

# Archived Information

## THE NATIONAL COMMISSION ON MATHEMATICS AND SCIENCE TEACHING FOR THE 21<sup>ST</sup> CENTURY

### MINUTES OF THE MEETING OF MARCH 6-7, 2000

#### Commission Members Present:

Sen. John Glenn, Chair

Paul L. Kimmelman

Craig R. Barrett

William E. Kirwan

Diane J. Briars

Maria Alicia Lopez-Freeman

Javier Gonzalez

Rep. Connie Morella

Jerilyn Grignon

Dennis Van Roekel

Jeffrey Himmelstein

Chang-Lin Tien

Rep. Rush Holt

Bruce Alberts (ex officio)

Gov. James Hunt

Rita R. Colwell (ex officio)

Anne Jolly

Neal F. Lane (ex officio)

Nancy Keenan

Jerome F. Smith, Jr. (ex officio)

Linda P. Rosen, Designated Federal  
Official

#### Other Attendees:

Kelley Coyner (for Sec. Rodney F. Slater)

Kate Dickens (with Rep. Connie Morella)

Carlene Ellis (with Craig R. Barrett)

Karen Garr (with Gov. James B. Hunt, Jr.)

Alice Gill (for Sandra Feldman)

Ken Griffin (for Gov. Jim Geringer)

Kathy Havens (for Edward B. Rust, Jr.)

Jay Labov (with Bruce Alberts)

Donna Osborn (for Sec. Bill Richardson)

Joan Rothenberg (with Rep. Rush Holt)

Richard Stoddard (with William Kirwin)

Judy Sunley (with Rita R. Colwell)

Jane Butler Kahle (with Rita R. Colwell)

Lisa Towne (for Neal F. Lane)

## **MARCH 6<sup>th</sup>**

### **Opening Remarks**

The National Commission on Mathematics and Science Teaching for the 21st Century met on March 6, 2000, at the J.W. Marriott Hotel in Washington, DC. In accordance with the provisions of Public Law 92-463, the meeting was open to the public. Rosen, Executive Director and Designated Federal Official, called the meeting to order at 4:05PM, welcomed the Commission and observers and noted that the meeting was being taped. She turned the meeting over to Senator Glenn, Chair of the Commission.

Senator Glenn asked for approval of the minutes of the November 29-30, 1999, meeting. The Commission so moved and the minutes were approved without objection. A signed copy of the minutes will be posted on the Commission's web site.

### **Goals for the Meeting**

Senator Glenn said that the goals for the meeting are: to decide if the draft for the first three chapters is on target, to begin to formulate recommendations related to technology, and to have an in-depth look at the areas of recruitment, induction, and professional development. He hoped that, by the end of the meeting, the Commission would focus on some recommendations that would be refined at the remaining two meetings.

Senator Glenn then asked John Gage to summarize the technology presentations hosted earlier in the day by the Association for Computing Machinery.

### **Plenary Discussion: Promise and Potential of Technology**

Gage said a major theme was for teachers to learn to teach students in ways they themselves had never experienced. The introduction of technology and corresponding new teaching methods are the hardest things teachers have been asked to do in 200 years. Teachers will need support to make these changes. The technology presentations demonstrated different ways to link teachers in conversation to create teacher-learning communities and to share curriculum materials globally. Gage commented that the current economic prosperity provides a unique opportunity to place significant resources, not previously available, behind the Commission's recommendations.

Susan Collins, Elliot Soloway and John Vaille joined the Commission's discussion as provocateurs. Collins commented that technology can help improve teaching but is not the total solution. Jolly said that Internet sites designed to help teachers need to be more accessible. Barrett responded that the private sector was working on creating a one-stop portal for relevant sites. Vaille commented that lack of time for teachers was a structural problem. Briars agreed that the Commission needed to address the fundamental structure of the teaching profession and added that the Commission should take the opportunity to help dispel certain, commonly held assumptions, such as teachers aren't working unless they are in front of a classroom. Soloway commented that issues of local control made restructuring efforts difficult. Collins suggested lengthening the school year to give teachers time without students for professional development. Vaille suggested that every teacher be given the technology and training

they need, supported through a public-private partnership. Representative Morella mentioned that the various reauthorization proposals for the Elementary and Secondary Education Act include specific funding for technology, as well as for recruiting and retaining teachers. Alberts suggested that one of the Commission's recommendations be that states provide funding to augment teachers' salaries for an extra month for professional development.

