UNITED STATES DEPARTMENT OF EDUCATION

Office of Elementary and Secondary Education
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Washington, D.C. 20202-6100

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FAX TRANSMITTAL

Date: 10/17/00

Number of Pages, Including Cover Sheet: 11

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Jennifer Kron + Lorenzo Rosetti at 395-4875

ADDRESSEE: _____

Organization: _____

Telephone #: _____

FROM: Tom Corwin

Telephone #: _____

MESSAGE: -See attached markup of Goodling charter schools language.
- A separate explanation of the changes is being developed.

Transcript

CBS News

Bilingual ED

Ken [illegible]
Mooney

11:30 conference call
david + carolines office

F:\M6\GOODLIN\GOODLI.188 Charter Deins

T. Corwin markup — 10/17 - 2:15

SEC. ____. (a) Part C of title X of the Elementary and Secondary Education Act of 1965 (20 U.S.C. 8061 et seq.) is amended—

(1) by inserting after the part heading the following:

"Subpart 1—Basic Charter School Grant Program";

and

(2) by adding at the end the following:

"Subpart 2—Credit Enhancement Initiatives to Assist Charter School Facility Acquisition, Construction, and Renovation

"SEC. 10321. PURPOSE.

"The purpose of this subpart is to provide one-time grants to eligible entities to permit them to demonstrate innovative credit enhancement initiatives that assist charter schools to address the cost of acquiring, constructing, and renovating facilities.

"SEC. 10322. GRANTS TO ELIGIBLE ENTITIES.

"(a) IN GENERAL.—The Secretary shall use 100 percent of the amount appropriated under section 10331 to award [not less than 2] grants to eligible entities having applications approved under this subpart to demonstrate innovative methods of assisting charter schools to address the cost of acquiring, constructing, and renovating facili-

too rigid

ties by enhancing the availability of loans or bond financing.

"(b) GRANTEE SELECTION.—The Secretary shall evaluate each application submitted, and shall make an initial determination of which are sufficient to merit approval and which are not. The Secretary shall award at least one grant to an eligible entity described in section 10330(2)(A), at least one grant to an eligible entity described in section 10330(2)(B), and at least one grant to an eligible entity described in section 10330(2)(C), if applications are submitted that permit the Secretary to do so without approving an application that is not of sufficient quality to merit approval.

Too rigid

"(c) GRANT CHARACTERISTICS.—Grants under this subpart shall be of a sufficient size, scope, and quality so as to ensure an effective demonstration of an innovative means of financing charter school acquisition, construction, or renovation.

enhance credit for the ... of

"SEC. 10323. APPLICATIONS.

"(a) IN GENERAL.—In order to receive a grant under this subpart [for a fiscal year] an eligible entity shall submit to the Secretary an application [for such year] in such form as the Secretary may reasonably require.

Program is authorized for only one FY.

"(b) CONTENTS.—An application under subsection (a) shall contain—

including how the applicant will determine which charter schools will receive assistance, and how much and what types of assistance they will receive

"(1) a statement identifying the activities proposed to be undertaken with funds received under this subpart;

"(2) a statement explaining the potential for the proposed activities to be broadly expanded or replicated and disseminated;

There is no authorization for dissemination or replication

"(3) ~~assurances~~ a description of the involvement of charter schools in the application's development and the design of the proposed activities;

"(4) ~~assurances that the applicant possesses~~ a description of the applicant's expertise in capital market financing;

"(5) ~~assurances that~~ a description of how the proposed activities will leverage the maximum amount of private sector financing capital relative to the amount of government funding used and otherwise enhance credit available to charter schools; ~~and~~

"(6) ~~assurances that~~ & a description of how the applicant possesses sufficient expertise in education in order to evaluate the likelihood of success of a charter school program for which facilities financing is sought; and

(9) such other information as the Secretary may reasonably require.

"SEC. 10324. CHARTER SCHOOL OBJECTIVES.

"An eligible entity receiving a grant under this subpart shall use the funds deposited in the reserve account established under section 10325(a) to access private-sector

Insert

Insert to section 10323(b) – page 3

"(6) in the case of a State entity, a description of the actions that the entity has taken, or will take, to ensure that charter schools within the State receive the funding they need to provide adequate public school facilities, including, if applicable—

"(A) how the State entity will use funding under this subsection to help meet that objective; and

"(B) changes in State policy that will enable charter schools in the State to have access to adequate facilties;

"(7) a description of how the applicant will ensure that, if it uses funds under this subpart to assist a charter school in renovating leased property, and the charter school later goes out of existence or vacates the property, other charter schools in the area, or the local educational agency, will have the opportunity to continue the lease and make use of the renovated facilities for school-related activities;

capital in order to assist one or more charter schools to accomplish one or both of the following objectives:

"(1) The acquisition (by purchase, lease, donation, or otherwise) of an interest (including an interest held by a third party for the benefit of a charter school) in improved or unimproved real property that is necessary to commence or continue the operation of a charter school.

"(2) [The construction of new facilities, or] the renovation, repair, or alteration of existing facilities, necessary to commence or continue the operation of a charter school.

Delete because the broader School Renovation program will not pay for new construction

SEC. 10325. RESERVE ACCOUNT.

"(a) USE OF FUNDS.—To assist charter schools to accomplish the objectives described in section 10324, an eligible entity receiving a grant under this subpart shall, in accordance with State and local law, directly or indirectly, alone or in collaboration with others, deposit the funds received under this subpart (other than funds used for administrative costs in accordance with section 10326) in a reserve account established and maintained by the entity for this purpose. Amounts deposited in such account shall be used by the entity for one or more of the following purposes:

"(1) Guaranteeing, insuring, and reinsuring bonds, notes, evidences of debt, loans, and interests therein, the proceeds of which are used for an objective described in section 10324.

"(2) Guaranteeing and insuring leases of personal and real property for an objective described in section 10324.

"(3) Identifying potential lending sources, encouraging private lending, and other similar activities that directly promote lending to, or for the benefit of, charter schools.

"(4) Facilitating the issuance of bonds by charter schools, or by other public entities for the benefit of charter schools, by providing technical, administrative, and other appropriate assistance (including the recruitment of bond counsel, underwriters, and potential investors and the consolidation of multiple charter school projects within a single bond issue).

"(b) REINVESTMENT OF EARNINGS.—Any earnings on funds received under this subpart shall be deposited in the reserve account established under subsection (a) and used in accordance with such subsection.

"SEC. 10326. LIMITATION ON ADMINISTRATIVE COSTS.

"An eligible entity may use not more than 0.25 percent of the funds received under this subpart for the ad-

ministrative costs of carrying out its responsibilities under this subpart.

"SEC. 10327. AUDITS AND REPORTS.

"(a) FINANCIAL RECORD MAINTENANCE AND AUDIT.—The financial records of each eligible entity receiving a grant under this subpart shall be maintained in accordance with generally accepted accounting principles and shall be subject to an annual audit by an independent public accountant.

"(b) REPORTS.—

"(1) GRANTEE ANNUAL REPORTS.—Each eligible entity receiving a grant under this subpart annually shall submit to the Secretary a report of its operations and activities under this subpart.

"(2) CONTENTS.—Each such annual report shall include—

"(A) a copy of the most recent financial statements, and any accompanying opinion on such statements, prepared by the independent public accountant reviewing the financial records of the eligible entity;

"(B) a copy of any report made on an audit of the financial records of the eligible entity that was conducted under subsection (a) during the reporting period;

"(C) an evaluation by the eligible entity of its use of the effectiveness of the Federal funds provided under this subpart in leveraging private funds;

"(D) a listing and description of the ~~number of~~ charter schools served during the reporting period;

(E) a description of the ~~and~~ activities carried out by the entity to assist charter schools in meeting the objectives set forth in section 10324; and

"(F) a description of the characteristics of lenders and other financial institutions participating in the activities undertaken by the eligible entity under this subpart during the reporting period.

"(3) SECRETARIAL REPORT.—The Secretary shall review the reports submitted under paragraph (1) and shall ~~provide a comprehensive annual report~~ report periodically to the Congress on the activities conducted under this subpart.

Every year is too often; particularly since this is only a one-year program

"SEC. 10328. NO FULL FAITH AND CREDIT FOR GRANTEE OBLIGATIONS.

"No financial obligation of an eligible entity entered into pursuant to this subpart (such as an obligation under a guarantee, bond, note, evidence of debt, or loan) shall be an obligation of, or guaranteed in any respect by, the United States. The full faith and credit of the United States is not pledged to the payment of funds which may

be required to be paid under any obligation made by an eligible entity pursuant to any provision of this subpart.

"SEC. 10329. RECOVERY OF FUNDS.

"(a) IN GENERAL.—The Secretary, in accordance with chapter 37 of title 31, United States Code, shall collect—

"(1) all of the funds in a reserve account established by an eligible entity under section 10325(a) if the Secretary determines, not earlier than 2 years after the date on which the entity first received funds under this subpart, that the entity has failed to ~~achieve at least one of~~ carry out the purposes described in section 10325(a); or

"(2) all or a portion of the funds in a reserve account established by an eligible entity under section 10325(a) if the Secretary determines that the eligible entity has permanently ceased to use all or a portion of the funds in such account to accomplish any purpose described in section 10325(a).

(b) PROCEDURES.—The provisions of sections 451, 452, and 458 of the General Education Provisions Act (20 U.S.C. 1234 et seq.) shall apply to the recovery of funds under subsection (a).

(c) CONSTRUCTION.—This section shall not be construed to impair or affect the authority of the Secretary

— 10325(a) does not list any purposes. - and merely doing one of the things mentioned in 10325(a) - eg - identifying a lender — seems like too low a threshold

to recover funds under part D of the General Education Provisions Act (20 U.S.C. 1234 et seq.).

"SEC. 10330. DEFINITIONS.

"In this subpart:

"(1) The term 'charter school' has the meaning given such term in section 10310.

"(2) The term 'eligible entity' means—

"(A) a public entity; such as a State entity

"(B) a private nonprofit entity; or

"(C) a consortium of entities described in subparagraphs (A) and (B).

"SEC. 10331. AUTHORIZATION OF APPROPRIATIONS.

"For the purpose of carrying out this subpart, there are authorized to be appropriated $100,000,000 for fiscal year 2001.".

(b) Part C of title X of the Elementary and Secondary Education Act of 1965 (20 U.S.C. 8061 et seq.) is amended in each of the following provisions by striking "part" each place such term appears and inserting "subpart":

(1) Sections 10301 through 10305.

(2) Section 10307.

(3) Sections 10309 through 10311.

Would we really need this much? The money will likely be heavily leveraged. Less than $100M would achieve a lot of credit enhancement.

Identical in Levin & Bonior Bills in Senate & House

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GPO's PDF version of this bill	References to this bill in the Congressional Record	Link to the Bill Summary & Status file.	*Full Display* - 2,103 bytes.[Help]

To require the Secretary of Health and Human Services to promulgate regulations regarding allowable costs under the Medicaid program for school based services provided to children with... (Introduced in the Senate)

S 3088 IS

106th CONGRESS

2d Session

S. 3088

To require the Secretary of Health and Human Services to promulgate regulations regarding allowable costs under the Medicaid program for school based services provided to children with disabilities.

IN THE SENATE OF THE UNITED STATES

September 21, 2000

Mr. LEVIN introduced the following bill; which was read twice and referred to the Committee on Finance

A BILL

To require the Secretary of Health and Human Services to promulgate regulations regarding allowable costs under the Medicaid program for school based services provided to children with disabilities.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. ALLOWABLE MEDICAID COSTS FOR SCHOOL-BASED SERVICES PROVIDED TO CHILDREN WITH DISABILITIES.

Not later than 90 days after the date of enactment of this Act, the Secretary of Health and Human Services and the Secretary of Education shall issue proposed regulations after consultation with the National Governors' Association, the National Association of State Directors of Special Education, the American Association of Educational Service Agencies, the American Public Human Services Administration, and other interested groups relating to

allowable costs under the administrative outreach program of the school based services program that is part of the Medicaid program established under title XIX of the Social Security Act (42 U.S.C. 1396 et seq.) with respect to services provided to children with disabilities. Any claim that is reasonably based on guidance provided orally or in writing by an officer or employee of a regional or national office of the Health Care Financing Administration submitted with respect to such services prior to the publication of final regulations may not be deferred or disallowed.

