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Folder Title:
President's Council of Advisors for Science and Technology: Meeting - 10/10/91 [1 of 2]

Stack:

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Position:

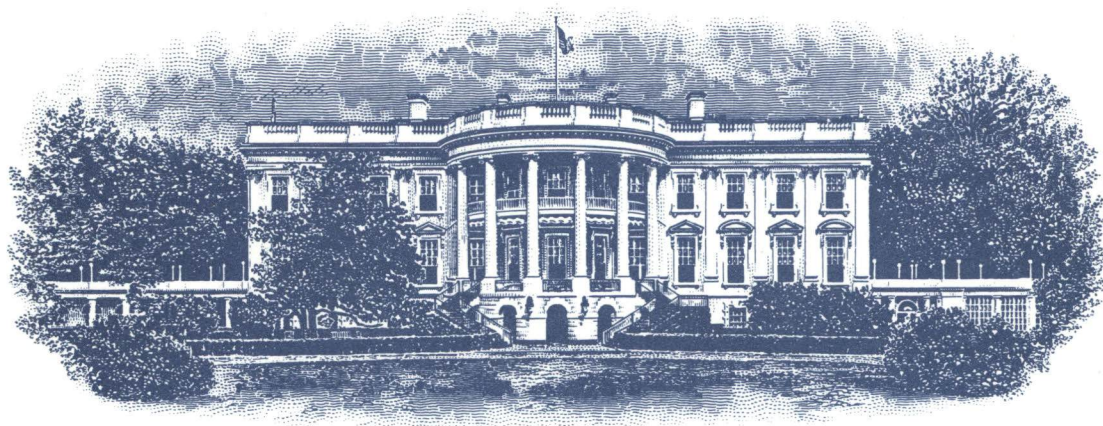
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**PRESIDENT'S COUNCIL OF ADVISORS
ON
SCIENCE AND TECHNOLOGY**



J. THOMAS RATCHFORD

OCTOBER 10, 1991



**MEETING OF THE
PRESIDENT'S COUNCIL OF ADVISORS
ON SCIENCE AND TECHNOLOGY**

OCTOBER 10, 1991

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EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF SCIENCE AND TECHNOLOGY POLICY
WASHINGTON, D.C. 20506

For Immediate Release

October 1, 1991

Dr. D. Allan Bromley, the Assistant to the President for Science and Technology, today announced key personnel changes in the Office of Science and Technology Policy (OSTP) to become effective October 1, 1991.

Dr. William D. Phillips, who has served since April 1990 as the Associate Director for Industrial Technology, has found it necessary to return to his hometown of St. Louis for medical reasons. Of Dr. Phillips' departure, Dr. Bromley said, "Bill Phillips has been an ideal colleague and friend. As the first occupant of the OSTP Associate Directorship in Industrial Technology, he has built new bridges between the Administration and the private sector and has made major contributions to the evolution of U.S. technology policy and the effective application of technology to problems of national significance. He will be very much missed."

Dr. Eugene Wong, who has served since April 1990 as the Associate Director for Physical Sciences and Engineering, will take over as Associate Director for Industrial Technology. Before coming to OSTP, Dr. Wong had a 28-year career as a professor of electrical engineering and computer science and as an administrator at the University of California at Berkeley. In 1980 he cofounded the INGRES Corporation, a pioneering company in database management systems. In his ten years with the company, he actively participated in managing its growth to annual revenues of \$170 million and 1,400 employees worldwide.

Dr. Karl Erb, who has served since December 1989 as the Assistant Director for Physical Sciences and Engineering, will become the Acting Associate Director for Physical Sciences and Engineering. Dr. Erb has been detailed to OSTP from the National Science Foundation, where he is Deputy Director of the Division of Physics. During his 20-year career as an experimental nuclear physicist, Dr. Erb has served as Technical Assistant to the Associate Director of Oak Ridge National Laboratory and, prior to that, as an associate professor of physics at Yale University.

In announcing these reassignments, Dr. Bromley said, "OSTP is extremely fortunate in having two such highly qualified individuals; both bring extensive experience and background to their new responsibilities."

#

October 7, 1991

**PRESIDENT'S COUNCIL OF ADVISORS
ON SCIENCE AND TECHNOLOGY**

**OCTOBER 10, 1991
AGENDA**

THURSDAY, OCTOBER 10, 1991

**OPEN SESSION 9:00 AM - 10:15 AM
CONFERENCE ROOM
COUNCIL ON ENVIRONMENTAL QUALITY
722 JACKSON PLACE, NW**

8:30 - 9:00	ARRIVAL AND COFFEE	
9:00 - 9:15	OPENING REMARKS	DR. BROMLEY
9:15 - 10:00	TWENTY YEAR TRENDS IN THE NATIONAL ASSESSMENT OF EDUCATIONAL PROGRESS	DR. ELLIOT
10:00 - 10:15	CLOSING REMARKS AND MOVE TO ROOM 180, OLD EXECUTIVE OFFICE BUILDING	DR. BROMLEY

Withdrawal/Redaction Sheet

(George Bush Library)

Document No. and Type	Subject/Title of Document	Date	Restriction	Class.
01. Proposal	Establishing and Initially Operating a Center for International Technical Cooperation and Research (17 pp.)		(b)(1)	

Collection:

Record Group: Bush Presidential Records
Office: Science and Technology Policy, Office of (OSTP)
Series: Bromley, D. Allan, Files
Subseries: Organization Files - PCAST
WHORM Cat.:
File Location: President's Council of Advisors for Science and Technology: Meeting - 10/10/91 [1 of 2]

Date Closed:	5/17/2010	OA/ID Number:	62079-006
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P-2/P-5 Review Case #:		Disposition Date:	
AR Case #:		MR Case #:	
AR Disposition:		MR Disposition:	
AR Disposition Date:		MR Disposition Date:	

RESTRICTION CODES

Presidential Records Act - [44 U.S.C. 2204(a)]

P-1 National Security Classified Information [(a)(1) of the PRA]
 P-2 Relating to the appointment to Federal office [(a)(2) of the PRA]
 P-3 Release would violate a Federal statute [(a)(3) of the PRA]
 P-4 Release would disclose trade secrets or confidential commercial or financial information [(a)(4) of the PRA]
 P-5 Release would disclose confidential advice between the President and his advisors, or between such advisors [(a)(5) of the PRA]
 P-6 Release would constitute a clearly unwarranted invasion of personal privacy [(a)(6) of the PRA]

C. Closed in accordance with restrictions contained in donor's deed of gift.

PRM. Removed as a personal record misfile.

Freedom of Information Act - [5 U.S.C. 552(b)]

(b)(1) National security classified information [(b)(1) of the FOIA]
 (b)(2) Release would disclose internal personnel rules and practices of an agency [(b)(2) of the FOIA]
 (b)(3) Release would violate a Federal statute [(b)(3) of the FOIA]
 (b)(4) Release would disclose trade secrets or confidential or financial information [(b)(4) of the FOIA]
 (b)(6) Release would constitute a clearly unwarranted invasion of personal privacy [(b)(6) of the FOIA]
 (b)(7) Release would disclose information compiled for law enforcement purposes [(b)(7) of the FOIA]
 (b)(8) Release would disclose information concerning the regulation of financial institutions [(b)(8) of the FOIA]
 (b)(9) Release would disclose geological or geophysical information

White House Science Office Facing New Scrutiny in Upcoming Hearings

Debate over technology policy politicizes agency, hobbles science adviser Bromley as pressure grows for office to restructure policy for '90s

Will Lepkowski, C&EN Washington

Early next month, the House Science, Space & Technology Committee will embark on a major assessment of the White House Office of Science & Technology Policy—a complete survey of how the agency has done under the 1976 law that set up its present structure. Both committee chairman George Brown (D.-Calif.) and OSTP director D. Allan Bromley are looking forward to the encounter.

Congress sees OSTP as the source of accountability to the American people in matters of science and technology policy. The rest of the White House may operate in secrecy, but Congress believes science and technology are too important to be held close to the vest by White House political operatives.

There is a growing wave of opinion and agitation that OSTP, always under political tension, needs to be refashioned, re-inspired, and re-equipped for engagement with the science and technology issues of the 1990s. A fair question, however, is whether OSTP has in fact peaked as a White House agency with the kind of conflict-laden Congressional mandate it has. For OSTP, the situation is ironic because Bromley is himself the embodiment of apparent renewal at OSTP and can point to rafts of headlines to demonstrate his visibility. Still, critics—most of whom declined to be identified for this article—say Bromley's OSTP is falling short of its mandate as the pilothouse of policy

and that he has little power to change things—all of which explains why Congress is reasserting itself in technology policy.

Brown plans to probe such matters as whether OSTP needs a much bigger and more experienced staff as well as its capability to fulfill the long-sought but never realized goals of foresight and analysis, and its ability to really influence action at agen-

NEWS ANALYSIS

cy levels. Brown will also explore Bromley's thoughts on the so-called new world order, Latin American science and technology relations, industrial policy, science education, and space and energy policy.

Despite OSTP's enlarged staff and clear structure, few believe it is doing the strategic jobs it was designed to do. One, rather parochial, area that Brown's committee and several of his subcommittees intend to probe is the tendency of OSTP to withhold the kind of information Congress thinks it should have from an agency that Congress itself set up. Requests for lists of members of technical panels, for example, often have been held up.

As the technical sophistication of Congress has increased, it has adopted a paternal role over programs that span several agencies—such as global change and high-performance computing. Whereas in the 1960s OSTP was usually the source of imagination in science and technology programs, the new policy ideas now come from Congress. Attempts have been made in Congress to legislate into permanence interagency committees that Bromley has assembled as part of the coordination process.



Bromley: future of U.S. chemical industry is a worry

He says such intrusion "limits the kind of flexibility we have in adjusting the optimum balance in certain fields."

Critics are saying that the more serious concern is the contrast between Bromley's high rank in the White House structure and the two-decades old torpor that continues to blanket the federal science and technology policy structure. Veterans in the field say ideas emanating from that structure were considerably more advanced and inspired during the 1960s and 1970s. Ideas that achieved consensus then are today routinely opposed by the Administration. Failure to adopt programs to help civilian technology, they believe, were largely responsible for the demise in America's industrial competitiveness.

One almost shocking omission at OSTP is any significant involvement in technology policies at the staff level. When OSTP was set up in its present form in 1976, a committee on federal-state science and technol-

ogy relations was set up under OSTP. The Reagan Administration, however, struck that mandate from OSTP's agenda and thus it was never implemented. Meanwhile, the states currently are hotbeds of entrepreneurial ideas and technological investment.

Students of federal science and technology—such as the Carnegie Commission on Science, Technology & Government, which is studying various aspects of the structure—all say Bromley is the one science adviser best positioned to effect real change in an Administration. But these bodies continue to point out where OSTP—Bromley or not—is still lacking: leadership. Report after report makes suggestions for improvement in OSTP that are years old—whether in science and math education where coordination between the National Science Foundation and the Education Department is stubbornly resisted, or in energy policy, where it hardly exists at all.

Bromley's problems are endemic to any high-level White House official. As long-time participant in science policy matters William O. Baker puts it, "The higher up you go in the White House, the more restrained you get." Baker, former president of AT&T Bell Laboratories, was an adviser to several Administrations. "We just don't see the people in government taking hold and seeing what needs to be done," Baker says. "And OSTP just does not feel the support and stimulus to do it."

Bromley is severely constrained in fashioning a goal-directed technology strategy that meets the competitiveness challenge. He has a guide in the several lists of so-called critical technologies needed for U.S. industry to remain competitive—one assembled through Congressional mandate by his own OSTP but quickly disowned by the White House.

One of the worst examples of the policy dither in technology is the incessant word games he is forced to play. The technical community has had to endure such redundant, language-despoiling terms as "critical," "generic," "precompetitive," and "enabling" technologies, all raising the illusion that the Administration really has a technology policy.

For years, the technological com-

munity has known the formula. Bring industry and government people together, agree on R&D projects to support, split the funding costs, work out the patent licensing rights, and get started.

Last May, when the *Wall Street Journal* published an article depicting Bromley as succeeding in establishing an industrial policy in the Administration, Bromley was forced in a public statement to deny the article's accuracy. An industrial policy (defined as targeting particular industries for support, or specific technologies for commercialization) "would result," he said, "in reduced efficiency, slower productivity growth, and a lower standard of living."

In fact, a scientist of Bromley's stature would know that no empirical data exist that support such an ideology, and a great deal of experience in federal support for, say, the aerospace, fertilizer, and computer industries, leads to just the opposite conclusion. In addition, the commercial and technological success of Japanese industry, working with government, powerfully reinforces the rebuttal. It is just these sorts of intellectual constraints that appear to be Bromley's main problem. The pity, they think, is that he cannot be open enough about the problems to spur the needed dialogue.

The result has been discouragement all around the technical community, felt most keenly late this summer when Bromley was forced to ask Congress to rescind funding of the Critical Technologies Institute around which so much hope was woven. The institute, funded at \$5 million under the defense appropriations bill, was to have been directed jointly by a board of government and industrial experts who, together with an experienced staff, would inform Bromley (and presumably the President) of the country's technological goals and how industry and government could cooperate to meet them.

But after initial enthusiasm, Bromley decided the idea was unworkable in the politically charged White House and an executive branch whose agencies vie with one another for influence. Not only did several individuals reject invitations to head the institute, but Bromley's colleagues in the executive branch—led

by Council of Economic Advisers chairman Michael J. Boskin, failed totally to share his enthusiasm for a new analytical capability in the White House that might compete with their own expertise or dilute their power.

But Bromley himself tells his friends he is patient and intends to keep chipping away. Convincing the White House that he needed an associate director for industrial technology, filled by chemist William D. Phillips, was a major victory in itself, says analyst Rodney W. Nichols of the Carnegie Commission. Other ideological hurdles could topple, too, says Nichols, if Bromley serves a second Bush Administration.

One issue to watch is Administration reaction to perhaps the next crisis in technology policy: the feared demise of the U.S. chemical industry. Bromley is clearly worried about its future.

A few days ago he was discussing with senior Du Pont officials the drastic cutbacks the huge chemical producer has been forced to take in today's confusing economy. "What I'm worried about," said Bromley, "is that in response to real pressure from the Japanese and the Europeans in such areas as new fibers, new materials, and biotechnology, that Du Pont and the chemical industry are not going to have the flexibility to pour back the kind of support for R&D that will allow them to continue to develop a backlog of really competitive products."

What will be interesting to watch is whether the chemical industry—always cool to a direct federal role in applied R&D—will turn sympathetic toward government help and join the ranks of the aerospace, computer, semiconductor, and electronics industries in pleading for that elusive industrial technology policy.

But even if it does, the likelihood is that the Administration will remain adamant against it. Why? The answer may be simpler than the high-tech community thinks: namely, that the public, which votes in Presidents, simply isn't interested. "If there's no vision, if no one is coming out with new ideas," says Baker, "it doesn't necessarily mean Bromley's at fault. It probably means that the public isn't asking for them." □

CRITICAL TECHNOLOGIES: White House stalls institute's creation

Autumn may be cool by nature's laws, but the season is shaping up as a hot time in the politically turbulent world of technology policy. Two developments raised the temperature last week.

One was presentation before Congress' Joint Economic Committee of a report by a blue-ribbon panel urging drastic changes in the government's approach to supporting commercially innovative technologies. Issued by the Carnegie Commission on Science, Technology, & Government, based in New York City, the report calls for broadening the mandate of the Pentagon's Defense Advanced Research Projects Agency and the National Security Council to include both military and civilian technological programs and strategies related to economic security.

Far more incendiary was news—kept under cover during recent weeks—that the White House Office of Science & Technology Policy has decided to turn its back on the one policy innovation the technology policy community was hanging its hopes on: establishment of a Critical Technologies Institute (CTI) connected to OSTP. White House Science Adviser D. Allan Bromley—on the brink of actually naming an institute director—decided the idea was unworkable and instructed the Office of Management & Budget to ask Congress to take back the \$5 million it appropriated for the new OSTP function. As of last week, various technological groups—knowing Congress would refuse the OMB request—were deciding how to respond to the demoralizing turn of events.

Cheers went up last April when OSTP issued its much awaited, Congressionally mandated list of 22 "critical technologies" needed to keep the U.S. competitive (C&EN, April 29, page 4). Spanning such



Bromley: the idea was unworkable

fields as computers, materials, and electronics, the list was rather predictable, since several other industry and government panels had previously launched similar undertakings. The whole critical technologies-CTI enterprise was initiated by Sen. Jeff Bingaman (D.-N.M.), chairman of the Subcommittee on Defense Industry & Technology of the Senate Armed Services Committee.

To veterans of technology policy, CTI was just the sort of body needed for a national technology policy really to function. Technology policy, they believe, means nothing without reference to specific technologies. A CTI would fit the technology hands with the policy gloves and help enable U.S. industry to outperform its competitors. It would do for the civilian arms of government—working with industry—much what the Defense Intelligence Agency or Rand Corp. do for the defense establishment.

But after waxing enthusiastic about

CTI for several months, Bromley underwent conversion over the summer, and decided he didn't want it after all. "We looked into what would be required for it to work," Bromley told C&EN last week, "and found several things wrong with it. It would have been made up half of government people, and half from the private sector. And that means it would have been extraordinarily difficult to integrate that body with the policy-making activities of government." Bromley also says he thinks federal conflict of interest rules probably would prevent private-sector outsiders from serving with CTI.

Bromley adds, "It also became clear that what Congress had in mind was development of policy road maps for critical technologies. We felt these might be better produced by the private sector than at OSTP, where there is insufficient breadth of background."