Gill, on behalf of Feldman, commented that teachers try to teach too much material each year and expressed concern about the depth of mathematics knowledge expected of U.S. students compared to students in other countries. She added that she did not have a clear idea of how technology could benefit significant numbers of teachers. Tien questioned how the strength of the Internet could be utilized.

Barrett suggested that private industry could play an expanded role, and urged the Commission to think broadly. He suggested a major statement by the Federal government and private industry, with the states invited to join. He pointed out that private industry was already spending considerable sums of money to train new hires. The Commission needs to do something dramatic. This is a unique time, the economy is strong, education is the number one issue with the public. He suggested raising half a billion dollars from private industry, with a matching amount from the Federal government to support a major program, targeted toward demonstrable results. Senator Glenn agreed that small proposals "don't stir men's souls." He suggested sending the report to every school board in America to challenge the decision-makers to take action. To continue the discussion, the afternoon agenda was modified and the Commission stayed in plenary session.

Keenan expressed concern about ensuring equity and access for all students. Based a cost of \$5 million a day to extend the school year in Montana, she said it was unrealistic to think that schools could expand the school year to add time for professional development. Even with an initial investment, school districts couldn't afford the price of a sustained effort. Glenn responded that if the situation is a crisis, then the country would have to find a way to afford the cost or relegate ourselves to second place. Keenan responded that it would take a State-Federal-private sector partnership.

Coyner, for Secretary Slater, commented that the report must be a clarion call, with a statement something like, "The nation must have the skills for the economy to continue to thrive." Commissioners agreed that the report needs a stronger, more convincing statement. Gonzalez remarked that school boards do have some money at their disposal but they must be given a reason to be risk-takers. Tien responded that the need for 2.2 million teachers is a national crisis. Kirwan recommended focusing on having an able teacher in every classroom. Lopez-Freeman commented that schools can't generate 2.2 million teachers. She suggested that the recommendations must address improvements that can be made to the existing system, as well as changes that would reflect the structure of schooling of the future. Rosen agreed that immediate steps are needed for students currently in school while laying the framework for the future. Himmelstein suggested that the report make a significant statement about the role and preparation of the principal. Alberts recommended calling for the creation of a major national database containing videos of effective teaching practice that could be used, free of cost, by every district.

Representative Holt suggested the report focus on five areas: recruiting the best people and lots of them, providing excellent training in both content and how students learn, providing teachers community recognition and respect, providing opportunities for advancement, and providing collegial support. He continued that teachers need to be given time, opportunities to overcome isolation, continuing professional development, technology, and aligned assessments. Barrett recommended adopting the position that we want our young people to be number one in the world. Tien commented that setting a measureable and demonstrable goal is key. Barrett said that a measureable goal was a prerequisite to raising a half billion dollars from private industry. Investors would want to see some return for their investment, such as a substantially improved workforce. Kimmelman suggested using funds raised as a carrot or incentive to ensure the recommendations are implemented.

Gonzalez suggested the slogan: “high standards start here.” Briars said that there are images of what teaching needs to look like; what is needed is a systematic commitment to continuous improvement. Lopez-Freeman asked how to envision teacher preparation and the necessary knowledge base when there are 50 standards, ever-changing. Gill, on behalf of Feldman, concurred that there needs to be a national consensus on a curriculum of core math and science concepts. The meeting was adjourned at 6:30PM.