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To Dave 345-4875

Report Language

The committee is concerned that:

The Health Care Financing Agency (HCFA) has proposed administrative claiming guidelines that would substantially alter the administrative claiming program making it more difficult for schools to identify poor children.

HCFA has reduced its reimbursement to schools for the services they have provided to poor and disabled children.

HCFA has held back and delayed payments to local school districts and states for the administration and identification of (Medicaid eligible?) poor children.

HCFA has developed these guidelines without consultation from the relevant school practitioners and ignored requests from interested groups to participate in a process that would develop guidelines resulting in the continuation of a program that improved services and opportunities for poor and disabled children.

Therefore, upon enactment of this act, the Conferees direct the Department of Health and Human Services and the Department of Education to collaborate with the American Association of School Administrators, The American Public Human Services Association, the National School Boards Association, and the National Governor's Association and other interested parties to draft claiming guidance for Medicaid allowable cost under the administrative claiming section of the School Based Services program.

Prior to the issuance of the final form of such claiming guidance, HHS shall act promptly as set forth below to ensure that administrative claims are paid:

1) claims submitted to HHS prior to the effective date of this act shall not be deferred or disallowed and shall be paid within 90 days of the effective date of this act; and

2) claims submitted subsequent to the effective date of this act shall be paid within 120 days of the effective date of this act provided such submitted claims are prepared in a manner and method consistent with claims

previously paid by HHS to other states prior to the effective date of this act. .

Upon issuance of the final form of claiming guidance by HHS, such guidance shall apply prospectively to claims submitted to HHS subsequent to the effective date of the claiming guidance.

SEC. ___. EDUCATIONAL ASSISTANCE FOR MILITARY CONNECTED CHILDREN.

(a) SHORT TITLE.—This section may be cited as the "Educational Assistance for Military Connected Children Act of 2000".

(b) FUNDING RESPONSIBILITY FOR MILITARY CONNECTED CHILDREN.—Title VIII of the Elementary and Secondary Education Act of 1965 (20 U.S.C. 7701 et seq.) is amended by adding at the end the following:

"SEC. 8015. FUNDING RESPONSIBILITY OF SECRETARY OF DEFENSE.

"(a) COMPUTATION OF AMOUNTS.—

"(1) FEDERAL PROPERTY.—The Secretary shall determine, for each local educational agency receiving assistance under section 8002, the amount of payment in each fiscal year attributable to the presence of a military installation.

"(2) MILITARY CONNECTED CHILDREN.—The Secretary shall determine, for each local educational agency receiving assistance under section 8003 or

8007, the number of military connected children served by such agency in a fiscal year.

"(3) FACILITIES.—The Secretary shall determine the amount provided for each local educational agency under section 8008.

"(4) TOTAL AMOUNT OF PAYMENTS.—The Secretary shall determine the total amount of payments—

"(A) all local educational agencies are to receive under section 8002 which are attributable to the presence of a military installation in each fiscal year;

"(B) all local educational agencies are to receive under section 8003 or 8007 for military connected children in each fiscal year; and

"(C) all local educational agencies are to receive under section 8008 in each fiscal year.

"(b) TRANSFER OF FUNDS.—From any amounts available to the Secretary of Defense, the Secretary of Defense shall transfer to the Secretary of Education in each fiscal year the total amount of funds necessary for the Secretary of Education to make all of the payments described in subsection (a)(4) for such fiscal year.

"(c) SPECIAL RULE.—Notwithstanding any other provision of law, funds made available by the Secretary

of Defense to the Secretary of Education pursuant to subsection (b) shall be the only funds used to make payments under section 8002, 8003, 8007, or 8008 to local educational agencies for military connected children or property.

"(d) DEFINITIONS.—For the purpose of this section—

"(1) the term 'military connected children' means the children described in—

"(A) section 8003(a)(1)(A) who reside on military installations;

"(B) section 8003(a)(1)(B) who reside on military installations; and

"(C) section 8003(a)(1)(D) who have parents employed on military installations.

"(2) the term 'military installation' has the same meaning given to such term in section 2801(c) of title 10, United States Code.".

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

Contents

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 30th 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 21st 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.

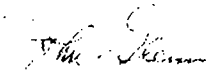
We believe that the issues and concerns raised in our report can be understood, addressed by, and potentially unite policymakers, teachers, the business community, parents, students, and private citizens alike. The goals and action strategies we suggest may be seen by some as too great a reach, by some 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.

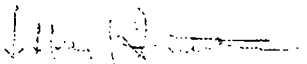
Finally, we offer our profound thanks for having provided us with this opportunity to serve our country—and our children—as members of this Commission.

Respectfully,

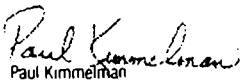
John Glenn, Commission Chairman



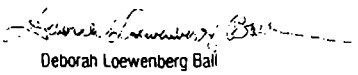
John Glenn
Commission Chairman



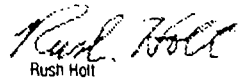
Jeffrey Himmelstein
Adjunct Professor of Biology, William Patterson University (NJ)



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

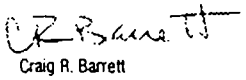


Deborah Loewenberg Ball
Arthur F. Thurnau Professor of Mathematics Education and Teacher Education, University of Michigan



Rush Holt
U.S. Representative, New Jersey

William E. Kirwan
President, The Ohio State University



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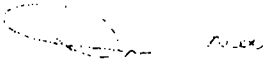
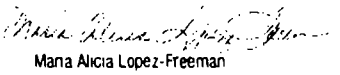
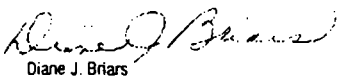
President and CEO, Intel Corporation



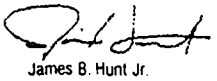
Ins T. Metts
Superintendent, Prince George's County Public Schools (MD)



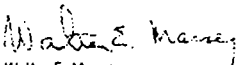
Maria Alicia Lopez-Freeman
Executive Director, California Science Project



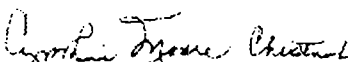
Diane J. Briars
Mathematics Director, Pittsburgh Public Schools



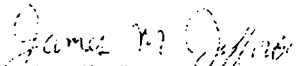
James B. Hunt Jr.
Governor, North Carolina



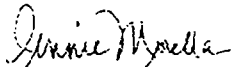
Walter E. Massey
President, Morehouse College



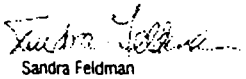
Cynthia Moore Chestnut
State Representative, Florida



James M. Jeffords
U.S. Senator, Vermont

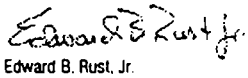


Connie Morella
U.S. Representative, Maryland



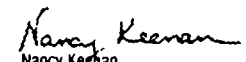
Sandra Feldman
President, American Federation of Teachers

Anne Jolly
Science Teacher/Professional Development Coordinator
Cranford Burns Middle School (AL)

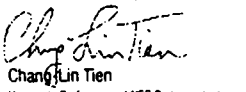


Edward B. Rust, Jr.
Chairman and CEO, State Farm Mutual Automobile Insurance Company

James E. Geringer
Governor, Wyoming



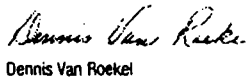
Nancy Keenan
Superintendent of Public Instruction
Montana Office of Public Instruction



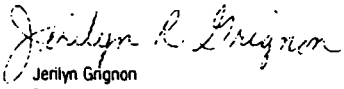
Chang-Lin Tien
University Professor and NEC Distinguished Professor of Engineering, University of California Berkeley

Javier Gonzalez
Mathematics Teacher, Pioneer High School (CA)

Edward M. Kennedy
U.S. Senator, Massachusetts



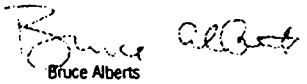
Dennis Van Roekel
Secretary-Treasurer, National Education Association



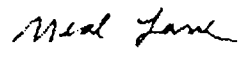
Jerilyn Grignon
Technology Instructor, Menominee Indian Junior High School (WI)

Ex Officio

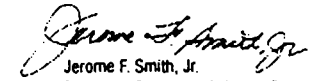
Richard W. Riley, U.S. Secretary of Education



Bruce Alberts
President, National Academy of Sciences

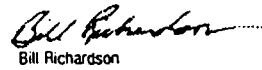


Neal Lane
Assistant to the President for Science and Technology Policy,
Office of Science and Technology Policy



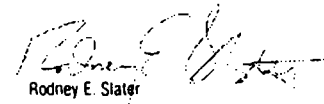
Jerome F. Smith, Jr.
Chancellor for Education and Professional Development
U.S. Department of Defense

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

John Glenn, Commission Chairman

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 21st 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

Our Students' Performance in Mathematics and Science is Unacceptable

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.

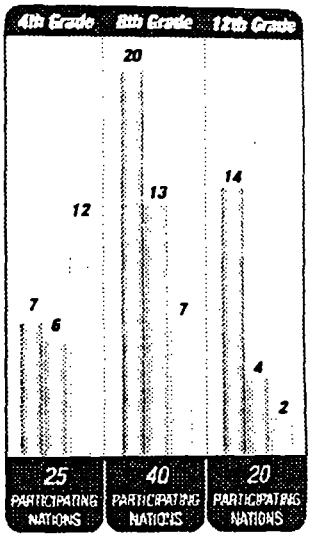
The Recycled Message of TIMSS and NAEP: Our Students Are Losing Ground

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 disappointedly unchanged. Their students have consistently scored higher than U.S. students.[2] Indicators from those three assessments and those conducted here at home corroborate the point.

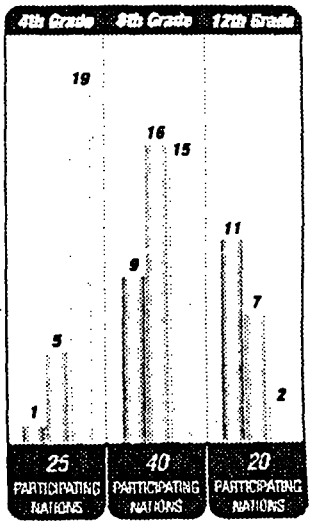
TIMSS Results: The Third International Mathematics and Science Study assessed the performance of students from 41 countries in 1995. U.S. fourth-graders scored above the international average in mathematics and science; eighth-graders scored slightly above the international average in science and slightly 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



Nations with average scores HIGHER than the U.S.

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.[3] 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.[4]

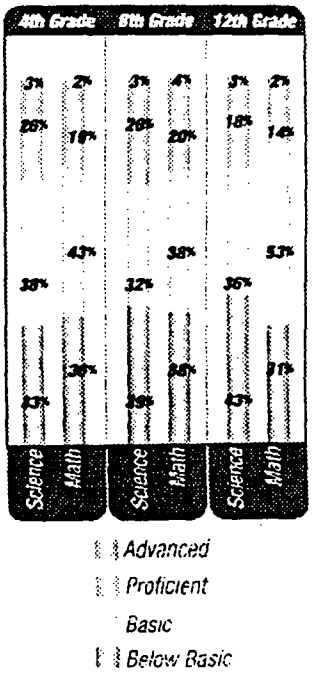
In sum, whether we look at comparisons of our young people to those of other nations or look simply at the progress our students are making at home,[5] the nation keeps getting the same dismal message about mathematics and science achievement: our students are losing ground. It's time we heeded it.

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*.[6] 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 4th, 8th & 12th Grade Students. National Center for Educational Statistics. www.nagb.ort/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.[7] Such productivity gains are unsustainable without a workforce sufficiently educated in the sciences and mathematics.