Bromley also acknowledges that lack of support by OMB and White House senior staff didn't help the cause. No other White House units beside OSTP wanted CTI, and the other units refused to participate in any planning meetings.

However, Bromley knows that Congress will turn down OMB's request for rescission. Bingaman has been meeting with "senior White House officials" to tell them his plans and to explain why, to him, targeting critical technologies is not the same as government telling industry what to do. So something close to the original idea will reemerge. But Bromley may use the money to contract out studies by private groups rather than form an institute.

Some observers believe Bromley has lost some face with the technical community by backtracking and buckling under to White House pressure. "My feeling is that OSTP

was weakened by the whole CTI exercise and that Bromley has lost influence in the White House," says one observer familiar with the exercise. "It put OSTP under a lot more scrutiny." Another theory is that the recision request was really a deft move by Bromley: It served to engage the rest of the White House with all the issues surrounding technological competition.

Meanwhile, the recommendations of the Carnegie Commission's study—"Technology and Economic Performance"—jolt the system in their own way by calling for a richer interplay between industry and government, better technological policy analysis at OSTP, and changes in thinking about national security. Chairman of the panel was Bobby R. Inman, former deputy director of the Central Intelligence Agency.

Inman and another heavy-hitter on the panel, Lewis M. Branscomb, former chairman of the National Science Board and former chief scientist at IBM, defended the report at the

Joint Economic Committee hearing. But a dissent was sounded by a Nixon Administration Council of Economic Advisers chairman, Murray L. Wiedenbaum. He would have none of it. He equated civilian technology programs with "handouts" to favored industries at the expense of more deserving smaller companies.

"New firms," he said, "are politically weak. They lack an extended record of political contributions or a large group of agitated employees/voters. The result is an uneven contest that favors old-line business and old technology over the new."

He said the answers to competitiveness lay in a "favorable economic climate" and reduced federal health and safety regulations. His response was conventional but still represents much of the thinking of Bush Administration officials. They distrust government interference with markets and dislike the spectacle of industry seeking public money they feel it has no right to.

Wil Lepkowski

in this case, 28 six-membered rings arranged in a closed cage. The ^{13}C NMR data essentially prove C_{76} has a chiral structure consisting of a spiraling, double-helical arrangement of pentagons and hexagons, Whetten says.

When the implications of the NMR data first became clear to the UCLA chemists, "We were stunned that this was the structure of C_{76} ," Whetten notes. In hindsight, he adds, the result is less startling. One essential structural feature of fullerenes that contributes to their stability is that none of the 12 pentagons is in contact with another pentagon. Recent, as yet unpublished, calculations by David E. Manolopoulos of the University of Nottingham in the U.K. show that only two of the thousands of possible structures for C_{76} have this property. One is the chiral structure the UCLA data show is the correct one.

Whetten calls the structure of C_{76} "one of the most fascinating molecular architectures ever seen in nature." Preliminary results suggest C_{84} has a similar, helical structure, indicating this may be a general fullerene structural motif.

The UCLA chemists have not yet been able to separate the two C_{76} enantiomers. Whetten speculates the purified forms are likely to interact strongly with polarized light, and thus could have useful applications.

Rudy Baum

C_{76} fullerene molecule determined to be chiral

C_{76} , one of the more stable members of the fullerene family of carbon-cage molecules, has been found to be a chiral molecule with a corkscrewlike twist to it by chemists at the University of California, Los Angeles. This structure, which may be shared by other fullerenes, sets C_{76} apart from its better known and highly symmetrical cousins C_{60} (buckminsterfullerene) and C_{70} .

UCLA chemistry professors Robert L. Whetten and François Diederich and coworkers have isolated and partially characterized a number of the higher fullerenes, including C_{76} , C_{84} , C_{90} , and C_{94} . But the group was frustrated in its early attempts to use ^{13}C NMR spectroscopy to confirm the highly symmetrical structures predicted for C_{76} and C_{84} .

The failure, it turns out, was not in the experiments but in the early structure predictions. The UCLA chemists have now obtained a ^{13}C NMR spectrum for C_{76} that contains 19 lines of equal intensity. This indicates C_{76} contains 19 distinct environments, each occupied by four symmetry-equivalent carbon atoms,

a result that severely limits the possible structures for the molecule [*Nature*, 353, 149 (1991)].

All of the experimental data clearly indicate C_{76} is a fullerene—that is, its carbon atoms are linked to form 12 five-membered rings and,



Whetten: fascinating architectures

European Community to consider CO_2 tax

A year ago, Carlo Ripa Di Meana, environment commissioner in the Commission of the European Community, warned a meeting of senior European chemical industry executives that he wanted to introduce a tax on carbon-dioxide-generating fuels. Now that warning is taking concrete form.

Ripa Di Meana has placed on the commission's agenda for next week his tax proposal for such fuels. This proposal was thoroughly revised after a commission session in June. By one estimate, it would push up industry's energy bills 50%. One of the hardest hit industries would be the

THE WHITE HOUSE
WASHINGTON

June 26, 1990

Dear Dave:

I understand that the House of Representatives will be considering the Fiscal Year 1991 Foreign Operations Appropriations bill (H.R. 5114), and that amendments will be offered which would nullify the pro-life, pro-human-rights policies which govern the U.S. population assistance program. You have my full backing in your fight to defeat these amendments, which I will veto if necessary.

Last year, I was forced to veto the original FY 1990 Foreign Operations Appropriations bill (H.R. 2939) because it contained language which would have restored U.S. funding to the United Nations Population Fund (UNFPA), even though AID had determined that the organization was in violation of the Kemp-Kasten prohibitions through its support for, and endorsement of, the coercive population control program of a specific nation. In my veto message, I noted that the language presented to me (the Mikulski Amendment) would have constituted a radical change in policy, which was rendered no more acceptable by a clause which required the UNFPA to keep its books in such a manner so as to prevent the direct flow of United States assistance to the coercive program in question. In effect, the Mikulski Amendment would have substituted an accounting device for the strong pro-life, pro-human-rights policy embodied in the Kemp-Kasten Amendment, and I found this unacceptable.

I am now advised that Congressman Lehman of Florida intends to offer another amendment which would earmark funds for the UNFPA. In this case, the funds would be used in Romania, but the clear intent is to undercut the Kemp-Kasten Amendment by mandating funding of an organization which supports coercive population control programs. Moreover, the Lehman Amendment would also mandate funding of the London-based International Planned Parenthood Federation (IPPF), which has refused to comply with the Mexico City Policy -- a policy for which I have often expressed my strong support.

If family-planning assistance is to be provided to Romania, as a form of humanitarian assistance, it must be provided through agencies which are in compliance with the Kemp-Kasten Amendment and the Mexico City Policy. The U.S. Agency for International Development has already informed Congress that there are a number of alternative agencies which comply with the Mexico City Policy and Kemp-Kasten could move rapidly into Romania if needed.

I am further advised that Congressman Mrazek intends to offer an amendment which would prevent the President from enforcing such different population assistance funding criteria for private organizations and sovereign governments. There are numerous reasons why such a distinction is appropriate. For example, in addition to providing abortion services and supporting abortion activities, some private organizations are actively engaged in undermining the anti-abortion laws of less-developed nations, and the U.S. should not support organizations which engage in such activities. This concern relative to the undermining of laws of sovereign nations simply does not arise with respect to those governments. The Mrazek Amendment is an obvious attempt to nullify the Mexico City Policy.

* [Weakening of the Mexico City Policy would result in renewed U.S. funding of organizations which promote abortion, or which campaign to legalize abortion as a method of family planning in less-developed nations. Moreover, for the United States to restore funding to the UNFPA, so long as the UNFPA supports the coercive population control program referred to above, would be a signal that the United States is not serious about supporting only voluntary family planning. Those organizations which advocate coercive methods of population control would proclaim such a change in U.S. policy as a vindication of their position.

* [As I said in 1989, I strongly support population assistance, so long as U.S. funds are directed to those organizations which promote contraception, rather than

3

those which condone or encourage abortion or coercive measures. The Lehman and Mrazek Amendments would weaken the pro-life Mexico City Policy and the Kemp-Kasten anti-coercion law, and I will be forced to veto H.R. 5114 if any such language is included in the bill as presented to me.

Sincerely,



The Honorable David R. Obay
House of Representatives
Washington, D.C. 20515

International Family Planning Programs

Terminology:

Family Planning vs. Population Planning vs. ?

Background:

- o Current Law**
 - Foreign Assistance Act of 1961**
 - Other laws**
- o Current policies**
 - 1. Population Planning - Volunteerism and informed choice**
 - 2. Mexico City**
 - 3. China**
 - 4. United Nations Population Fund (UNFPA)**
- o Funding**

Congressional Action:

- o Restrictions and conditions on U.S.-assisted programs overseas**
- o Amendments to the Foreign Assistance Act of 1961**
- o Appropriations**
- o The Kemp-Kasten Amendment, the Mexico City Policy**

Possible Issues:

- o U.S. government funding for international family planning programs.**
- o Non-government funding of international family planning programs.**
- o U.S. response to coercive family planning practices in foreign countries.**
- o Informed choice policies.**

THURSDAY, OCTOBER 10, 1991 Continued...

**CLOSED SESSION 11:30 AM - 1:00 PM
ROOM 180
OLD EXECUTIVE OFFICE BUILDING**

10:15 - 10:45	PANEL PROGRESS REPORT - Education and Human Resources	DR. LIKINS DR. DRAKE
10:45 - 12:00	DISCUSSION OF PCAST PANEL DRAFT PAPER - Global Environment and Natural Resources	DR. LOVEJOY DR. BORLAUG
12:00 - 1:00	LUNCH (In Indian Treaty Room, OEOB Room 474)	

**CLOSED SESSION 1:00 - 3:00 PM
ROOM 180
OLD EXECUTIVE OFFICE BUILDING**

1:00 - 1:30	DISCUSSION OF PCAST PANEL DRAFT PAPER - Science, Technology and National Security	DR. BUCHSBUAM
1:30 - 3:00	PANEL PROGRESS REPORTS - High Performance Computing and Communications - Bioscience and Biotechnology - Megaprojects in the Sciences - International Economic Competitiveness	DR. BUCHSBAUM DR. GOMORY DR. NATHANS DR. BORLAUG DR. MCTAGUE DR. SHAPIRO DR. GOMORY DR. SHAPIRO

**CLOSED SESSION 3:00 - 5:00 PM
ROOSEVELT ROOM
WEST WING**

3:00 - 4:30	DISCUSSION	
4:30 - 5:00	DISCUSSION OF NOVEMBER AGENDA AND CLOSING REMARKS	DR. BROMLEY

PRESS PEOPLE INVITED

Wil Lepkowski	Chemical and Engineering News
Colleen Cordes	Chronicle of Higher Education
Bruce Agnew	Journal of NIH Research
Ed Chen	Los Angeles Times
Chris Anderson or Barbara Culliton	Nature
Chris Joyce	New Scientist
Richard McCormack	New Technology Week
Warren Leary	New York Times
Michael Miller	Performance Materials Magazine
Irwin Goodwin	Physics Today
Dan Greenberg	Science and Government Report
Elliot Marshall	Science Magazine
Arthur Kranish	Science Trends
Tim Beardsley	Scientific American
Jeffrey Mervis	The Scientist
Dick Thompson	Time-Warner
Georgia Persinos	Washington Insight
William Booth	Washington Post

PRESIDENT'S COUNCIL OF ADVISORS
ON SCIENCE AND TECHNOLOGY

Expected Attendance For October Meeting

10th

BORLAUG	Yes
BUCHSBAUM	Yes
DRAKE	Yes
GOMORY	Yes
GOOD	No
LIKINS	Yes
LOVEJOY	Yes
McTAGUE	Yes
MURRIN	No
NATHANS	Yes
PACKARD	No
SHAPIRO	Yes

TAB F

***Draft Report From Panel on Global Environment
and Natural Resources***

[This document will distributed at the meeting]

PRESIDENT'S COUNCIL OF ADVISORS
ON SCIENCE AND TECHNOLOGY

Expected Attendance For November Meeting

	<u>14th</u>	<u>Dinner*</u>	<u>15th</u>
BORLAUG	Yes	Yes	Yes
BUCHSBAUM	No	No	No
DRAKE	Yes	Yes	Yes
GOMORY	Yes	?	Yes
GOOD	?	?	Yes
LIKINS	?	?	?
LOVEJOY	Yes	No	?
McTAGUE	Yes	Yes	Yes
MURRIN	Yes	Yes	Yes
NATHANS	Yes	Yes	Yes
PACKARD	Yes	Yes	Yes
SHAPIRO	No	No	No
	—	—	—
Totals	8	6	8

* Dinner hosted by Chuck Drake, et al.

DRAFT

October 7, 1991

PRESIDENT'S COUNCIL OF ADVISORS ON SCIENCE AND TECHNOLOGY

NOVEMBER 14-15, 1991
AGENDA

THURSDAY, NOVEMBER 14, 1991

OPEN SESSION 9:00 AM - 11:15 AM
CONFERENCE ROOM
COUNCIL ON ENVIRONMENTAL QUALITY
722 JACKSON PLACE, NW

8:30 - 9:00	ARRIVAL AND COFFEE	
9:00 - 9:15	OPENING REMARKS	DR. BROMLEY
9:15 - 10:00	IDENTIFYING ENDANGERED SPECIES	DR. CLUTTER
10:00 - 10:15	DISCUSSION	DR. BROMLEY
10:15 - 11:00	MATHEMATICS AND SCIENCE EDUCATION	MR. KEARNS
11:00 - 11:15	CLOSING REMARKS AND MOVE TO ROOM 180, OLD EXECUTIVE OFFICE BUILDING	DR. BROMLEY

DRAFT

THURSDAY, NOVEMBER 14, 1991 Continued...

CLOSED SESSION 11:30 AM - 1:00 PM
ROOM 180
OLD EXECUTIVE OFFICE BUILDING

11:30 - 12:00	PROSPECTS FOR ECONOMIC GROWTH	MR. BOSKIN
12:00 - 1:00	LUNCH (In Indian Treaty Room, OEOB Room 474)	
1:00 - 1:30	DISCUSSION OF DRAFT PCAST REPORT - Science and Technology and National Security	TBD
1:30 - 2:00	DISCUSSION OF DRAFT PCAST REPORT - Global Environment and Natural Resources	DR. LOVEJOY DR. BORLAUG MR. PACKARD
2:00 - 2:30	DISCUSSION OF PCAST PANEL PROGRESS - High Performance Computing and Communications	TBD
	- Bioscience and Biotechnology	DR. NATHANS DR. BORLAUG
	- Education and Human Resources	DR. LIKINS DR. DRAKE
	- Megaprojects in the Sciences	DR. MCTAGUE
	- International Economic Competitiveness	DR. GOMORY
2:30 - 3:30	S&T AND THE DEPARTMENT OF AGRICULTURE	
2:30 - 3:00	CHARLES HESS	
3:00 - 3:30	SECRETARY MADIGAN	
3:30 - 4:15	THE GULF CONFLICT AND U.S. MILITARY STRATEGY	GENERAL POWELL
4:15 - 4:30	DISCUSSION	
4:30 - 5:00	DISCUSSION OF DECEMBER AGENDA AND CLOSING REMARKS	DR. BROMLEY

DRAFT

FRIDAY, NOVEMBER 15, 1991

**CLOSED SESSION 9:00 AM - 12:00 NOON
ROOSEVELT ROOM
WEST WING**

8:30 - 8:50	ARRIVAL AND COFFEE <u>(DR. BROMLEY'S OFFICE, ROOM 358, OEOB)</u>	
8:50 - 9:00	MOVE TO ROOSEVELT ROOM	
9:00 - 9:15	OPENING REMARKS	DR. BROMLEY
9:15 - 10:00	THE COUNCIL ON COMPETITIVENESS	MR. FISHER
10:00 - 10:45	S&T AND U.S. COMPETITIVENESS	SECRETARY MOSBACHER
10:45 - 11:30	DISCUSSION	
11:30 - 12:00	OTHER BUSINESS AND CLOSING REMARKS	DR. BROMLEY

PCAST PANEL ACTIONS
(October 10, 1991)

	Sol, Ralph	Ralph, Harold	Dan, Norman	Peter, Chuck	Sol, Johnny Foster, David	Tom, David, Norman	John, Harold
	High Perfor. Computing & Commun.	International Economic Competitive.	Bioscience and Biotech.	Education & Human Resources	Technology & National Security	Global Environ. & Natural Res.	Megaprojects in the Sciences
Information Briefing on Topic	MAR '90	MAY '90 JUL '90	APR '90	APR '90	FEB '91	MAY '90 JUL '90 FEB '91	FEB '91
Issues & Panel Members Discussed	MAR '90	APR '91	MAY '90 MAR '91	JUL '90 SEP '90 MAR '91	FEB '91 MAR '91	FEB '91	FEB '91 MAR '91 APR '91
Terms of Reference, Members Approved	APR '90	MAY '91	MAY '91	MAY '91	APR '91	MAY '91	MAY '91
Progress Report #1	JUL '90	JUL '91	JUL '91	JUL '91	JUL '91	JUL '91	JUL '91
Progress Report #N	MAY '91 JUL '91 SEP '91 OCT '91	SEP '91 OCT '91	SEP '91 OCT '91	SEP '91 OCT '91	SEP '91 OCT '91	SEP '91 OCT '91	SEP '91 OCT '91
PCAST Briefed				SEP '91 OCT '91	SEP '91 OCT '91		
PCAST Position Taken							
Discuss With President							
Status Review							

THE PRESIDENT'S COUNCIL OF ADVISORS
ON SCIENCE AND TECHNOLOGY

Council and Panel Calendar

June

- 26 Fact-finding discussion on Science, Technology, and National Security with Sol Buchsbaum, Johnny Foster, Charles Herzfeld in Boston, MA.