## **MARCH 7<sup>th</sup>**

### **Overview for the Day**

Rosen called the meeting to order at 8:40AM. Senator Glenn summarized the previous day's discussion: teachers need significant time without teaching responsibilities for professional development; teachers are the key in the change process but they cannot take on the responsibility alone; the recommendations need to set a measurable target and agree to be measured by it; we must capture the attention and imagination of the public about math and science teaching; and teaching must be a more highly respected profession. He suggested that one powerful way to capture the public's attention might be an announcement of Barrett's commitment of a half billion dollars from business with an additional billion in matching funds from the States and Federal government. Glenn indicated that the day's task was to identify recommendations and associated action strategies in the areas of recruitment, induction and professional development.

### **Presentations: Current and Potential Policies**

#### **Recruitment – Dr. Barnett Berry**

Berry suggested the time is right for significant changes in recruitment. He cited several causes of the teacher shortage: imbalances across states and fields, cumbersome hiring and selection practices, unequal funding, noncompetitive salaries, lack of data on the distribution of teachers nationwide, inadequate working conditions, and dysfunctional school organizations that prevent teachers from learning from each other.

Berry offered a series of recommendations: identify out-of-field teachers in math and science, provide them intensive-laden and content-specific professional development, lower their class load, and increase support from expert teachers; establish differentiated staffing of math and science teachers; identify expert teachers to serve as mentors to

novice teachers, out-of-field teachers, and content-specialists who need pedagogical support; provide incentives for nationally board certified teachers to teach in Title I, hard-to-staff, and low-performing schools; connect pre-collegiate courses, like the South Carolina Cadets program, to college recruitment and preparation programs, such as the North Carolina Fellows program; offer incentives through new funding formulas to colleges and universities to recruit and prepare math and science teachers; and provide incentives for redesigning schools that support teaching and learning.

### **Recruitment – Dr. Iris T. Metts**

Metts described recruitment problems in Prince George's County, MD: wage differentials, high cost of living in the metropolitan area, and the lack of qualified math and science candidates. She noted that the number of uncertified teachers in Prince George's County is approaching 19 percent across all categories. The County's recruiting plan for the upcoming year includes: incentives of \$1,000 in high-need areas; using technology to recruit by connecting to major Internet employment facilities; and recruiting out of the country, particularly in Canada because their fifth year university requirement qualifies their teachers to teach math and science in this country. Metts recommended providing training incentives to people grounded in the content area but not certified to teach, or to those with instructional and pedagogy backgrounds but who need training in content areas. She suggested looking to the business community for opportunities to recruit people with content knowledge. Recruitment will have to be very proactive to identify people early who might consider a career change into education, with training programs designed to help them transition into the classroom. She recommended: a sophisticated approach to analyzing the numbers of teachers that are needed, networks to connect school systems, and a national databank system; a national program to recruit diverse candidates; greater and more creative use of technology; outlets to recruit from outside the country; systems to rapidly train people; and support mechanisms within systems. She commented that the digital divide will extend into a scientific divide and a mathematics divide if we do not get qualified teachers. To make these changes will require federal programs, legislation, state support, and funding.

### **Induction – Dr. Dennis Bartels**

Bartels suggested that focusing on induction may be the most critical thing that the Commission does. Colleges cannot be expected to provide, in a 1-2 year program, everything teachers need to teach the rest of their careers. The first two years of teaching may be the most critical and the steepest part of a teacher's learning curve. Patterns and habits that teachers form in their first years have a much greater impact on how they will teach throughout their careers than do their preparation programs. Without support in their first years, teachers revert to traditional methods. Bartels noted that beginning teachers are unique and require a different model, one that is discipline-based. Pre-service education should focus on content; the focus in the first few years of teaching should be on helping teachers to teach. Inservice programs should move teachers from novice to sophisticated practice, focusing on deeper issues of teaching and learning. A new induction system would introduce teachers to a community of practice -- a sort of residency program as in the medical profession. Bartels suggested that this work does not have to happen at colleges and universities and local education agencies, that there are a host of professional, discipline-based organizations, and informal science institutions across the country devoted to math, science, and

technology that could take on this work. The key to quality induction programs is having mentor teachers fully released from their classroom duties to work with novice teachers, and these programs are expensive, about \$8,000 per teacher, per year -- with 200,000 new teachers across the U.S. -- about \$1.6 billion per year. Bartels recommended that this is the time to invest in new program designs, rather than trying to change existing institutions.