- The technology-driven economy of the 21st century will add about 20 million jobs to the American economy by 2008—if we can only educate our young people to fill them.[8]

- 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.[9]

- 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.[10]

- 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.[11]

- 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.[12]

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."[13] 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.[14]

- 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.[15] 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 21st century will require skills that are possessed by only 20% of the current workforce.[16]

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,[17] effective teaching methods, challenging assessments, and how young people learn.[18] 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.[19]

Now, The Glimpse of a Greater Challenge

At the beginning of the 20th century, schools in our country underwent profound changes as they adapted teaching and curricula to the demands of industrialization and the needs of a growing population. At the beginning of the 21st 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.

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.[20] 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.[21] 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.[22]

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*.[23] 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.[24] 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.[25]
- 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.[26]
- 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.[27]

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.[28]

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.[29]

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."[30]

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.[31]

If the core of mathematics and science is about inquiry, then too many of today's mathematics and science classrooms come up short. Student 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 Stategies 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.[32] 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.[33] 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.[34] 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.

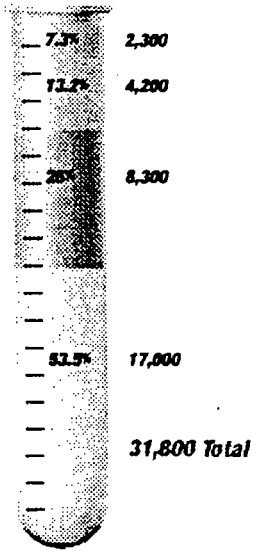
REWARDS PROGRAMS

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.[35]

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.

- 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 competively 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.[38] 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.[39] 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%).[40] 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.[41] 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.[42] 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.[43] 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 PARNERSHIPS

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,[43] 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.[44] 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 21st 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:

- ❑ Develop a common vision, with input from the community, for promoting a high level of student achievement in mathematics and science.
- ❑ Use accurate data to develop policies that will improve mathematics and science teaching.
- ❑ Commit funding to ensure that all mathematics and science teachers have ongoing collaborative opportunities to improve their skills and knowledge.
- ❑ 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.
- ❑ 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).
- ❑ Provide competitive salaries to attract and retain the best-qualified mathematics and science teachers.
- ❑ Establish induction programs to ensure that new mathematics and science teachers receive the support necessary to be effective.
- ❑ Develop mathematics and science teacher leaders who facilitate the continuous learning of their colleagues.
- ❑ Provide administrators and teachers with electronic and other forms of access to an ever-expanding knowledge base about mathematics and science teaching.

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:

- ❑ 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.
- ❑ 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.
- ❑ Ensure that new mathematics and science teachers have frequent interaction with mentor teachers, participate in Inquiry Groups, and have reasonable teaching loads.
- ❑ Should you have no option but to assign an out-of-field teacher, be certain that a mentor and other ongoing support is available.
- ❑ Ensure that opportunities to pursue careers in mathematics and science teaching are emphasized for students in your school.

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:

- ❑ 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.
- ❑ Actively work to improve your knowledge and skills to incorporate educational technology into your learning and teaching.
- ❑ 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.
- ❑ 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.
- ❑ Actively share your knowledge and experience with new teachers.

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 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.
- ❑ Support increased funding for programs that support quality mathematics and science teaching.

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.
- ❑ 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.
- ❑ 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 and enforce high standards for mathematics and science teachers for initial and continuing certification.
- ❑ 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 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:

- ❑ Work closely with area schools to identify existing and future needs for highly qualified K-12 mathematics and science teachers.
- ❑ 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.
- ❑ Collaborate with area school districts to ensure a quality induction process for new mathematics and science teachers.
- ❑ Emphasize recruitment strategies and provide incentives for eligible students to become science and mathematics teachers.
- ❑ Evaluate and track teacher performance following graduation and use this information to improve your mathematics and science teacher preparation programs.

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:

- ❑ 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.
- ❑ "Lend" qualified employees to act as part- or full-time teachers in local schools, without incurring loss of pay or benefits.
- ❑ Actively participate in reward and incentive programs that recognize excellence in mathematics and science teaching in local schools as measured by improved student achievement.
- ❑ Provide support for National Board for Professional Teaching Standards certification.
- ❑ Make regular contributions of time, materials and resources to enhance instruction in mathematics and science education in local schools.

Estimate of Costs in First Year

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

	Action Strategy	Federal	State/Local[1]	Business	Public/Private
Goal 1	Needs Assessment[2,3]	$15,340,000	$7,660,000		
	Summer Institutes[2,5]	$1,214,000,000	$606,060,000		
	Inquiry Groups[2,6]	$1,574,950,000	$786,300,000		
	Leadership Training[4]	$112,000,000			
	Internet Portal	$50,000,000			
	Coordinating Council				$4,000,000
	Rewards Program			$500,000,000	
Goal 2	Scholarships (Exemplary Models)[7]	$18,000,000			
	Loan Forgiveness[8]	$36,000,000			
	Academics/Fellows[9,10]	$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***

[1] There are 56 units nationwide -- states, territories and Washington, D.C.

[2] 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.

[3] First year, one time cost.

[4] First year, one time cost for 15,000 leaders.

[5] One-fifth of the math/science teaching force (340,000 per year)

[6] All K-12 math/science teachers (1.7 million)

[7] Scholarships offered (1,500/year)

[8] Loans offered (6,000/year)

[9] Stipends and operating expenses (3,000 Fellow/year)

[10] Beginning in second year, an additional $30,000,000 needed for induction programs

September 2000

[1]*Report of the National Education Goals Panel*, Washington, D.C.: U.S. Department of Education, 1989.

[2]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.

[3]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.

[4]Kearns and Harvey, *op. cit.*, p. 27.

[5]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.

[6]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.

[7]*The Wall Street Journal*, "Technology Spurs Economic Expansion," January 31, 2000.

[8]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).

[9]*Ibid.*

[10]*Ibid.*

[11]*Workforce Economics*, National Alliance of Business, Occasional Report, Vol. 6, No. 1 (Spring, 2000), pp. 9-11.

[12]*Ibid.*, p. 10.

[13]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.

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

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

[16]Interview with Richard W. Judy, Hudson Institute, Indianapolis, April 19, 2000, as cited in Goldberg and Traiman, *loc. cit.*

[17]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.

[18]National Research Council, *How Young People Learn*, Washington, D.C.. National Academy Press, 1999

[19]Higher Education Research Institute, The American Freshman: National Norms for Fall, 1998, Los Angeles. University of California at Los Angeles, 1999.

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

[21]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.

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

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

[24]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.

[25]Linda Darling-Hammond, "Supply, Demand, and Quality in Mathematics and Science Teaching."

[26]*Ibid.*

[27]*Ibid.*

[28]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 21st 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.

[29]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.

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

[31]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.

[32]*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.

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

[34]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."

[35]National Research Council, *op. cit.*

[34]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.

[37]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 21st 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.

[38]James W. Stigler and James Hiebert, *The Teaching Gap*, New York: The Free Press, 1999, pp. 170-71.

[39]Richard M. Ingersoll, *loc. cit.*, p.5.

[40]*Ibid.*, Figure 4, p.7.

[41]*Ibid.*, Table 1, p.6.

[42]*Ibid.*

[43]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.

[44]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).

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

[46]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.*

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.

A number of individuals provided support to the members and ex officio members of the Commission, attending meetings in their stead when necessary and contributing to the Commission's discussions. Our thanks are due them for helping to keep lines of communication open. They were: V.J. Ajarwal, Arthur Bienenstock, Brian Branton, Laura Chow, Kelley S. Coyner, Kate Dickens, Carlene Ellis, Peter Faletra, Karen Garr, Alice Gill, Ken Griffin, Susan Hattan, Kathy Havens, Jay Labov, Frank Owens, Danica Petroshius, Joan Rothenberg, Richard Stoddard, Lisa Towne, and Judith Sunley. Also deserving thanks is Edward T. Esty and Judy Wurtzel, whose advice and counsel were of great assistance. And, the extra hands offered by Anthony Ashton, Seth Fenton, and Wendy Goldstein were invaluable in expediting the work.

The Commission's deliberations were greatly informed by the wisdom of many experts. These stimulating views were shared with us through commissioned papers and presentations. Commissioned paper authors included Richard Ingersoll; Edward Britton, Senta Raizen, Lynn Paine, and Mary Ann Huntley; Beatriz Chu Clewell and Laurie B. Forcier; as well as Brian Lord and Barbara Miller. Presenters included Dennis Bartels, Barnett Berry, Barbara Blumenthal, Barbara Cervone, Cindy Chapman, Susan Collins, Linda Darling-Hammond, Richard Elmore, William Firestone, Thomas Gillett, Gary Hart, Janice Jackson, Carolyn Kelley, Michael Lach, Donald Langenberg, Michal Lomask, Susan Loucks-Horsley, Iris Metts, Tom Payzant, Susan Sclafani, Nanette Seago, Gail Shroyer, Elliot Solloway, James W. Stigler, Uri Treisman, John Vaille, and Suzanne Wilson.

Finally, our thanks are due to Battelle, the Disney Learning Partnership, and Texas Instruments, who provided considerable support to the Commission's work; to Jennifer House and Lillian Israel of the Association for Computing Machinery for organizing an engaging and informative demonstration of learning technology for us.

September 2000

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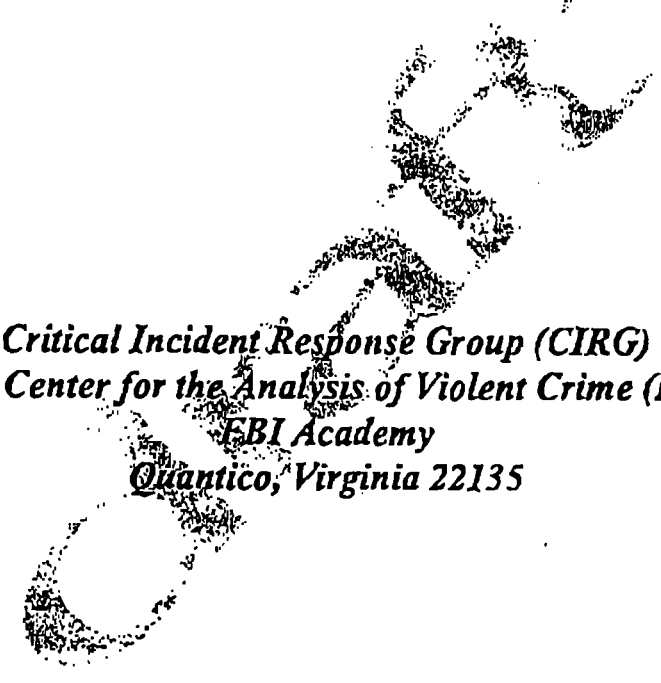

Critical Incident Response Group (CIRG)
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THE SCHOOL SHOOTER: A THREAT ASSESSMENT PERSPECTIVE

July 2000
First Edition

final draft

Mary Ellen O'Toole, PhD
Supervisory Special Agent

TABLE OF CONTENTS

CHAPTER I

INTRODUCTION

Why would a student bring a weapon to school and without any explicable reason open fire on fellow students and teachers? Are school shooters angry? Are they crazy? Is their motive revenge? Hatred for the victims? A hunger for attention?

The origins of human violence are complex. Thinkers, historians, and scientists have explored the issue for centuries, but answers remain elusive. The roots of a violent act are multiple, intricate, and intertwined. The mix of factors varies according to the individual and the circumstances. Understanding violence after it has occurred is difficult enough. Trying to assess a threat and keep it from being carried out is even more of a challenge.

This monograph presents a systematic procedure for threat assessment and intervention. The model is designed to be used by educators, mental health professionals and law enforcement agencies. Obviously, the same events that led the National Center for the Analysis of Violent Crime (NCAVC) to this subject have also led school administrators and law enforcement officials across the country to consider and develop their own policies and procedures for dealing with threats or acts of violence in schools. This model is offered in the hope that it may help refine and strengthen those efforts. Its fundamental building blocks are the threat assessment standards outlined in Chapter II, which provide a framework for evaluating a spoken, written, and symbolic threat, and the four-pronged assessment approach, which will be described in Chapter III and provides a logical, methodical process to examine the threatener and assess the risk that the threat will be carried out.

