematics and science if they are to succeed in today's world and if the United States is to stay competitive in an integrated global economy. The Report's second message points in the direction of a solution the most direct route to improving mathematics and science achievement for all students is better mathematics and science teaching.

Evidence of the positive effect of better teaching is unequivocal; indeed, the most



consistent and powerful predictors of student achievement in mathematics and science are full teaching certification and a college major in the field being taught.

Better mathematics and science teaching is therefore grounded, first of all, in improving the quality of teacher preparation and in making continuing professional education available for all teachers. A closer look at the teaching that goes on in mathematics and science



classrooms today puts the performance of U.S. students on national and international assessments in sharper focus. The basic teaching style in too many mathematics and science classes today remains essentially what it was two generations ago. By contrast, teaching innovation and higher student performance are well documented in other countries, where students' improvements are anchored to an insistence on strong professional development for teachers.

What *could* be happening in U.S. mathematics and science classrooms is markedly different. The report names an extensive set of characteristics of "high-quality teaching." When they are focused through the lens of exemplary teacher preparation and an integrated system of

professional development, an enormous potential for empowering teachers and improving instruction is apparent.

The pressing national need for *high-quality teaching* described in this report, therefore, demands a vigorous, national response that unifies the efforts of all stakeholders in mathematics and science education. To that end, three wide-ranging, intertwined goals focus the report's call for action at local, state, and federal levels. As an aid to implementation, each goal is accompanied by a coordinated set of well-funded action strategies that identify key stakeholders who should take the lead in implementing each strategy. The estimated annual cost to achieve these action strategies is over \$5 billion. These funds and other resources will come from a diversified set of sources, including all levels of government, higher education, business and industry, professional education associations and teachers' unions, community groups, and the citizenry. The goals and action strategies set forth in the report are as follows:

**Goal 1:** *Establish an ongoing system to improve the quality of mathematics and science teaching in grades K-12.*

Seven interdependent action strategies are offered to implement this system: (1) each state, must immediately undertake a full *needs assessment* to determine what teachers require, both in their schools and their professional lives, if they are to routinely deliver high-quality teaching; (2) *Summer Institutes* must be established to address the professional development

needs identified; (3) building- and district-level *Inquiry Groups* can provide venues for teachers to engage in common study to enrich their subject knowledge and teaching skills; (4) *Leadership Training* is needed to prepare facilitators for the Summer Institutes and Inquiry Groups; (5) a dedicated *Internet Portal* must be available to teachers so they can make use of and contribute to an ever-expanding knowledge base about mathematics and science teaching; (6) a nongovernmental *Coordinating Council* is needed to bring together the above initiatives and those that follow to assess accomplishments; and (7) all states and local districts should initiate *reward and incentive programs*, both to support exemplary professional development that results in higher student achievement and to increase the attractiveness of teaching as a profession.

**Goal 2:** *Increase significantly the number of mathematics and science teachers and improve the quality of their preparation.*

Three action strategies are offered for this goal: (1) a direct strategy that identifies *exemplary models of teacher preparation* whose success can be widely replicated; (2) an overarching strategy of finding ways to *attract additional qualified candidates into teaching* from among high school and college students, recent college graduates, and people at mid-career; and (3) creating 15 competitively selected *Mathematics and Science Teaching Academies* to annually train 3,000 Academy Fellows, who will be nationally recruited for a one-year, intensive course on effective teaching methods in mathematics or science.

**Goal 3:** *Improve the working environment and make the teaching profession more attractive for K-12 mathematics and science teachers.*

Four action strategies address this goal: (1) focused *induction* programs are required to help acclimate beginning mathematics and science teachers to the profession, create formal mentoring relationships, and introduce teachers to Inquiry Groups; (2) *district/business partnerships* are needed to provide support for a broad range of efforts that can help create professional working environments for teachers. These efforts can enhance teaching by providing materials, facilities, equipment, and mentor stipends; (3) *incentives*—whether in the form of cash awards, salary increases, support for further education, or community-wide recognition—are needed to encourage deserving mathematics and science teachers to remain in teaching and improve their skills; and (4) *salaries* of all teachers must be made more competitive, but especially for mathematics and science teachers, whose combined preparation and skills command high wages in the private sector.

The report concludes by challenging all Americans directly to take personal responsibility for expressing their views on mathematics and science education to policy- and decision-makers, and to take the initiative to implement the report's action strategies in their own communities.

# The Problem



*Eleven Septembers ago,  
with the heady horizon  
of a new millennium  
within sight,*

the nation's governors gathered in Charlottesville, Virginia, to set ambitious goals for our schools. Among the challenges the governors issued was this one:

*"By the Year 2000, United States students will be first in the world in mathematics and science achievement."*

A goal like that might be tough, Americans thought, but it was reachable.

But our effort since has not matched our rhetoric. Results from the Third International Mathematics and Science Study (TIMSS) show U.S. students devastatingly far from this goal by the time they finish high school.

In an age now driven by the relentless necessity of scientific and technological advance, the preparation our students receive in mathematics and science is, in a word, unacceptable. Despite our good intentions, their learning is too often superficial. Students' grasp of science as a process of discovery, and of mathematics as the language of scientific reasoning, is often formulaic, fragile, or absent altogether. And perhaps most alarming of all, as recent assessments seem to show, the longer our children study these crucial disciplines, the less favorably they compare with their peers in other countries.

## Our Students' Performance in Mathematics and Science is Unacceptable

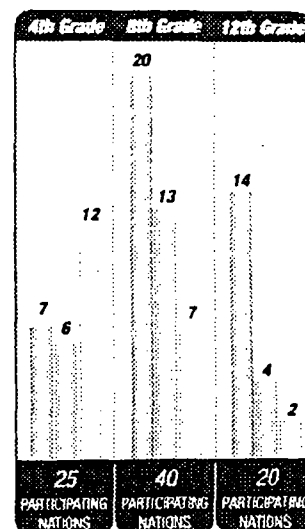
### *The Recycled Message of TIMSS and NAEP: Our Students Are Losing Ground*

America has heard news like this before. In 1957, the sudden appearance of Sputnik galvanized a massive national effort to win the space race and improve mathematics and science education. We knew we had to "catch up with the Russians." With a burst of single-minded intensity, we more than caught up: in 12 years we achieved the moon. But we did not duplicate or sustain that intensity, a lesson we have heard three times over from international assessments of science and mathematics achievement conducted since the 1960s. The unmistakable message is that our students' performance relative to their peers in other countries—our competitors all—is disappointingly unchanged. Their students have consistently scored higher than U.S. students.<sup>2</sup> Indicators from those three assessments and those conducted here at home corroborate the point.

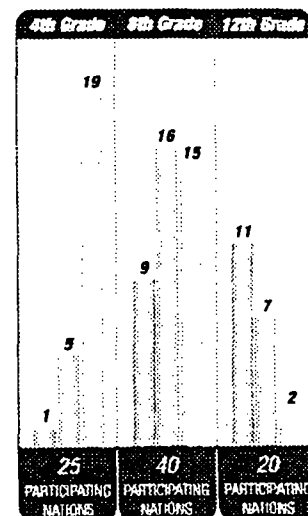
**TIMSS Results:** The Third International Mathematics and Science Study assessed the performance of students from 41 countries in 1995. U.S. fourth-graders scored above the international average in mathematics and science; eighth-graders scored slightly above the international average in science and slightly below the international average in mathematics. However, among 20 nations assessed in advanced mathematics and physics (students were not assessed from all

### TIMSS Results\*

#### MATHEMATICS



#### SCIENCE



1 Nations with average scores HIGHER than the U.S.

2 Nations with average scores EQUIVALENT to the U.S.

Nations with average scores LOWER than the U.S.

\*When participation of the United States is included, the total number of participating countries is 26, 41, 21 at the 4th grade, 8th grade, and the 12th grade respectively

countries for all grades), *none* scored significantly lower than the United States in advanced mathematics, and only *one* scored lower in physics.<sup>1</sup> In a phrase, our mathematics and science students are not "world class."

**NAEP Results:** The National Assessment of Educational Progress (NAEP, the "Nation's Report Card") periodically reports student achievement in science and mathematics using four categories: "Below Basic," "Basic," "Proficient," and "Advanced." On the 1996 NAEP, *less than one-third* of all U.S. students in grades 4, 8, and 12 performed at or above the "Proficient" achievement level in mathematics and science, where "Proficient" represents solid academic performance for each grade assessed. Perhaps even more alarming, *more than one-third* of U.S. students scored below the "Basic" level in these subjects, which means they lack mastery of the prerequisite knowledge and skills needed for "Proficient" at each grade. While U.S. students do, indeed, learn more each year they are in school, they are performing less well in twelfth grade than in the fourth and eighth grades, *compared to the standards of proficiency* for those grade levels. Despite some improvements in NAEP mathematics scores since the 1970s, our students' performance in science and mathematics has remained at disappointing levels for nearly 30 years.<sup>2</sup>

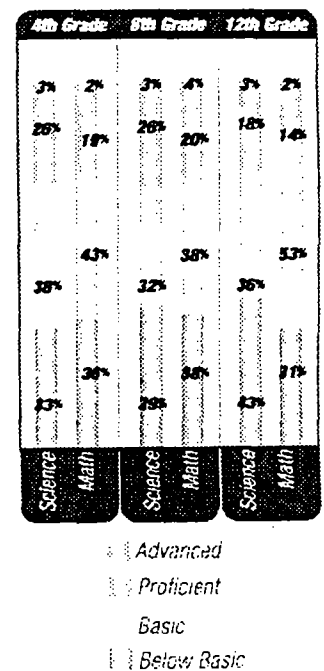
In sum, whether we look at comparisons of our young people to those of other nations or look simply at the progress our students are making at home,<sup>3</sup> the nation keeps getting the same dismal message about mathematics and science achievement: our students are losing ground. It's time we heeded it.

But heeding the bad news has to involve something other than wringing our hands and raising a polite rallying cry for improvement. The issues raised by TIMSS, NAEP, and state performance data are deeply entrenched. They cannot be papered over. Only a well-conceived strategy, grounded in data and sustained over time, can possibly overcome the status quo. The majority of states report assessment data for both mathematics and science; but proficiency levels in both subjects are often too incomplete to paint a useful portrait for determining accountability. This is especially true in science, where only 16 states report proficiency levels. Thus, a crucial first step in creating greater accountability is for state education agencies to supply to the public complete, user-friendly, reporting on student performance, *school-by-school*.<sup>4</sup> As it stands, only 12 state education agencies provide parent information on their Web site guides to student assessment; that is 38 states too few.

### Why Does It Matter?

Four important and enduring reasons underscore the need for our children to achieve competency in mathematics and science: (1) the demands of our changing

### NAEP Performance Results



Science Results Reported in "What Do Students Know?": Results for 4<sup>th</sup>, 8<sup>th</sup> & 12<sup>th</sup> Grade Students. National Center for Educational Statistics. [www.nagb.org/pubs/students/nation.html](http://www.nagb.org/pubs/students/nation.html)

NAEP 1996 Mathematics: Report Card for The Nation and the States. Washington D.C.: National Center for Educational Statistics. February 1997. p. 59

economy and workplace, (2) our democracy's continuing need for a highly educated citizenry, (3) the vital links of mathematics and science to the nation's national security interests, and (4) the deeper value of mathematical and scientific knowledge.

### ***The demands of our changing economy and workplace***

**A Changing Economy:** Science and mathematics exert the most visible influence on the economy through their most rapidly changing offspring—new technologies.