### **Induction – Dr. Michal Lomask**

Lomask described the BEST Program (Beginning Educator Support and Training Program), a 2-year induction program for all beginning teachers in Connecticut that costs \$1,300 per teacher per year. Connecticut has 2,000 beginning teachers every year, approximately 5 percent of the teaching force, resulting in between 4,000 and 5,000 teachers in BEST each year. BEST started as a generic induction program that tied teacher training and teacher assessment to enhancement of salaries and required teachers to be re-certified every five years. Subject-specific induction and assessment was added later. The science education program is based on a set of very high-level standards developed by experienced science teachers and university professors; teachers learn both quantitative and qualitative inquiry; all beginning teachers have to develop a teaching portfolio; the quality of the teaching is assessed by state-trained assessors; and all beginning teachers are supported by mentoring. Lomask said that after socioeconomic factors, which still have the greatest affect on student performance, the next best predictor of student performance is the percentage of teachers with masters' degrees and the percentage of teachers in the BEST program. Lomask reported that the BEST program has had a ripple effect; over the last 10 years, 40-50 percent of Connecticut's teachers have been trained in the new standards and teaching methods.

### **Professional Development – Dr. Susan Loucks-Horsley**

Loucks-Horsley noted that most professional development programs are single, one-time workshops. She defined effective professional development as the continuous improvement of professional practice; it should build over time, providing adequate time to learn and make meaningful and substantial changes. Some of the best programs are 80-100 hours of training, providing a cycle of learning, practice, and assessment with feedback. Effective professional development: centers on high quality teaching, probes and cares about student understanding, is rich in subject matter content, builds on a teacher's pedagogical content knowledge, focuses on the actual act of teaching and a teacher's own curriculum materials, supports collaboration among teachers, builds a learning community among teachers, and provides opportunities for leadership. While effective professional development cannot cure all problems, Loucks-Horsley suggested it can create a culture and a capacity for meeting some of the challenges that lie ahead.

### **Professional Development – Dr. William Firestone**

Firestone suggested that existing teachers set the culture of the school and the tone for new teachers. The way to reach them is through professional development; the challenge is to get a lot of teachers teaching in a way that is largely foreign to them or that they haven't experienced. Effective professional development policy must target both teachers and school districts. A change in professional development policies requires influencing the demand for professional development, the supply of professional

development, and changing teacher's work contexts; preferably all together. It takes time to effect demand, supply, and work context; policy implementers need to stay the course for a long time. To affect the demand for professional development, Firestone recommended linking salary increases to professional development, but not basing it on years of experience or course credits; using student assessments to create a context for improved professional development, yet keeping the stakes moderate and limiting the content areas taught; and aligning recertification requirements with state standards while recognizing the needs of different students and teachers. To affect the supply of professional development, Firestone recommended focusing on state standards; avoiding state mandated topical fragmentation; allowing for both collective and individual teacher input; allowing for higher education input; and requiring quality control. To affect the work context, it's important to recognize that time with students doesn't equal teacher work time. Schools need to be staffed so teachers have time to work together, and every supervisor or content leader should have ongoing classroom experience.

### **Plenary Discussion**

Senator Glenn thanked the presenters and invited Governor Hunt to speak, noting his long-standing commitment to education. Governor Hunt suggested that the time was right to come out with some big, bold ideas. Education is the top issue and the nation now has the money to invest. He noted that after Sputnik, America passed the National Defense Education Act (NDEA). He recommended creating the John Glenn Improving Math and Science Education Act as a follow-up to the NDEA that would provide a residency or fellowship with funds to assist each new math and science teacher, paid mentors, new materials, and summer experiences in teaching.

The Commission broke into small discussion groups at 10:30AM and planned to reconvene at 1:00PM.

### **Plenary Discussion: Small Group Reports**

Senator Glenn called the meeting to order at 1:10PM. He noted that the role of principal had not really come up in the morning discussion. He introduced Richard Stoddard from The Ohio State University and asked him to comment on Ohio's Principal Academy. Stoddard reported that the Ohio Business Roundtable started the Academy with the help of two governors. The Academy will put principals through programs to help train them and keep them current.