This model is not a "profile" of the school shooter or a checklist of danger signs pointing to the next adolescent who will bring lethal violence to a school. Those things do not exist. Although the risk of an actual shooting incident in any one school is very low, threats of violence are potentially a problem in any school. Once a threat is made, having a fair, rational, and standardized method of evaluating and responding to threats is critically important.

NCAVC's Study and the Leesburg Symposium

The monograph was developed from the concepts and principles developed by the FBI's NCAVC in nearly 25 years of experience in threat assessment, ideas generated at a 1999 NCAVC symposium on school shootings, and an in-depth review of eighteen school shooting cases.

In May, 1998, the NCAVC initiated a research initiative to study the recent occurrences of school shootings, from a behavioral perspective. The original research was designed to study specific cases of school shootings or foiled attempts in order to develop a better understanding of these events -- the incident itself, and the shooter, his background, the school, and other social dynamics which may have influenced the crime. Eighteen cases were ultimately identified and included in the study. (These cases are not identified in this monograph because of confidentiality issues.)

The shooting at Columbine High School in Littleton, Colorado, in April 1999, shocked the country and gave new urgency to the FBI's research effort. With the support of Attorney General Janet M. Reno and FBI Director Louis J. Freeh, the FBI's NCAVC invited 160 educators, administrators, mental health professionals, law enforcement officers, and prosecutors to a symposium on school shootings and threat assessment. The symposium took place in Leesburg, Virginia, in July 1999. In attendance were teachers and administrators from all eighteen schools involved in the NCAVC study (including someone from each school who knew the shooter or would-be shooter personally), NCAVC staff members, and law enforcement officers who were involved in investigating each of the shootings. Also attending were experts in disciplines including adolescent violence, mental health, suicidology, school dynamics, and family dynamics.

The School Shooter Phenomenon and Threat Assessment

Adolescent violence in general, and homicides in particular, have decreased since 1993, but that hopeful trend has been somewhat obscured in the nationwide wave of concern over school shootings of the type examined in NCAVC's study. This recent form of adolescent violence is in fact quite rare. But the sudden, senseless deaths of teenagers and teachers in the middle of a school day, for no comprehensible reason, is far more shocking and gets far more attention than the less extreme acts of violence that happen in schools every week.

Under the intense spotlight of national media coverage, a tragedy such as the Columbine High School shooting spreads horror, shock, and fear to every corner of the country. Educators, mental health professionals, legislators, law enforcement officers, parents, students, and the rest of the public all share a sense of frustration and helplessness and a compulsion to take some quick action that can prevent similar incidents in the future. Though understandable, this impulse can lead communities to forget the wisdom of H. L. Mencken's aphorism: "For every problem, there is a solution which is simple, neat, and wrong." In a knee-jerk reaction, communities may resort to inflexible, one-size-fits-all policies on preventing or reacting to violence.

One response to the pressure for action may be an effort to identify the next shooter by developing a "profile" of the typical school shooter. This may sound like a reasonable preventive measure, but in practice, trying to draw up a catalogue or "checklist" of warning signs to detect a

potential school shooter can be shortsighted, even dangerous. Such lists, publicized by the media, can end up unfairly labeling many nonviolent students as potentially dangerous or even lethal. In fact, a great many adolescents who will never commit violent acts will show some of the behaviors or personality traits included on the list.

In the wake of a school shooting there is often an outcry for immediate response in the form of more stringent security precautions in schools or stricter laws aimed at school violence. However, these demands have been accompanied by little if any concerted and organized effort to understand the roots of school shooting incidents. How did a particular student come to the point of feeling that shooting fellow students and teachers was in some way an answer to his problems or emotional needs? Were there signs along the way – not a catalogue of traits identifying him as a predicted killer, but clues that could have indicated a need for help? What was the influence of family, friends, and community?

The issue facing educators, law enforcement agencies, and the wider public is not how to predict school violence. Reliably predicting any type of violence is extremely difficult. Predicting that an individual who has never acted out violently in the past will do so in the future is still more difficult. Seeking to predict acts that occur as rarely as school shootings is almost impossible. This is simple statistical logic: when the incidence of any form of violence is very low and a very large number of people have identifiable risk factors, there is no reliable way to pick out from that large group the very few who will actually commit the violent act.

After a violent incident has taken place, retracing an offender's past and identifying clues that in retrospect could have been signs of danger can yield significant, useful information. However, even clues that appear to help interpret past events should not be taken as predictors of similar events in the future. At this time, there is no research that has identified traits and characteristics that can reliably distinguish school shooters from other students. Many students appear to have traits and characteristics similar to those observed in students who were involved in school shootings.

Misinformation About School Shootings

Though school shootings are extensively covered in the news media, the information available in news reports is not necessarily complete, accurate, or balanced. News coverage is inherently hasty and often relies on sources who themselves have incomplete or inaccurate information. And journalists ordinarily do not have access to police and other investigative reports that may contain highly significant but confidential information about a school shooting incident or about the background, previous activities, and traits of the student or students who carried out the shooting.

To the extent that academics, researchers, and other specialists writing in professional publications base their articles on news accounts or other public sources, these too should be

viewed with some reservations since they will also lack critical information available only in confidential school or law enforcement files.

News coverage magnifies a number of widespread but wrong or unverified impressions of school shooters. Among them are:

- School violence is an epidemic.
- All school shooters are alike.
- The school shooter is always a loner.
- School shootings are exclusively revenge motivated.
- Easy access to weapons is THE most significant risk factor.
- Unusual or aberrant behaviors, interests, hobbies, etc., are hallmarks of the student destined to become violent.

School shootings and other forms of school violence are not just a school's problem or a law enforcement problem. They involve schools, families, and the communities. An adolescent comes to school with a collective life experience, both positive and negative, shaped by the environments of family, school, peers, community, and culture. Out of that collective experience come values, prejudices, biases, emotions, and the student's responses to training, stress, and authority. His or her behavior at school is affected by the entire range of experiences and influences. No one factor is decisive. By the same token, however, no one factor is completely without effect, which means that when a student has shown signs of potential violent behavior, schools and other community institutions do have the capacity – and the responsibility – to keep that potential from turning real.*

*The threats which some schools face may not fall within the experience of the NCAVC. For example, some urban schools have experienced threats not like the threats represented in this monograph. Therefore, the applicability of the recommendations made in this monograph may not cover all situations.

CHAPTER II

ASSESSING THREATS

All threats are NOT created equal. However, all threats should be accessed in a timely manner and decisions regarding how they are handled must be done quickly.

In today's climate, some schools tend to adopt a one-size-fits-all approach to any mention of violence. The response to every threat is the same, regardless of its credibility or the likelihood that it will be carried out. In the shock-wave of recent school shootings, this reaction may be understandable, but it is exaggerated -- and perhaps dangerous, leading to potential underestimation of serious threats, overreaction to less serious ones, and unfairly punishing or stigmatizing students who are in fact not dangerous. A school that treats all threats as equal falls into the fallacy formulated by Abraham Maslow: "If the only tool you have is a hammer, you tend to see every problem as a nail." Every problem is not a nail, of course, and schools must recognize that every threat does not represent the same danger or require the same level of response.

Some threats can herald a clear and present danger of a tragedy on the scale of Columbine High School. Others represent little or no real threat to anyone's safety. Neither should be ignored, but reacting to both in the same manner is ineffective and self-defeating. In every school, an established threat assessment procedure managed by properly trained staff can help school administrators and other school staff distinguish between different levels of threats and choose different appropriate responses.

Threat assessment seeks to make an informed judgment on two questions: how credible and serious is the threat itself? And to what extent does the threatener appear to have the resources, intent, and motivation to carry out the threat?

A systematic approach to threat assessment should be part of the nationwide approach advocated by Attorney General Janet Reno and Secretary of Education Richard W. Riley in a 1998 letter to principals and teachers, calling for "an overall effort to make sure that every school in the Nation has a comprehensive violence prevention plan in place." Their letter, which introduced the joint Justice and Education Department publication "Early Warning, Timely Response: A Guide to Safe Schools," added this cautionary advice: "We also caution you to recognize that over labeling and using this guide to stigmatize children in a cursory way that leads to overreaction is harmful."

The NCAVC threat assessment-intervention model presented in this paper can be used by educators, law enforcement officers, mental health professionals, and others involved in school safety. It outlines a methodical procedure for evaluating a threat and the person making the threat, with the aim of reaching an informed judgment on the danger that a violent act will

actually be carried out. To use the model effectively, those making the assessments should have appropriate training.

What is a Threat?

A threat is an expression of intent to do harm or act out violently against someone or something. A threat can be spoken, written, or symbolic -- for example, motioning with one's hands as though shooting at another person.

Threat assessment rests on two critical principles: first, that all threats and all threateners are not equal; second, that most threateners are unlikely to carry out their threat. However, all threats must be taken seriously and evaluated.

In NCAVC's experience, most threats are made anonymously or under a false name. Because threat assessment relies heavily on evaluating the threatener's background, personality, lifestyle, and resources, identifying the threatener is necessary for an informed assessment to be made -- and also so criminal charges can be brought if the threat is serious enough to warrant prosecution. If the threatener's identity cannot be determined, the response will have to be based on an assessment of the threat alone. That assessment may change if the threatener is eventually identified: a threat that was considered low risk may be rated as more serious if new information suggests the threatener is dangerous, or conversely, an assessment of high risk may be scaled down if the threatener is identified and found not to have the intent, ability, means, or motive to carry out the threat.

Motivation

Threats are made for a variety of reasons. A threat may be a warning signal, a reaction to fear of punishment or some other anxiety, or a demand for attention. It may be intended to taunt; to intimidate; to assert power or control; to punish; to manipulate or coerce; to frighten; to terrorize; to compel someone to do something; to strike back for an injury, injustice or slight; to disrupt someone's or some institution's life; to test authority, or to protect oneself. The emotions that underlie a threat can be love; hate; fear; rage; or desire for attention, revenge, excitement, or recognition.

Motivation can never be known with complete certainty, but to the extent possible, understanding motive is a key element in evaluating a threat. A threat will reflect the threatener's mental and emotional state at the time the threat was made, but it is important to remember that a state of mind can be temporarily but strongly influenced by alcohol or drugs, or a precipitating incident such as a romantic breakup, failing grades, or conflict with a parent. After a person has absorbed an emotional setback and calmed down, or when the effects of alcohol or drugs have

worn off, his motivation to act on a violent threat may also have diminished.

Signposts

In general, people do not switch instantly from nonviolence to violence. Nonviolent people do not "snap" or decide on the spur of the moment to meet a problem by using violence. Instead, the path toward violence is an evolutionary one, with signposts along the way. A threat is one observable behavior; others may be brooding about frustration or disappointment, fantasies of destruction or revenge, in conversations, writings, drawings, and other actions.

Types of Threats

Threats can be classed in four categories: *direct, indirect, veiled,* or *conditional.*

A direct threat identifies a specific act against a specific target and is delivered in a straightforward, clear, and explicit manner: "I am going to place a bomb in the school's gym."

An indirect threat tend to be vague, unclear, and ambiguous. The plan, the intended victim, the motivation, and other aspects of the threat are masked or equivocal: "If I wanted to, I could kill everyone at this school!" While violence is implied, the threat is phrased tentatively -- "If I wanted to" -- and suggests that a violent act COULD occur, not that it WILL occur.

A veiled threat is one that strongly implies but does not explicitly threaten violence. "We would be better off without you around anymore" clearly hints at a possible violent act, but leaves it to the potential victim to interpret the message and give a definite meaning to the threat.

A conditional threat is the type of threat often seen in extortion cases. It warns that a violent act will happen unless certain demands or terms are met: "If you don't pay me one million dollars, I will place a bomb in the school."