- New technologies are the relentless drivers behind the nation's standard of living. Since 1996, national productivity (i.e., output per worker hour) has increased, on average, by 2.6% per year, a rate that doubles the standard of living roughly every 25 years.<sup>7</sup> Such productivity gains are unsustainable without a workforce sufficiently educated in the sciences and mathematics.
- The technology-driven economy of the 21<sup>st</sup> century will add about 20 million jobs to the American economy by 2008—if we can only educate our young people to fill them.<sup>8</sup>
- Jobs in both the health sciences and computer industries requiring science and mathematics skills will increase by 5.6 million by 2008. The Department of Labor estimates that postsecondary institutions will have to produce nearly

four times as many graduates in computer science as they do now to meet the demand.<sup>9</sup>

- Bureau of Labor Statistics projections for 1998-2008 revealed that more than two-thirds of the 30 occupational categories expected to have the fastest growth—most of them high-tech—already had hourly earnings above the national median; 11 of those job categories were in the top earnings quartile of \$16.25/hour and up.<sup>10</sup>
- Finance, trade, industrial production, communications, and asset ownership are becoming increasingly integrated on a global basis. So are capabilities in science and technology. Singapore, for example, reputedly has the most technologically intensive workforce in the world. Israel now produces more technology-based startups than anywhere outside Silicon Valley; its high-tech exports account for a quarter of its global sales, and the country boasts 135 engineers per 10,000 citizens—twice the U.S. ratio. Drawing on a young, skilled, and well-educated workforce, Ireland now produces 60% of all PC business-application software sold in Europe. The common denominator of these advances abroad is education—a “raw material” far easier to acquire than lumber or iron ore.<sup>11</sup>
- Ironically, the U.S. higher education system itself contributes mightily to the rapid advances by equipping the

workforces of our competitors. The Department of Education has reported that, for 1995-96, nonresident aliens received 34.6% of all bachelor's and 44% of all master's degrees in engineering, mathematics, and information science. These students are out-competing young Americans for university spots and are returning to their native lands to expand technical capacity there.<sup>12</sup>

**A Changing Workplace:** New scientific discoveries not only add to basic knowledge, they also transform jobs, the lives of families, and the shape of public issues. The mathematical and scientific preparation of each new generation—beginning with the one now in school—has become the precondition not just to progress but to the future itself, as the links among economy, technologies, and education tighten in a rapidly changing workplace.

■ "Knowledge work" is replacing low-end, low-wage jobs. In 1950, 80% of jobs were classified as "unskilled"; now, an estimated 85% of all jobs are classified as "skilled."<sup>13</sup> A telling example is found in machine tooling. The operators of today's computer-numerically-controlled (CNC) manufacturing technology now need sophisticated skills, commonly including computer programming and knowledge of calculus.<sup>14</sup>

■ Many American companies now have to import the computing talent they

need to stay competitive. Two years ago the Congress had to pass special legislation to permit the entry of computer workers, in rapidly escalating numbers, from abroad. The so-called "H-1B Visa Bills" progressively raised the ceiling to permit the entry of some 300,000 temporary, non-immigrant, skilled computer workers between 1998 and 2002.

■ *Training Magazine* reports that approximately \$62.5 billion was spent by businesses on training in 1999.<sup>15</sup> Much of these funds are spent on upgrading basic employee skills, many of which should have been acquired at school. In too many contexts, the nation is paying twice to equip its workforce.

■ Among the scarier statistics recently reported by a Midwest think tank is this one: 60% of all new jobs in the early 21<sup>st</sup> century will require skills that are possessed by only 20% of the current workforce.<sup>16</sup>



### ***Our democracy's need for an educated citizenry***

It is not just the role that mathematics, science, and technology play in the changing economy and workplace that matters. Mathematics and science have become so pervasive in daily life that we tend to overlook them. Literacy in these areas affects the ability to understand weather and stock reports, develop a personal financial plan, or understand a doctor's advice. Taking advantage of mathematical and scientific information does not generally require an expert's grasp of those disciplines. But it does require a distinctive approach to analyzing information. We *all* have to be able to make accurate observations, develop conjectures, and test hypotheses—in short, we have to be familiar with a scientific approach.

Examples of science-related issues with far-reaching implications for public and private life that require the understanding of an informed citizenry are present everywhere:

- **In biology:** Cloning of organisms, the selective genetic manipulation of human reproduction, and the use of DNA as courtroom evidence;
- **In health:** The development of new drugs, chemical and biological terrorism, the effect of agricultural herbicides and pesticides on the food chain, whether to take nutritional supplements, or even calculating the nutritional value of a week's groceries;
- **In computer science.** Issues of data encryption, maintaining computer privacy, the conduct of e-commerce; and

### ■ **In meteorology and earth science:**

Global warming, the ozone layer, and hurricane and earthquake research.

The list is endless, but the point is a simple one. No citizen of America can participate intelligently in his or her community or, indeed, conduct many mundane tasks, without being familiar with how science affects his daily life and how mathematics shapes her world.

### ***The vital links of mathematics and science to our national security interests***

The warp of our nation's security interests and the woof of mathematics and science are closely woven. It was the pure science of nuclear physics that first gave rise to, then continued to support, the nation's nuclear deterrent throughout the last half century. Nuclear science—put to sea in nuclear submarines—has also formed the second pillar of our strategic defense system. Long-range bombers, the third pillar, became possible only with advances in aeronautical science.

Mathematics and science today supply the architecture that gives structure and strength to the development of new weapons, from long-range missiles to the B-2 ("Stealth") bomber. Science and mathematics continuously enhance our armed forces' ability to protect the nation, whether in the form of vaccinations against chemical and biological agents, or night-vision goggles for combat troops, or the Global Positioning Satellite system (GPS) that can pinpoint the location of virtually any object on the planet. An invisible web of sophisticated satellite communications technology connects our military forces in the global defense arena.

where U.S. troops must respond quickly and operate for indefinite periods. On the ground, the modern equipment and weaponry that our troops are now called on to use in battle require mathematical and scientific skills, particularly computer-based learning. Finally, the sophisticated mathematics of encryption supports and protects our diplomatic and military communications around the world, as well as those of American corporations.

### ***The deeper value of mathematical and scientific knowledge***

The wealth of knowledge that mathematics and science impart for understanding the world has such breadth that it is easy to overlook the dimension of depth. But teaching our children these subjects is important at a more profound level than that of their practical benefits. Above all, mathematics and science impart three qualities that define our human world and enable us to meet its challenges.

■ First, mathematics and the sciences bring order, harmony, and balance to our lives. They have great explanatory power. They teach us that our world is not capricious but predictable, i.e., that it contains pattern and logic, which can be used in the service of humankind. The analytical tools of mathematics and the investigative skills of a scientific approach are also foundational skills for lifelong learning, in other words, for creating progress itself.

■ Second, science and mathematics continually shape and reshape our history and culture, giving rise to new

ideas and inventions. It was early astronomy that formed the knowledge base of ancient Near Eastern civilizations. The physics of Newton made the Industrial Revolution possible. In our own time, the pure science of information theory has yielded not only computers but also an incredibly useful global communications system.

■ Third, as science and mathematics provide human beings with powerful tools for understanding and continually reshaping the physical world itself, they teach us again and again that Nature's secrets can be unlocked—in short, that the new is possible.

### ***Not the Last Word***

Despite the pervasiveness of mathematics and science in our lives, the sad reality is that our nation continues to renege on its "By the Year 2000..." promise. Our schools are not producing graduates with the kinds of skills our economy needs to remain on the competitive cutting edge. In consequence, we are bequeathing failure to our children. As they try to meet the challenge with the longest-range implications of all—securing their own and America's place in the world—they need to command the disciplines that they are only indifferently mastering today.

If this were all that could be said, then the future would be bleak indeed. But it is not. Some important factors have begun to coalesce, each adding to the others' momentum.

# The Time to Act is Now



*An ancient Chinese proverb says, "The best time to plant a tree is twenty years ago; the second best time is today."*

We believe that wisdom applies to the task of strengthening and improving the quality of mathematics and science teaching and learning in America. Fortunately, an unusual confluence of factors has created an unprecedented—perhaps once-in-a-lifetime—opportunity for making progress. Five things seem to be happening at once.

- ❖ First, two decades of experience in education reform demonstrate that tinkering around the edges will not suffice. Happily, education reform now has the focused attention of the American people. Not long ago, when asked to name the top problems facing the nation, Americans ranked education well down on the list. Today, in poll after poll, it is number one. That kind of concern, focused through the lens of a well-crafted agenda, offers an opportunity to generate real energy. But that opportunity will not last forever.
- ❖ Second, America now has the abundance of resources it needs to address the issue of mathematics and science education powerfully. We are still in the midst of the longest economic expansion in our history. Thanks in part to a half-century of investment in science and technology,

there may be a trillion-plus-dollar surplus at hand to invest in our people.

- ❖ Third, the U.S. teaching force is about to go through a massive reshuffling. Over the next decade, our schools will replace two-thirds of their teachers, whether by retirement, attrition, or job changes. This immense demographic shift in our schools presents us with an unparalleled chance to plan—to inject new energy into mathematics and science teaching in the form of new recruitment, training, and supportive structures that can strengthen teaching at all grade levels. This we *must* do, before we are forced to play yet another game of educational catch-up.
- ❖ Fourth, we have learned much in the past generation about what works in mathematics and science education—about rigorous curriculum, high standards,<sup>17</sup> effective teaching methods, challenging assessments, and how young people learn.<sup>18</sup> In several states, school districts, and schools, innovative approaches are being attempted. Many are promising. We need to build on these approaches and extend them with new research. We now have the chance to bring this knowledge together in a mathematics and science education effort that will serve as a powerful tool for change. Ignored research is worthless; unused tools can only rust.

✱ Finally, many more able college students are expressing an interest in teaching. The success of such programs as *Teach for America* and *AmeriCorps*, and the national resurgence in volunteerism, demonstrate that the long dormant idealism of a former generation has been reawakened. According to a recent poll, 10% of young Americans say they want to teach in our schools—double the number who said so in 1982.<sup>19</sup>

rialization and the needs of a growing population. At the beginning of the 21<sup>st</sup> century we look to an even greater challenge. Our schools, and the teachers who imbue them with life, must find ways to produce higher levels of proficiency in mathematics and science in *all* their students. The American people must do this because our world and our times require it. If we do not plant this tree today, we will surely have to do so tomorrow, next month, or next year—at a higher price.

### ***Now, The Glimpse of a Greater Challenge***

At the beginning of the 20<sup>th</sup> century, schools in our country underwent profound changes as they adapted teaching and curricula to the demands of indust-



# Toward a Solution

## We Must Place Better Teaching at the Center of Mathematics and Science



*The two core premises of this report are simply stated and they undergird every change we recommend:*

(1) *Now, more than ever, America's students must improve their performance in mathematics and science.* That is the burden of the case presented thus far.

(2) *The second premise points in the direction of a solution: The most direct route to improving mathematics and science achievement for all students is better mathematics and science teaching.* In other words, better teaching is the lever for change.

To call for higher student achievement and high-quality teaching as the most direct route to change seems obvious on the surface, but recent educational reform recommendations have not been sufficiently guided by this clear linkage. Now, before it's too late, is the time to make it.

The evidence for the effect of better teaching is unequivocal.<sup>20</sup> The most consistent and most powerful predictors of higher student achievement in mathematics and science are: (a) full certification of the teacher and (b) a college major in the field being taught.<sup>21</sup> Conversely, the strongest predictors of lower student achievement are new teachers who are uncertified, or who hold less than a minor in their teaching field.

The difference better teaching makes is often dramatic. The National Commission on Teaching and America's Future reported in 1996, for example, that licensing examination scores and teaching experience accounted for 43% of the gains in mathematics test scores in the early grades.<sup>22</sup>

The difference better teaching makes for students is paralleled by what can also happen for teachers. A focused *professional development* experience led by qualified teachers, mentors, and colleagues is the indispensable foundation for competence and high-quality teaching.

As school gets under way in the fall of 2000, many underprepared and out-of-field teachers will take charge of mathematics and science classrooms. They, as well as their better-prepared and more knowledgeable colleagues, must have access to ways to continually improve their teaching. Only a tailored system of professional development provides that access.

Thus, if we are to create the kind of mathematics and science education America needs, we have to start rebuilding at education's very foundation—*teaching itself*.<sup>23</sup> For this reason, the three goals in this report—and the action strategies that accompany them—point in a new direction.

But before turning to specific remedies, we need to know more about what is happening now in America's mathematics and science classrooms—and what should take its place.