July

- 11 President's Council of Advisors on Science and Technology, Open Session - 9:00 AM to 11:00 AM, CEQ Conference Room, 722 Jackson Place. Closed Session - 11:00 AM - 5:00 PM, Room 476, Old Executive Office Building.
- 12 President's Council of Advisors on Science and Technology, Closed Session - 9:00 AM to 12:00 NOON, Roosevelt Room, West Wing.

August

- 5 Panel on Science, Technology and National Security, Closed Session - 9:00 AM to 5:00 PM, Room 476, Old Executive Office Building.
- 6 Panel on Science, Technology and National Security, Closed Session - 9:00 AM to 5:00 PM, Room 476, Old Executive Office Building.
- 19 Panel on Science, Technology and National Security, Closed Session - 9:00 AM to 5:00 PM, Room 2064A, Naval Ocean Systems Center (NOSC), San Diego, CA.
- 20 Panel on Science, Technology and National Security, Closed Session - 8:00 AM to 2:00 PM, Room 2064A, Naval Ocean Systems Center, (NOSC), San Diego, CA.

September

- 12 President's Council of Advisors on Science and Technology, Open Session - 9:00 AM to 11:00 AM, CEQ Conference Room, 722 Jackson Place, NW. Closed Session - 11:00 AM to 5:00 PM Room 476, Old Executive Office Building.

- 13 President's Council of Advisors on Science and Technology, Closed Session - 9:00 AM to 12:00 NOON, Location TBD. Fact-finding session on Education and Human Resources, 12:00 NOON to 3:00 PM, Room 476, Old Executive Office Building. Fact-finding session on Megaprojects in the Sciences, 12:00 NOON to 2:00 PM, Room 22, Old Executive Office Building.
- 26 Panel on Science, Technology and National Security, Closed Session - 9:00 AM to 5:00 PM, Room 476, Old Executive Office Building.
- 27 Panel on Science, Technology and National Security, Closed Session - 8:00 AM to 12:00 NOON, Room 180, Old Executive Office Building.

October

- 10 President's Council of Advisors on Science and Technology, Open Session - 9:00 AM to 10:15 AM, CEQ Conference Room, 722 Jackson Place. Closed Session - 10:15 AM to 5:00 PM, Room 180, Old Executive Office Building.
- 25 Panel on Science, Technology, and National Security, Closed Session - 9:00 - 5:00 PM, Old Executive Office Building, Room TBD.

November

- 14 President's Council of Advisors on Science and Technology, Open Session - 9:00 AM to 11:00 AM, CEQ Conference Room, 722 Jackson Place. Closed Session - 11:00 AM to 5:00 PM, Location TBD.
- 15 President's Council of Advisors on Science and Technology, Closed Session - 9:00 AM to 12:00 NOON, Location TBD.
- Panel on International Economic Competitiveness, fact-finding session, Old Executive Office Building, Room and Time TBA.
- 22 Panel on High Performance Computing and Communications, Old Executive Office Building, Room and Time TBA.
- Panel on Bioscience and Biotechnology, fact-finding session, 11:00 AM, Old Executive Office Building, Room TBA.

December

- 2* Panel on Science, Technology and National Security, Closed Session - 9:00 AM - 5:00 PM, Location TBD.
- 3* Panel on Science, Technology and National Security, Closed Session - 8:00 AM - 12:00 NOON, Location TBD.

12

President's Council of Advisors on Science and Technology, Open Session - 9:00 AM to 11:00 AM, CEQ Conference Room, 722 Jackson Place. Closed Session - 11:00 AM to 5:00 PM, Location TBD.

13

President's Council of Advisors on Science and Technology, Closed Session - 9:00 AM to 12:00 NOON, Location TBD.

* Tentative

1991-1992

PCAST Meeting Schedule

October 1991

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

October

10 8:30am PCAST OCTOBER MEETING
 14 Columbus Day (Observed)
 Thanksgiving Day (Canada)
 27 Daylight Savings--set back 1 hour
 31 Halloween

November

11 Veterans Day
 14 8:30am PCAST NOVEMBER MEETING
 15 8:30am PCAST NOVEMBER MEETING
 28 Thanksgiving

December

2 Hanukkah
 12 8:30am PCAST DECEMBER MEETING
 13 8:30am PCAST DECEMBER MEETING
 25 Christmas

January

1 New Year's Day
 9 8:30am PCAST JANUARY MEETING
 10 8:30am PCAST JANUARY MEETING
 20 Martin Luther King, Jr.

February

6 8:30am PCAST FEBRUARY MEETING
 7 8:30am PCAST FEBRUARY MEETING
 12 Lincoln's Birthday
 14 Valentine's Day
 17 President's Day
 22 Washington's Birthday

March

5 8:30am PCAST MARCH MEETING
 6 8:30am PCAST MARCH MEETING
 17 St. Patrick's

April

1 April Fools Day
 2 8:30am PCAST APRIL MEETING
 3 8:30am PCAST APRIL MEETING
 5 Daylight Savings--set ahead 1 hour
 19 Easter

May

7 8:30am PCAST MAY MEETING
 8 8:30am PCAST MAY MEETING
 10 Mother's Day
 16 Armed Forces Day
 25 Memorial Day (Observed)

June

4 8:30am PCAST JUNE MEETING
 5 8:30am PCAST JUNE MEETING
 14 Flag Day
 21 Father's Day

July

1 Dominion Day (Canada)
 4 Independence Day
 9 8:30am PCAST JULY MEETING
 10 8:30am PCAST JULY MEETING

September

7 Labor Day

April 1992

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

May 1992

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

June 1992

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

July 1992

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

August 1992

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

September 1992

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

RESUME

EMERSON J. ELLIOTT

Address: 2038 N. Stafford Street, Arlington, Virginia 22207
Telephone - Office (202) 219-1828 Home (703) 525-1707

EMPLOYMENT EXPERIENCE

November 1984 to Present	Acting Commissioner for Education Statistics, Department of Education
November 1982-1984	Director, Issues Analysis Staff, Department of Education
June 1981-October 1982	Director, Planning and Evaluation Service (Consultant to the Secretary)
May 1979-January 1981	Director, HEW School Finance Project
March 1978-April 1979	Director, Educational Staff Seminar
August 1977-February 1978	Practitioner in Residence, <u>Institute for Educational Leadership</u>
August 1971-July 1977	Deputy Director, National Institute of Education
July 1970-April 1972	Deputy Chief, Human Resources Programs Division, Office of Management and Budget
September 1967-June 1970	Assistant Director for Education, Programs Human Resources Division, Bureau of the Budget
June 1957-August 1967	Budget Examiner, Federal Education Programs, Bureau of the Budget

AWARDS AND OTHER ACTIVITIES

Presidential Rank Award for Distinguished Executive Service, 1987
Presidential Rank Award for Meritorious Executive Service, 1983
Outstanding Public Service Award, American Society for Public Administration 1990
NIE Director's Superior Service Award, 1979
Albion College Distinguished Alumni Award, 1975
William A. Jump Award for Exemplary Achievement in Public Administration, 1970
Nominated by the Department of Education for the Roger Jones Award, 1982 and 1983

Member, AERA, ASA

EDUCATION

AB Degree from Albion College, Albion, Michigan, June 1955. Graduated with "highest honors." Member of Phi Beta Kappa, Phi Mu Alpha Sinfonia music fraternity). Major - physics, minors - music, mathematics, and economics.

MA in Public Administration, University of Michigan, 1957. Elected to Phi Kappa Phi honor society. Program chairman and President, Ann Arbor Chapter, American Society for Public Administration. Federal Executive Institute residential program, March 1970.

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**PRESIDENT'S COUNCIL OF ADVISORS
ON SCIENCE AND TECHNOLOGY**

**OCTOBER 10, 1991
AGENDA**

THURSDAY, OCTOBER 10, 1991

**OPEN SESSION 9:00 AM - 10:15 AM
CONFERENCE ROOM
COUNCIL ON ENVIRONMENTAL QUALITY
722 JACKSON PLACE, NW**

8:30 - 9:00	ARRIVAL AND COFFEE	
9:00 - 9:15	OPENING REMARKS	DR. BROMLEY
9:15 - 10:00	TWENTY YEAR TRENDS IN THE NATIONAL ASSESSMENT OF EDUCATIONAL PROGRESS	DR. ELLIOT
10:00 - 10:15	CLOSING REMARKS	DR. BROMLEY

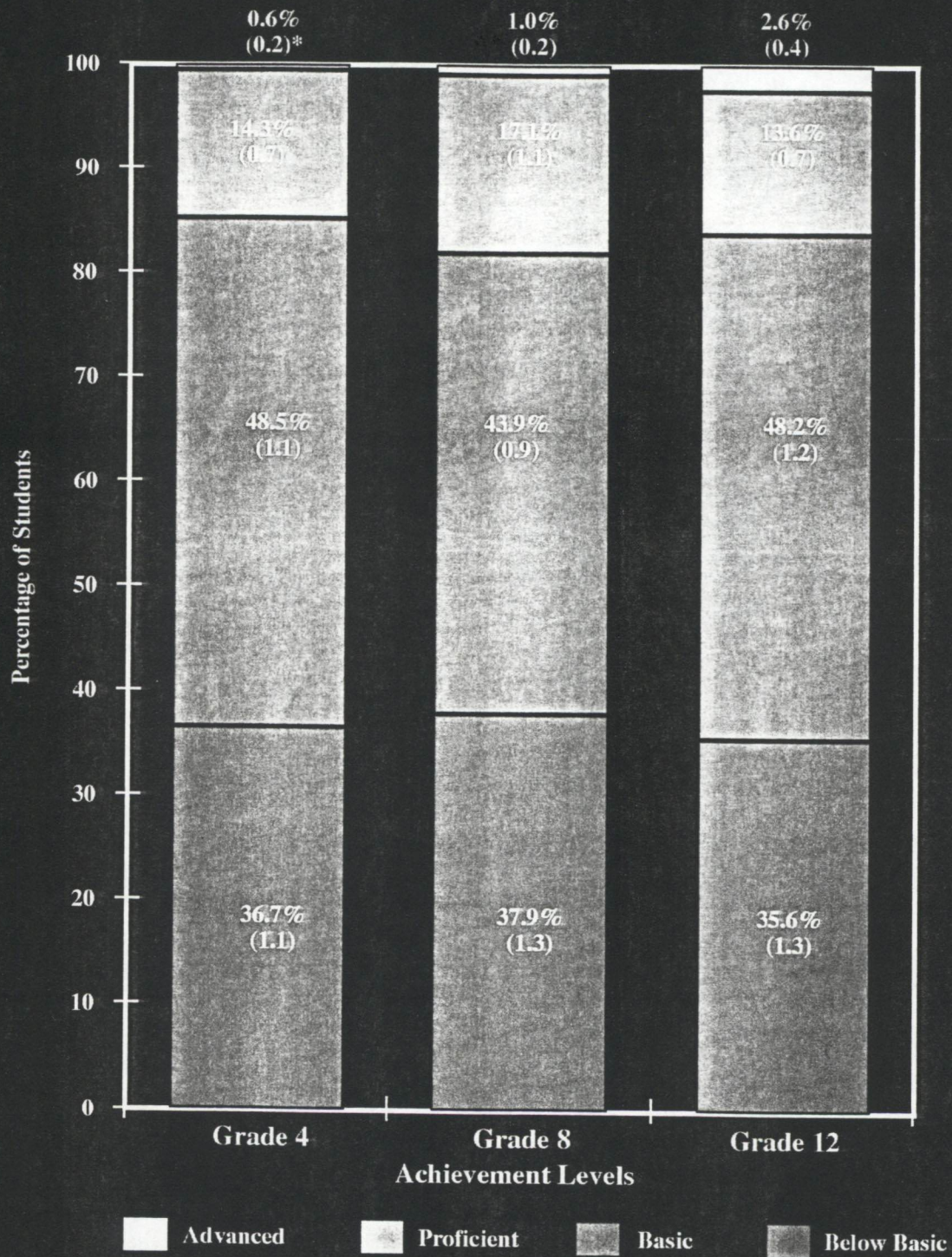
ASSESSMENT TERMS AND DEFINITIONS for September 30, 1991 Releases

Sept. 24, 1991

<u>Question</u>	<u>Characteristics of Report</u>	<u>Measure Used</u>
NCES: Is student performance improving? [Change over time]	Science Trends, 1969-70 to 1989-90 Math Trends, 1973 to 1990 Reading Trends, 1971 to 1990 Writing Trends, 1984 to 1990 All nationally representative plus four regions Ages 9, 13, 17 (except writing, grades 4, 8 and 11)	Science: 1969 test; all multiple choice Math: 1973 test; multiple choice, short answer and extended response Reading: 1971 test; multiple choice, short answer and extended response Writing: 1984 test; direct writing Use of "scale scores" to describe performance. Scales "behaviorally anchored" at 150, 200, 250, 300, 350
NAGB: How well are students performing? [Level students should reach]	Math 1990 only Nationally representative for grades 4, 8 and 12 34 states plus DC + 2 territories for grade 8, public schools only	New 1990 test; about 3/4 multiple choice, 1/4 constructed response. Less emphasis than in 1973 trend test on numbers and operations, more on algebra, and other subtopics, and use of mathematical tools (calculators, protractors, rulers) Basic, proficient and advanced achievement levels.
NEGP: How many students demonstrate competence in challenging subject matter? [Competence]	"Competence" defined by NAGB proficiency levels	Define competence as proficient and advanced.

Figure 2.1

Percentage of Students Below Basic and Within Each Achievement Level, by Grade, 1990 NAEP Mathematics Assessment



* Standard errors are shown in parentheses

From: The LEVELS of Mathematics Achievement,
National Assessment Governing Board

Executive Summary

The National Assessment Governing Board (NAGB) has established new standards for reporting the results of the National Assessment of Educational Progress (NAEP). This effort, part of the Board's congressionally-mandated responsibilities, resulted in three achievement levels: basic, proficient, and advanced. The basic level denotes partial mastery of the knowledge and skills fundamental for proficient work at each grade. Proficient, the central level, represents solid academic performance and demonstrated competence over challenging subject matter. The advanced level signifies superior performance beyond proficient.

Under the Board's direction, an elaborate standard-setting process was employed to adapt these definitions of achievement to the subject matter and content of the 1990 Mathematics Assessment. This process incorporated the views of a broadly representative body of teachers, test experts, administrators, and interested members of the public. The initial application of these standards to the 1990 Mathematics Assessment and the Trial State Assessment marks a significant departure from prior practice. Previously, NAEP results have only been reported in terms of statistical profiles. Now, for the first time on the national level, the Board's new standards allow NAEP data to be reported in terms of what students *should* be able to do.

Results, presented for the first time in this report, indicate that just over 60 percent of the students in Grades 4, 8, and 12 are performing at or above the basic level on the 1990 NAEP Mathematics Assessment. Less than 20 percent of the students in these three grades reach the proficient level or beyond. The percentage of students at or above the advanced level ranges from 0.6 percent in Grade 4 to 2.6 percent in Grade 12. Over one-third of the students assessed did not reach the lowest level adopted by the Board.

There are variations in NAEP mathematics performance by gender, race/ethnicity, type of community, parental education, and (for Grade 12 students) number of mathematics courses taken. Generally, similar patterns are found for the nation as a whole and for participating states from the Trial State Assessment.

The percentage of males reaching the proficient and advanced levels in Grade 12 is greater than the percentage of females. Similar percentages of males and females, however, reach each achievement level in Grades 4 and 8.

Asian/Pacific Island students are more likely to reach the basic and proficient levels than are students from other race/ethnic groups. Whites have the second highest percentages at or above these same two achievement levels, significantly behind the Asian/Pacific Islanders, but above the other minority groups.

Students from disadvantaged urban communities are less likely to reach the basic level in Grades 4 and 8 than students from other types of communities. The percentage of students from extreme rural communities reaching the basic and proficient levels is above that for students from disadvantaged urban communities, but below that of students from advantaged urban communities.

The percentage of students at or above the basic and proficient achievement levels is also related to parental education. Students with the most educated parents are more likely to reach the basic and proficient levels in Grades 4, 8, and 12.

For Grade 12 students, there is a strong relationship between the number of high school mathematics courses taken and performance on NAEP. The percentage of students at or above the basic and proficient levels increases directly with the number of semesters of high school mathematics.

The significant (and sometimes substantial) differences across groups, however, are largely variations on a theme. Even in the most successful demographic groups, the majority of the students do not meet the performance standards set for the proficient level and only a small fraction of the students reach the advanced level. The failure of the students to reach the performance standards set by a broad-based group of citizens is not a phenomenon limited to isolated groups of students but, rather, a reflection of the performance of all segments of the population.

These findings, indicating that many students are not performing as well as they should be, are both revealing and diagnostic. As a result of the Board's actions, data and standards are now available for those seeking to make change. In addition to the information on the nation and participating states presented in this volume, state-level performance data for individual assessment items are presented in an accompanying volume.

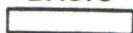
The development and application of performance level standards represents an initial effort. These processes have been, and will continue to be, carefully evaluated by the Board and others. The Board remains committed to the use of performance level standards and will be continuing these activities in connection with future administrations of NAEP, including the assessments of mathematics, writing, and reading scheduled for 1992.