Factors in Threat Assessment

Specific, plausible details are a critical factor in evaluating a threat. Details can include the identity of the victim or victims; the reason for making the threat; the means, weapon, and method by which it is to be carried out; the date, time, and place where the threatened act will occur; and concrete information about plans or preparations that have already been made.

Specific details can indicate that substantial thought, planning, and preparatory steps have already been taken, suggesting a higher risk that the threatener will follow through on his threat.

Similarly, a lack of detail suggests the threatener may not have thought through all of the contingencies, has not actually taken steps to carry out the threat, and may not seriously intend violence but is "blowing off steam" over some frustration or seeking to frighten or intimidate a particular victim or disrupt a school's events or routine.

Details that are specific but not logical or plausible may indicate a less serious threat. For example, a high school student writes that he intends to detonate hundreds of pounds of plutonium in the school's auditorium the following day at lunch time. The threat is detailed, stating a specific time, place, and weapon. But the details are unpersuasive. Plutonium is almost impossible to obtain, legally or on the black market. It is expensive, hard to transport, and very dangerous to handle, and a complex high explosive detonation is required to set off a nuclear reaction. No high school student is likely to have any plutonium at all, much less hundreds of pounds, nor would he have the knowledge or complex equipment to detonate it. A threat this unrealistic is obviously unlikely to be carried out.

The emotional content of a threat can be an important clue to the threatener's mental state. Emotions are conveyed by melodramatic words and unusual punctuation -- "I hate you!!!!!" "You have ruined my life!!!!" "May God have mercy on your soul!!!!" -- or in excited, incoherent passages that may refer to God or other religious beings or deliver an ultimatum.

Though emotionally charged threats can tell the assessor something about the temperament of the threatener, they are not a measure of danger. They may sound frightening, but no correlation has been established between the emotional intensity in a threat and the risk that it will be carried out.

Precipitating stressors are incidents, circumstances, reactions, or situations which can trigger a threat. The precipitating event may seem insignificant and have no direct relevance to the threat, but nonetheless becomes a catalyst. For example, a student has a fight with his mother before going to school. The argument may have been a minor one over an issue that had nothing to do with school, but it sets off an emotional chain reaction leading the student to threaten another student at school that day -- possibly something he has thought about in the past.

The impact of a precipitating event will obviously depend on "pre-disposing factors": underlying personality traits, characteristics, and temperament that predispose an adolescent to fantasize about violence or act violently. Accordingly, information about a temporary "trigger" must be considered together with broader information about these underlying factors, such as a student's vulnerability to loss and depression.

Levels of Risk

Low Level of Threat: A threat which poses a minimal risk to the victim and public safety.

★ Threat is vague and indirect.

★ Information contained within the threat is inconsistent, implausible or lacks detail.
★ Threat lacks realism.
★ Content of the threat suggests person is unlikely to carry it out.

Medium Level of Threat: A threat which could be carried out, although it may not appear entirely realistic.

★ Threat is more direct and more concrete than a low level threat.
★ Wording in the threat suggests that the threatener has given some thought to how the act will be carried out.
★ There may be a general indication of a possible place and time (though these signs still fall well short of a detailed plan).
★ There is no strong indication that the threatener has taken preparatory steps, although there may be some veiled reference or ambiguous or inconclusive evidence pointing to that possibility -- an allusion to a book or movie that shows the planning of a violent act, or a vague, general statement about the availability of weapons.
★ There may be a specific statement seeking to convey that the threat is not empty: "I'm serious!" or "I really mean this!"

High Level of Threat: A threat that appears to pose an imminent and serious danger to the safety of others.

★ Threat is direct, specific and plausible.
★ Threat suggests concrete steps have been taken toward carrying it out, for example, statements indicating that the threatener has acquired or practiced with a weapon or has had the victim under surveillance.

Example: ***"At eight o'clock tomorrow morning, I intend to shoot the principal. That's when he is in the office by himself. I have a 9mm. Believe me, I know what I am doing. I am sick and tired of the way he runs this school."*** This threat is direct, specific as to the victim, motivation, weapon, place, and time, and indicates that the threatener knows his target's schedule and has made preparations to act on the threat.

NCAVC's experience in analyzing a wide range of threatening communications suggests that in general, the more direct and detailed a threat is, the more serious the risk of its being acted on. A threat that is assessed as high level will almost always require immediate law enforcement intervention.

In some cases, the distinction between the levels of threat may not be as obvious, and there will be overlap between the categories. Generally, obtaining additional information about, either the threat or the threatener will help in clarifying any confusion. What is important is that schools be able to recognize and act on the most serious threats, and then address all other threats appropriately and in a standardized and timely fashion.

CHAPTER III

FOUR-PRONGED ASSESSMENT APPROACH

The Four-Pronged Assessment Model

This model is designed to assess someone who has made a threat and evaluate the likelihood that the threat will actually be carried out. Anyone can deliver a spoken or written message that sounds foreboding or sinister, but evaluating the threat alone will not establish if the person making it has the intention, the ability, or the means to act on the threat. To make that determination, assessing the threatener is critical.

Educators, law enforcement, mental health professionals and others must realize they cannot handle threats in the same "old" way. Those tasked with assessing threats must be trained in the basic concepts of threat assessment, personality assessment and risk assessment as presented in this monograph, and realize the importance of assessing all threats in a timely manner.

What information about students can help us tell which threateners are likely to carry out their threats? Their age? Their grades in chemistry class? Their socioeconomic level? The experience of the NCAVC is that frequently, only limited information is known about someone being evaluated for threat assessment, or information may be available only in certain areas -- a student's academic record, or family life, or health. All aspects of a threatener's life must be considered when evaluating whether a threat is likely to be carried out. This model provides a framework for evaluating a student in order to determine if he or she has the motivation, means, and intent to carry out a proclaimed threat. The assessment is based on the "totality of the circumstances" known about the student in four major areas: (One of the most important recommendations of this monograph is that additional empirical research be conducted in the area of threat assessment and school violence. Following this additional research, it may be determined that one or more of the four prongs plays a more significant role than the others in threat assessment.)

Prong One: **Personality of the student**

Prong Two: **Family dynamics**

Prong Three: **School dynamics and the student's role in those dynamics**

Prong Four: **Social dynamics**

Here is how the Four-Pronged Assessment Model can be used when a threat is received at

a school: A preliminary assessment is done on the threat itself, as outlined in the preceding chapter. If the threatener's identity is known, a threat assessor quickly collects as much information as is available in the four categories. The assessor may be a school psychologist, counselor, or other staff member or specialist who has been designated and trained for this task. Information can come from the assessor's personal knowledge of the student or can be sought from teachers, staff, other students (when appropriate), parents, and other appropriate sources such as law enforcement agencies or mental health specialists.

If the student appears to have serious problems in the majority of the four prongs or areas and if the threat is assessed as high or medium level, the threat should be taken more seriously and appropriate intervention by school authorities and/or law enforcement should be initiated as quickly as possible.

In order to effect a rapid assessment, it may not be possible to evaluate a student thoroughly in each of the four prongs. Nonetheless, having as much information as possible about a student and his or her life is important in order to determine if that student is capable and under enough stressors to carry out a threat.

The following section outlines factors to be considered in each of the four prongs:

Personality of the Student: Behavior Characteristics and Traits

According to Webster's, personality is "the pattern of collective character, behavioral, temperamental, emotional, and mental traits of an individual." This pattern is a product of both inherited temperament and environmental influences. Personality shapes how people consistently view the world and themselves and how they interact with others. Forming an accurate impression of someone's personality requires observing his or her behavior over a period of time and in a wide variety of situations.

Understanding adolescent personality development is extremely important in assessing any threat made by someone in that age group. An adolescent's personality is not yet crystallized. It is still developing. During adolescence, young people are likely to explore or engage in what others perceive as strange behavior. Adolescents struggle with vulnerability and acceptance ("am I lovable and able to love?"), with questions of independence and dependence, and with how to deal with authority, among other difficult issues.[1]

[1]The 1999 Institutes of Medicine's (IOM) Report on Adolescents, published by the National Science Foundation, states that adolescence is frequently divided into three stages: early (ages 10-14) involving biological puberty, sexual and psychological awakening and self-awareness; middle (ages 15-17) a time of increased autonomy and experimentation and late (ages 18 to early 20's) for those who delay entry into adult independence and autonomy. Each stage produces opportunities, challenges and risks. For example, most (60 percent +) experiment with alcohol and drugs before age 15.

Clues to a student's personality can come from observing behavior when the student is:

- Coping with conflicts, disappointments, failures, insults, or other stresses encountered in everyday life.

- Expressing anger or rage, frustration, disappointment, humiliation, sadness, or similar feelings.

- Demonstrating or failing to demonstrate resiliency after a setback, a failure, real or perceived criticism, disappointment, or other negative experiences.

- Demonstrating how the student feels about himself, what kind of person the student imagines himself or herself to be, and how the student believes he or she appears to others.

- Responding to rules, instruction, or authority figures.

- Demonstrating and expressing a desire or need for control, attention, respect, admiration, confrontation, or other needs.

- Demonstrating or failing to demonstrate empathy with the feelings and experiences of others.

- Demonstrating his or her attitude toward others. (For example, does the student view others as inferior or with disrespect?)

Assessors who have not been able to observe a student first-hand should seek information from those who knew the student before he or she made a threat.

Teasing and physical fighting is more frequent at ages 13-14 than at age 16-17. Violent criminal activity generally peaks between the ages of 15-17. About 25 percent of the adolescent population is at high risk for psycho-social problems and poor developmental outcomes such as academic failure, alcohol and other drug abuse, delinquency and problems with the law and violence. Twenty percent have a diagnosable mental health disorder at sometime during adolescence, the highest rate for any age group through the life-span. Adolescents are more diverse and heterogeneous than originally believed. Important interaction between hormonal, social, and environmental factors shape development and behavior during this period. The IOM reports that the social context in which the adolescent is developing has markedly changed during the past decade - with an increase in many negative factors, including less adult supervision. Adolescence now begins earlier - as early as age nine - and is second only to infancy in growth and change. Their social cognition is different from adults and strongly influences the adolescents' decision-making. They experience emotions more intensely than adults, process information differently, and as a result make decisions differently. These factors are critical for evaluators to be skilled in recognizing the information gathered and observations of youth. It is important to observe and gather information in order to understand the context of adolescent development (K. Dwyer, personal communication, February 2000).

Family Dynamics

Family dynamics are patterns of behavior, thinking, beliefs, traditions, roles, customs and values that exist in a family. When a student has made a threat, knowledge of the dynamics within the student's family -- and how those dynamics are perceived by both the student and the parents – is a key factor in understanding circumstances and stresses in the student's life that could play a role in any decision to carry out the threat.

School Dynamics

School dynamics are patterns of behavior, thinking, beliefs, customs, traditions, roles and values that exist in a school's culture. Some of these patterns can be obvious, and others subtle. Identifying those behaviors which are formally or informally valued and rewarded in a school helps explain why some students get more approval and attention from school authorities and have more prestige among their fellow students. It can also explain the "role" a particular student is given by the school's culture, and how the student may see himself or herself fitting in, or failing to fit in, with the school's value system.

Students and staff may have very different perceptions of the culture, customs, and values in their school. Assessors need to be aware of how a school's dynamics are seen by students. A big discrepancy between students' perceptions and the administration's can itself be a significant piece of information for the assessor.

The relationship between school dynamics and threat assessment has not been empirically established and therefore its level of significance can either increase or decrease depending on additional research into these cases. ***However, assessors need to have some level of understanding of the particular dynamics in their school because the school can ultimately become the scene of the crime.***

Social Dynamics

Social dynamics are patterns of behavior, thinking, beliefs, customs, traditions, and roles that exist in the larger community where students live. These patterns also have an impact on students' behavior, their feelings about themselves, their outlook on life, attitudes, perceived options, and lifestyle practices. An adolescent's beliefs and opinions, his choices of friends, activities, entertainment, and reading material, and his attitudes toward such things as drugs, alcohol, and weapons will all reflect in some fashion the social dynamics of the community where he lives and goes to school.