### WHO IS A MATH OR SCIENCE TEACHER?

All teachers, grades K–12, who provide instruction in mathematics or science for some part of the school day are math or science teachers. The elementary school generalist, the high school teacher specializing in physics, as well as the drama teacher who may be assigned to a single geometry class, are all persons whose teaching quality is of interest—and of consequence—to the nation.

### WHAT IS PROFESSIONAL DEVELOPMENT?

When this report uses the term "professional development," it means a planned, collaborative, educational process of continuous improvement for teachers that helps them do five things: (1) deepen their knowledge of the subject(s) they are teaching; (2) sharpen their teaching skills in the classroom; (3) keep up with developments in their fields, and in education generally; (4) generate and contribute new knowledge to the profession; and (5) increase their ability to monitor students' work, so they can provide constructive feedback to students and appropriately redirect their own teaching.

### ***The Need for Professional Development***

To say that improving the quality of teaching yields better student performance in science and mathematics makes sense, and some states have taken this wisdom to heart.<sup>24</sup> But in many more places, nearly the reverse is true. There, the knowledge base and arsenal of teachers' skills must be replenished:

- ✱ More than one in four high school mathematics teachers and nearly one in five high school science teachers lack even a minor in their main teaching field.<sup>25</sup>
- ✱ More than 12% of all new hires enter the classroom without any formal training; another 14% start work without meeting the teaching standards of their states.<sup>26</sup>
- ✱ About 56% of high school students taking physical science are taught by out-of-field teachers, as are 27% of those taking mathematics. These percentages are much greater in high-poverty areas. Among schools with the highest minority enrollments, for example, students have less than a 50% chance of getting a science or mathematics teacher who holds both a license and a degree in the field being taught.<sup>27</sup>

Thus, when the dismissal bell rings each day, untold thousands of American students depart for home having been taught by mathematics and science teachers ill-equipped for the job. Far too many are inexperienced beginners, with

little or no training, and little or no mentoring by qualified colleagues.

Astonishingly, in no other profession is so much of such ultimate worth entrusted to people with such uneven qualifications.



#### **SHORT-TERM SOLUTION CREATES LONG-TERM PROBLEM**

The most common solution to the shortage of qualified mathematics and science teachers is to assign those classes to out-of-field teachers. But merely being able to keep one chapter ahead of the students in an algebra or environmental science text does not a mathematics or science teacher make.

Predictably, underqualified teachers are most prevalent in urban schools. A recent survey taken among 40 large urban schools, for instance, showed that more than 90% of them had an immediate need for a certified mathematics or science teacher.<sup>28</sup>

# What Happens in Most Classes



*Despite the dramatic transformations throughout our society over the last half-century,*

teaching methods in mathematics and science classes have remained virtually unchanged. Classroom practice has still hardly begun to capitalize on the many dimensions of the learning process.

A videotape study of eighth-grade mathematics classes in the United States reveals that the basic teaching style in American mathematics classrooms remains essentially what it was two generations ago. The approach used for the lessons was numbingly predictable: (1) a review of previous material and homework, (2) a problem illustration by the teacher, (3) drill on low-level procedures that imitate those demonstrated by the teacher, (4) supervised seat work by students, often in isolation, (5) checking of seatwork problems, and (6) assignment of homework. In not one of 81 videotaped U.S. classes did students construct a mathematical proof.<sup>29</sup>

In Japan, by contrast, closely supervised, collaborative work among students is the norm. Teachers begin by presenting students with a mathematics problem employing principles they have not yet learned. They then work alone or in small groups to devise a solution. After a few minutes, students are called on to present their answers; the whole class works through the problems and solutions,

uncovering the related mathematical concepts and reasoning. The students learn through reasoned discovery, not lecture alone.

Not incidentally, this approach is a natural outgrowth of the teaching culture in Japan, which accords teachers not only abundant time for preparation, but also for collaborative lesson planning. Fully 99% of all elementary teachers and 50% of all middle school teachers participate in lesson study groups that meet for two to five hours per week. The debilitating professional isolation of U.S. teachers stands in stark contrast to this pattern. A core conclusion from the videotape research: "The key to long-term improvement [in teaching] is to figure out how to generate, accumulate, and share professional knowledge."<sup>30</sup>

Instructional patterns in the United States do not yield much better results when it comes to the sciences. Tests of scientific knowledge and classroom observation indicate that most science students spend much of their time learning definitions, or the labels that apply to natural phenomena and scientific processes. In other words, much science instruction in our schools parallels what happens in a badly taught history unit on the Civil War, in which students learn nothing but the names of the generals and the dates of the battles. Seldom are students asked to master the "big" concepts that make science so powerful and fascinating.<sup>31</sup>

If the core of mathematics and science is about inquiry, then too many of today's mathematics and science classrooms come up short. Students are crippled by content limited to the "What?" They get only a little bit about the "How?" (or "How else?") and not nearly enough about the "Why?" Missing almost entirely is "Why should I care?" It is hard to imagine that students in these classes are gaining the conceptual and problem-solving skills they need to function effectively as workers and citizens in today's world—a world that increasingly depends on mathematics and science.



# What Could Happen

## We Need To Capture A Vision Of High-Quality Teaching



*What kind of instruction in mathematics and science can justifiably be called "high-quality teaching?"*

- A core premise of high-quality teaching is that the ability to teach, contrary to myth, is not "something you're born with"; it can be learned and refined over time. Specific teaching skills—for example, the ability to distinguish between what is most important for students to learn and what is hardest for them to understand—can only be acquired through training, mentoring, collaboration with peers, and practice.
- High-quality teaching requires that teachers have a deep knowledge of subject matter. For this there is no substitute.
- In high-quality teaching, the process of *inquiry*, not merely "giving instruction," is the very heart of what teachers do. Inquiry not only tests what students know, it presses students to put what they know to the test. It uses "hands on" approaches to learning, in which students participate in activities, exercises, and real-life situations to both learn and apply lesson content. It teaches students not only what to learn but how to learn.
- High-quality teaching not only encourages students to learn, it *insists* they learn.
- High-quality teaching, especially in the sciences, focuses on the skills of observation, information gathering, sorting, classifying, predicting, and testing. A good science or mathematics teacher encourages students to try new possibilities, to venture possible explanations, and to follow them to their logical conclusions.
- High-quality teaching fosters healthy skepticism. It encourages students to submit their work to questioning by others, to pull things apart and put them back together, and to reflect on how conclusions were reached.
- High-quality teaching allows for, recognizes, and builds on differences in the learning styles and abilities of students. It has the deepest respect for students as persons; it corrects without squelching; it builds on strengths rather than trying to stamp out weaknesses.
- High-quality teaching is grounded in a careful and thorough alignment of curriculum, assessment, and high standards for student learning.
- To keep its edge, high-quality teaching must be continually reshaped by the institutional structures that support it, i.e., by professional development, continuing education, the effective use of technology, and recognition and rewards.
- Finally, the effectiveness of high-quality teaching can be evaluated by the performance and achievement of the students who receive it.

# Three Goals



*The pressing national need for high-quality teaching described in this report demands a vigorous,*

national response that unifies the efforts of all stakeholders in mathematics and science education. To that end, three wide-ranging but intertwined goals focus our call for action at the local, state, and federal levels. Achieving these goals will involve the sustained efforts of legislators and other decision-makers, the business community, higher education, school boards and administrators, teachers, and parents. An intense, serious commitment to achieve these goals, through a coordinated set of well-funded action strategies, is needed immediately.

All together, the action strategies for achieving these goals nationally will cost more than \$5 billion annually. Strategy by strategy, the financial responsibility must be shouldered by the governments and institutions best equipped to do so, whether at the federal, state, or local levels, by business and industry, or by higher education. The agenda laid out here details concrete steps that all Americans can take. The most important point to keep in focus is that the funds invested in mathematics and science education today can purchase a lifetime of leverage on the future of American school children and the nation as a whole.

Clearly, the cost of achieving these goals

will create a noticeable line item in education budgets at every level. (An estimate of the costs associated with the first year of implementation of the goals concludes this report.) At the same time, however, the nation's balance sheet now shows a considerable surplus and the cost of delay is higher still. Those funds must therefore be put to work now, when and where they can most usefully equip our young people, and through them the nation itself, for the new century's challenges.

*GOAL 1: Establish an ongoing system to improve the quality of mathematics and science teaching in grades K-12.*

If high-quality teaching is the leverage point for improving mathematics and science education, and if professional development is a prerequisite for a well-qualified and effective teaching force, then teachers need a focused support system and enough time to grow as professionals.

Sadly and short-sightedly, however, professional development is too often treated not as a necessity but as a luxury item on the school budget. Many people erroneously believe that teachers are not working unless they are standing in front of a classroom. In fact, preparation time, individual study time, as well as time for peer contact and joint lesson planning, are vital sources of both competence and nourishment for all teachers.

But teachers are granted precious little time for any of these activities. Equally rare are extended periods of time set aside

## SCALING UP

Several states and school districts already provide excellent instruction in mathematics and science. Their students' test scores provide evidence of high-quality teaching. But occasional oases of excellence are not enough to meet the nation's needs. That means scaling up our efforts to match our aspirations. Our perspective must be nationwide and we must intensify our efforts immediately: not next week, or next year, but now. Our aim can be no less than equipping every K-12 student in every school with an excellent education in mathematics and science. The three strategic goals of this report are therefore just as urgent as they are visionary.

The estimated costs that accompany the Action Strategies proposed here remind us that we will get only what we are willing to pay for.

## WHAT IS A PROFESSIONAL?

A professional "professes" the values associated with a particular occupation, and has acquired the special core of knowledge and skills needed to serve others effectively through that occupation. If professionals do not maintain and expand their knowledge and skills, they will atrophy.

We have the resources and insights to build an even stronger base of professional knowledge about mathematics and science teaching. Where that is not available, it has to be developed.

### ***Why isn't high-quality teaching universal?***

For teachers to deliver high-quality teaching, they must be empowered to do so. Generating this kind of teaching means that school boards, administrators, parents, and policymakers must be willing to stand up for teachers as the primary drivers of student achievement. Teachers must be given the time they need within the school day to keep up with new developments in their fields, teaching aids, materials, and technology. Teachers must be encouraged to contribute knowledge back to their disciplines. They need the time and feedback necessary to reflect on their teaching, so they can get better at it.



Teacher empowerment also means according teachers the respect they deserve for their judgments about learning, rewarding their professionalism, and yes, paying them what they are worth. These concerns are addressed by the goals that follow.



for teachers to have challenging educational experiences of their own. In consequence, much-needed study and preparation time is routinely sacrificed to in-service events that are no more substantive than a broad-brush overview of this semester's teaching fad. High-quality professional development ought to be the lifeblood of American teaching; instead, it is used only to provide the occasional, anemic transfusion.

Everyone connected with and touched by the U.S. education system is responsible for changing the character of professional development and its impact. *Teachers* need to take responsibility for their own professionalism as they practice mathematics and science teaching and work to improve their knowledge and teaching skills. *Principals, superintendents and school boards* must make sure teachers have the time and resources they need to prepare and collaborate. *Teacher preparation institutions, state departments of education, and the federal government* all have a substantive policy role in enabling teachers, schools, and districts to realize improved teaching via professional development. The support of businesses, which stand squarely to benefit from improvements made in the quality of mathematics and science teaching, is also crucial to enriching the quality of professional development. *Professional associations and their members* can make their own important contributions through workshops, clinics, and new curricular initiatives.

The place to begin improving mathematics and science teaching is with a *system* that promotes high-quality professional development opportunities for all teachers. Such opportunities should build upon one another and reinforce accountability. The system must be rooted, first of all, in a clear determination of the professional development needs of teachers in every school and school district. That determination must be followed by an immediate response to the most pressing needs; a sustained response with the necessary leadership, resources, tools and time; and a continuing system that recognizes and rewards schools that demonstrate improved student achievement.

Despite progress in some states and districts, there remains an urgent need for wide-scale self-examination, strategic planning, and rapid implementation of a system of professional development tailored to the needs of those who provide instruction in science and mathematics, K-12. Action strategies for implementing such a system are outlined below; each is accompanied by concrete suggestions on how the work can be done and who can do it.