Turning to the topic of the small group reports, the following provocateurs were introduced: Gary Hart, Secretary of Education, California, Tom Payzant, Superintendent of Boston Public Schools, and Uri Treisman, Director of the Dana Center at the University of Texas, Austin.

### **Presentation: Recruitment Group**

The group presented a list of possible targets for increasing the K-12 math and science teaching pool: retired teachers, certified teachers who left the field, existing teachers in other fields, aides or paraprofessionals from 2-year institutions, global recruiting, master teachers coupled with distance learning and classroom facilitators, new college graduates, technology as the teacher with facilitators, and second careers for business and military. To attract professionals to teaching, the group proposed: loan forgiveness,

scholarships, high school recruiting, salary structures, retirement systems, housing assistance, alternative pathways, incentives to teach in shortage areas, incentives to higher education, and K-8 math and science specialists. Three needs were identified: a system for tracking the supply and demand of K-12 math and science teachers; preparation for licensing at the K-8 level; and linkages to induction, professional development, and teacher preparation. Recommendations included: at the Federal level, NDEA 2000; at the state level, national reciprocity for math and science and K-12 teachers, better salaries; and at the local level, recruiting with business leaders, better salaries. (Attachment A) Suggestions were made to add two items to the list of proposals: utilize sales and marketing strategies for recruiting teachers, and have teachers work with local industry or government labs during the summer to augment their salaries. A group member also clarified that they were recommending increased salaries for all, not differentiated salaries.

### **Presentation: Induction Group**

This group considered recommendations on how to keep teachers and how to make them successful. The group had three recommendations with action strategies. First, promote the use of master teachers to mentor new teachers by (1) creating Federal programs to fund and evaluate context-based induction programs, (2) encouraging states to fund and require induction programs, and (3) encourage states and districts to fund and provide effective training to mentor teachers. Second, reduce the teaching load of new teachers and replace with induction activities by (1) encouraging Federal and state investments to reduce new teachers' teaching load, and (2) encourage districts to work with local unions to structure a new teacher contract. Third, provide new teachers with summer opportunities to improve their teaching by (1) creating Federal, state and district-level summer programs, and (2) promoting partnership programs with business. A final point of discussion was on teacher needs, including supplies, support, technology, and mentors, and recommendations for addressing them. (Attachment B) A group member added that they had discussed looking at specific NSF programs that may be worth replicating for new and beginning teachers. A group member also added that they had discussed setting criteria for the selection of mentors. A suggestion was made that programs at institutes of higher education could continue during the academic year.

### **Presentation: Professional Development Group**

The group made a single recommendation: to guarantee or expect that all teachers will engage in high quality, continuous, content-based professional development experiences as part of their role and responsibilities during their normal work day and year. The group proposed three action strategies to facilitate the recommendation. The first dealt with facilitating conditions, including: salaries, restructuring the school day and year, teacher collaboration around improving teaching practice, collaboration with community, including business and industry, K-12 and beyond continuum, connecting to literacy, and defining appropriate roles for stakeholders. The second was incentives, including: linking to the existing standards and aligning the system, holding the professional development system accountable and correcting it as necessary, greater student achievement, and multi-faceted performance based accountability. The third was making available knowledge and resources, including: developing national resources to support high quality teaching and organizing it in a database to facilitate large-scale dissemination and use, the role of the principal and what principals can do to

enhance the professional development implementation plan, and developing cadres of leaders to support professional development in a variety of ways. (Attachment C) In response to a question, the group indicated it did not discuss who would be the professional developers. The group also clarified that teachers would have regular blocks of time built into their schedules for professional development.