Within the larger community, an adolescent's peer group plays an especially crucial role in influencing attitudes and behavior. Information about a student's choice of friends and relations with his peers can provide valuable clues to his attitudes, sense of identity, and possible decisions about acting or not acting on a threat.

CHAPTER IV

FINDINGS

This chapter lists certain types of behavior, personality traits, and circumstances in the family, school, and community environment that should be regarded as warning signs if all or most of them – in all four categories – seem to fit a student who has made a threat.

It should be strongly emphasized that this list is not intended as a checklist to predict future violent behavior by a student who has not acted violently or threatened violence. ***Rather, the list should be considered after a student has made some type of threat and an assessment has been developed using the four-pronged model.*** **If the assessment shows evidence of these characteristics, behaviors and consistent problems in all four areas or prongs, it can indicate that the student may be fantasizing about acting on the threat, has the motivation to carry out the violent act, or has actually taken steps to carry out a threat.**

The following cautions should also be emphasized:

1. *No one or two traits or characteristics should be considered in isolation or given more weight than the others.* Any of these traits, or several, can be seen in students who are not contemplating a school shooting or other act of violence. The key to identifying a potentially dangerous threatener under this four-pronged assessment model is that there is evidence of problems on nearly every item in each of the four areas. → but how many traits 1 - 15 - ?

2. *Behavior is an expression of personality, but one bad day may not reflect a student's real personality or usual behavior pattern.* Accurately evaluating someone's behavior requires establishing a baseline -- how he or she typically behaves most of the time. Those responsible for assessing a student should seek information from people who have known the student over a period of time and have been able to observe him in varying situations and with a variety of people.

3. *Many of the behaviors and traits listed below are seen in depressed adolescents with narcissistic personality characteristics and other possible mental health problems. Despite the overlap between this list and diagnostic symptoms, evaluation under the four-pronged threat assessment model cannot be a substitute for a clinical diagnosis of mental illness.* Signs of serious mental illness and/or substance abuse disorders can significantly elevate the risk for violence and should be evaluated by a mental health professional.

The following list of behaviors and traits, grouped in the four areas of the assessment model, was developed from three sources: NCAVC's extensive experience in assessing threats, including current cases of threats made in schools; ideas presented at the 1999 Leesburg

symposium; and NCAVC's intensive review of eighteen school shooting cases.

Subject to the cautionary points mentioned above, the list identifies particular behaviors, personality traits and family, school and social dynamics that may be associated with violence.

Prong One: Personality Traits and Behavior

- ***Leakage***

"Leakage" occurs when a student intentionally or unintentionally reveals clues to feelings, thoughts, fantasies, attitudes, or intentions that may signal an impending violent act. These clues can take the form of subtle threats, boasts, innuendos, predictions, or ultimatums. They may be spoken or conveyed in stories, diary entries, essays, poems, letters, songs, drawings, doodles, tattoos, or videos.

Another form of leakage involves efforts to get unwitting friends or classmates to help with preparations for a violent act, at times through deception (for example, the student asks a friend to obtain ammunition for him because he is going hunting).

Leakage can be a cry for help, a sign of inner conflict, or boasts that may look empty but actually express a serious threat. Leakage is considered to be one of the most important clues that may precede an adolescent's violent act.

An example of leakage could be a student who shows a recurring preoccupation with themes of violence, hopelessness, despair, hatred, isolation, loneliness, nihilism, or an "end-of-the-world" philosophy. Those themes may be expressed in conversation or in jokes or in seemingly offhand comments to friends, teachers, other school employees, parents, or siblings. Statements may be subtle, or immediately minimized by comments such as, "I was just joking," or "I didn't really mean that."

Another example of leakage could be recurrent themes of destruction or violence appearing in a student's writing or artwork. The themes may involve hatred, prejudice, death, dismemberment, mutilation of self or others, bleeding, use of excessively destructive weapons, homicide, or suicide. Many adolescents are fascinated with violence and the macabre, and writings and drawings on these themes can be a reflection of a harmless but rich and creative fantasy life. Some adolescents, however, seem so obsessed with these themes that they emerge no matter what the subject matter, the conversation, the assignment, or the joke. In an actual case, a student was taking a home economics class and was assigned to bake something. He baked a cake in the shape of a gun. His school writings and other work also contained recurrent

themes of violence.

■ ***Low Tolerance for Frustration***

The student is easily bruised, insulted, angered, and hurt by real or perceived injustices done to him by others and has great difficulty tolerating frustration.

■ ***Poor Coping Skills***

The student consistently shows little if any ability to deal with frustration, criticism, disappointment, failure, rejection, or humiliation. His or her response is typically inappropriate, exaggerated, immature, or disproportionate.

■ ***Lack of Resiliency***

The student lacks resiliency and is unable to bounce back even when some time has elapsed since a frustrating or disappointing experience, a setback, or putdown.

■ ***Failed Love Relationship***

The student may feel rejected or humiliated after the end of a love relationship, and cannot accept or come to terms with the rejection.

■ ***"Injustice Collector"***

The student nurses resentment over real or perceived injustices. No matter how much time has passed, the "injustice collector" will not forget or forgive those wrongs or the people he or she believes are responsible. The student may keep a hit list with the names of people he feels have wronged him.

■ ***Signs of Depression***

The student shows features of depression such as lethargy, physical fatigue, a morose or dark outlook on life, a sense of malaise, and loss of interest in activities that he once enjoyed.

Adolescents may show different signs than those normally associated with depression. Some depressed adolescents may display unpredictable and uncontrolled outbursts of anger, a generalized and excessive hatred toward everyone else, and feelings of hopelessness about the future. Other behaviors might include psychomotor agitation, restlessness, inattention, sleep and eating disorders, and a markedly diminished interest in almost all activities that previously occupied and interested him. The student may have difficulty articulating these extreme feelings.

■ ***Narcissism***

The student is self-centered, lacks insight into others' needs and/or feelings, and blames others for failures and disappointments. The narcissistic student may embrace the role of a victim to elicit sympathy and to feel temporarily superior to others. He or she displays signs of paranoia, and assumes an attitude of self-importance or grandiosity that masks feelings of unworthiness (Malmquist, 1996). A narcissistic student may be either very thin-skinned or very thick-skinned in responding to criticism.

■ ***Alienation***

The student consistently behaves as though he feels different or estranged from others. This sense of separateness is more than just being a loner. It can involve feelings of isolation, sadness, loneliness, not belonging, and not fitting in.

■ ***Dehumanizes Others***

The student consistently fails to see others as fellow humans. He characteristically views other people as "nonpersons" or objects to be thwarted. This attitude may appear in the student's writings and artwork, in interactions with others, or in comments during conversation.

■ ***Lack of Empathy***

The student shows an inability to understand the feelings of others, and appears unconcerned about anyone else's feelings. When others show emotion, the student may ridicule them as weak or stupid.

■ ***Exaggerated Sense of Entitlement***

The student constantly expects special treatment and consideration, and reacts negatively if he doesn't get the treatment he feels entitled to.

■ ***Attitude of Superiority***

The student has a sense of being superior and presents himself as smarter, more creative, more talented, more experienced, and more worldly than others.

■ ***Exaggerated or Pathological Need for Attention***

The student shows an exaggerated, even pathological, need for attention, whether positive or negative, no matter what the circumstances.

■ ***Externalizes Blame***

The student consistently refuses to take responsibility for his or her own actions and typically faults other people, events or situations for any failings or shortcomings. In placing blame, the student frequently seems impervious to rational argument and common sense.

■ ***Masks Low Self-esteem***

Though he may display an arrogant, self-glorifying attitude, the student's conduct often appears to veil an underlying low self-esteem. He avoids high visibility or involvement in school activities, and other students may consider him a nonentity.

■ ***Anger Management Problems***

Rather than expressing anger in appropriate ways and in appropriate circumstances, the student consistently tends to burst out in temper tantrums or melodramatic displays, or to brood in sulky, seething silence. The anger may be noticeably out of proportion to the cause, or may be redirected toward people who had nothing to do with the original incident.

His anger may come in unpredictable and uncontrollable outbursts, and may be accompanied by expressions of unfounded prejudice, dislike, or even hatred toward individuals or groups.

■ ***Intolerance***

The student often expresses racial or religious prejudice or intolerant attitudes toward minorities, or displays slogans or symbols of intolerance in tattoos, jewelry, clothing, bumper stickers, or book covers.

■ ***Inappropriate Humor***

The student's humor is consistently inappropriate. Jokes or humorous comments tend to be macabre, insulting, belittling, or mean.

■ ***Seeks to Manipulate Others***

The student consistently attempts to con and manipulate others and win their trust so they will rationalize any signs of aberrant or threatening behavior.

■ ***Lack of Trust***

The student is untrusting and chronically suspicious of others' motives and intentions. This lack of trust may approach a clinically paranoid state. He may express the belief that society has no trustworthy institution or mechanism for achieving justice or resolving conflict, and that if

something bothers him, he has to settle it in his own way.

- ***Closed Social Group***

The student appears introverted, with acquaintances rather than friends, or associates only with a single small group that seems to exclude everyone else. Students who threaten or carry out violent acts are not necessarily loners in the classic sense, and the composition and qualities of peer groups can be important pieces of information in assessing the danger that a threat will be acted on.

- ***Change of Behavior***

The student's behavior changes dramatically. His academic performance may decline, or he may show a reckless disregard for school rules, schedules, dress codes, and other regulations.

- ***Rigid and Opinionated***

The student appears rigid, judgmental and cynical, and voices strong opinions on subjects about which he or she has little knowledge. He disregards facts, logic, and reasoning that might challenge these opinions.

- ***Unusual Interest in Sensational Violence***

The student demonstrates an unusual interest in school shootings and other heavily publicized acts of violence. He may declare his admiration for those who committed the acts, or may criticize them for "incompetence" or failing to kill enough people. He may explicitly express a desire to carry out a similar act in his own school, possibly as an act of "justice."

- ***Fascination with Violence-Filled Entertainment***

The student demonstrates an unusual fascination with movies, TV shows, computer games, music videos or printed material that focus intensively on themes of violence, hatred, control, power, death, and destruction. He may incessantly watch one movie or read and reread one book with violent content, perhaps involving school violence. Themes of hatred, violence, weapons, and mass destruction recur in virtually all his activities, hobbies, and pastimes.

The student spends inordinate amounts of time playing video games with violent themes, and seems more interested in the violent images than in the game itself.

On the Internet, the student regularly searches for web sites involving violence, weapons, and other disturbing subjects. There is evidence the student has downloaded and kept material from these sites.

■ ***Negative Role Models***

The student may be drawn to negative, inappropriate role models such as Hitler, Satan, or others associated with violence and destruction.

■ ***Behavior Appears Relevant to Carrying Out a Threat***

The student appears to be increasingly occupied in activities that could be related to carrying out a threat – for example, spending unusual amounts of time practicing with firearms or on various violent websites. The time spent in these activities has noticeably begun to exclude normal everyday pursuits such as homework, attending classes, going to work, and spending time with friends.

Prong Two: Family Dynamics

■ ***Turbulent Parent-Child Relationship***

The student's relationship with his parents is particularly difficult or turbulent. This difficulty or turbulence can be uniquely evident following a variety of factors, including recent or multiple moves, loss of a parent, addition of a step parent, etc. He expresses contempt for his parents and dismisses or rejects their role in his life. There is evidence of violence occurring within the student's home.

■ ***Acceptance of Pathological Behavior***

Parents do not react to behavior that most parents would find very disturbing or abnormal. They appear unable to recognize or acknowledge problems in their children and respond quite defensively to any real or perceived criticism of their child. If contacted by school officials or staff about the child's troubling behavior, the parents appear unconcerned, minimize the problem, or reject the reports altogether even if the child's misconduct is obvious and significant.

■ ***Access to Weapons***

The family keeps guns or other weapons or explosive materials in the home, accessible to the student. More important, weapons are treated carelessly, without normal safety precautions; for example, guns are not locked away and are left loaded. Parents or a significant role model may handle weapons casually or recklessly and in doing so may convey to children that a weapon can be a useful and normal means of intimidating someone else or settling a dispute.