**Action Strategies: What Needs to Happen**  
**Needs Assessment:** Each state must quickly undertake a full assessment of the professional development needs, district by district, of its mathematics and science teachers, K-12. As many stakeholders as possible must be involved in this self-

## NEEDS ASSESSMENT

*Who Will Make Them Happen and How?*

- Some selected states will begin their needs assessments immediately. States should first establish criteria and protocols for conducting their needs assessment, then go on to identify and analyze state certification and recertification requirements. Once procedures and systems have been established and tested in these initial states, what is learned can be widely disseminated to all states.
- Governors, state legislatures, and state boards of education in each of the remaining states (thence districts) must work together quickly to allocate the federal, state, and local funds and staff needed to develop and oversee a similar assessment of the professional development needs of mathematics and science teachers.
- Two- and four-year colleges and universities, using their mathematics, science, and education faculties, can assist school districts and others in planning and implementing needs assessments.

## SUMMER INSTITUTES

### Who Will Make Them Happen and How?

- As with the needs assessments, selected states will establish protocols and evaluation criteria for Summer Institutes, working in concert with state boards of education. The lessons learned from these experiences will be widely disseminated to other states to inform their efforts.
- Governors, state legislatures, state boards of education, and districts in each of the remaining states must work together quickly, allocating funds and staff, to develop and oversee a series of Summer Institutes addressing the most pressing professional development needs of mathematics and science teachers.
- Federal, state, and local professional development funds must be allocated to this coordinated purpose—rather than in the diffuse way that is currently all too common. Teachers should be compensated for their participation in the Summer Institutes.
- Institutions of higher education and professional associations are well positioned to assist in planning, hosting, conducting, and evaluating Summer Institutes.

evaluation—teachers, administrators, parents, school boards, businesses, two- and four-year institutions of higher education, professional associations, and others. In addition to seeking to upgrade content knowledge

and teaching skills, statewide needs assessments must also determine:

- (1) whether schools offer a full complement of mathematics and science courses;
- (2) whether the quality of curricula, texts, and assessments strongly supports high-quality teaching and learning;
- (3) whether the necessary materials and resources (e.g., laboratories and equipment) are readily available;
- (4) whether teachers are adept in using technology; and
- (5) whether teacher certification and recertification guidelines are sufficiently ambitious. As a result, school districts will have a complete snapshot of the status of their science and mathematics teaching corps, enabling the ready identification of professional development tasks that must be targeted first.



Based on what is learned from these needs assessments, each state, with district input, must move immediately to implement a *system* of professional development, designed to address the short- and long-term needs of its mathematics and science teachers. To put this in perspective, collectively the states must plan to quickly reach the *1.7 million teachers nationwide* who provide instruction in science and mathematics.

**Summer Institutes:** In the near term, two-week Summer Institutes will address the most pressing problems, such as providing opportunities for upgrading content knowledge for out-of-field teachers, conducting subject-based workshops for all science and mathematics teachers, integrating technology into the teaching of mathematics and science, introducing new teaching methods, and improving skills for teaching specific subject matter by grade. Over the long term, states are urged to tailor their Institutes to teachers' identified needs and to make regular Institute attendance a critical component of teacher recertification, with the purpose of continually increasing teachers' science and mathematics knowledge base. In many locations, the powerful technology of distance learning can open Summer Institutes to a statewide teacher audience.

**Inquiry Groups:** However well they may have been prepared to teach, and whatever knowledge they may have gained in Summer Institutes, *all* teachers need continuing, collegial contact, peer

reinforcement and input from experts to sharpen their skills and deepen their subject knowledge. Building- and district-level Inquiry Groups are envisioned as communities of learning. They will provide a specific venue for teachers to share ideas, gain the benefit of one another's teaching experience, engage in common study to enrich their subject knowledge, learn more about technology, and design ways to incorporate local, state, and national educational developments (e.g., subject-matter learning standards) into their teaching. While critically important during the school year, Inquiry Groups must also continue through the summer, enabling teachers to explore some issues without the pressing responsibility of daily student contact. For districts moving to 11-month salary schedules, full participation in an Inquiry Group ought to be an integral part of every teacher's responsibilities when school is not in session.

*Time* for in-depth study through regular work with peer Inquiry Groups is a teacher's most valuable professional resource. *It must be considered sacrosanct.*

Perhaps most important, these groups can be a rich source of new knowledge about teaching itself, generated from the field. Such groups can readily take advantage of local resources (e.g., businesses, museums, laboratories), other Inquiry Groups from neighboring districts, and faculty from nearby two- and four-year higher education institutions. Inquiry Groups could also be networked

electronically, via distance learning technology, for wider sharing of information, instruction, and resources.

**Leadership Training:** Summer Institutes and Inquiry Groups must be facilitated by teachers who are current with the most effective teaching methods in their disciplines, who have shown demonstrable results of higher student achievement in mathematics and science, and who are adept in the use of technology for teaching and learning. Although there are many such teachers, the demand far outpaces the supply. To remedy this, many more potential leaders must be identified and trained.

**Internet Portal:** High-quality mathematics and science teaching requires not only access to technology (especially the Internet) but also regular training in how to use it effectively. An Internet Portal, i.e., an interactive, conversational Web resource dedicated to science and mathematics instruction, would provide links to an ever-expanding knowledge base that would be invaluable in supporting high-quality professional development.

The Portal, functioning as a "virtual resource center" and updated frequently, would provide hyper-links to form a "one-stop-shopping" learning network. It would also codify what is already available on the Web elsewhere, while providing a framework for new entries over time. Among the activities and resources envisioned for the Portal are:

## INQUIRY GROUPS

*Who Will Make Them Happen and How?*

- Districts must establish conditions that promote and support continuing learning communities among science and mathematics teachers in each school, focusing on teaching quality. Doing so will demand a reallocation of teacher time and professional development funds to focus on discipline-based efforts.
- Policies must be enacted by school boards, and rigorously enforced by school administrators, to ensure that this reallocation occurs.
- Access to a variety of Web-based resources—through an Internet Portal dedicated to mathematics and science teaching—must be readily available to all Inquiry Group participants.
- Parent organizations have a watchdog and advocacy role to play in ensuring that Inquiry Groups have the means and opportunity to succeed.

## LEADERSHIP TRAINING

*Who Will Make it Happen and How?*

- Appropriate agencies within the federal government must provide the funding needed to train cadres of facilitators and help them, thereafter, to keep abreast of new insights and research in science and mathematics teaching.
- These trained leaders should work in their respective districts and states to organize and facilitate Summer Institutes and Inquiry Groups. They should also be proactive in helping colleagues develop their Internet and research skills.

### THE INTERNET PORTAL

#### *Who Will Make it Happen and How?*

- Appropriate federal agencies, especially the National Science Foundation, must scale up current efforts to create a digital library that will serve as the foundation for an Internet Portal.
- States must provide search engines keyed to their respective state standards and curriculum frameworks for more tailored use of the information in the Portal.
- Businesses, particularly those in information management, have a crucial role to play in contributing to and sustaining the Internet Portal.
- Curriculum and software developers, publishers, and academics should collaborate with teachers in generating the resources and tools offered via the Portal.
- Local school boards must make it a matter of policy that mathematics and science teachers have access to, and training in how to use, the Internet Portal.

- An online professional journal that encourages mathematics and science teachers to engage in publishable research and to share new teaching strategies with colleagues, both nationwide and internationally;
- User-friendly access to the growing number of Web sites with real-time data and experiences to support high-quality teaching and learning;
- A dedicated database for mathematics and science teachers, containing teaching ideas, lesson plans, student work, and other resources;
- An interactive, online resource for conversations, meetings, and idea sharing;
- An outlet to distance-learning courses in science and math for K-12 students and their teachers; and
- Interactive video, both for observing good teachers and critiquing teachers' own teaching, for mentoring, and for online instruction.



### ***Coordinating Council for Mathematics and Science Teaching:***

Implementing and sustaining the initiatives described above, as well as several of those that follow in subsequent goals, require special attention from a *nongovernmental* organization. A Coordinating Council for Mathematics and Science Teaching will serve primarily as a collaborative body. It will function as a broker and matchmaker, bringing together groups that have a stake in mathematics and science education. The Council will also monitor state and local progress on needs assessments, Summer Institutes, Leadership Training, and other initiatives, and make such information widely available. In addition, the Council will take a special interest in creating opportunities for states and localities to collaborate in implementing the goals and strategies offered in this report, particularly those related to the professional development needs of mathematics and science teachers. Key activities for the Council in this arena include:

- Encouraging state needs assessments and collecting and publishing data on mathematics and science teaching that emerge from the assessments;
- Helping schools and school districts consider ways to align their professional development system with state curricula, teaching guidelines, performance standards, and assessment frameworks;

- Disseminating models for restructuring the school day and teachers' responsibilities to provide sufficient time to support a system of ongoing professional development;
- Collecting and disseminating research on improving mathematics and science teaching; developing databases relevant to teaching; identifying and promoting "best practices" in mathematics and science teaching; and facilitating nationwide communication among teachers; and
- Measuring progress and making the results of implementing these action strategies widely known to the public.

**Rewards Programs:** Just as we do our children a profound disservice when we fail to reward their effort, or worse, promote them beyond their merit, so do we cheat their teachers when we fail to recognize their success, or worse, reward them for mediocre performance. To increase the attractiveness of the professional development system, and to make clear that continual improvement in teaching methods is highly valued, all states and local districts must institute a program of recognition and rewards to deserving schools and teachers. Schools with exemplary professional development systems, and those that, *most importantly*, show improvement on rigorous assessments of student achievement in mathematics and science, must be recognized with monetary rewards for their teachers and other staff, and through well-publicized, showcase events. Such programs must speak directly to the

bedrock issue of the accountability of our schools—and especially of teachers—for the performance of students.

*GOAL 2: Increase significantly the number of mathematics and science teachers and improve the quality of their preparation.*

The demand for teachers generally, and for certified and fully qualified mathematics and science teachers specifically, is far outpacing the supply. The most recent data available (1993-94) on nationwide vacancies indicate that 20% of the slots—about 6,500 individuals—were filled by uncertified teachers. A more recent survey indicates that the problem is not diminishing. The National Science Teachers Association has reported that 48% of all middle schools and 61% of all high schools responding reported difficulty in finding qualified science teachers.<sup>32</sup> In urban areas the problem intensifies: 95% of urban districts report an immediate need for high school science and mathematics teachers, while 80% report a need for middle school science and mathematics teachers.<sup>33</sup> These estimated shortages are likely to grow with the impending retirement of almost two-thirds of the current teaching force. The quality of instruction in mathematics and science will be compromised unless the pipeline of qualified teachers expands significantly.

An estimated 240,000 middle and high school mathematics and science teachers will be needed over the next 10 years.<sup>34</sup> Of this total, nearly 70% will be newcomers to the profession. The negative

## COORDINATING COUNCIL

*Who Will Make It Happen and How?*

- Financial support for the Council must come from a diversified funding stream, including the federal and state governments, businesses, and foundations.
- Where appropriate, the Council will partner with existing groups to provide the necessary services and motivation to states and districts.
- Institutions of higher education will support the Council's mission by providing the training venues and the human resources needed to enact Council-brokered activities.

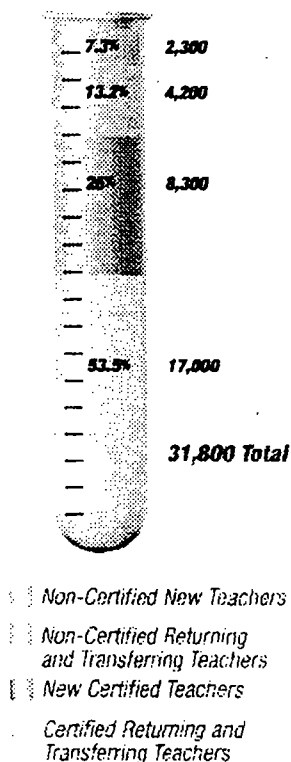
## REWARDS PROGRAMS

*Who Will Make Them Happen and How?*

- U.S. corporations and businesses, which have a stake in improving mathematics and science education, should provide significant funds, over several years, to support rewards and recognition programs in those states and districts that have implemented a system of high-quality professional development and assessment.
- It makes sense to gradually move rewards and recognition programs under the umbrella of state and local education agencies, although a strong business presence is needed to keep school-business relationships viable and to impart to the public the importance of the business stake in mathematics and science education.