Competency in Mathematics

Percent of 4th, 8th, and 12th graders by Achievement Levels, 1990

BELOW

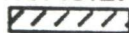
BASIC



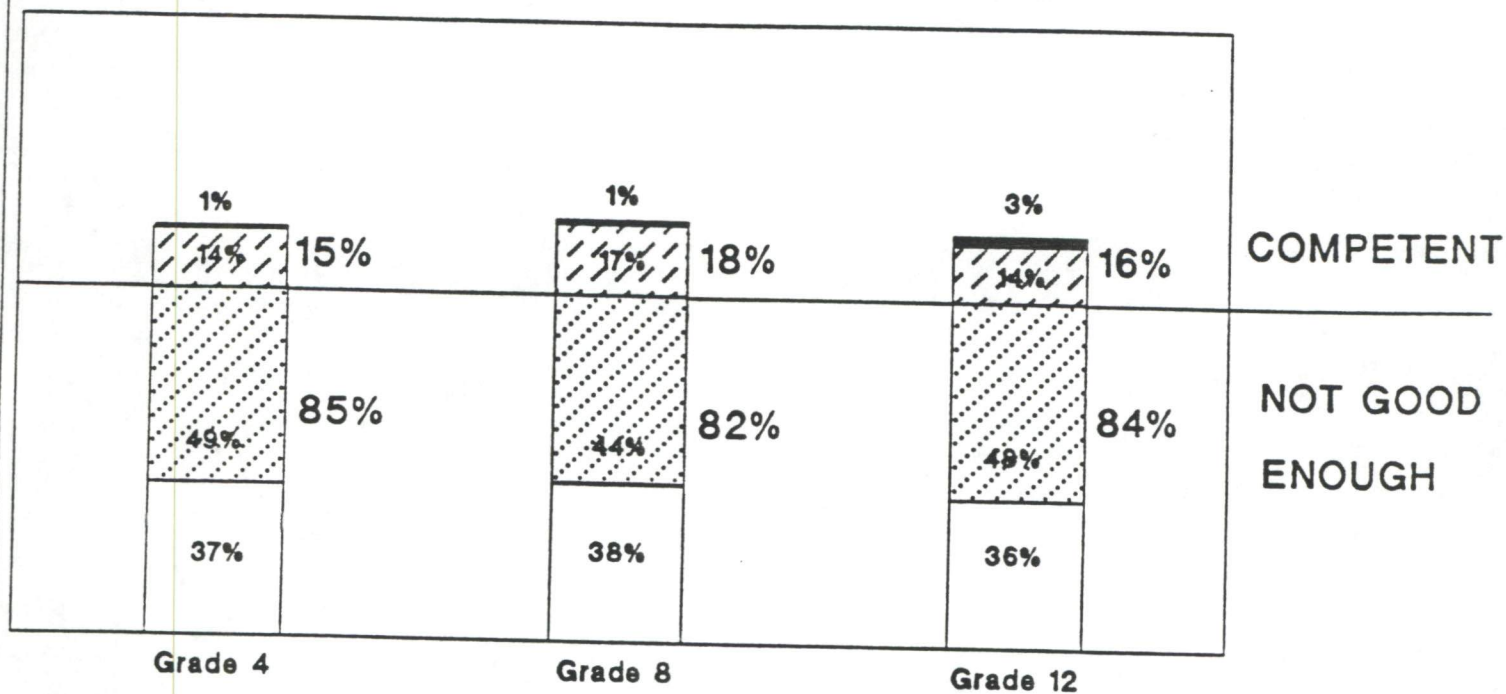
BASIC



PROFICIENT



ADVANCED



Note: Percentages may total more than 100% due to rounding.

NATIONAL CENTER FOR EDUCATION STATISTICS

Trends in Academic Progress

Achievement of American Students in Science, 1970-90,
Mathematics, 1973-90, Reading, 1971-90, and Writing, 1984-90



Prepared by EDUCATIONAL TESTING SERVICE under
contract with the National Center for Education Statistics
Office of Educational Research and Improvement
U.S. Department of Education

EMBARGOED UNTIL 9am E.D.S.T., SEPTEMBER 30, 1991

National Center for Educational Statistics

**Data Summary
of
Trends in Academic Progress:
Achievement of American Students in Science, 1970-90, Mathematics, 1973-90,
Reading, 1971-90, and Writing, 1984-90**

compiled by Eugene H. Owen

**from the report by Ina V.S. Mullis, John A. Dossey,
Mary Foertsch, Lee Jones, and Claudia Gentile**

INTRODUCTION

The National Assessment of Educational Progress (NAEP) has been monitoring the scholastic achievement of our nation's 9-, 13-, and 17-year-olds since its inception in 1969. NAEP's 1990 trend data in science, mathematics, reading, and writing provide several avenues for describing changes in student achievement in each curriculum area, including results for specific assessment questions and summaries of achievement across the questions. For science, mathematics, and reading, NAEP has used proficiency scales that range from 0 to 500 to summarize student performance across questions and to provide a basis for describing overall student achievement in each curriculum area. To "anchor" or give meaning to the results, students' performance is characterized at five levels along the proficiency scales (i.e., 150, 200, 250, 300, and 350), and the percentages of students reaching each level are presented.¹ For writing, NAEP summarized achievement across a common set of writing assignments administered in three successive assessments and computed trends in performance on each of the tasks.

¹The NAEP trend scales, each with a range of 0 to 500, were developed using Item Response Theory (IRT) technology. The numerical values on each scale were established on the basis of student performance in the 1984 reading, 1986 science, and 1986 mathematics assessments. Each scale was set to span the range of student performance across all three ages in that subject-area assessment and to have a mean of 250.5 and a standard deviation of 50. To characterize levels of student performance, NAEP began by empirically identifying items that discriminated between adjacent pairs of proficiency levels. These items were grouped for each of the levels, and subject-area experts were then asked to interpret the items and describe what students at each level knew and could do compared to students at the next lower level.

OVERALL TRENDS

The overall trends in science, mathematics, reading and writing are presented in FIGURE 1.*

Science

- At all three age levels, performance in science declined in the 1970s and improved in the 1980s.
- In 1990, science achievement was at the same level at ages 9 and 13 as it was in 1970.
- Science achievement for 17 year-olds in 1990 was lower than 1969.

Mathematics

- Average mathematics performance improved between 1973 and 1990 at ages 9 and 13.
- Average mathematics performance for 17 year-olds in 1990 was at the same level as in 1973.
- At all three ages, students' average proficiency was significantly higher in 1990 than 1978.

Reading

- At age 17, average reading proficiency was higher in 1990 than it was in 1975.
- Average reading performance for 9- and 13-year-olds was the same in 1990 as it was in 1971.
- For 9-year-olds, improvement in the 1970s was offset by declines in the 1980s. There was no change across the two decades in reading performance for 13-year-olds.

Writing

- Average performance in writing was unchanged from 1984 to 1990 for 4th and 11th grade students.
- For 8th graders, average writing performance in 1990 was lower than in 1984.

* Note: All FIGURES are attached at the end of the data summary.

TRENDS FOR DEMOGRAPHIC SUBPOPULATIONS

The NAEP trend data in the four subject areas are presented for three racial/ethnic groups (White, Black and Hispanic Students), males and females, and for four geographic regions (Northeast, Southeast, Central and West.) The race/ethnicity data are presented in FIGURES 2 through 5, the gender data in FIGURES 6 through 9, and the regional data in FIGURES 10 through 13.

RACE/ETHNICITY

Science. Trends in the average science performance of White, Black, and Hispanic students are shown in FIGURE 2.

- From 1970 to 1977, the average proficiency in science of White 9- and 13-year-olds declined. During the same period the average proficiency of 9- and 13-year-old Black students remained the same. (No data are available for Hispanic students for 1970 and 1973.)
- Between 1977 and 1990, the average science proficiency of 9- and 13-year-olds increased in all three racial/ethnic groups.
- There was a decline in average science performance for White and Black 17-year-olds from 1969 to 1982. The average science performance of Hispanic 17-year-olds declined from 1977 to 1982.
- The average science proficiency of 17-year-olds in all three racial/ethnic groups increased from 1982 to 1990.
- For Black students, average performance in science of 9-year-olds in 1990 is above that in 1970, but for 13- and 17-year-olds there was no difference from 1970 to 1990.

- Although the gap between the performance of White and Black 9- and 13-year-olds did decrease between 1970 and 1982, the average performance of Black students was significantly below that of White students at all three ages in 1990.
- For Hispanic students, the average science performance of 9- and 13-year-olds in 1990 was higher than that in 1977. For Hispanic 17-year-olds there was no change between 1977 and 1990.
- Hispanic students at all three ages have lower average proficiency than their White counterparts, although the gap at age 13 decreased from 1977 to 1990.

Mathematics. Trends in average mathematics proficiency of White, Black and Hispanic students are displayed in FIGURE 3.

- For all three racial/ethnic groups, the average mathematics proficiency of 9-year-olds was higher in 1990 than in 1973.
- At age 13, both Black and Hispanic Students showed significant gains from 1973 to 1990. The performance of White 13-year-olds in 1990 was the same as in 1973.
- At age 17, White students showed an increase in average mathematics proficiency from 1982 to 1990 following a decline from 1973 to 1982. Black 17-year-olds had a higher average proficiency in mathematics in 1990 than in 1973. There was no significant change in average mathematics proficiency of Hispanic 17-year-olds during the period.
- At all three ages, White students in 1990 continued to have a higher average mathematics proficiency than Black and Hispanic students. The gap between White students and their Black and Hispanic counterparts has not narrowed significantly since 1982, except between Black students and White students at age 17.

Reading. Trends in average reading proficiency for White, Black, and Hispanic students are presented in FIGURE 4.

- White 9- and 13-year-olds had the same average proficiency in reading in 1990 as they did in 1971. The average proficiency of 9-year-olds was higher in 1980 and 1984 than 1971, and for 13-year-olds the proficiency was higher in 1980 than in 1971.
- The average performance of White 17-year-olds was higher in 1990 and 1984 than in 1971.
- For Black students at all three ages, average reading performance was higher in 1990 than in 1971.
- Hispanic 9- and 13-year-olds were reading at about the same level in 1990 as in 1975.
- Hispanic 17-year-olds were reading significantly better in 1990 than in 1975 or 1980.
- The gap between White and Black 13- and 17-year-olds decreased significantly in 1990 from the 1970s and in 1980.
- The gap between Hispanic and White 17-year-olds was significantly smaller in 1990 than in 1975.

Writing. Trends in average writing achievement for White, Black, and Hispanic students are displayed in FIGURE 5.

- Average writing achievement for White 8th graders was lower in 1990 than 1984. Average writing achievement for White 4th and 11th graders was about the same in 1990 as in 1984.
- The average writing performance for Black and Hispanic students at all three grades showed no change from 1984 to 1990.
- On average, the gaps between White students' writing achievement and the achievement of their Black and Hispanic counterparts remained quite large.

GENDER

Science. Trends in average science proficiency for males and females are shown in FIGURE 6.

- At ages 9 and 13, the average proficiency of both males and females was lower in 1977 than 1970, but was about the same in 1990 as in 1970.
- At age 17, both males and females showed declines in science performance between 1969 and 1982. Although females did significantly better in 1990 than in 1982, neither males nor females did as well in 1990 as in 1969.
- There were small or no gender differences at age 9 for any science assessment. At ages 13 and 17, the average science proficiency of females in 1990 was significantly lower than that of males, continuing a trend that began in the 1970s.

Mathematics. Trends in average mathematics proficiency for males and females are presented in FIGURE 7.

- At age 9, both male and female students made significant gains in 1990 compared with their levels of performance in 1973, with the improvement generally occurring during the 1980s.
- As in previous assessments, male and female 9-year-olds had about the same level of average mathematics proficiency in 1990.
- Thirteen-year-olds of both genders showed improvement between 1978 and 1990. Their average performance in 1990 was essentially the same.
- At age 17, the average performance of males and females declined significantly between 1973 and 1982 and then improved significantly, returning to the same level in 1990 as in 1973.
- In 1990, the average mathematics proficiency of males remained higher than that of females at age 17.

Reading. The trends in average reading proficiency for males and females are shown in FIGURE 8.

- The reading proficiency of 9-year-old males and females was significantly lower in 1990 than in 1980, however males had significantly higher proficiencies in the 1980s compared with 1971.
- There were no significant differences in the proficiencies of 13-year-old males and females from 1971 to 1990.
- Seventeen-year-old females showed higher levels of reading proficiency in 1990 than in 1975 and 1980. Males at this age

showed no significant change in 1990 compared with previous assessments.

- At all three ages, females outperformed males in reading and have done so in all six NAEP reading assessments since 1971.

Writing. The trends in average writing proficiency for males and females are presented in FIGURE 9.

- Between 1984 and 1990, the average proficiency of fourth-grade females increased significantly, while the performance of fourth-grade males remained the same.
- At grade 8, writing proficiency for both males and females declined significantly between 1984 and 1990.
- The writing performance of both male and female eleventh graders remained the same from 1984 to 1990.
- On average, females at all grades performed better in writing than their male counterparts.

REGION

Science. The trends in average science proficiency for the four regions are presented in FIGURE 10.

- In the Northeast, the average proficiency in science for 9- and 13-year-olds did not change from 1970 to 1990. For 17-year-olds, proficiency was lower in 1982 than in 1969 and was still below the 1969 level in 1990.

- In the Southeast, 9- and 13-year-olds were doing better in science in 1990 than 1970. There was no significant difference in the performance of 17-year-olds in 1990 from that of their counterparts in 1970.
- In the Central region, the proficiency at all three ages was virtually the same in 1990 as two decades earlier.
- In the West, the performance of 9- and 13-year-olds in science was about the same in 1990 as in 1970. However, the science performance of 17-year-olds was significantly lower in 1990 than in 1970.

Mathematics. The trends in average mathematics performance for the four regions are shown in FIGURE 11.

- The average mathematics proficiency for 9-year-olds was higher in all four regions in 1990 than it was in 1973.
- At age 13, students in the Southeast and West showed improvement in their average mathematics performance in 1990 compared with the 1970s, but there was no significant change in the proficiencies in the Northeast and Central regions.
- At age 17, during the 1980s, an increase was observed in the Southeast, West, and Central regions. However, in the Northeast, students' performance at age 17 did not change significantly during this period.

Reading. The trends in average reading proficiency for the four regions are shown in FIGURE 12.

- In the Northeast, reading achievement at all three ages was about the same in 1990 as it was in 1971.
- In the Southeast, 13- and 17-year-olds were reading significantly better in 1990 than they were in 1971. For 9-year-olds, gains made in the 1970s were offset by declines in the 1980s, with the result that average reading proficiency in 1990 was about the same as that in 1971.
- For 9- and 17-year-old students in the Central region, reading performance was about the same in 1990 as in 1971. Thirteen-year-olds' performance declined significantly in 1990 compared to 1980, but remained unchanged from 1971.
- For the West, average reading proficiency at all three ages was about the same in 1990 as in 1971.

Writing. Trends in average writing proficiency for the four regions are shown in FIGURE 13.

- In the Northeast from 1984 to 1990, average writing proficiency for 4th and 11th graders did not change significantly. For 8th grade students, writing performance was significantly lower in 1990 than in 1984.
- In the Southeast, average writing performance did not significantly change at grade 4, while 8th graders' performance in 1990 was significantly lower than in both 1984 and 1988. The trend at grade 11 is similar to those in grade 8, but the apparent decline is not statistically significant.
- In both the Central and Western regions at all three grades, average writing performance was about the same in 1990 as in 1984.

Trends in Percentages of Students At or Above Proficiency Levels

Trends in percentages of students at or above proficiency levels in science, mathematics, and reading are presented in TABLES 1, 2 and 3. The trends cover the period 1977-1990 for science, 1978-1990 for mathematics, and 1971-1990 for reading. Comparisons are made only between each assessment year and 1990.

TABLE 1* Trends in Percentages of Students At or Above Five Science Proficiency Levels, 1977 to 1990

		Assessment Years			
<u>Proficiency Levels</u>	<u>Age</u>	<u>1977</u>	<u>1982</u>	<u>1986</u>	<u>1990</u>
<u>Level 350</u>					
Integrates Specialized	9	0 (0.0)	0 (0.1)	0 (0.1)	0 (0.0)
Scientific Information	13	1 (0.1)	0 (0.1)	0 (0.1)	0 (0.1)
	17	9 (0.4)	7 (0.4)*	8 (0.7)	9 (0.5)
<u>Level 300</u>					
Analyzes Scientific	9	3 (0.3)	2 (0.7)	3 (0.5)	3 (0.3)
Procedures and Data	13	11 (0.5)	10 (0.7)	9 (0.9)	11 (0.6)
	17	42 (0.9)	37 (0.9)*	41 (1.4)	43 (1.3)
<u>Level 250</u>					
Applies General	9	26 (0.7)*	24 (1.8)*	28 (1.4)	31 (0.8)
Scientific Information	13	49 (1.1)*	51 (1.6)*	53 (1.6)	57 (1.0)
	17	82 (0.7)	77 (1.0)*	81 (1.3)	81 (0.9)
<u>Level 200</u>					
Understands Simple	9	68 (1.1)*	71 (1.9)*	72 (1.1)*	76 (0.9)
Scientific Principles	13	86 (0.7)*	90 (0.8)*	92 (1.0)	92 (0.7)
	17	97 (0.2)	96 (0.5)	97 (0.5)	97 (0.3)
<u>Level 150</u>					
Knows Everyday	9	94 (0.6)	95 (0.7)	96 (0.3)	97 (0.3)
Science Facts	13	99 (0.2)	100 (0.1)	100 (0.1)	100 (0.1)
	17	100 (0.0)	100 (0.1)	100 (0.1)	100 (0.2)

*Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons between previous science assessments and 1990. (No significance test is reported when the percentage of students is either > 95.0 or < 5.0). The standard errors of the estimated percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. When the percentage of students is either 0 or 100, the standard error is inestimable. However, percentages 99.5 percent and greater were rounded to 100 percent and percentages less than 0.5 percent were rounded to 0 percent. When reading tables, comparisons are made only with 1990. No extrapolations for proficiency levels can be made for years before those presented in the tables.