■ ***Lack of Intimacy***

The family appears to lack intimacy and closeness. The family has moved frequently and/or recently.

■ ***Student "Rules the Roost"***

The parents set few or no limits on the child's conduct, and regularly give in to his demands. The student insists on an inordinate degree of privacy, and parents have little information about his activities, school life, friends, or other relationships.

The parents seem intimidated by their child. They may fear he will attack them physically if they confront or frustrate him, or they may be unwilling to face an emotional outburst, or they may be afraid that upsetting the child will spark an emotional crisis. Traditional family roles are reversed: for example, the child acts as if he were the authority figure, while parents act as if they were the children.

■ ***No Limits or Monitoring of TV and Internet***

Parents do not supervise, limit or monitor the student's television watching or his use of the Internet. The student may have a TV in his own room or is otherwise free without any limits to spend as much time as he likes watching violent or otherwise inappropriate shows. The student spends a great deal of time watching television rather than in activities with family or friends.

Similarly, parents do not monitor computer use or Internet access. The student may know much more about computers than the parents do, and the computer may be considered off limits to the parents while the student is secretive about his computer use, which may involve violent games or Internet research on violence, weapons, or other disturbing subjects.

Prong Three: School Dynamics

What does this mean.

■ ***Student's Attachment to School***

Student appears to be "detached" from school, including other students, teachers, and school activities.

■ ***Tolerance for Disrespectful Behavior***

The school does little to prevent or punish disrespectful behavior between individual students or groups of students. Bullying is part of the school culture and school authorities seem oblivious to it, seldom or never intervening or doing so only selectively. Students frequently act

in the roles of bully, victim, or bystander (sometimes, the same student plays different roles in different circumstances). The school atmosphere promotes racial or class divisions or allows them to remain unchallenged.

■ ***Inequitable Discipline***

The use of discipline is inequitably applied - or has the perception of being inequitably applied by students and/or staff.

■ ***Inflexible Culture***

The school's culture -- official and unofficial patterns of behavior, values, and relationships among students, teachers, staff, and administrators -- is static, unyielding, and insensitive to changes in society and the changing needs of newer students and staff.

■ ***Pecking Order Among Students***

Certain groups of students are officially or unofficially given more prestige and respect than others. Both school officials and the student body treat those in the high-prestige groups as though they are more important or more valuable to the school than other students.

■ ***Code of Silence***

A "code of silence" prevails among students. Few feel they can safely tell teachers or administrators if they are concerned about another student's behavior or attitudes. Little trust exists between students and staff.

■ ***Unsupervised Computer Access***

Access to computers and the Internet is unsupervised and unmonitored. Students are able to use the school's computers to play violent computer games or to explore inappropriate web sites such as those that promote violent hate groups or give instructions for bomb-making.

Schools should maintain documentation of all prior incidents or problems involving students so it can be considered in future threat assessments.

Prong Four: Social Dynamics

■ ***Media, Entertainment, Technology***

The student has easy and unmonitored access to movies, television shows, computer games, and Internet sites with themes and images of extreme violence.

■ ***Peer Groups***

The student is intensely and exclusively involved with a group who share a fascination with violence or extremist beliefs. The group excludes others who do not share its interests or ideas. As a result, the student spends little or no time with anyone who thinks differently and is shielded from the "reality check" that might come from hearing other views or perceptions.

■ ***The Copycat Effect***

School shootings and other violent incidents that receive intense media attention can generate threats or copycat violence elsewhere. Copycat behavior is very common, in fact. Anecdotal evidence strongly indicates that threats increase in schools nationwide after a shooting has occurred anywhere in the United States. Students, teachers, school administrators and law enforcement officials should be more vigilant in noting disturbing student behavior in the days and weeks or even several months following a heavily publicized incident elsewhere in the country.

CHAPTER V

THE INTERVENTION PROCESS

A school cannot ignore any threat of violence. Plausible or not, every threat must be taken seriously, investigated, and responded to. A clear, vigorous response is essential for three reasons: first and most important, to make sure that students, teachers, and staff *are* safe (that is, that a threat will not be carried out); second, to assure that they will *feel* safe; and third, to assure that the person making the threat will be supervised and given the treatment that is appropriate and necessary to avoid future danger to others or himself.

It is not the purpose of this paper to recommend any specific forms of intervention for a particular student or type of threat. School disciplinary policies and appropriate treatment approaches should be determined by school administrators and counseling staff, mental health professionals, and other specialists. Rather, the following discussion focuses on two specific issues: (1) the need for schools to adopt a well thought-out system for responding to threats, and (2) guidelines for the role of law enforcement agencies in the threat-response process.

Threat Management In Schools

A clear, consistent, rational, and well-structured system for dealing with threats is vitally important in a school. If students or staff feel that threats are not addressed quickly and sensibly, or if school administrators appear overwhelmed and uncertain at every threat, confidence in the school's ability to maintain a safe environment will be seriously undermined. This in turn can seriously disrupt the school's educational program.

An effective threat management system will include a standardized method for evaluating threats, and consistent policies for responding to them. A standardized approach will help schools construct a data base, with information on the types and frequency of threats, which may help evaluate the effectiveness of school policies. Consistency in threat response can deter future threats if students perceive that any threat will be reported, investigated, and dealt with firmly.

Here are some guidelines for establishing and implementing a threat management system:

Inform students and parents of school policies: A school should publicize its threat response and intervention program at the beginning of every school year (or to new students when they transfer into the school). The school should clearly explain what is expected of students -- for example, students who know about a threat are expected to inform school authorities. The school should also make clear to parents that if their child makes a threat of any kind, they will be contacted and will be expected to provide information to help evaluate the

threat.

Designate a threat assessment coordinator: One person in a school – or perhaps several in a large school – should be assigned to oversee and coordinate the school's response to all threats. The designated coordinator may be the principal, another administrator, a school psychologist, resource officer, or any other staff member. The school should find appropriate threat assessment training programs for whoever is designated.

When any threat is made, whoever receives it or first becomes aware of it should refer it immediately to the designated coordinator, and school policy should explicitly give the coordinator the necessary authority to make or assist in making quick decisions on how to respond – including implementing the school's emergency response plan, if the threat warrants.

The coordinator's specific responsibilities will be determined in each school, in accord with the professional judgment of the principal and administrative staff. They could include: arranging for an initial assessment when a threat is received to determine the level of threat; conducting or overseeing an evaluation after the threatener is identified, using the Four-Pronged Assessment Model; developing and refining the threat management system; monitoring intervention in previous cases; establishing liaison with other school staff and outside experts; and maintaining consistency and continuity in the school's threat response procedures.

Consider forming a Multidisciplinary Team: As well as appointing a threat assessment coordinator, schools may decide to establish a multi disciplinary team as another component of the threat assessment system. Schools may draw team members from school staff and other professionals. The team would constitute an experienced, knowledgeable group that could review threats, consult with outside experts, and provide recommendations and advice to the coordinator and to the school administration. ***It is strongly recommended that a law enforcement representative should either be included as a member of the team or regularly consulted as a resource person.*** Making threats can be a criminal offense, depending on the threat and the laws of each state. Although most school threats may not lead to prosecution, school officials need informed, professional advice on when a criminal violation has occurred and what actions may be required by state or local laws.

It is especially important that a school not deal with threats by simply kicking the problem out the door. Expelling or suspending a student for making a threat must not be a substitute for careful threat assessment and a considered, consistent policy of intervention. Disciplinary action alone, unaccompanied by any effort to evaluate the threat or the student's intent, may actually exacerbate the danger – for example, if a student feels unfairly or arbitrarily treated and becomes even angrier and more bent on carrying out a violent act.

The role of law enforcement: *In the vast majority of cases, the decision on whether to involve law enforcement will hinge on the seriousness of the threat: low, medium, or high, under the criteria outlined earlier in this paper.*

Low Level: A threat that has been evaluated as low level poses little threat to public safety and in most cases would not necessitate law enforcement investigation for a possible criminal offense. (However, law enforcement agencies may be asked for information in connection with a threat of any level.)

Appropriate intervention in a low level case would involve, at a minimum, interviews with the student and his or her parents. If the threat was aimed at a specific person, that person should also be asked about his or her relationship with the threatener and the circumstances that led up to the threat. The response -- disciplinary action and any decision to refer a student for counseling or other form of intervention – should be determined according to school policies and the judgment of the responsible school administrators.

Medium Level: When a threat is rated as medium level, the response should in most cases include contacting law enforcement agencies, as well as other sources, to obtain additional information (and possibly reclassify the threat into the high or low category).

A medium-level threat will sometimes, though not necessarily, warrant investigation as a possible criminal offense.

High Level: Almost always, if a threat is evaluated as high level, the school should immediately inform the appropriate law enforcement agency. A response plan, which should have been designed ahead of time and rehearsed by both school and law enforcement personnel, should be implemented, and law enforcement should be informed and involved in whatever subsequent actions are taken in response to threat.

A high-level threat is highly likely to result in criminal prosecution.

Examples of Threats

Example #1: Low-Level Threat: *Student John Jones sends another student an e-mail message saying: "You are a dead man."*

Step One -- Referral

The parents and student who received the message bring the message to the attention of the school's Threat Assessment Coordinator the following morning.

Step Two -- Threat Assessment - Based on the following reasons the e-mail threat is assessed as a low level of threat

(1) Threat is vague and indirect: "You are a dead man."

(2) Threat lacks detail. There is no specific information on how the threat is to be carried out, on the motive or intent, or on the time and place where the threat is to be acted on.

(3) The means to carry out the threat is unknown.

Step Three -- Four-Pronged Assessment

(1) Since the threatener's identity is known, background information can be obtained from faculty members who knew the student and his family before the threat was made. They picture him as somewhat immature and prone to losing his temper, but report no seriously troubling traits or changes in behavior.

(2) Interviews with the student and his parents establish that he has no access to weapons. No other information emerges to indicate that the student has made any actual preparations or seriously intends to carry out the threat.

(3) The target of the threat is interviewed. His responses also suggest the threat is unlikely to be acted on: "We've had arguments before; he gets mad and says stupid things but he gets over it."

Step Four -- Evaluation and Response

Based on the evaluation of the threat and the four-pronged assessment of the student, the ***OVERALL*** assessment is that this is a low level threat. A law enforcement contact or resource person is advised of the incident, but administrative action will be determined by school authorities in accordance with school policy.

Example #2: Medium-Level Threat: Tom Murphy, a ninth-grader, makes a videotape for one of his classes. The tape shows student actors shooting at other students on the school grounds, using long-barreled guns that appear real. On the videotape, the actor-students are heard yelling at other students, laughing, and making off-color remarks, while aiming their weapons at others. Murphy's teacher receives the tape and becomes concerned.

Step One -- Referral

The teacher brings the tape to the Threat Assessment Coordinator, who in turn calls a meeting of the available members of the school's Multidisciplinary Team.

Step Two -- Threat Assessment - Based on the following, the videotape is determined to be a medium level of threat until more information can be obtained.

(1) The threat is specific. Murphy and fellow students who are posing as shooters, are pointing weapons at other students pretending to be victims. *However*, it is unknown if Murphy and his friends actually intended to carry out the threat, and if the weapons displayed in the videotape are real. Some of the comments heard on the tape are explicitly threatening but all of the students are laughing and it is therefore unclear whether they are speaking seriously or joking.

(2) The guns used in the videotape may or may not be real.

(3) The "script" used in the videotape suggests that the threateners have given some thought to how the threat will be carried out regarding place and time.

(4) It is unclear if the videotape, with all of its detail, is a serious prelude to real threat, or a joke.

Step Three -- Four-Pronged Assessment

(1) The Threat Assessment Coordinator and members of the Multidisciplinary Team gather additional background on each of the students who appear in the videotape. Information is sought from faculty members who knew the students and their families prior to the incident.

(2) Students and parents are interviewed and it is determined that the guns used in the videotape were toys, and the students have no access to real weapons. No other information is provided that would elevate the level of the threat.