## The Right Measurements

Middle and High School Mathematics and Science positions filled during the 1993-94 school year.



### EXEMPLARY MODELS

Who Will Make Them Happen and How?

- An appropriate federal agency, working with an array of highly respected professionals, will move quickly to set the criteria and process for identifying exemplary programs.
- This agency will also move, in a very timely fashion, to facilitate the identification process for new and redesignated models.
- Federal funds should be made available to the identified institutions for their use in supporting promising students to study science and mathematics teaching.

impact of the teacher shortage is compounded by the diffuse and therefore uneven quality of the education delivered by teacher preparation institutions. The sad fact is that many teacher preparation programs do not build an adequate knowledge base in their graduates. An aggressive recruitment program, therefore, must be accompanied by an equally aggressive, and simultaneous, effort to improve teacher preparation.<sup>35</sup>

To deal with these issues, two fundamental tasks must be accomplished: (1) identify exemplary models of teacher preparation that can be widely replicated, and (2) find ways to attract large numbers of qualified candidates into teaching (e.g., persons in mid-career seeking new challenges). We must train these individuals to high standards and provide them with the resources they need, throughout their careers, to meet the certification requirements and demands of high-quality teaching. Once employed, these new teachers can both contribute to and learn from Inquiry Groups that are part of a well-conceived professional development strategy in their respective schools.

The first step in such a strategy, however, must be a preparation program that imparts a deep understanding of content, teaches prospective teachers many ways to motivate young minds, especially with the appropriate use of technology, and instills a knowledge of—and basic skills in using—effective teaching methods in the discipline.

Action Strategies: What Needs to Happen

**Exemplary Models:** Identifying exemplary programs of teacher preparation around the country, and finding ways to encourage others to multiply their success, are basic to reaching Goal 2. To identify successful approaches and expand the pool of exemplary institutions and well-prepared new teachers, rigorous criteria are needed beyond those already used by credentialing and accrediting bodies. (Better-targeted performance criteria are indicated for teacher preparation institutions if for no other reason than the less-than-successful teaching generated by many of their graduates.) Designation as an exemplary program must be highly selective, a mark of prestige; nonetheless, there should be no artificial limit on the number of institutions accorded that status.

Each group of exemplary programs will keep its status for five years, at which time they will undergo a new review. Once identified, faculty at institutions with exemplary programs will need to collaborate with colleagues at other higher education institutions to increase the number of programs that can meet the exemplary criteria in subsequent years. In addition, designation as "Exemplary" should be required to qualify two- and four-year institutions to receive the federal funds needed to support full-tuition four-year scholarships. These new scholarships can entice high school students to become mathematics and science teachers and increase the number of undergraduates who can benefit from high-quality teacher preparation. When fully operational, more

than 1,500 scholarships will be available yearly to high-achieving students who are attracted and committed to math and science teaching as a career.

**Teacher Recruitment:** Once we can identify the kinds of teacher preparation programs that are most effective, and have a mechanism in place to increase the number of such programs, we can give full attention to an ambitious program to recruit students to enter the corps of mathematics and science teachers. Incentive-based strategies offer the most promise for attracting individuals capable of high-quality teaching, drawing from at least three groups of potential candidates:

- To address the pressing needs created by teacher shortages in mathematics and science, *recent college graduates and persons at mid-career* with baccalaureate (or higher) degrees in mathematics or science will be invited to compete for 3,000 prestigious, one-year, paid fellowships that lead to certification as mathematics and science teachers.\* At the end of their training, Fellows will agree to be employed for five years, to teach in districts with math and science teacher shortages.<sup>11</sup>
- To attract *college students*, a federally funded loan program, based on financial need, is required to target those considering mathematics and science teaching as a career. These loans will be forgiven, contingent upon the students' agreement to teach for

five years in districts with shortages of mathematics and science teachers.

The number of available loans can be adjusted annually to reflect the demand; 6000 loans are appropriate for current shortages of qualified teachers.

- Although *high school seniors* typically explore various career options, many are open to the idea of teaching. To attract this group, 1500 scholars will be competitively chosen to attend one of the exemplary preparation institutions on a full-tuition scholarship. In return, these students must agree to teach for five years in areas with teacher shortages.

### **Mathematics and Science Teaching**

**Academies:** An entirely new kind of research- and school-based preparation program must be created to provide a year of teacher education for those with scientific and mathematical content knowledge. Specifically, 15 Mathematics and Science Teaching Academies must be competitively selected, one in each of the 10 federal regions, with 5 more strategically located. No new brick-and-mortar infrastructure is envisioned. Rather, each Academy will build on existing institutions and bring them together into a new kind of relationship. Each Academy will ideally comprise an administrative consortium of at least one institution of higher education (including two-year colleges), neighboring school districts, business partners, members of

### **RECRUITMENT**

#### *Who Will Make It Happen and How?*

- The federal government must support an aggressive, national outreach, media campaign to attract young people to teaching careers in mathematics and science.
- Those in frequent and close contact with the academic progress of such students—parents, school counselors, principals, teachers, professors—must build on the campaign with encouragement and guidance for these prospective teachers. The Coordinating Council will disseminate materials and information in support of the campaign and stimulate recruitment strategies for mid-career and recent college graduates.
- Through appropriate federal agencies, funds will be available to support the different scholarship and loan programs.
- Appropriate federal agencies will administer the financial aid aspects of the programs.

## MATHEMATICS and SCIENCE TEACHING ACADEMIES

### Who Will Make Them Happen and How?

- Academies must be established through a competitive grant process administered by appropriate federal agencies and supported by federal funding.
- Higher education institutions will take the lead in the administration of the Academies. Members of the faculty from science, mathematics, and education departments will have substantive roles.
- Nearby school districts must provide internships for Fellows during their year of training, and districts with a demonstrated shortage will hire Fellows upon their completion of the Academy's program.
- Districts must also develop and implement induction programs for new mathematics and science teachers, including involvement in their Inquiry Groups.

the Eisenhower Math and Science Consortia, and perhaps others. The permanent staff at each Academy will be kept small, supplemented with visiting scholars on sabbatical.

Three thousand competitively selected Academy Fellows with degrees in mathematics and science will be identified from among recent college graduates and persons at mid-career who are seeking a new challenge in life. Fellows will be appointed annually to receive a one-year, intensive course in effective teaching methods in mathematics or science; each will receive a \$30,000 stipend for the year. Training for all Fellows must include school-based internships that involve supervised teaching.

After an intense high-quality preparation program, these individuals will be ideal job candidates for school districts suffering from mathematics and science teacher shortages in middle and high schools. Federal funds, up to \$10,000 per Fellow, will be available to the districts that hire Fellows at the conclusion of their course of study, with two provisos: that the funds be locally matched, and that a *district-wide* induction program be created for as many new mathematics and science teachers as possible. It is worth pointing out that districts that already have established Inquiry Groups will benefit greatly from the newly minted knowledge that Fellows bring to their posts, just as Fellows will benefit from sharing experiences with seasoned veterans.

Once established, all the Academies

will work collaboratively to share knowledge and experience. Similarly, the Academies and exemplary undergraduate teacher preparation programs will work collaboratively to share lessons learned in their quest for high-quality preparation for teaching.

*GOAL 3: Improve the working environment and make the teaching profession more attractive for K-12 mathematics and science teachers.*

Our society frequently refuses to recognize the professional status of teachers, ranking them below doctors, lawyers, and clergy. Many Americans think "anyone can be a teacher" and that little expertise is required. And because teachers are not fully appreciated for the special knowledge and skills required to do their jobs, they are vulnerable to public attack.<sup>36</sup> This widespread attitude is simply wrongheaded.

The low esteem teachers experience is only one source of the disappointment they feel, however. The lack of positive regard for teachers is compounded when efforts to recruit new members to the teaching profession fail to solve the staffing problems of schools. Turnover in the nation's teaching force is high—about 14% overall in 1994-95, with somewhat higher rates among mathematics and science teachers.<sup>37</sup> The top reason mathematics and science teachers leave teaching is "dissatisfaction" with their working environment, a factor cited far more often among mathematics and science teachers

than others (40% vs. 29%).<sup>40</sup> The specific causes given for their unhappiness make a long list, but chief among them are these professional issues: lack of leadership and respect from principals, lack of classroom autonomy, lack of respect from students, poor support from administrators, overly large classes, and poorly equipped classrooms and laboratories.<sup>41</sup> But by far, the number one reason for dissatisfaction among mathematics and science teachers is "poor salary"—cited by 66% of those who leave their jobs.<sup>42</sup> This issue is examined separately at the conclusion of the report.

The professional environment of too many mathematics and science teachers contains too many of these negative factors. Their effect is to drive more and more teachers out of the profession, which leads to stop-gap strategies such as out-of-field teaching and temporary certification, which in turn deprofessionalize teaching even more—a vicious circle.

Energetic and sustained steps are needed to break out of this downward spiral. State education agencies, school districts, and schools must move immediately and aggressively to make mathematics and science teaching more attractive.<sup>43</sup> And, they must have the widespread support of local businesses and the public.

Not all these "dissatisfactions" can be remedied at once, but it is possible to launch a turnaround that will foster better teaching. Three action strategies are suggested here. First, beginning teachers, especially, need help in acclimating to the challenges and opportunities of teaching. Second, some business/school district

partnerships have already proven themselves uniquely capable of the kind of collaboration that fosters high-quality teaching and makes the profession more attractive. More of these vital partnerships are needed. Third, veteran teachers who demonstrate improvement and who regularly seek new challenges should be encouraged to stay in the classroom and rewarded for their efforts. The following action strategies are accompanied by concrete suggestions on how the work can be done and who can do it.

#### **Action Strategies: What Needs to Happen**

**Induction Programs:** A first step is to set up special "induction" programs for new teachers, especially in districts that may not be able to hire Academy Fellows. This kind of program is routine throughout the business world as a means of easing new people into the workplace, imparting the "company culture," fostering employee loyalty, and acknowledging leadership and excellence in seasoned veterans. Such programs can also create formal mentoring relationships, including participation in Inquiry Groups, that focus on transmitting not only content matter but also vital knowledge and skills related to teaching itself. Other induction strategies include:

- ✦ Frequent, formal interaction with master teachers, including class observations and teaching critiques. Several states and districts have already launched such programs.
- ✦ Policies that ensure that new teachers do not inherit the most demanding teaching schedules and most challenging students;

#### **INDUCTION PROGRAMS**

*Who Will Make Them Happen and How?*

- State leaders, school board members, local superintendents, and principals must act with determination, realign priorities, and take the policy initiatives needed to develop the induction programs that can foster professionalism across the continuum of teaching experience.
- Professional associations have a powerful role to play in creating and offering model professional development and induction programs, as well as model mentoring programs.
- The Coordinating Council must provide a forum for sharing information about existing and new model induction programs and reporting on the effectiveness of such programs, especially regarding issues of retention and teaching quality.
- The American Federation of Teachers and the National Education Association have an enormous stake in professionalizing teaching. Superintendents and principals need to be able to count on union members to support efforts to develop induction programs aimed at improving the quality of mathematics and science education in grades K-12.

## **BUSINESS/SCHOOL DISTRICT PARTNERSHIPS**

### *Who Will Make Them Happen and How?*

- Business/district partnerships must focus on mechanisms for sharing knowledge, expertise, and resources. Together, they must define the best match between the needs and capabilities of the two partners.
- The Coordinating Council, working with groups such as the National Alliance of Business and the Business Coalition for Education Reform, must provide models of existing partnerships and encourage the development of new ones.
- Both businesses and school districts must assign a high-level staff person as a liaison with responsibility for maintaining and improving the partnership, coordinating the assignment of business personnel to the schools and vice versa, and developing appropriate activities.