Level 150: Knows Everyday Science Facts

The results from 1990 show that nearly every student at all three ages had some knowledge of general scientific facts and an ability to read simple

graphs, the material typical of performance at Level 150. This was also the case in 1977 at ages 13 and 17.

Level 200: Understands Simple Scientific Principles

In 1990, three-fourths of 9-year-olds and most 13- and 17-year-olds had some understanding of simple scientific principles as well as basic knowledge about plants and animals. At both ages 9 and 13, the percentages of students performing at Level 200 increased since 1977, while at age 17 the percentage remained constant.

Level 250: Applies Basic Scientific Information

In 1990, 31 percent of 9-year-olds and 57 percent of 13-year-olds were able to perform tasks typical of Level 250, such as interpreting graphs and making inferences from experimental results. These results represent a significant increase in the percentages since 1977 at both ages. The percentage of 17-year-olds reaching Level 250 was about the same in 1990 as in 1977 (about four-fifths).

Level 300: Analyzes Scientific Procedures and Data

In both the 1977 and 1990 assessments, very few 9- or 13-year-olds were successful in evaluating the appropriateness of an experimental design or in using scientific knowledge to interpret new information -- tasks typical of performance at Level 300. Additionally, fewer than half of the 17-year-olds reached this level in either year.

Level 350: Integrates Specialized Scientific Information

Students attaining Level 350 were able to use detailed knowledge from the physical sciences to make inferences and draw conclusions or apply basic genetics principles. Only 9 percent of 17-year-olds performed at or above this level in either 1977 or 1990. Although 9-year-olds probably would not be expected to achieve this level of performance, all but a very few 13-year-olds (1 percent or less) also found this material beyond their grasp in every assessment from 1977 to 1990.

TABLE 2 Trends in Percentages of Students At or Above Five Mathematics Proficiency Levels, 1978 to 1990

Assessment Years					
<u>Proficiency Levels</u>	<u>Age</u>	<u>1978</u>	<u>1982</u>	<u>1986</u>	<u>1990</u>
<u>Level 350</u>					
Multi-Step Problem Solving and Algebra	9	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
	13	1 (0.2)	1 (0.1)	0 (0.1)	0 (0.1)
	17	7 (0.4)	6 (0.4)	7 (0.5)	7 (0.6)
<u>Level 300</u>					
Moderately Complex Procedures and Reasoning	9	1 (0.1)	1 (0.1)	1 (0.2)	1 (0.3)
	13	18 (0.7)	17 (0.9)	16 (1.0)	17 (1.0)
	17	52 (1.1)*	49 (1.3)*	52 (1.4)	56 (1.4)
<u>Level 250</u>					
Numerical Operations and Beginning Problem Solving	9	20 (0.7)*	19 (1.0)*	21 (0.9)*	28 (0.9)
	13	65 (1.2)*	71 (1.2)	73 (1.6)	75 (1.0)
	17	92 (0.5)	93 (0.5)	96 (0.5)	96 (0.5)
<u>Level 200</u>					
Beginning Skills and Understandings	9	70 (0.9)*	71 (1.2)*	74 (1.2)*	82 (1.0)
	13	95 (0.5)	98 (0.4)	99 (0.2)	99 (0.2)
	17	100 (0.1)	100 (0.0)	100 (0.1)	100 (0.1)
<u>Level 150</u>					
Simple Arithmetic Facts	9	97 (0.3)	97 (0.3)	98 (0.3)	99 (0.2)
	13	100 (0.1)	100 (0.1)	100 (0.0)	100 (0.0)
	17	100 (0.0)	100 (0.0)	100 (0.0)	100 (0.0)

*Shows statistically significant difference from 1990, by an application of the Bonferroni procedure where alpha equals .05 per set of three comparisons (each year compared with 1990). Thus, alpha equals .0167 for each comparison. (No significance test is reported when the percentage of students is either > 95.0 or < 5.0.) The standard errors of the estimated percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. When the percentage of students is either 0 percent or 100 percent, the standard error is inestimable. However, percentages 99.5 percent and greater were rounded to 100 percent and percentages less than 0.5 percent were rounded to 0 percent.

Level 150: Simple Arithmetics Facts

Students performing at or above Level 150 were able to perform elementary addition and subtraction; however, their ability to apply these simple arithmetic procedures was quite limited. In 1990, as in the three previous assessments conducted since 1978, nearly all students in each of the three age groups performed at or above Level 150.

Level 200: Beginning Skills and Understandings

Students performing at or above Level 200 demonstrated a greater range and depth of basic mathematical skill than those who reached only Level 150, but were still developing a grasp of multiplication and division and

reasoning ability beyond that required by simple numerical computation. Virtually all 13- and 17-year-olds and more than four-fifths of 9-year-olds performed at or above Level 200 in the 1990 assessment. The findings at ages 13 and 17 were consistent with previous assessments. However, at age 9, the results represented dramatic improvement compared to the 1978 performance level, with an increase from 70 to 82 percent of the students showing an initial understanding of mathematical skills and concepts.

Level 250: Numerical Operations and Problem Solving

Students performing at or above Level 250 had developed a surface understanding of the four basic operations, and were beginning to acquire more developed reasoning skills. Trends in the percentages of students demonstrating this level of mathematical understanding showed a significant increase at ages 9 and 13. Yet in 1990, the percentages of students reaching this level differed considerably across the age groups. The percentage of 9-year-olds demonstrating these basic computation abilities increased from 20 percent in 1978 to 28 percent in 1990, and 10 percent more 13-year-olds attained this level in 1990 than in 1978 (75 percent compared to 65 percent).

Level 300: Moderately Complex Procedures and Reasoning

Students performing at or above Level 300 demonstrated more sophisticated numerical reasoning, and were able to draw from a wider range of mathematical areas, including algebra and geometry. At age 17, significantly more students performed at this level in 1990 than did in 1978 -- 56 percent compared to 52 percent. There was little or no change in performance at ages 9 and 13.

Level 350: Multi-step Problem Solving and Algebra

Students performing at Level 350 demonstrated the capacity to apply mathematical operations in a variety of problem settings. Yet virtually no 13-year-olds and only 7 percent of the 17-year-olds attending school attained this level, and these results have remained essentially constant since 1978.

TABLE 3

Trends in Percentages of Students At or Above Five Reading Proficiency Levels, 1971 to 1990

		<u>Assessment Years</u>					
<u>Skills and Strategies</u>	<u>Age</u>	<u>1971</u>	<u>1975</u>	<u>1980</u>	<u>1984</u>	<u>1988</u>	<u>1990</u>
<u>Level 350</u>	9	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.1)
<u>Learn from</u>	13	0(0.0)	0(0.0)	0(0.0)	0(0.1)	0(0.1)	0(0.1)
<u>Specialized Reading</u>	17	7(0.4)	6(0.3)	5(0.4)	6(0.3)	5(0.6)	7(0.5)
<u>Materials</u>							
<u>Level 300</u>	9	1(0.1)	1(0.1)	1(0.1)	1(0.1)	1(0.3)	2(0.3)
<u>Understand</u>	13	10(0.5)	10(0.5)	11(0.5)	11(0.4)	11(0.8)	11(0.6)
<u>Complicated</u>	17	39(1.0)	39(0.8)	38(1.1)	40(0.8)	41(1.5)	41(1.0)
<u>Information</u>							
<u>Level 250</u>	9	16(0.6)	15(0.6)*	18(0.8)	17(0.6)	18(1.1)	18(1.0)
<u>Interrelate Ideas</u>	13	58(1.1)	59(1.0)	61(1.1)	59(0.6)	59(1.3)	59(1.0)
<u>and Make</u>	17	79(0.9)*	80(0.7)*	61(0.9)	83(0.5)	86(0.8)	84(1.0)
<u>Generalizations</u>							
<u>Level 200</u>	9	59(1.0)	62(0.8)	68(1.0)*	62(0.7)	63(1.3)	59(1.3)
<u>Partially Developed</u>	13	93(0.5)	93(0.4)	95(0.4)	94(0.3)	95(0.6)	94(0.6)
<u>Skills and</u>	17	96(0.3)	96(0.3)	97(0.3)	98(0.1)	99(0.3)	98(0.3)
<u>Understanding</u>							
<u>Level 150</u>	9	91(0.5)	93(0.4)*	95(0.4)*	92(0.3)	93(0.7)	90(0.9)
<u>Simple, Discrete</u>	13	100(0.0)	100(0.1)	100(0.0)	100(0.0)	100(0.1)	100(0.1)
<u>Reading Tasks</u>	17	100(0.1)	100(0.1)	100(0.1)	100(0.0)	100(0.0)	100(0.1)

* Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure where alpha equals .05 per set of comparisons between previous reading assessments and 1990. Thus, alpha equals .01 for each comparison. (No significance test is reported when the percentage of students is either >95.0 or <5.0.) The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. When the proportion of students is either 0 or 100 percent, the standard error is inestimable. However, percentages 99.5 percent and greater were rounded to 100 percent, and percentages less than .5 percent were rounded to 0 percent.

Level 150--Simple, Discrete Reading Tasks

Students performing at this level of proficiency were able to read and understand brief, uncomplicated passages and respond correctly to questions based on information presented in the passage -- for example, questions asking them to recall particular details.

In each assessment, virtually all 13- and 17-year-olds and most 9-year-olds reached or surpassed this level of reading proficiency. The percentage of 9-year-olds at or above Level 150 in 1990 remained essentially the same as in 1971.

Level 200--Partially Developed Skills and Understanding

Students performing at Level 200 demonstrated partial use of reading skills and strategies, evidenced by their basic understanding of stories and expository passages, ability to summarize main ideas, and capacity to distill information from the material presented.

Students at ages 13 and 17 performed at or above Level 200 on all six assessments. At age 9, however, the percentage of students demonstrating some use of reading skills and strategies declined significantly since 1980, when 68 percent of the students performed at or above this level. Only 59 percent did so in 1990. The performance of nine-year-olds in 1990 represented a return to 1971 levels.

Level 250--Interrelate Ideas and Make Generalizations

The reading passages that characterize Level 250 performance tend to be longer and more complex than those at the lower levels, and the questions are more demanding, asking students to interpret, make inferences from, and elaborate on the information and ideas presented.

In the 1990 assessment, as with previous NAEP reading assessments, there were large differences across the age groups in the ways that the percentages of students who demonstrated reading skills and strategies at this level changed across time. Since 1971, the percentage of 13-year-olds reaching Level 250 remained constant. Over the same time period, however, the percentage of 17-year-olds who reached Level 250 increased from 79 percent in 1971 to 84 percent in 1990.

Level 300--Understand Complicated Information

Performance at Level 300 indicates an ability to read and comprehend a wide variety of materials, including various types of informational and literary passages as well as documents. It also reflects the ability to summarize and elaborate on the information and ideas presented. To a greater extent than at the lower levels of proficiency, the reader performing at this level is attentive to genre, form, and rhetorical features.

There have not been significant changes across time in the percentage of students performing at this level of reading proficiency across age groups. In 1990, fewer than half the 17-year-olds, 11 percent of the 13-year-olds, and 2 percent of the 9-year-olds reached Level 300.

Level 350—Learn from Specialized Reading Materials

Performance at this level reflects the ability to integrate ideas and information presented in a variety of genres, to understand specialized content, and make meaning from passages that contain challenging syntactic and rhetorical elements. Many of the questions following the passages at this level are open-ended, asking students to articulate their views and ideas based on the selection presented.

The percentage of students across age groups who reached Level 350 in the 1990 assessment is essentially unchanged from 1971. Virtually none of the 13-year-olds reached Level 350 during the past six reading assessments, and very few 17-year-olds reached this level.

Trends in Students' Writing by Types of Writing Tasks

Rating Scale for Writing. To examine trends in writing achievement from 1984 to 1990, one set of analyses, based on primary trait scoring was conducted which focused on the writer's effectiveness in accomplishing each task. Primary trait scoring is designed to be sensitive to the writer's understanding of the audience as well as to the inclusion of specific features needed to accomplish the specific purpose of that task. The primary trait scoring criteria, while specific to each writing prompt, also defined five levels of task accomplishment: not rated, unsatisfactory, minimal, adequate, and elaborated.

Informative Writing. Trends in students' responses to the five informative writing tasks reveal little progress from 1984 to 1990. Overall, a majority of students at all three grades wrote minimal or better responses to various informative tasks, but fewer wrote papers rated as adequate or better.

Persuasive Writing. Students' achievement on various persuasive writing tasks indicates a slippage in persuasive writing performance at grades 8 and or 11, with fewer students writing a minimal or better paper in 1990 than in 1984. Fourth graders' persuasive writing remained the same between 1984 and 1990.

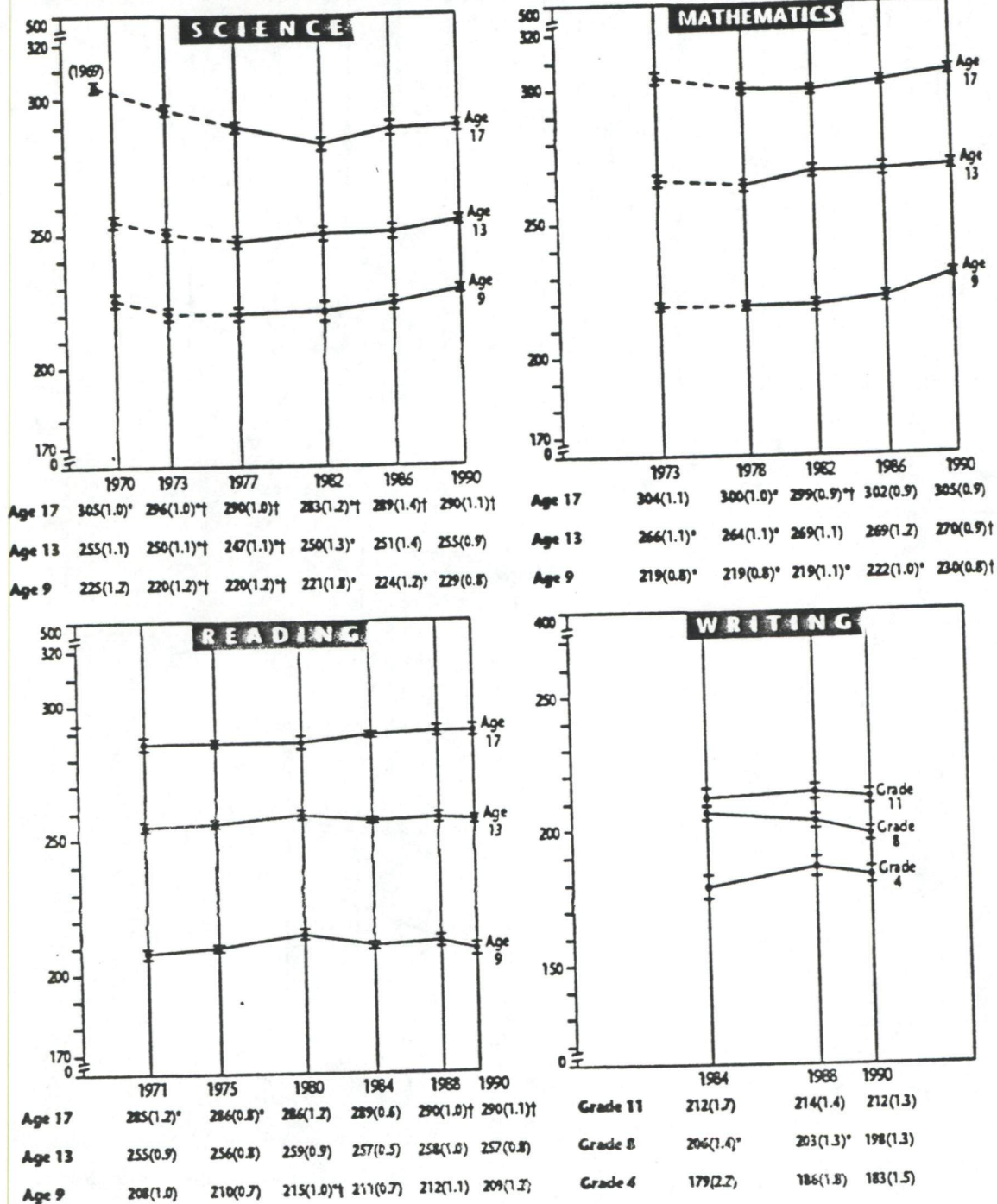
Narrative Writing. In 1990, as in 1984, the majority of fourth graders wrote minimal or better stories, but only 9 to 12 percent wrote at the adequate or better level.

Explanatory Note for the Figures

For trend analysis, each assessment was compared with the two end years in the time series. Adjacent assessments were not tested against each other. Asterisks (*) indicate significant differences from 1990 and daggers (†) indicate significant differences from the first year in the series. For example, in Figure 1 for science, at age 17, the average proficiency in 1973 is significantly lower than in 1970 and significantly higher than in 1990.