### **Panel: Reflections on Emerging Ideas**

Treisman suggested that the Commission should focus on increasing the demand for quality mathematics and science education. He commented that school districts like to compare their performance with that of other districts. Tools that allow districts to see where they stand in comparison with other districts are critical, and producing those kinds of instruments is an appropriate Federal role. He suggested expanding NAEP or developing research tools for states and districts to use to develop their own assessments. He cautioned that both TIMSS and NAEP show massive differences across states and that explanations for the differences among states otherwise considered similar are needed. Local school boards also need models, based on national standards, of what good math and science education looks like and that can be customized and shaped to local needs. Options, such as for certifying teachers, are critical. Treisman suggested that current litigation across the country offers opportunities to affect math and science education and that professional math and science groups need to work with lawyers and judges involved with these cases. He noted that most monies allocated for professional development and teacher recruitment are spent in traditional ways not connected to student performance changes. He recommended that the Commission make induction a priority. In the area of technology, he suggested that standards need to be upgraded and connections between technology and math and science learning need to be addressed.

Payzant noted that all young people are going to have to know and be able to apply their knowledge of math and science in a way that we used to ask only a small percentage to do. Standards and curriculum must be aligned with teaching practice and with assessments that give children the opportunity to demonstrate what they know and how they can apply what they know. Payzant suggested a number of issues that the Commission may need to consider. He noted that there is tension in the country about what should be centralized; and suggested that the Commission may need to address the role of the individual classroom, the school, and the system. He suggested also that the Commission may need to consider whether any strategies require the reallocation of resources as a first step. Many issues have to be resolved through collective bargaining, so it is important that the NEA and AFT buy into the implementation strategies. Regarding recruitment strategies, he suggested that job sharing with business and industry would provide an opportunity for a person to work in business a portion of the week and teach a few days in a local school system. Separate recruitment strategies for urban and rural areas may be needed, and math and science teachers of color are needed everywhere, especially in urban areas. Payzant recommended: building flexibility into the teaching schedule, providing common planning time, school-based professional development, using a model like a teaching hospital to build in a continuum of research and practice, and a greater focus on role of colleges, universities and teacher training institutions.

Secretary Hart said the Commission should address issue of equity; minority students suffer the most from under-prepared teachers. He cautioned that awards and

distinctions for certain kinds of teachers raises political concerns and issues of equity. Recruitment issues are the most difficult because the problems won't be solved without raising salaries and without colleges producing more math and science graduates. Secretary Hart recommended: prestigious fellowships for students who pursue teaching careers in math and science; alternative certification programs; reaching out to part-time instructors, particularly at community colleges; Federal bonuses through a national certification process; and incentives for universities to train and help local schools retain more math and science teachers. In the induction area, Secretary Hart recommended Federal involvement and said that the Commission should focus on model induction programs and highlight the most comprehensive programs. He noted that mentors are difficult to get, particularly in hard-to-staff schools and that full-time mentoring positions might be needed. Secretary Hart recommended retired teachers as mentors. In the induction area, there needs to be discussion of the trade-offs between reduced class size and reduced class load. In the professional development area, it may be necessary to move away from laissez-fair, discretionary systems at the local level that allow teachers to avoid math and science training and instead, redesign systems to link resources to issues having to do with math and science.

### **Plenary Discussion**

Rosen called for a brief break at 2:35PM. The Commission reconvened at 3:10PM to discuss the draft report. She summarized the previous day's comments: the draft was well written and contains many of the main points; the issue is the tone -- the sense of crisis and urgency needs to be much stronger. Ellis, on behalf of Barrett, suggested moving the end to the beginning. She also suggested identifying the target audience and then determining if a full report or 2-page summary, for example, is the appropriate product. Senator Glenn agreed and suggested different formats for the various target audiences such as a checklist for school board members that challenges them to compare their districts with their peers; another kind of product for Capitol Hill, etc. Keenan suggested a report with different chapters that would serve as an action plan, each directed to the different audiences that must carry it out: a segment saying what the President needs to do, one for what the governors need to do, another for what school boards must do. She proposed that the Commission reconvene in a year to see how the various segments were doing. Senator Glenn suggested a checklist for each audience. Keenan suggested that a statement of the Commission's beliefs regarding the issues of equity and access be included in a preamble. Briars said much of the current draft is appropriate for background papers or an appendix; the report should be short, pithy, and pointed. Keenan suggested thinking of it as a web page.