Step Four -- Evaluation and Response

Based on evaluation of the videotape and the assessment of the ninth-grader who organized the filming, this is reclassified as a low level threat. Law enforcement officers conducted the investigation, but administrative action is left to the discretion of the school.

High-Level Threat: A high school principal receives an anonymous phone call at 7:30 a.m. The caller says: "There is a pipe bomb scheduled to go off in the gym at noon today. I placed the bomb in the locker of one of the seniors. Don't worry, it's not my locker. I just placed it there because I can see it from where I will be sitting -- and will know if someone goes to check on it."

Step One -- Immediate Law Enforcement Involvement and Emergency Response

The principal calls a designated contact in the local police department as provided in the

school's emergency response plan. The emergency plan is put into effect.

Step Two -- Threat Assessment - Based on the following, this anonymous threat was determined to be a high level of threat.

(1) The threat is direct and specific. The caller identifies a specific weapon he will use as well as a location for the assault, and the time the threat will be carried out.

(2) The content of the threat suggests the caller has taken concrete steps to carry out the threat, i.e., he has placed the locker under surveillance in order to determine if someone checks on it.

(3) The identity of the threatener is unknown. His means, knowledge, and resources to construct a pipe bomb are unknown.

Step Three -- Because the threatener is unidentified, the Four-Pronged Assessment cannot be conducted.

Step Four -- Evaluation and Response

Because of its specific detail and plausible nature, this is determined to be a high level threat posing a serious danger to students and staff and requiring immediate intervention by law enforcement. If the threatener is subsequently identified, he is likely to be charged with a criminal offense and prosecuted.

CHAPTER VI

RECOMMENDATIONS AND CONCLUSIONS

As has been noted, the threat assessment and intervention model presented in this paper was a focus of discussion at the 1999 NCAVC Symposium in Leesburg, Virginia. Noting that additional research can further develop and refine the concepts and methods embraced in this model, the symposium made the following recommendation:

There is a compelling need to field test, evaluate and further develop these threat assessment recommendations and to develop appropriate interventions designed to respond to the mental health needs of the students involved. This is a pressing public health need which could be addressed through multidisciplinary collaboration by educators, mental health professionals and law enforcement.

The symposium also recommended that additional research should include studies on the following topics:

- The presence of psychopathic and narcissistic personality traits in offenders convicted of charges arising from a school shooting.

- The significance and relevance of verbal and written "leakage" for threat assessment and predicting future violence.

- Determining which specific school dynamics appear to be significant risk factors in schools.

- The influence and relevance of suicide and suicide ideation in adolescents who have become involved in school shootings.

- Identifying significant commonalities between the school shooter's personality, background, and family circumstances, and those of other violent adolescents.

- Identifying significant commonalities and differences between the adolescent school shooter and adult offenders involved in workplace violence.

- A review of relevant state and federal laws and confidentiality requirements that

The symposium made these additional recommendations:

Investigating school violence: To further develop a basis for assessment, after a school shooting or other act of school violence, investigations should be designed to obtain more information in the four areas of the student's life: (1) personality, (2) family dynamics, (3) school dynamics, and (4) social factors.

Training: To make effective use of the assessment and intervention procedures outlined in this monograph, school administrators and staff members should receive additional training in the fundamentals of the threat assessment. Specialized training is needed for those assigned to conduct or supervise the assessment process.

Training is also needed to educate and sensitize students about "leakage" and its significance in dealing with the threat of violence. Students are often in the best position to see and hear signs or cues of potential violence, and training should stress that ignoring those cues or remaining silent can be dangerous for themselves as well as others. Training should also confront the common teenage "code of silence" and students' reluctance to be branded as a "snitch" or to violate a friend's confidence.

Other suggestions relating to training include:

- Establish "Internal Teams" in schools to find ways to encourage students to come forward in a confidential manner with information about threatening behavior.

- Encourage "Student Assistance Programs" in which concerned teachers would come together and discuss students who are having academic problems, behavioral problems, or problems at home.

- Establish "Peer Assistance Groups" that will encourage students to come forward with information about possible threatening behavior in other students, and provide support to overcome self-doubts or guilty feelings about breaking the "code of silence."

- Develop programs to help parents recognize when their child may be in emotional trouble or socially isolated or rejected, and help parents become more knowledgeable about where to get help and more willing to seek it.

Questions of how threat assessment training should be set up or how it should be funded are beyond the scope of this monograph. Representatives of national educational organizations that participated in the Leesburg Symposium indicated interest in exploring these issues in concert with local, state and federal law enforcement.

CONCLUSIONS

Violence -- whether in a school, home, workplace, or on the street -- is a complex issue with complex causes and consequences. Imagining that there are easy answers and instant solutions is counterproductive: there is no easy way to attack the causes and no simple formula that can predict who will commit a violent act. It is also true, however, that violent behavior develops progressively, that making a threat represents a stage in an evolutionary process, and that there are observable signs along the way that most of us can see if we know what to look for.

Overall, the level of violence in American schools is falling, not rising. But the shock and fear generated by the recent succession of school shootings and other violent acts in schools -- and by violence in society at large -- have led to intense public concern about the danger of school violence. In this atmosphere, it is critically important for schools to respond to all threats swiftly, responsibly, fairly, and sensitively, and with an understanding that all threats are not equal.

It is not enough to react only to the threatening message, whether spoken, written, or symbolic. It is also vital to assess whether the person who made the threat has the intent, means, and motivation to carry it out. The procedure presented in this monograph can help schools assess a threat and the threatener, evaluate the risk, and respond appropriately and effectively.

We know that students will continue to make threats in schools, and that most will never carry them out. The use of this assessment/intervention model will help school authorities identify and deal with the high-risk threats that are the major concern, and respond to less serious threats in a measured way. The same distinction needs to be recognized in the larger world outside the school as well, for the same reasons. Threats in schools are not just the schools' problem; therefore, neither is the solution.

APPENDIX A

The threat assessment model recommended in this monograph was developed in part from NCAVC's analysis of eighteen school-shooting cases around the country. Analysts also drew on material from other cases in which NCAVC prepared threat assessments in response to a threatened act of school violence. NCAVC's findings were used to formulate questions and topics for discussion at the July 1999 Leesburg symposium on school shooting.

The methodology for collecting and considering data from the eighteen cases is summarized below. Following that is a brief explanation of how the material was presented and considered at the symposium.

Methodology

Identification of cases: Eighteen schools throughout the country were included in this study. Actual shootings occurred at fourteen of the schools. In the other four, the student or students involved planned a shooting and made significant preparations, but were detected and preempted by law enforcement, and arrests were made before a shooting took place.

Five of the schools were middle schools and thirteen were high schools. All but one were public schools. The cases involved single and multiple offenders. Criminal and/or civil litigation was pending in all but one of the cases.

In addition to these eighteen cases, current NCAVC cases were also included in this study. These were cases in which a threat assessment was being prepared by the NCAVC.

Acquisition of case materials: School and law enforcement officials involved in each of the incidents were contacted and told about the NCAVC study and the scheduled symposium.

NCAVC requested information on each case specifically relevant to the area of threat assessment. The material included:

- A summary of the incident, as described in investigation reports.
- Tapes or transcripts of interviews with the offender(s).
- Witness statements.
- Interviews with persons who knew the students and families and provided information about offenders' background.

- Crime scene photographs and videos.

- Counseling and psychiatric reports and evaluations.

- Examples of the shooter's writings, drawings, doodles, essays, letters, poems, songs, videotapes, and audiotapes.

- School records and any class work that would provide insight into the shooter and his relationships with teachers and other students.

- Pre-sentence psychiatric reports and psychiatric evaluations by either defense or prosecution experts.

- Other pertinent case materials.

In addition to reviewing case materials, NCAVC agents interviewed law enforcement and school personnel who were familiar with each case to obtain additional insight about the shooters, their families and background, the social climate and atmosphere of the school, and any other factors or stressors which may have affected the student before or at the time of the shooting.

Case review: Case materials were reviewed by NCAVC agents with extensive experience in the area of threat assessment. After examining the available information about the shooter, his behavior before and after the shooting, how victims were selected, and events at the scene, the analysts sought to identify and describe critical aspects, including:

- The shooter's behavior patterns in relating to family members, peers, teachers, and persons in authority.

- Disciplinary problems noted or reported by school staff or parents.

- Reported incidents of aggressive behavior and/or anger management problems.

- Type, style and content of the student's writing and artwork, including journals, poems, essays, drawings, doodles, and videotapes.

- Student's preferences in literature, artwork and Internet sites.

- Student's circle of friends, including girlfriends, and his apparent role in that group.

- Changes in the student's behavior that were noted by others prior to the incident.

- Statements by the student directly or indirectly telling others ahead of time about a planned shooting.

- Extent of planning and preparations before the crime.
- Student's behavior on the day of the shooting.
- Types of weapons brought to the scene.
- Type and extent of the interaction between the shooter and victims before and during the shooting.
- Student's behavior after the shooting.
- Results of prosecution.

Use of Case Reviews at the Symposium

Data from these case reviews was used at the Leesburg symposium in three ways: (1) as focus for the expert panels to stimulate further questions and answers; (2) as material for discussion in the breakout groups; and (3) to augment findings of the breakout groups.

The ***expert panel*** portion of the symposium program consisted of four three-hour sessions. Panelists were specialists in the fields of adolescent development, adolescent violence, mental health, school dynamics and school violence. At each session, panelists presented current research findings and offered ideas on how recent research in their areas of expertise may bear on issues of school violence, school shootings and threat assessment.

In addition to the expert panels, two-hour School Incident Panels were held on four specific school shootings. At each of these sessions, teachers, administrators, and investigators involved in the particular case presented information on the incident, the shooter and his background, the dynamics of the school, and the course and outcome of criminal prosecution.

Breakout groups were convened on the fourth day of the symposium. Each group had approximately fifteen people, including educators, mental health professionals, researchers, and representatives of state, local and federal law enforcement agencies. The breakout groups were assigned the task of identifying behavioral traits and characteristics shown by students then, when considered in their totality, could be indicative of threatening behavior. In addition, the groups were asked to discuss different forms of intervention appropriate to threats with varying levels of seriousness and immediacy.

A member of the NCAVC with training in threat assessment, risk assessment, and personality assessment was assigned to each breakout group as a facilitator, whose role was to lead and focus discussions. The breakout sessions were not tape recorded, in order to protect confidential information, but each group appointed a recorder to keep a written record of the

ideas discussed.

Conclusions from the breakout discussions were presented on the final day of the symposium.

APPENDIX B

Suggested Readings

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Caroline
Kendra
Bethany
DAVID

Keven
- advisor to the Sec

TASK

Kendra is point for QA guidance — QA guidance
clearance
species papers
letters (Thank you's)

Kendra - race + affirmative action
music + arts - Kendra
david - vouchers
Kendra - religion (moment of silence
The weekly (Thursdays) by 6pm for the Pres
Bullet point summary
David - fatherhood
parent involvement
david - Timeline
Kendra - school safety
Bethany - rural education
David + Kendra - meetings of roundtable informal discussion with teachers + principals + superintendents
Caroline - urban education

* Joanne Swany: our contact on the Senate floor
~~[illegible]~~ (who supports it and who doesn't?)
~~[illegible]~~
~~[illegible] [illegible]~~

Chief education - dian Rossy
Dir of Com - alex wool
Senior ad. to secretary - Susan frost

ISSUE

key * Bilingual ed. - Bethany
Budget
charter schools - Caroline
david - After school programs
~~[illegible]~~ teacher quality - dave
~~[illegible]~~ reading + math - caroline
~~[illegible]~~
Special ed - Bethany
Technology - caroline
caroline Standard + Accountability
Title 1 - caroline
class size reduction - david
Caroline Indian affairs + Defense
Elementary + Secondary education act - caroline (not going to happen)
Vocational school - dave

group dynamics

- Kendra manages my workload

possibility of putting together an 02 budget
"dummy budget"

11 AM Tomorrow room 472