FIGURE 1

National Trends in Average Achievement in Science, Mathematics, Reading, and Writing

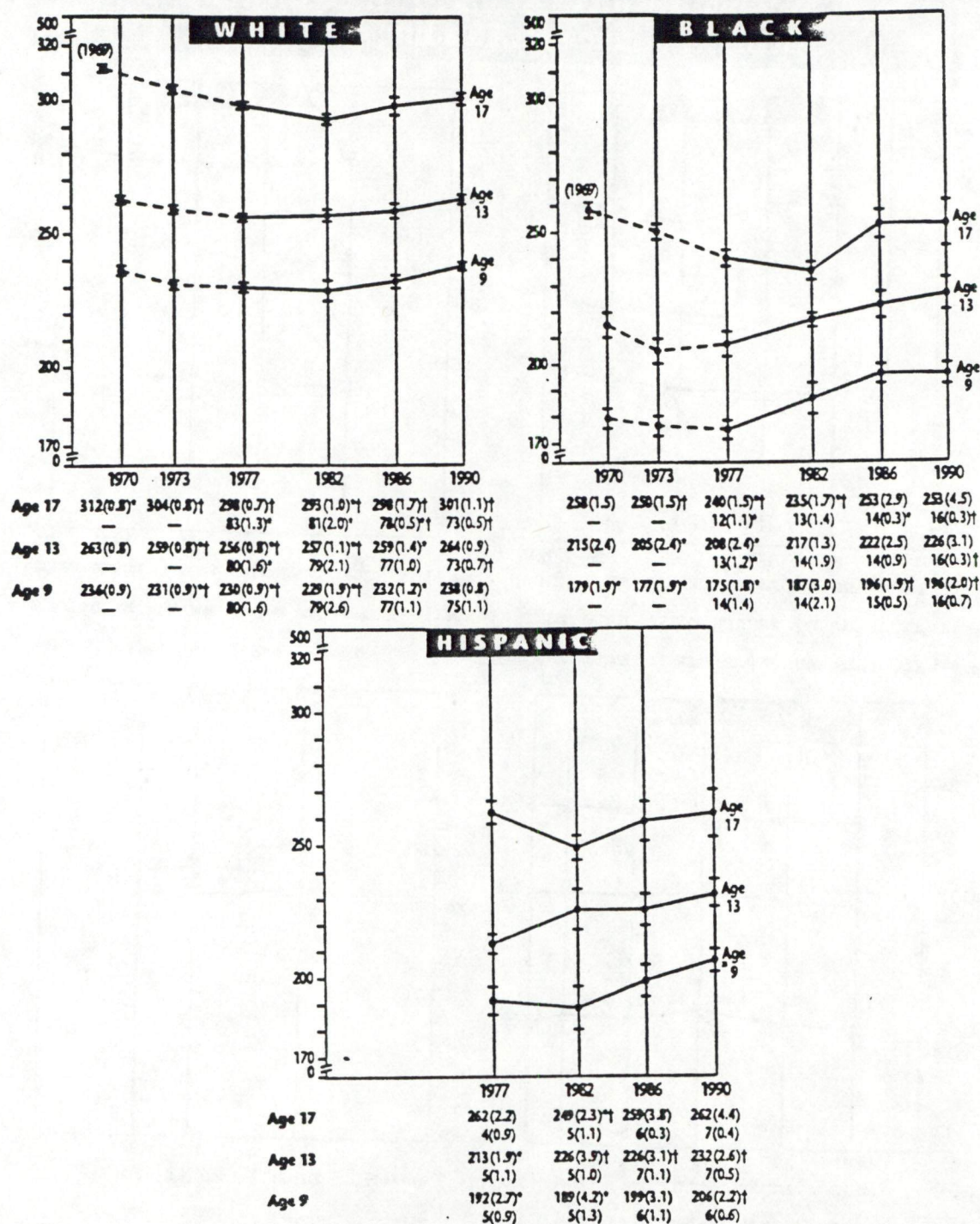


± 95 percent confidence interval. [---] Extrapolated from previous NAEP analyses.

* Statistically significant difference from 1990 and † statistically significant difference from 1969-70 for science, 1973 for mathematics, and 1971 for reading, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons. The standard errors of the estimated proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

FIGURE 2

Trends in Average Science Proficiency by Race/Ethnicity, 1969-70 to 1990



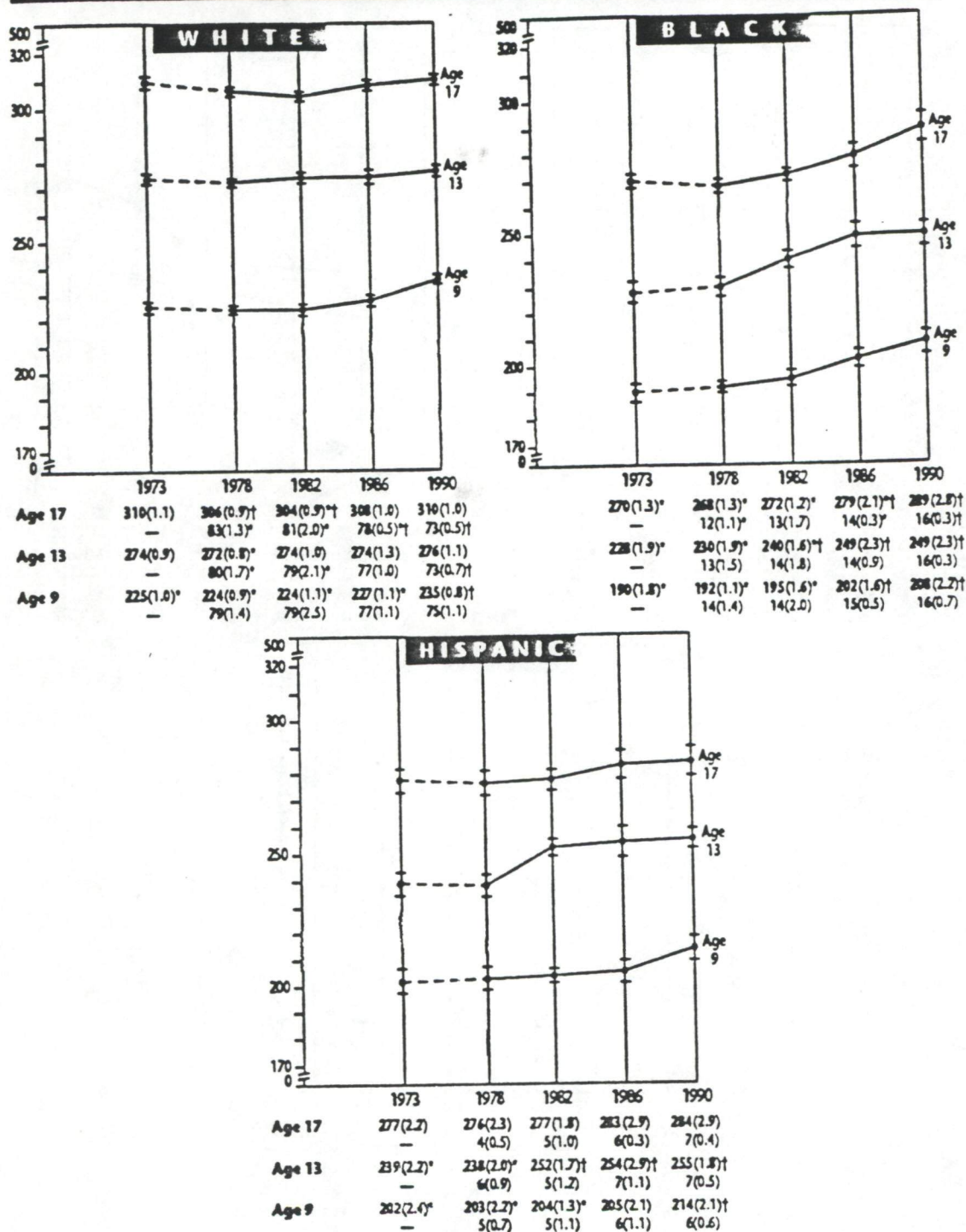
Note: Average proficiencies are in bold face type. For each age, the second row of data lists the percentages of students in the total population from each subgroup. Unavailable data are shown by dashes (—).

† 95 percent confidence interval. [—] Extrapolated from previous NAEP analyses.

* Statistically significant difference from 1990 and † statistically significant difference from 1969-70 (for proficiencies for White and Black students) or 1977 (for proficiencies for Hispanic students and for all percentages), as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons. (No significance test is reported when the percentage of students is either > 95.0 or < 5.0.) The standard errors of the estimated proficiencies and percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages do not total 100 percent because Asian/Pacific Islander and American Indian student data were analyzed separately. For Asian/Pacific Islander or American Indian students, the sample sizes were insufficient to permit robust trend estimates.

FIGURE 3

Trends in Average Mathematics Proficiency by Race/Ethnicity, 1973 to 1990



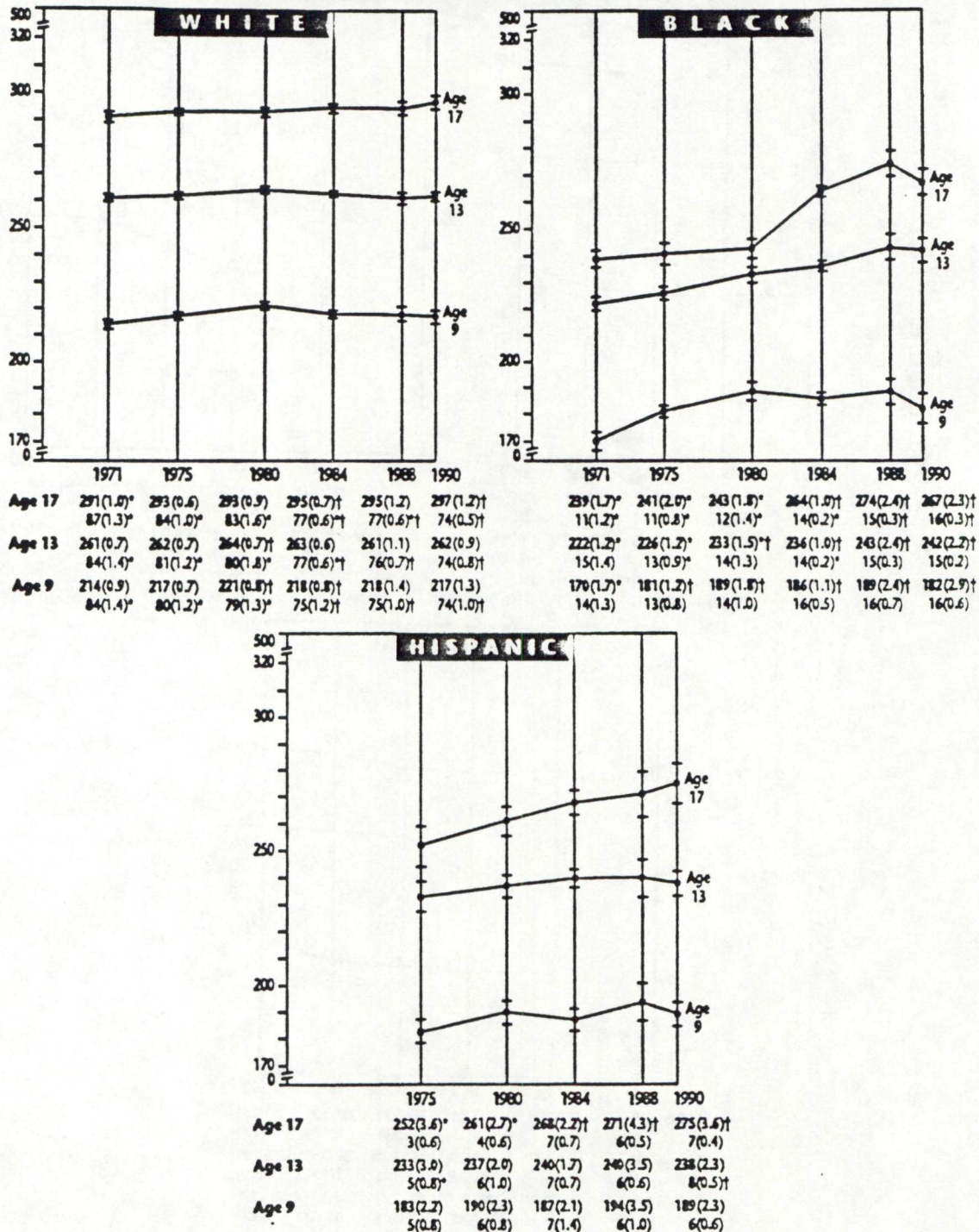
Note: Average proficiencies are in bold face type. For each age, the second row of data lists the percentages of students in the total population from each subgroup. Unavailable data are shown by dashes (—).

± 95 percent confidence interval; [---] Extrapolated from previous NAEP analyses.

* Statistically significant difference from 1973 (for proficiencies) or 1978 (for percentages), as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons. (No significance test is reported when the percentage of students is either > 95.0 or < 5.0.) The standard errors of the estimated proficiencies and percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages do not total 100 percent because Asian/Pacific Islander and American Indian student data were analyzed separately. For Asian/Pacific Islander or American Indian students, the sample sizes were insufficient to permit robust trend estimates.

FIGURE 4

Trends in Average Reading Proficiency by Race/Ethnicity, 1971 to 1990

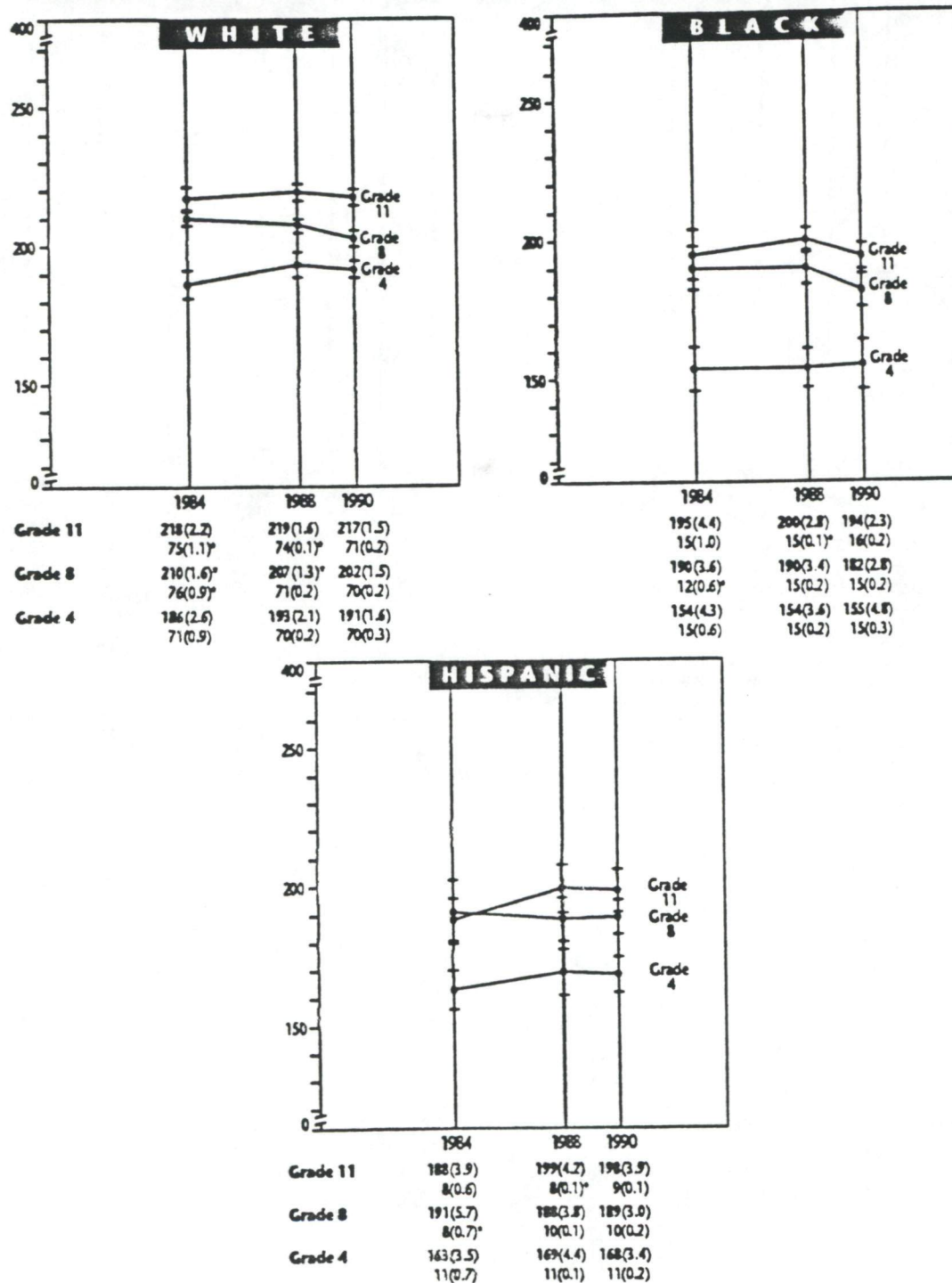


Note: Average proficiencies are in bold face type. For each age, the second row of data lists the percentages of students in the total population from each subgroup. Unavailable data are shown by dashes (—).

† 95 percent confidence interval.

* Statistically significant difference from 1990 and † statistically significant difference from 1971 (for White and Black students) or 1975 (for Hispanic students), as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons. (No significance test is reported when the percentage of students is either > 95.0 or < 5.0.) The standard errors of the estimated proficiencies and percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages do not total 100 percent because Asian/Pacific Islander and American Indian student data were analyzed separately. For Asian/Pacific Islander or American Indian students, the sample sizes were insufficient to permit robust trend estimates.