Rosen suggested continuing discussion about the recommendations on recruitment, induction, and professional development over the next weeks. Alberts commented that the professional development group tried to come up with a single recommendation and suggested the other groups do the same. He noted that it will be a huge job to convince the public that this will make a difference, and suggested that something significant be said about induction, and that the NDEA recruitment recommendation be clearly spelled out to attract new people into the profession. Butler Kahle, on behalf of Colwell, suggested job sharing as a quick recruitment strategy. Briars suggested "Every teacher must be engaged in a high quality induction program" as the induction recommendation.

Kimmelman suggested something brief, such as Covey's seven principles card, but in a 21<sup>st</sup> century context. Rosen suggested setting 12-month benchmarks -- short-term

strategies at the same time as building an infrastructure for a long-term strategy. Senator Glenn suggested a PERT chart outlining the various goals and timelines.

Ellis, on behalf of Barrett, asked how to address the reality of holding onto good teachers when demand from high tech industries, which offer stock options, will increase. She also reported that Barrett, upon reflection, thought it might be possible to raise \$1 billion from private industry. Jolly suggested reorganizing the report around teaching conditions. Butler Kahle, on behalf of Colwell, suggested a focus on learning conditions and the quality of schools, first in reference to children and then to the adults in those schools. Jolly concurred that children come first in terms of physical facilities, but clarified that teaching conditions was a broader concept than just physical conditions.

Grignon said that more information was needed about what's currently happening with teacher preparation globally. Himmelstein added that evidence is needed to illustrate the differences between preparation for science teaching and math teaching. Gill, on behalf of Feldman, suggested that the report from the National Academy of Sciences might provide useful information. Representative Holt noted there was a reference to integrating math and science throughout the curriculum, and believed that showing the benefit of math and science to other disciplines will be essential to gaining acceptance. He noted that the interdisciplinary nature of science in society makes the challenge different than in math. Representative Holt suggested offering rewards to colleges for bringing in and retaining math and science teachers as a way to involve the universities. A professional development program is needed to help veteran teachers rethink their jobs so that they teach and reach all students.

Treisman said that schools respond to accountability systems. To solve the problem, you can't just appeal to individual teachers but need to affect the systems. If States do not include elementary math and science in their accountability plans, then there won't be improvement. Briars commented that assessment and accountability is a double-edged sword. In some instances, schools are in fact teaching to a very narrow test. Treisman concurred that bad assessments are dangerous and noted that leadership and policy can affect how people will respond to tests. He suggested organizing a leadership team that understands the national science standards, can advocate for them and help make them the state or district standards. Stoddard, on behalf of Kirwan, commented that the challenge is to provide a vision to the key stakeholders who can do something about science and math education and then set a direction for addressing it. He suggested that a Commission is not the appropriate place to define specific programs and policies but should provide the vision and the principles, without a lot of detail.

Van Roekel said that quality control is needed with regard to the alignment of standards, assessment, and curriculum. In professional development, there must be built in time for teachers to be able to look at choices and decide what fits. He agreed that something must be done about salaries. But he stressed that the other reason why some teachers stay in the profession, the sense of the nobility of the profession, should not be ignored. The difficulties of the first year of teaching often make teachers forget why they wanted to teach. Induction and professional development strategies should acknowledge, protect and bolster those feelings.

Rosen urged the Commission members to think about the most important statements for the Commission to make before the May 8-9 meeting. She asked members to look at

possible dates for a July meeting. Senator Glenn thanked the Commission and adjourned the meeting at 4:10PM.

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This is to certify that the minutes of the March 6-7, 2000 meeting of the National Commission on Mathematics and Science Teaching for the 21st Century are true and accurate to the best of my knowledge.