- Policies aimed at focusing a new teacher's time and energy on *teaching*, e.g., by excluding or limiting extracurricular duties; and
- Policies that ensure instruction in the use of technology in general, including participation in the existing high-quality programs designed for this purpose, and in the use of the mathematics and science teaching Portal in particular.

### ***Business/District Partnerships:*** Many

businesses already serve their local communities in extraordinary ways.

These enlightened companies are needed as models for others who can expand, rejuvenate, or establish new partnerships that will help strengthen professionalism in mathematics and science teaching. Acting with states, districts, and other stakeholders, business/district partnerships can take several steps to encourage teachers to stay in the classroom, continually sharpen their skills, optimize working conditions, and encourage widespread public support for mathematics and science education. Some of these steps—but not all—involve commitments of funds; all of them do involve business commitments of time and talent. Among the specific roles business/district partnerships can play are the following:

- Business/district partnerships can collaborate to provide facilities, materials, equipment, scholarship support, and other resources to enhance the learning environment in K-12 mathematics and science

classrooms, and to support students preparing to become mathematics and science teachers. For example, a local business could stock a science laboratory or train teachers in the use of the Internet Portal;

- Partnerships can provide or help to generate community grants and incentives to schools that restructure time and personnel responsibilities for mathematics and science teachers, thereby enabling them to focus their energies on collaboration and high-quality teaching.
- Partnerships can help schools and school districts sustain induction programs for all teachers of mathematics and science, K-12. They might, for example, help raise funds to pay annual stipends to mentors. Local businesses might also offer new teachers and mentors opportunities for field-based learning experiences that can enhance teaching;
- Such partnerships can establish and run paid summer internship programs within companies for interested teachers, both as a means of expanding their skills and of enhancing their incomes;
- Business/district partnerships can develop "release time" programs that make employees available to act as mentors or to assist mathematics and science teachers in other ways—without loss of seniority or benefits. Similarly, business partners can work with colleges and universities to

significantly reduce the number of out-of-field mathematics and science teachers by helping to retrain unqualified teachers, or by releasing qualified employees to work in schools; and

- Business/district partnerships can serve as advocates for additional teachers to go through the advanced certification process of the National Board for Professional Teaching Standards and support the costs of participation.

But a caveat is in order here. As vitally important as the participation of the business community is in improving mathematics and science education, the long-term responsibility for public education remains with the public. The proper role of American business and business/district partnerships lies in helping to “jump-start” initiatives called for here, not in financing them indefinitely. Equally important is the pragmatic realization that some districts do not have a business base nearby. The needs of business-poor districts in rural and inner-city areas are just as urgent as those where businesses are prominent; therefore, states, school organization advocacy groups (e.g., PTAs and PTOs), and other voluntary associations must step into the breach to ensure that differences between districts are not deepened.

**Career-long Incentives:** All groups with a stake in mathematics and science education must provide incentives for deserving mathematics and science

teachers to remain in teaching and improve their skills. These incentives must be directly tied to accountability measures for teachers that take student performance seriously as a criterion of high-quality teaching and teachers’ professional competence.

Mathematics and science teachers, like other professionals, ought to be fully able to advance through a series of career stages that reflect both their intellectual and professional growth; teachers who demonstrate improvement in their teaching must be appropriately acknowledged.”

Often, the only opportunity for teachers to advance is to leave the classroom and take a position in school administration. In fact, achieving the goal of high-quality teaching demands that good teachers be able to flourish in the classroom. That can only happen when teachers have an open-ended opportunity to improve their teaching and be recognized for their accomplishments. Today, almost all teachers are paid on the basis of years of

## **CAREER-LONG INCENTIVES**

*Who Will Make Them Happen and How?*

- All members of the local education community (principals, administrators, school boards, parents, civic leaders, etc.) must provide recognition to teachers whose students show higher achievement on high-quality measures.
- To encourage excellent teachers to remain in the classroom, school districts must create new salary structures that recognize added responsibilities and achievements.



experience and number of education units and degrees earned. More progressive salary structures—tied to increased levels of teacher responsibility and to job-performance criteria—are needed.

Teachers also need to know that they are valued. When appropriate, civic organizations ought to demonstrate the community's appreciation to hard-working, highly accomplished teachers.

### *Teacher Pay: The Litmus Test*

Teachers in this country are scandalously underpaid, a fact that invariably affects the quality of teaching in our nation's classrooms. The fact is, many teachers experience their jobs as exercises in irony: they are expected to have high-quality qualifications and skills, but they are neither accorded professional status nor rewarded with a professional's salary. Creating high-quality teaching in mathematics and science education demands both.

**What Teachers Earn:** The National Center for Education Statistics reports that, on average, teachers earn 29% less than other workers with a baccalaureate degree (\$35,048 per year compared to \$49,362 per year in 1997), a differential that has nearly quadrupled during the economic expansion of the 1990s. The demands of the economy and workplace are widening this gap. Given that the national average starting salary for teachers is \$25,735,<sup>43</sup> the teaching profession is nowhere near being a financially competitive option for most young people who leave college with backgrounds in mathematics and science.

In fact, baccalaureate degree earners in these fields can earn twice as much in private industry as in teaching.<sup>44</sup> Making sure that teaching mathematics and science has appeal as a career option is directly linked to the potential for meaningful salary growth. It is hard to escape the conclusion that without better pay for mathematics and science teachers, the high-quality teaching needed in these fields will be very difficult to sustain.

One powerful litmus test of how serious we are about providing high-quality mathematics and science teaching is what we are willing to pay good mathematics and science teachers. That is not really so much a financial test as it is a policy one, not so much a matter of the pocketbook as one of political will. And that statement, in the end, leads to this final point.

### *Taking Personal Responsibility*

This report has laid out a coordinated set of tasks for the key stakeholders in mathematics and science education. But the story is not yet complete. *We therefore put this challenge directly to the American people: if you have found our case persuasive, it is up to you to take responsibility for achieving these goals.*

Realistically, neither paying mathematics and science teachers what they are worth, nor any other issue raised in this report, is a problem that will be solved by "someone else." It is this nation's citizens and taxpayers whose priorities and principles should be honored in public policy, including—and in this context especially—in decisions about what teachers are paid.

### **THE VITAL ROLE OF LOCAL SCHOOL BOARDS**

Local school boards, because they are the decision-making body closest to the classroom, play a central role in setting a new course. It is they who have the ultimate responsibility to bring high-quality teaching in mathematics and science to our schools. It is their job (within some state-imposed guidelines) to set local instructional priorities and policy, to determine budgets, and to set salary scales.

Perhaps most important of all, it is school boards that are accountable—to citizens, parents, and taxpayers alike—for the education our children receive. Whether elected or appointed, school board members serve at the sufferance of the public.

But to be accountable, school boards must be held accountable. They must be called on to interpret their actions and justify their decisions. And in America, making them responsive is the people's job.

So we put this agenda squarely before you:

- ✧ If you don't know how well children in your local schools are performing in mathematics and science on challenging state and district assessments, find out. How do their scores stack up against those of children in neighboring schools? Then decide if they are learning what they need to know to "hit the future running."
- ✧ If you are unaware of what mathematics and science teachers are paid where your children attend school, find out. Then decide what steps you will take to bring teacher salaries up to the professional level that reflects the value you, as parents and as taxpayers, put on their work and their performance.
- ✧ If you believe that out-of-field teaching, temporary certificates, and high turnover among mathematics and science teachers are unacceptable outcomes of current policies, and if you believe that high-quality teaching is the right direction to take, then declare yourself. It is up to you to put an end the former and ensure the latter.
- ✧ If you want your voice to be heard, call your child's principal, your school board representative, your local school superintendent. Call and write your representatives in state government. Contact the local chapters of the professional teachers' organizations whose members teach your children

subjects such as arithmetic, biology, and algebra. Ask them: "What is being done here to attract more teachers into mathematics and science teaching?"

"How many teachers *here* are teaching out-of-field?" "What are mathematics and science teachers paid here and why?" "What is the status of professional development in math and science instruction here?" "What do you need?" "How can I help?"

High-quality teaching in mathematics and science cannot be bought on the cheap. But it comes back—ten-, twenty-, a hundredfold—to the nation, the community, and especially to our own children, in the form of a better prepared workforce, a more productive economy, and a more creative people.

The time to find out what you can do and to whom you should speak is now. Go to the meetings; get involved. Only when those who sit in the seat of power understand the public's priorities can they act in the citizens' interest. And only you can declare that interest.

This Commission has done what it can do. It has studied the problem and it here offers the American people three goals. We believe they can be achieved, and we have offered ideas on how. Whether they *are* achieved is still to be decided. We know that it is not enough to call for change. In a democracy, the people create real change, not commissions.

As the Chinese proverb says, the time to plant the tree is now—*before it's too late*.

# What Can You Do?



*Every American has a stake in mathematics and science teaching for the 21<sup>st</sup> Century. Parents, teachers, administrators, school board members, higher education institutions, state political leaders, and business leaders have particularly critical roles to play in ensuring success. To improve student achievement in mathematics and science, everyone involved must first ask themselves several hard questions and then must take action.*

*The Commission targeted the seven stakeholder groups below. For each group, several questions are posed to direct attention to critical issues. A checklist of important steps is then provided to define a comprehensive plan for raising K-12 mathematics and science student achievement in states, districts and schools.*

## **School Board and Superintendent Team**

- ❖ Do your district's mathematics and science achievement levels compare favorably to achievement levels in neighboring districts, states and other countries?
- ❖ How many individuals assigned to teach mathematics and science in your district have a major or minor in these fields?
- ❖ Does your district teacher salary schedule compare favorably to that of neighboring districts?

If your answers to any of these questions are at all disquieting, the following checklist can inform efforts to promote higher student achievement:

- |                                                                                                                                                                                                                                                                     |                                                                                                                                                                                    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> Develop a common vision, with input from the community, for promoting a high level of student achievement in mathematics and science.                                                                                                      | <input type="checkbox"/> Provide competitive salaries to attract and retain the best-qualified mathematics and science teachers.                                                   |
| <input type="checkbox"/> Use accurate data to develop policies that will improve mathematics and science teaching.                                                                                                                                                  | <input type="checkbox"/> Establish induction programs to ensure that new mathematics and science teachers receive the support necessary to be effective.                           |
| <input type="checkbox"/> Commit funding to ensure that all mathematics and science teachers have ongoing collaborative opportunities to improve their skills and knowledge.                                                                                         | <input type="checkbox"/> Develop mathematics and science teacher leaders who facilitate the continuous learning of their colleagues.                                               |
| <input type="checkbox"/> Set a target date for hiring only fully certified teachers of mathematics and science and put in place the policies and programs necessary to meet the target.                                                                             | <input type="checkbox"/> Provide administrators and teachers with electronic and other forms of access to an ever-expanding knowledge base about mathematics and science teaching. |
| <input type="checkbox"/> Aggressively recruit high-quality mathematics and science teachers from a nationwide pool, including those certified through alternative pathways (e.g., by offering signing bonuses or giving salary credit for all previous experience). |                                                                                                                                                                                    |

## **Principals**

- ✦ Are you satisfied that the science and mathematics preparation that your students receive is adequate preparation for the next level of schooling?
- ✦ Are the new teachers that you hire adequately prepared?
- ✦ Are your teachers provided with sufficient time to work together to improve teaching and student learning?

If your answers to any of these questions are at all disquieting, the following checklist can inform efforts to promote higher student achievement:

- |                                                                                                                                                                                                                                                                    |                                                                                                                                                            |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> Provide your teachers with significant professional development opportunities to improve their teaching year-round including in-depth study through Inquiry Groups with peers, mentors and outside experts and through Summer Institutes. | <input type="checkbox"/> Should you have no option but to assign an out-of-field teacher, be certain that a mentor and other ongoing support is available. |
| <input type="checkbox"/> Ensure that teachers and other school staff have electronic and other forms of access to the ever-expanding knowledge base about mathematics and science teaching.                                                                        | <input type="checkbox"/> Ensure that opportunities to pursue careers in mathematics and science teaching are emphasized for students in your school.       |
| <input type="checkbox"/> Ensure that new mathematics and science teachers have frequent interaction with mentor teachers, participate in Inquiry Groups, and have reasonable teaching loads.                                                                       |                                                                                                                                                            |

## **Teachers**

- ✦ Are your student's mathematics and science achievement levels on state and classroom assessments at an acceptably high level?
- ✦ Are you actively seeking to deepen your content knowledge?
- ✦ Are you actively seeking to learn new teaching methods for diverse student learners?