FIGURE 5
Trends in Average Writing Achievement
by Race/Ethnicity, 1984 to 1990



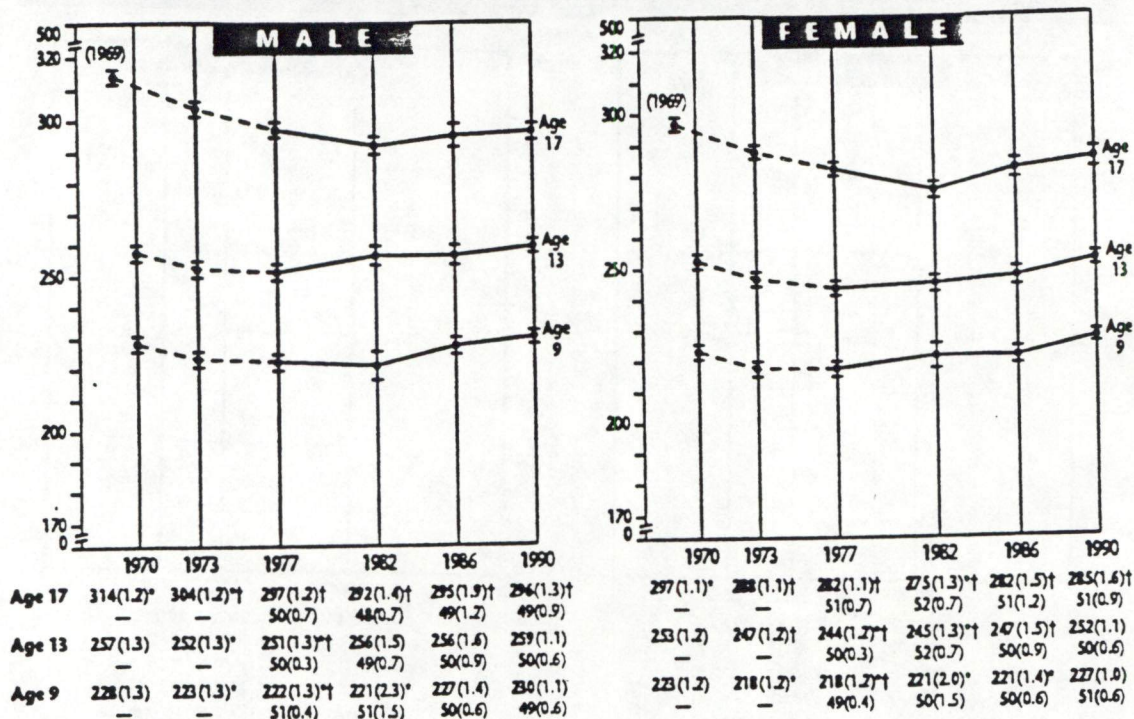
Note: Average proficiencies are in bold face type. For each age, the second row of data lists the percentages of students in the total population from each subgroup. Unavailable data are shown by dashes (—).

± 95 percent confidence interval.

* Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of two comparisons (each year compared to 1990). The standard errors of the estimated averages and percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages do not total 100 percent because Asian/Pacific Islander and American Indian student data were analyzed separately. For Asian/Pacific Islander or American Indian students, the sample sizes were insufficient to permit robust trend estimates.

FIGURE 6

Trends in Average Science Proficiency by Gender, 1969-70 to 1990



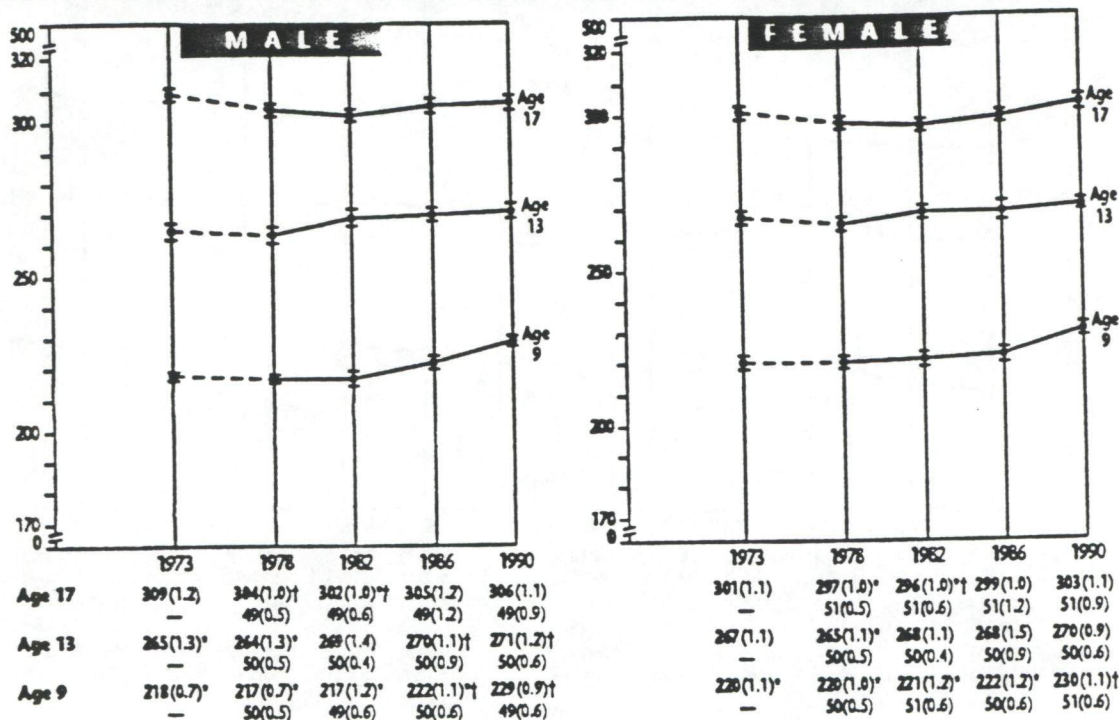
Note: Average proficiencies are in bold face type. For each age, the second row of data lists the percentages of students in the total population from each subgroup. Unavailable data are shown by dashes (—).

± 95 percent confidence interval. [- -] Extrapolated from previous NAEP analyses.

* Statistically significant difference from 1990 and † statistically significant difference from 1969-70 (for proficiencies) or 1977 (for percentages), as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons. The standard errors of the estimated proficiencies and percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students may not total 100 percent due to rounding.

FIGURE 7

Trends in Average Mathematics Proficiency by Gender, 1973 to 1990

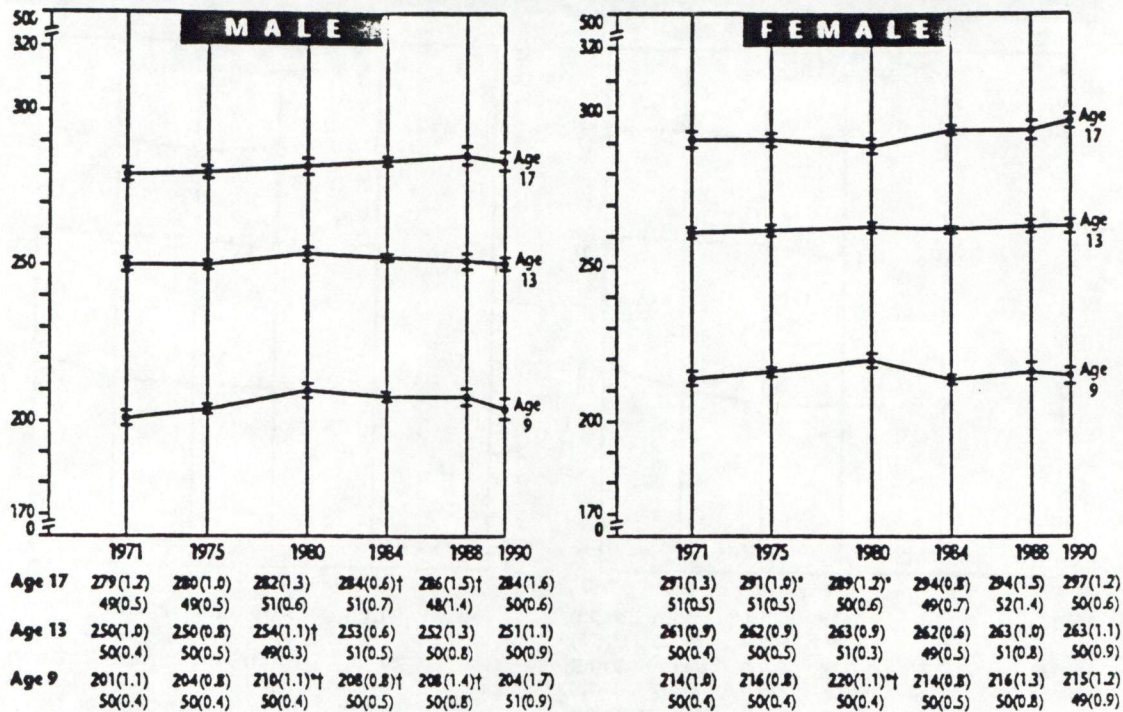


Note: Average proficiencies are in bold face type. For each age, the second row of data lists the percentages of students in the total population from each subgroup. Unavailable data are shown by dashes (—).

± 95 percent confidence interval. [—] Extrapolated from previous NAEP analyses.

- * Statistically significant difference from 1990 and † statistically significant difference from 1973 (for proficiencies) or 1978 (for percentages), as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons. The standard errors of the estimated proficiencies and percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students may not total 100 percent due to rounding.

FIGURE 8
Trends in Average Reading Proficiency
by Gender, 1971 to 1990

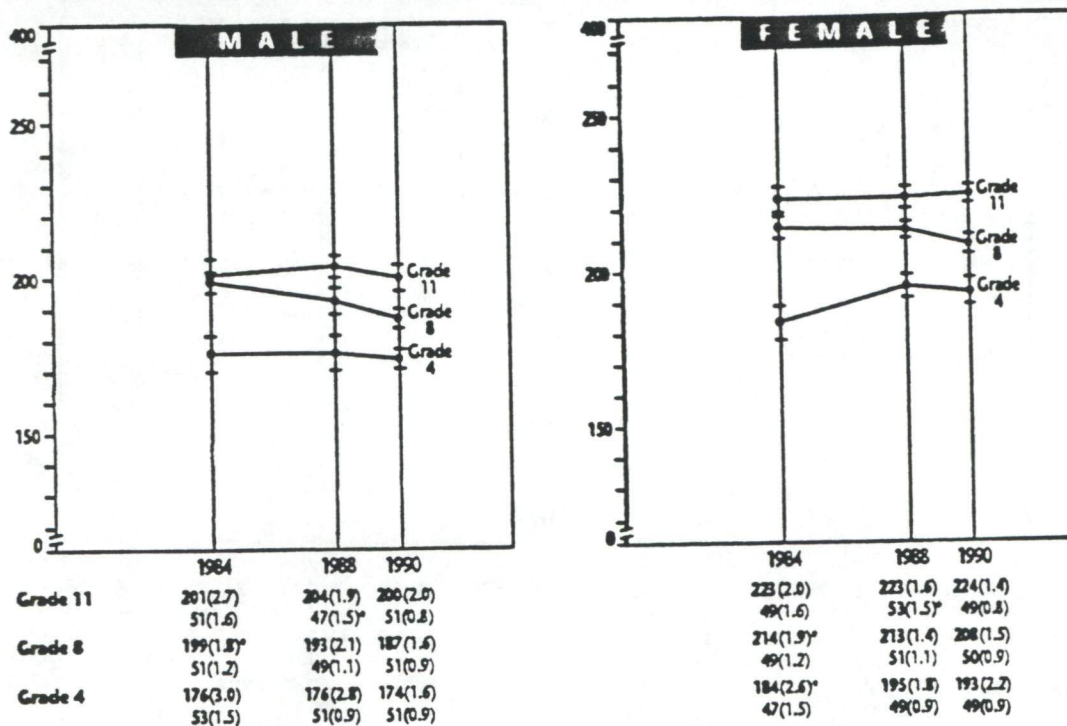


Note: Average proficiencies are in bold face type. For each age, the second row of data lists the percentages of students in the total population from each subgroup. Unavailable data are shown by dashes (—).

± 95 percent confidence interval.

* Statistically significant difference from 1990 and † statistically significant difference from 1971, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of nine comparisons. The standard errors of the estimated proficiencies and percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students may not total 100 percent due to rounding.

FIGURE 9
Trends in Average Writing Achievement
by Gender, 1984 to 1990



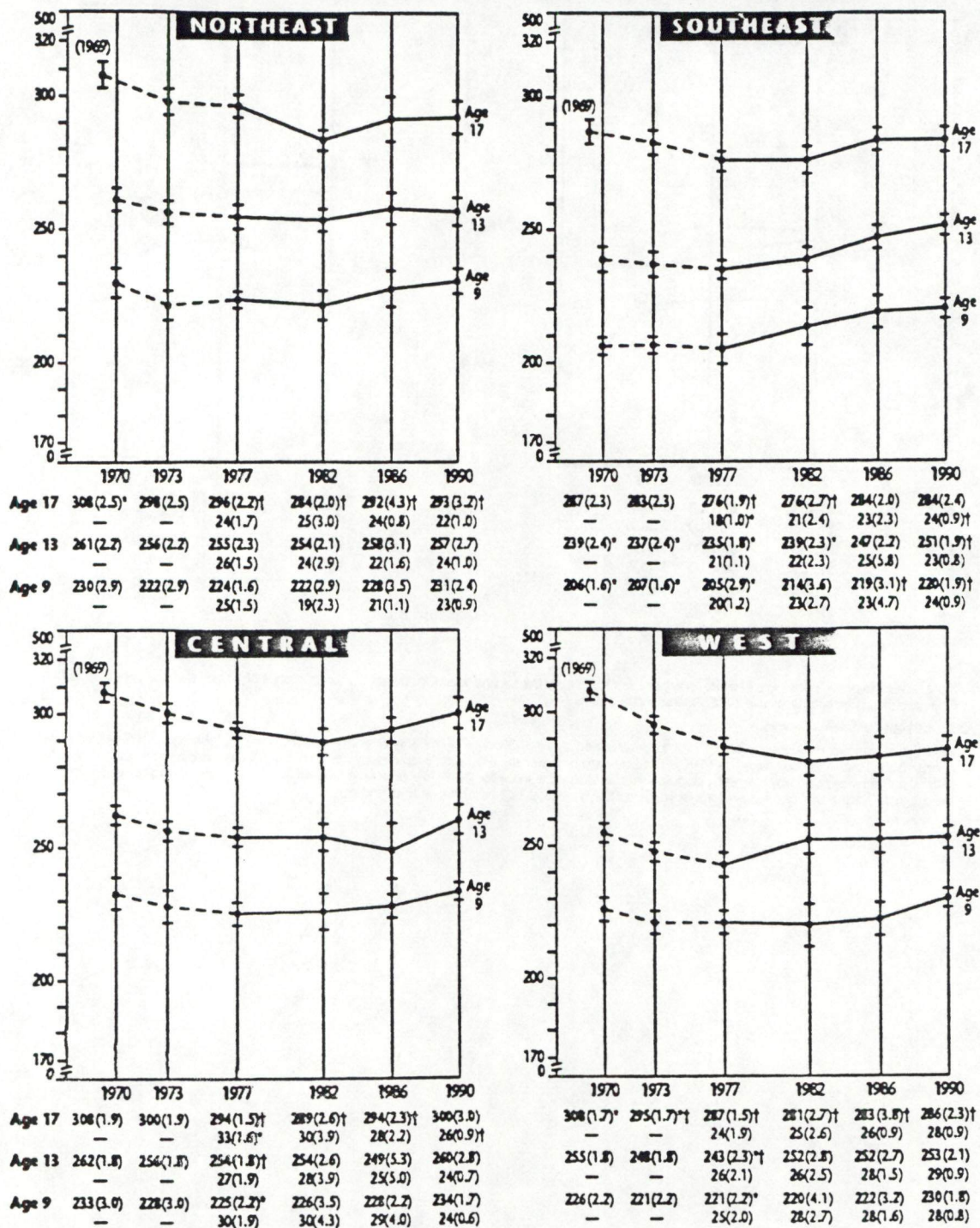
Note: Average proficiencies are in bold face type. For each age, the second row of data lists the percentages of students in the total population from each subgroup. Unavailable data are shown by dashes (—).

± 95 percent confidence interval.

- * Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of two comparisons (each year compared to 1990). The standard errors of the estimated averages and percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students may not total 100 percent due to rounding.

FIGURE 10

Trends in Average Science Proficiency by Region, 1969-70 to 1990



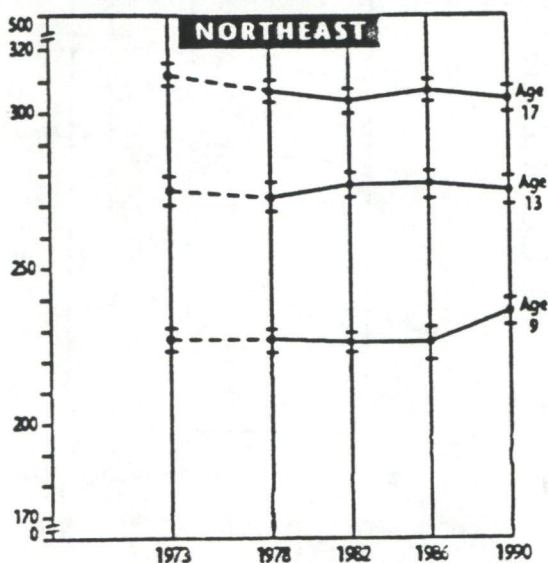
Note: Average proficiencies are in bold face type. For each age, the second row of data lists the percentages of students in the total population from each subgroup. Unavailable data are shown by dashes (—).