(Signed by John Glenn)

May 8, 2000

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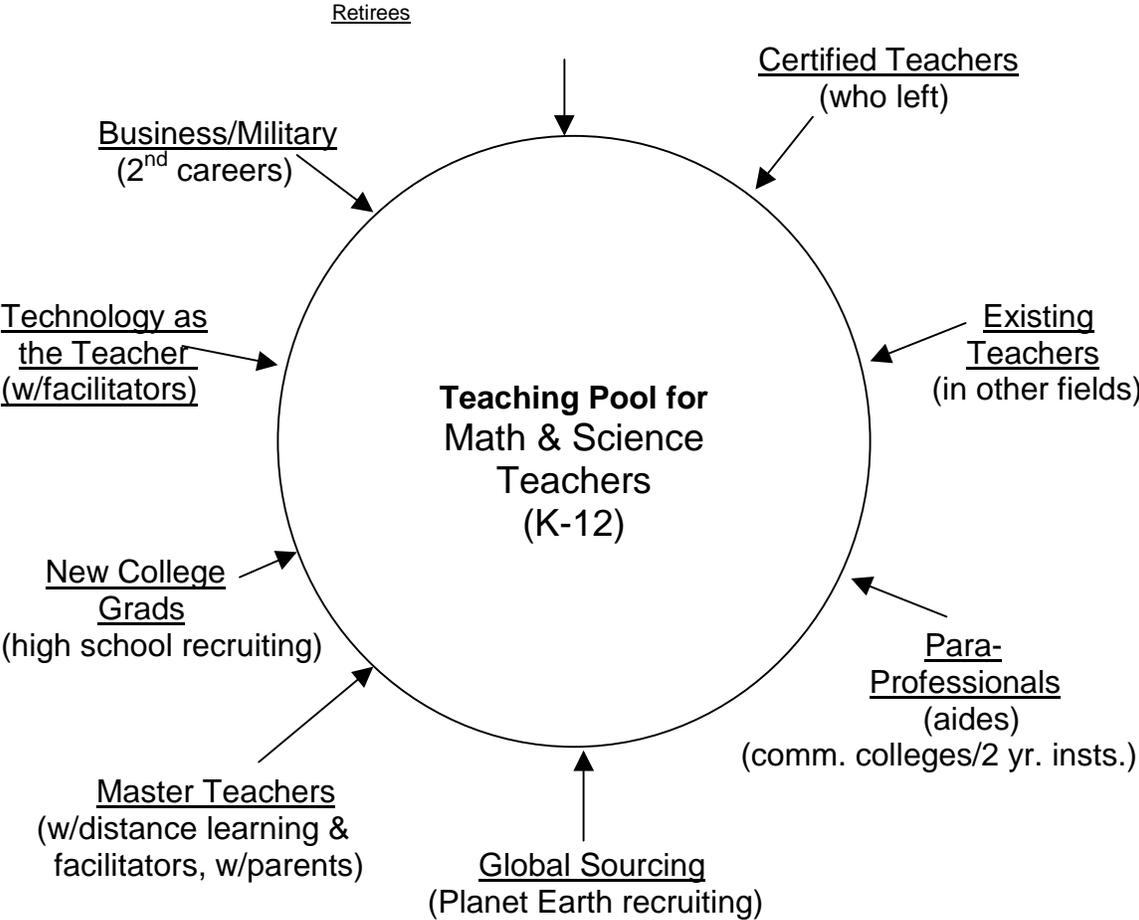
John Glenn, Chairman

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Date

# Potential Recruitment Recommendations

## Supply Side



## How?

1. Loan forgiveness
2. Scholarships
3. High school recruiting
4. Salary structures (state & district)
5. "Retirement" systems (ala Social Security)
6. Housing assistance
7. Alternative pathways (2<sup>nd</sup> career, including summer hires)
8. Incentives (i.e. Title I schools)
9. Incentives for higher ed math & science producers
10. K-8 math & science specialists (short-term)
11. Sales & marketing for recruiting (PSAs, etc.)

## **Needs**

1. System for tracking supply and demand of math and science teachers for K-12.
2. K-8 math and science prep for licensing (long-term).
3. Linkages to induction, professional development, and teacher prep.

## Program Recommendations

Federal Level

“NDEA” 2000

State Level

-“National” reciprocity (math & science K-12)  
-SALARIES!!!

District Level

-Local recruiting with business leaders  
-SALARIES!!!