If your answers to any of these questions are at all disquieting, the following checklist can inform efforts to promote higher student achievement:

- |                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> Actively seek new knowledge about teaching in your discipline, work with your peers on a continuing basis to improve your skills, and take full advantage of the professional development opportunities offered by your district and state. | <input type="checkbox"/> Regularly work with colleagues to compare the achievement level of your students against the standards in your district and state, identify areas for improvement, set goals, and make plans for achieving these goals. |
| <input type="checkbox"/> Actively work to improve your knowledge and skills to incorporate educational technology into your learning and teaching.                                                                                                                   | <input type="checkbox"/> Actively share your knowledge and experience with new teachers.                                                                                                                                                         |
| <input type="checkbox"/> Communicate to parents the specific standards that students are to meet at each grade level and update parents on their child's progress in meeting these standards.                                                                        |                                                                                                                                                                                                                                                  |

### ***Parents***

- ❖ Do your district's mathematics and science achievement levels compare favorably to achievement levels in neighboring districts, states and other countries?
- ❖ Do your child's teachers have the necessary background to teach the courses to which they are assigned?
- ❖ How does the teacher salary schedule in your school district compare to that of neighboring districts?

If your answers to any of these questions are at all disquieting, the following checklist can inform efforts to promote higher student achievement:

- ☐ Learn about the mathematics and science standards that children are required to meet in your state and get a clear picture of how well your child's school is doing in meeting these standards.
- ☐ Support increased funding for programs that support quality mathematics and science teaching.
- ☐ Support the principal's efforts at your child's school to hire well-qualified teachers and to provide them with opportunities to continually improve their skills.

### ***State Leadership***

- ❖ Do your district's mathematics and science achievement levels compare favorably to achievement levels in neighboring districts, states and other countries?
- ❖ How many out-of-field teachers are assigned to teach mathematics and science across your state?
- ❖ How do certification requirements for K-12 mathematics and science teachers in your state compare to those of neighboring states and national standards?

If your answers to any of these questions are at all disquieting, the following checklist can inform efforts to promote higher student achievement:

- ☐ Identify the critical professional development needs of the individuals teaching mathematics and science through a district-by-district assessment.
- ☐ Establish and enforce high standards for mathematics and science teachers for initial and continuing certification.
- ☐ Develop policies and dedicate funding, based on identified needs, to upgrade content knowledge and improve the skills for all those teaching mathematics and science, K-12.
- ☐ Develop career-long incentives and rewards for effective mathematics and science teachers that encourage them to remain in teaching and to continually upgrade their skills.
- ☐ Establish and implement a professional development model that addresses the specific needs of mathematics and science teachers and their students through Summer Institutes and Inquiry Groups.
- ☐ Establish alternative pathways to teacher certification that encourage recent college graduates and people with degrees in mathematics and science to pursue teaching.

### ***Higher Education Institutions***

- ❖ How do your graduates perform as mathematics and science teachers after graduation? How does their performance compare to those from other programs?
- ❖ What portion of your mathematics and science education graduates teach and for how long?
- ❖ Do your graduates report that your program prepared them for successful teaching? Are schools that hire your graduates satisfied with the quality of their instruction?

If your answers to any of these questions are at all disquieting, the following checklist can inform efforts to promote higher student achievement:

- |                                                                                                                                                                                                 |                                                                                                                                                                                     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> Work closely with area schools to identify existing and future needs for highly qualified K-12 mathematics and science teachers.                                       | <input type="checkbox"/> Emphasize recruitment strategies and provide incentives for eligible students to become science and mathematics teachers.                                  |
| <input type="checkbox"/> Ensure that your program meets criteria for exemplary math and science teacher preparation and actively contribute to the knowledge base in support of these criteria. | <input type="checkbox"/> Evaluate and track teacher performance following graduation and use this information to improve your mathematics and science teacher preparation programs. |
| <input type="checkbox"/> Collaborate with area school districts to ensure a quality induction process for new mathematics and science teachers.                                                 |                                                                                                                                                                                     |

### ***Business***

- ❖ Does your business encourage its employees to work as advocates in the schools, with the goal of achieving high-quality mathematics and science education?
- ❖ Do your corporate philanthropic priorities help students and educators meet higher standards in mathematics and science?

If your answers to any of these questions are at all disquieting, the following checklist can inform efforts to promote higher student achievement:

- |                                                                                                                                                                                                                                            |                                                                                                                                                                    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> Work to increase the supply and quality of incoming mathematics and science teachers by advocating for policies, programs and investments that will make the teaching profession a more attractive career option. | <input type="checkbox"/> Provide support for National Board for Professional Teaching Standards certification.                                                     |
| <input type="checkbox"/> "Lend" qualified employees to act as part- or full-time teachers in local schools, without incurring loss of pay or benefits.                                                                                     | <input type="checkbox"/> Make regular contributions of time, materials and resources to enhance instruction in mathematics and science education in local schools. |
| <input type="checkbox"/> Actively participate in reward and incentive programs that recognize excellence in mathematics and science teaching in local schools as measured by improved student achievement.                                 |                                                                                                                                                                    |

*What Can You Do?*

# Estimate of Costs in First Year

Prepared by the U.S. Department of Education Budget Office

|            | Action Strategy                              | Federal                  | State/Local <sup>1</sup> | Business      | Public/Private  |
|------------|----------------------------------------------|--------------------------|--------------------------|---------------|-----------------|
| Goal 1     | Needs Assessment <sup>2,3</sup>              | \$15,340,000             | \$7,660,000              |               |                 |
|            | Summer Institutes <sup>2,5</sup>             | \$1,214,000,000          | \$606,060,000            |               |                 |
|            | Inquiry Groups <sup>2,6</sup>                | \$1,574,950,000          | \$786,300,000            |               |                 |
|            | Leadership Training <sup>4</sup>             | \$112,000,000            |                          |               |                 |
|            | Internet Portal                              | \$50,000,000             |                          |               |                 |
|            | Coordinating Council                         |                          |                          |               | \$4,000,000     |
|            | Rewards Program                              |                          |                          | \$500,000,000 |                 |
| Goal 2     | Scholarships (Exemplary Models) <sup>7</sup> | \$18,000,000             |                          |               |                 |
|            | Loan Forgiveness <sup>8</sup>                | \$36,000,000             |                          |               |                 |
|            | Academics/Fellows <sup>9,10</sup>            | \$120,000,000            |                          |               |                 |
|            |                                              |                          |                          |               |                 |
| Goal 3     | Induction/Partnerships/Incentives/Salaries   | To be determined locally |                          |               |                 |
|            |                                              |                          |                          |               |                 |
| Sub Total: |                                              | \$3,140,290,000          | \$1,400,020,000          | \$500,000,000 | \$4,000,000     |
|            |                                              |                          |                          | Total:        | \$5,044,310,000 |

<sup>1</sup> There are 56 units nationwide -- states, territories and Washington, D.C.

<sup>2</sup> Current authorizing legislation for the Eisenhower Professional Development State Grants (ESEA, IIB) requires that each participating Local Education Agency match every two dollars of federal funding with one dollar of its own resources. Such local resources can come from other federal programs or from non-federal sources. The same ratio is used here for those Strategies in which it is most appropriate.

<sup>3</sup> First year, one time cost.

<sup>4</sup> First year, one time cost for 15,000 leaders.

<sup>5</sup> One-fifth of the math/science teaching force (340,000 per year)

<sup>6</sup> All K-12 math/science teachers (1.7 million)

<sup>7</sup> Scholarships offered (1,500/year)

<sup>8</sup> Loans offered (6,000/year)

<sup>9</sup> Stipends and operating expenses (3,000 Fellow/year)

<sup>10</sup> Beginning in second year, an additional \$30,000,000 needed for induction programs

September 2000

<sup>1</sup>Report of the National Education Goals Panel, Washington, D.C.: U.S. Department of Education, 1989.

<sup>2</sup>T. Husen, *International Study of Student Achievement in Mathematics*, New York: Wiley, 1967, and C. C. McKnight, et al., *The Underachieving Curriculum: Assessing U.S. School Mathematics from an International Perspective*, Champaign, Ill.: Stipes, 1987, as cited in James W. Stigler and James Hiebert, *The Teaching Gap*, New York: The Free Press, 1999, p. 5.

<sup>3</sup>David Kearns and James Harvey, *A Legacy of Learning*, Washington, D.C.: Brookings Institution Press, 2000, pp. 29-30. In general science, American fourth-grade students ranked third among 26 nations; by eighth grade they were seventeenth among 41 nations; and by twelfth grade they were tied for eighteenth among 20 nations. In general, the mathematics pattern is similar. American students were twelfth among 26 nations in fourth grade, twenty-eighth among 41 nations in eighth grade; and twelfth-graders were tied for eighteenth among 20 nations. (Students were not assessed from the same number of nations in all grades.) See also the U.S. Department of Education, *National Digest of Education Statistics, 1999*, Washington, D.C.: National Center for Education Statistics, 1999.

<sup>4</sup>Kearns and Harvey, *op. cit.*, p. 27.

<sup>5</sup>Although recent news about the rise in the average mathematics score on the SAT and the corresponding broadening of the student population taking the test is welcome, U.S. students remain behind the average performance level in mathematics attained more than 30 years ago. See *The Washington Post*, August 31, 2000, p. 1.

<sup>6</sup>Under Title I legislation that becomes effective in the spring of 2001, States are required to annually disseminate information, school by school, on student performance in reading and math. Anticipating the requirement, all but two States are currently posting at least some mathematics assessment data on the State Education Agency's (SEA) Web site; 35 States provide assessment data by specific grade levels and 32 states report mathematics proficiency levels. In science, reporting is spottier. Thirty-one states report assessment data; 21 states provide science assessment data by specific grade levels; but only 16 states report science proficiency levels. For parents, SEA Web addresses can be readily obtained with a phone call to their local school district. Information on state assessment data provided by Westat, Inc., unpublished tabulations compiled from state education agencies' Web sites, Rockville, Md., Sept. 8, 2000.

<sup>7</sup>*The Wall Street Journal*, "Technology Spurs Economic Expansion," January 31, 2000.

<sup>8</sup>U.S. Department of Labor, "20 Million Jobs: January 1993-November 1999," A Report by the Council of Economic Advisors and the Chief Economist, U.S. Department of Labor, December 3, 1999, downloaded from <http://www.dol.gov/sec/public/media/reports/20mill/main.htm>, March 13, 2000, as cited in Milton Goldberg and Susan L. Traiman, "Why Business Backs Education Standards," in Diane Ravitch, ed., *Brookings Papers on Education Policy*, Washington, D.C.: Brookings Institution, 2000 (forthcoming).

<sup>9</sup>*Ibid.*

<sup>10</sup>*Ibid.*

<sup>11</sup>*Workforce Economics*, National Alliance of Business, Occasional Report, Vol. 6, No. 1 (Spring, 2000), pp. 9-11.

<sup>12</sup>*Ibid.*, p. 10.

<sup>13</sup>Philip R. Day and Robert H. McCabe, "Remedial Education: A Social and Economic Imperative," AACC Issue Paper, Washington, D.C.: American Association of Community Colleges, 1997.

<sup>14</sup>Interview with Robert Gardner, Director of Public Relations, Association for Manufacturing Technology, June 20, 2000, as cited in Goldberg and Traiman, *loc. cit.*

<sup>15</sup>*Training Magazine*, Annual Report, Minneapolis: Bil Communications, Vol. 36, No. 10 (1999), downloaded from <http://www.trainingsupersite.com>.

<sup>16</sup>Interview with Richard W. Judy, Hudson Institute, Indianapolis, April 19, 2000, as cited in Goldberg and Traiman, *loc. cit.*

<sup>17</sup>The vision of high-quality teaching in K-12 mathematics and science is expanded on and operationally defined in three reports that are currently guiding standards-based science and mathematics education: (1) American Association for the Advancement of Science, *Benchmarks for Science Literacy*, New York: Oxford University Press, 1993; (2) National Council of Teachers of Mathematics, *Principles and Standards for School Mathematics*, Reston, Va: NCTM, 2000; and (3) National Research Council, *National Science Education Standards*, Washington, D.C.: National Academy Press, 1996.

<sup>18</sup>National Research Council, *How Young People Learn*, Washington, D.C.: National Academy Press, 1999.

<sup>19</sup>Higher Education Research Institute, *The American Freshman: National Norms for Fall, 1998*, Los Angeles: University of California at Los Angeles, 1999.

<sup>20</sup>Linda Darling-Hammond, *What Matters Most: Teaching for America's Future*, New York: National Commission on Teaching and America's Future, 1996, Executive Summary.

<sup>21</sup>Linda Darling-Hammond, "Teacher Quality and Student Achievement: A Review of State Policy Evidence," Teaching Quality Policy Briefs, Number 2 (December, 1999), Washington, D.C.: Center for the Study of Teaching, downloaded from <http://www.depts.washington.edu/ctpmail>.

<sup>22</sup>Linda Darling-Hammond, *Supply, Demand, and Quality in Mathematics and Science Teaching*, Briefing for the National Commission on Mathematics and Science Education for the 21<sup>st</sup> Century, Washington, D.C., September, 1999.

<sup>23</sup>National Research Council, *Educating Teachers of Science, Mathematics, and Technology: New Practices for the New Millennium*, Washington, D.C.: National Academy Press, 2000.

<sup>24</sup>Examples of two states that have produced impressive results by focusing on better teaching are Texas and North Carolina. In Texas, a study of grades 1-11 found that teachers' subject-matter expertise accounted for 40% of the difference on achievement tests. Disparities between white and minority students were almost entirely accounted for by the qualifications of their teachers. In North Carolina, students entered the 1990s near the bottom of the NAEP rankings in mathematics. After the State boosted minimum salaries, used scholarship programs to recruit more able students to teaching, invested in better teacher education curricula, created professional development academies, instituted mentoring programs for entering teachers, and created incentives for teachers to be certified by the National Board of Professional Teaching Standards, North Carolina students now score well above the NAEP averages. See "Who Should Teach?" *Education Week*, January 13, 2000.

<sup>25</sup>Linda Darling-Hammond, "Supply, Demand, and Quality in Mathematics and Science Teaching."

<sup>26</sup>*Ibid.*

<sup>27</sup>*Ibid.*

<sup>28</sup>Richard M. Ingersoll, "Turnover Among Mathematics and Science Teachers in the U.S.," Study Paper prepared for the National Commission on Mathematics and Science Teaching for the 21<sup>st</sup> Century, Washington, D.C., September, 1999; and Urban Teacher Collaborative, *The Urban Teacher Challenge: Teacher Demand and Supply in the Great City Schools*, Washington, D.C.: Council of Great City Schools, January, 2000.

<sup>29</sup>Steve Olson, "Candid Camera," *TEACHER MAGAZINE on the WEB*, May/June, 1999. Videotape, "Eighth-Grade Mathematics Lessons: United States, Japan, and Germany," Washington, D.C.: U.S. Department of Education, 1999, produced by Nanette Seago.

<sup>30</sup>James W. Stigler, Briefing for the National Commission on Mathematics and Science Teaching for the 21<sup>st</sup> Century, Washington, D.C., September, 1999, pp. 23 and 19 of the transcript.

<sup>31</sup>Division of Research, Evaluation, and Communication, Directorate for Education and Human Resources, *Indicators of Science and Mathematics Education, 1995*, Arlington, Va.: National Science Foundation, 1996.

<sup>32</sup>National Science Teachers Association Reports, "Survey Indicates High Teacher Turnover, Job Dissatisfaction," Arlington, Va.: National Science Teachers Association, 2000, downloaded from <http://www.nsta.org/reports/00jun2.asp>.

<sup>33</sup>*The Urban Teacher Challenge: Teacher Demand in the Great City Schools*, 2000, Washington, D.C.: Council of Great City Schools, 2000, pp. 9-11.

<sup>34</sup>Estimates based on projected fall 1999 counts of teachers and proportions from the U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey, 1993-94; and Fast Response Survey, "Teacher Survey on Professional Development and Training."

<sup>35</sup>National Research Council, *op. cit.*

<sup>36</sup>Emily C. Feistritzer and David T. Chester, *Alternative Teacher Certification: A State-by-State Analysis 1998-99*, Washington, D.C.: National Center for Education Information, p. 6, downloaded from <http://www.ncei.com/Alt-Teacher-Cert.htm>. Alternative routes for preparing and licensing science and mathematics teachers provide ways to attract large numbers of highly educated and life-experienced adults who have the talent and enthusiasm to teach.

<sup>37</sup>Susan Sclafani, "Comparisons of Alternative Certification Program, Teach for America, and Certified Teachers in the Houston Independent School District," Briefing for the National Commission on Mathematics and Science Teaching for the 21<sup>st</sup> Century, Washington, D.C., May, 2000. The Houston Independent School district has found that the students of teachers certified through the Alternative Certification Program performed just as well as, or better than, students of teachers trained through traditional teacher preparation programs. Also, the retention rate of the alternatively certified teachers five years later was significantly higher.

<sup>38</sup>James W. Stigler and James Hiebert, *The Teaching Gap*, New York: The Free Press, 1999, pp. 170-71.

<sup>39</sup>Richard M. Ingersoll, *loc. cit.*, p.5.

<sup>40</sup>*Ibid.*, Figure 4, p.7.

<sup>41</sup>*Ibid.*, Table 1, p.6.

<sup>42</sup>*Ibid.*

<sup>43</sup>The Commission recognizes that the action steps recommended here could—and should—be made for all teachers, not just teachers of mathematics and science. But the need for improving the professional environment of mathematics and science teachers is particularly acute because of their shortage, and because of the salaries degree holders in these fields can command in the private sector.

<sup>44</sup>Adam Urbanski and Roger Erskine, "School Reform, TURN, and Teacher Compensation," *Phi Delta Kappan*, January, 2000, pp. 367-70. The Teacher Union Reform Network (TURN), composed of local school districts and the local affiliates of the AFT and the NEA, is a labor/management collaboration that rewards teachers who obtain certification by the National Board of Professional Teaching Standards (NBPTS). Participating teachers receive support for NBPTS fees or are granted special standing as mentors or lead teachers. Nine TURN locals provide bonuses, salary supplements for certification, or additional pay for teachers who act as mentors. In addition, the Consortium for Policy Research in Education has identified 15 States and 20 districts that offer financial rewards to teachers who obtain NBPTS certification. Teachers are generally provided with one-time rewards ranging from \$2,000 to \$10,000, and annual salary supplements ranging from \$500 to \$10,000 per year or from 1% to 12% of their base salary per year (see <http://www.wcer.wisc.edu/cpre/teachercomp/reform/nbtpspay.thm>).

<sup>45</sup>Steven Greenhouse, "Teachers' Pay: Adding Up the Impact of Raising Salaries," *The New York Times*, August 9, 1999.

<sup>46</sup>Ann Bradley, "High Tech Fields Luring Teachers from Education," *Education Week*, January 19, 2000. Indeed, the average annual teacher salary is only "a fraction of the annual bonus received by many thirty-somethings on Wall Street." Greenhouse, *loc. cit.*

Endnotes:

# Charter

## **AUTHORITY**

The National Commission on Mathematics and Science Teaching for the 21st Century, (Commission) is established by the Secretary of Education and is governed by the provisions of the Federal Advisory Committee Act (FACA) (P. L. 92-463, as amended; 5 U.S.C.A. Appendix 2).

## **PURPOSE AND FUNCTIONS**

The Office of the Under Secretary serves as the principal advisor to the Secretary by directing, coordinating, and recommending Department policy. Therefore, the Commission has been established in this office for the purpose of: (1) reviewing the current state of American K-12 mathematics and science education with a focus on the challenges of teacher recruitment, preparation, retention, and professional growth and (2) articulating the steps needed to strengthen the classroom practice of math and science teachers. The Commission would produce a report describing specific action steps that federal, state, and local policymakers can take to address math and science teacher supply and quality issues.

## **STRUCTURE**

The Commission will be composed of not more than twenty-five members. Members shall be appointed from, but not limited to, the following groups: current or recent members of Congress, Governors, Mayors, State Legislators, Chief State School Officers, Nobel laureates, CEOs, teachers, University presidents, principals, parents, students, public representatives, and other distinguished leaders in the fields of mathematics and science. *Ex officio*, non-voting members, of the Commission, include the Secretary of Education or his designee, the Secretary of Defense, the Secretary of Energy, the Secretary of Transportation, the NASA Administrator, the Director of the Office of Science and Technology Policy, the Director of the National Science Foundation, and the President of the National Academy of Sciences.

Members shall be appointed by the Secretary for the duration of the Commission. Any vacancy in the Commission shall not affect its powers, but shall be filled in the same manner as the original appointment. The Secretary shall designate a member of the Commission to serve as the chairperson.

The Under Secretary names the Designated Federal Official (DFO) to the Commission.

## **MEETINGS**

The Commission shall meet at the call of the Chairperson, with the concurrence of the Designated Federal Official or designee who is present at all meetings. The Commission shall meet at least four times, or more frequently, as may be necessary to carry out the Commission's responsibilities. Meetings are open to the public except as may be determined otherwise by the Under Secretary in accordance with Section 10(d) of the FACA. Adequate public notification will be given in advance of each meeting. Meetings will be conducted and records of the proceedings kept, as required by applicable laws.

A quorum of the Commission consists of a majority of the authorized members.

## **ESTIMATED ANNUAL COST**

Members will serve without compensation. However, members may each receive reimbursement for travel expenses incident to attending Commission meetings, including per diem in lieu of subsistence, as authorized by the Federal travel regulations. Funds will be provided by the Department of Education to administer the Commission. The estimated annual person-years of staff support is: two (2) FTE. An estimated budget of \$800,000 over two fiscal years has been allotted for this Commission.

## **REPORTS**

Not later than September 30, 2000, the Commission shall submit a report to the Secretary that contains a detailed statement of the findings and conclusions resulting from the study, together with the Commission's recommendations. The Secretary will then submit the report to the President and Congress together with the recommendations of the Commission.

## **TERMINATION**

The Commission shall terminate 90 days after the date on which the Commission submits its report to the Secretary.

The Commission is hereby chartered in accordance with Section 14(b) of FACA. This charter expires two years from the date of filing.

## **APPROVED:**

August 12, 1999

Richard W. Riley, Secretary of Education

Establishment date: March 23, 1999

Filing date: April 6, 1999

*The Commission wishes to express its deep gratitude* to the many individuals and organizations without whose work our own labors would have been far more difficult and far less productive.

We owe, first, an enduring debt to the Commission staff. Under the able leadership of Executive Director Linda P. Rosen, they worked long hours to organize and manage our several meetings, keep the flow of communication moving, prepare extensive and invaluable briefing books, handle travel and logistical arrangements, and attend faithfully to the myriad details that are never noticed because they are never left undone. Beyond all these very necessary tasks, however, the staff ably contributed in substantive ways to our discussions and our final report. Thanks are due to John M. Luczak, Nancy Hawthorne Mumaw, Jamila A. Rattler, Jan Solomon, Rebekah Song, and Emmett L. Wright for their excellent work.

Bruce O. Boston of Wordsmith, Inc., served as the eloquent writer/editor of *Before It's Too Late*, building on earlier substantive work by Steve Olson and Amy Kaslow.

RCW Communications Design, Inc., created the report's layout and design and ably guided it through the production process.

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