† 95 percent confidence interval. [---] Extrapolated from previous NAEP analyses.

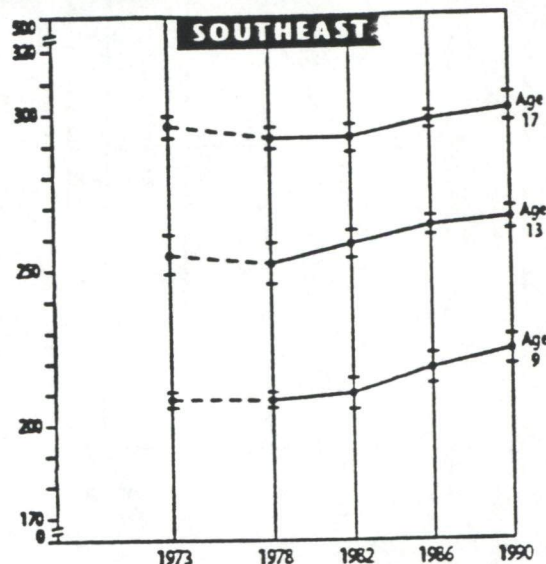
* Statistically significant difference from 1990 and † statistically significant difference from 1969-70 (for proficiencies) or 1977 (for percentages), as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons. The standard errors of the estimated proficiencies and percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students may not total 100 percent due to rounding.

FIGURE 11

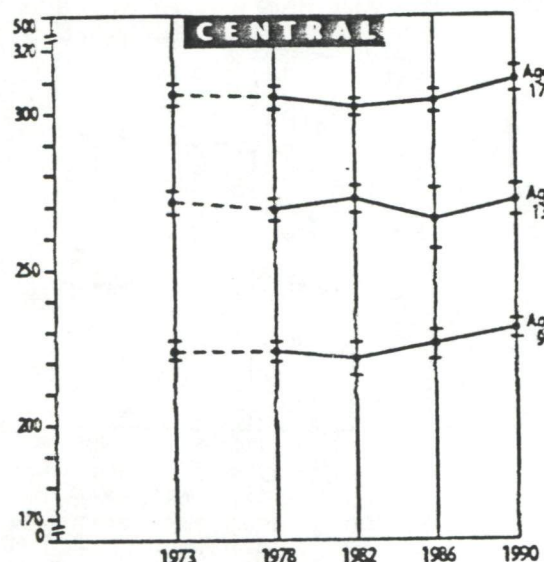
Trends in Average Mathematics Proficiency by Region, 1973 to 1990



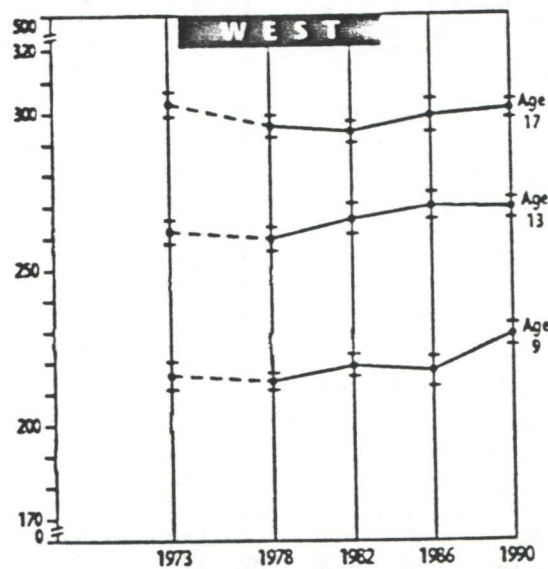
	1973	1978	1982	1986	1990
Age 17	312(1.8)	307(1.8)	304(2.0)	307(1.9)	304(2.1)
	—	23(2.0)	24(2.8)	24(0.8)	22(1.0)
Age 13	275(2.4)	273(2.4)	277(2.0)	277(2.2)	275(2.3)
	—	23(2.2)	24(2.5)	22(1.6)	24(1.0)
Age 9	227(1.9)*	227(1.9)*	226(1.8)*	226(2.7)*	236(2.1)†
	—	23(2.5)	21(2.7)	21(1.1)	23(0.9)



	1973	1978	1982	1986	1990
Age 17	296(1.8)	292(1.7)*	292(2.1)	297(1.4)	301(2.3)
	—	22(2.1)	21(2.1)	23(2.3)	24(0.9)
Age 13	255(3.2)	252(3.3)*	258(2.2)	264(1.4)	266(1.9)
	—	23(2.0)	23(2.1)	25(5.8)	23(0.8)
Age 9	208(1.3)*	208(1.2)*	210(2.5)*	218(2.5)†	224(2.4)†
	—	24(2.1)	24(2.7)	23(4.7)	24(0.9)



	1973	1978	1982	1986	1990
Age 17	306(1.8)	305(1.9)	302(1.4)*	304(1.9)	311(2.1)
	—	31(2.1)	30(4.3)	28(2.2)	26(0.9)
Age 13	271(1.8)	269(1.8)	273(2.1)	266(4.5)	272(2.4)
	—	31(1.8)*	27(3.4)	25(5.0)	24(0.7)†
Age 9	224(1.5)*	224(1.5)*	221(2.7)*	226(2.3)	231(1.3)†
	—	31(1.8)*	28(3.8)	29(4.0)	24(0.6)†



	1973	1978	1982	1986	1990
Age 17	303(2.0)	296(1.8)	294(1.9)†	299(2.7)	302(1.5)
	—	23(2.5)	26(2.8)	26(0.9)	28(0.9)
Age 13	262(1.9)*	260(1.9)*	266(2.4)	270(2.1)†	269(1.6)†
	—	24(2.2)	27(2.3)	28(1.5)	29(0.9)
Age 9	216(2.2)*	214(1.3)*	219(1.8)*	217(2.4)*	229(1.8)†
	—	23(2.0)	27(2.0)	28(1.6)	28(0.8)

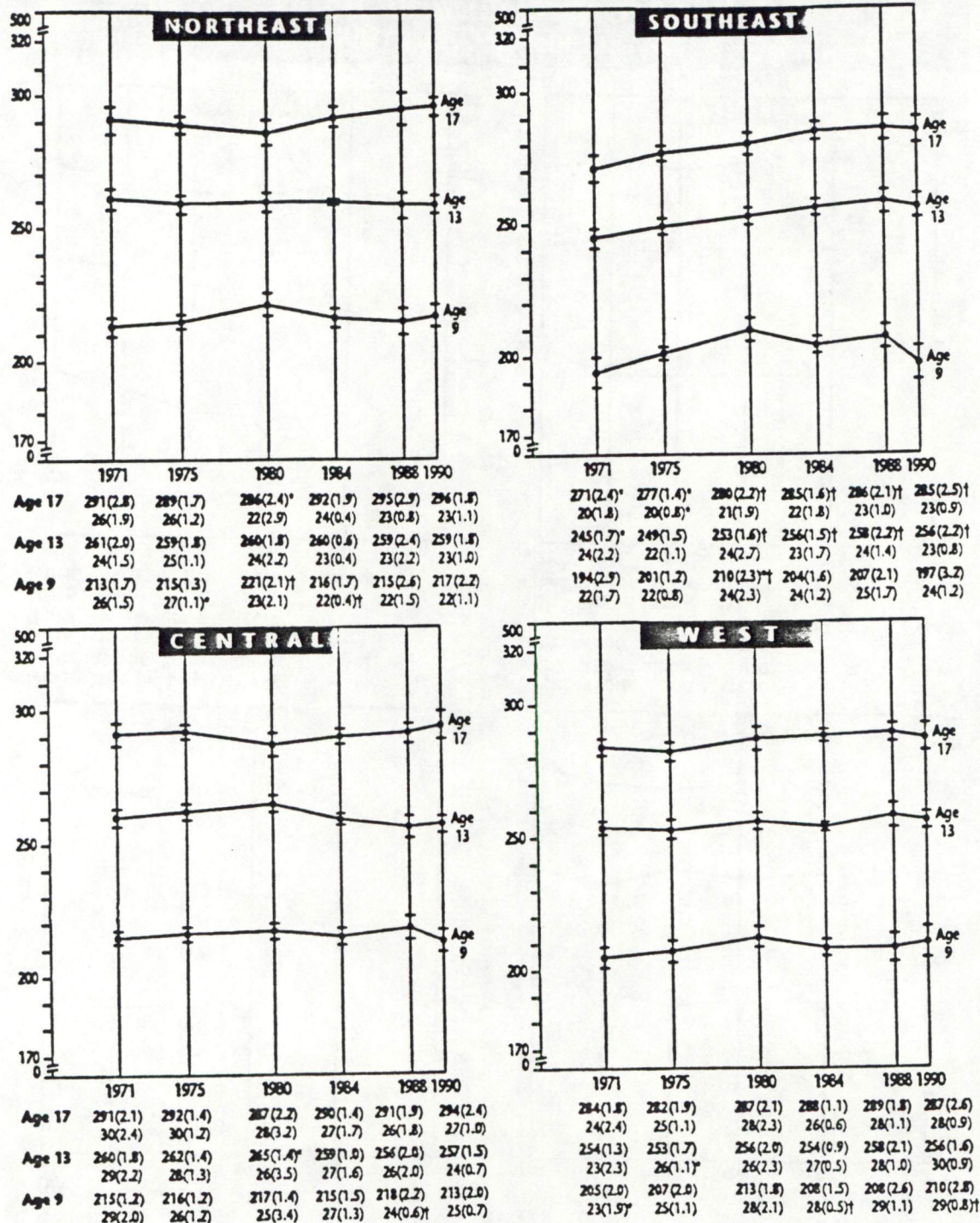
Note: Average proficiencies are in bold face type. For each age, the second row of data lists the percentages of students in the total population from each subgroup. Unavailable data are shown by dashes (—).

† 95 percent confidence interval. [---] Extrapolated from previous NAEF analyses.

* Statistically significant difference from 1990 and † statistically significant difference from 1973 (for proficiencies) or 1978 (for percentages), as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons. The standard errors of the estimated proficiencies and percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students may not total 100 percent due to rounding.

FIGURE 12

Trends in Average Reading Proficiency by Region, 1971 to 1990



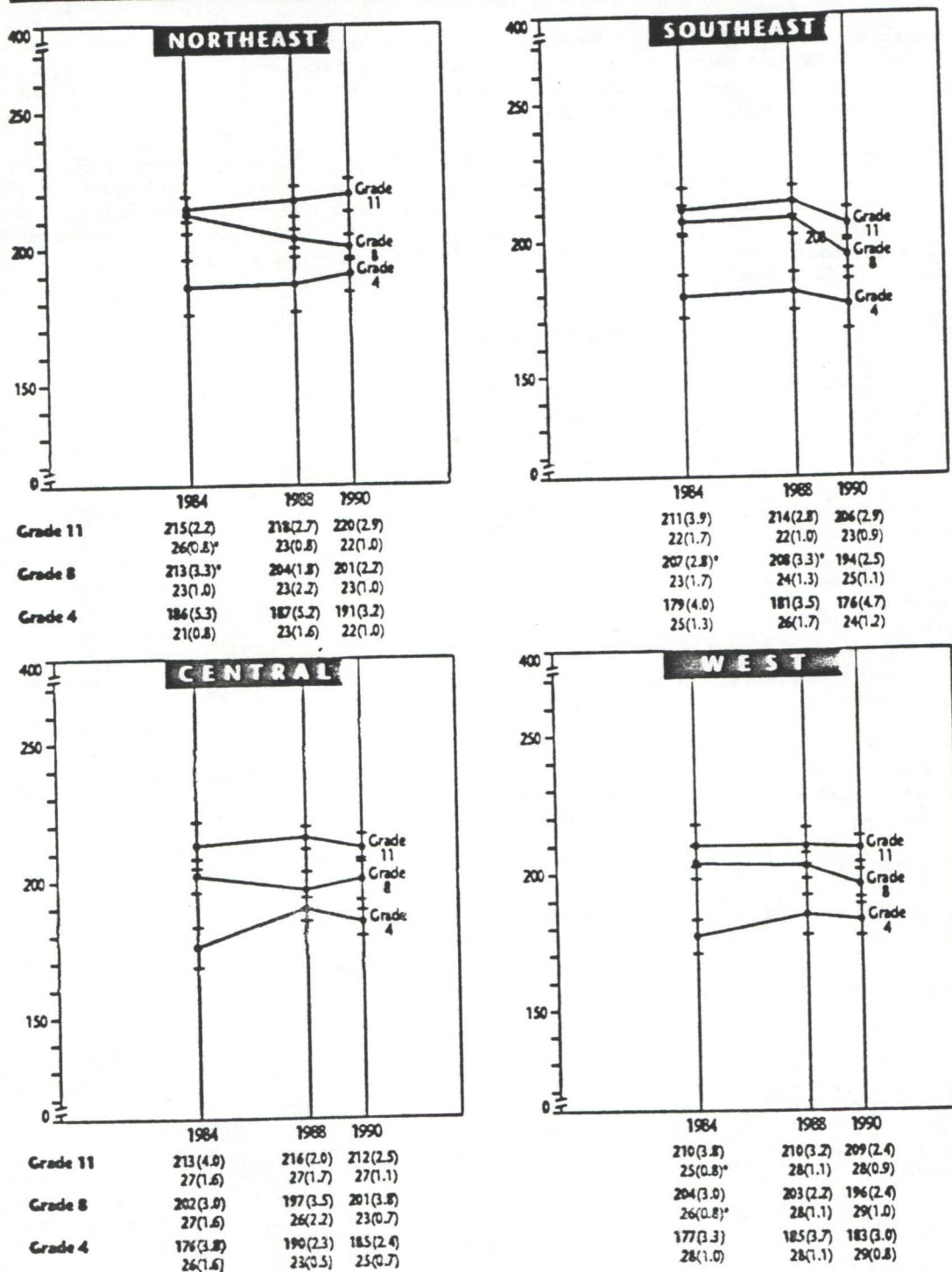
Note: Average proficiencies are in bold face type. For each age, the second row of data lists the percentages of students in the total population from each subgroup. Unavailable data are shown by dashes (—).

± 95 percent confidence interval.

* Statistically significant difference from 1990 and † statistically significant difference from 1971, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of nine comparisons. The standard errors of the estimated proficiencies and percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students may not total 100 percent due to rounding.

FIGURE 13

Trends in Average Writing Achievement by Region, 1984 to 1990



Note: Average proficiencies are in bold face type. For each age, the second row of data lists the percentages of students in the total population from each subgroup. Unavailable data are shown by dashes (—).

± 95 percent confidence interval.

* Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of two comparisons (each year compared to 1990). The standard errors of the estimated averages and percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students may not total 100 percent due to rounding.

What is The Nation's Report Card?

THE NATION'S REPORT CARD, the National Assessment of Educational Progress (NAEP), is the only nationally representative and continuing assessment of what America's students know and can do in various subject areas. Since 1969, assessments have been conducted periodically in reading, mathematics, science, writing, history/geography, and other fields. By making objective information on student performance available to policymakers at the national, state, and local levels, NAEP is an integral part of our nation's evaluation of the condition and progress of education. Only information related to academic achievement is collected under this program. NAEP guarantees the privacy of individual students and their families.

NAEP is a congressionally mandated project of the National Center for Education Statistics, the U.S. Department of Education. The Commissioner of Education Statistics is responsible, by law, for carrying out the NAEP project through competitive awards to qualified organizations. NAEP reports directly to the Commissioner, who is also responsible for providing continuing reviews, including validation studies and solicitation of public comment, on NAEP's conduct and usefulness.

In 1988, Congress created the National Assessment Governing Board (NAGB) to formulate policy guidelines for NAEP. The board is responsible for selecting the subject areas to be assessed, which may include adding to those specified by Congress; identifying appropriate achievement goals for each age and grade; developing assessment objectives; developing test specifications; designing the assessment methodology; developing guidelines and standards for data analysis and for reporting and disseminating results; developing standards and procedures for interstate, regional, and national comparisons; improving the form and use of the National Assessment; and ensuring that all items selected for use in the National Assessment are free from racial, cultural, gender, or regional bias.

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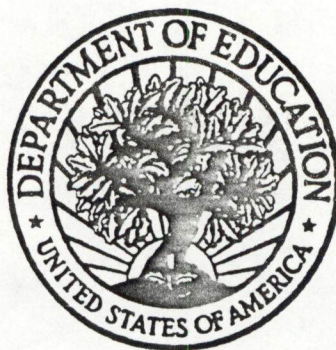
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Nelson, Mullins, Riley and
Scarborough
Columbia, South Carolina

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Senior Vice President
Valley Independent Bank
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Improvement (Ex-Officio)
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File

**ILLINOIS ACADEMY FOR SCIENCE AND MATHEMATICS TEACHERS
CHICAGO, ILLINOIS**

BACKGROUND

- o Chicago Public Schools--Statistics
 - 400,000 students
 - 29,000 teachers
 - 15,000 science/mathematics teachers
 - 525 elementary schools; 65 high schools

 - 88% minority
 - 60% Black
 - 24% Hispanic
 - 13% Caucasian
 - 84 different languages

 - 46% drop-out rate

 - 67% of total student population below poverty level

 - City-wide reform movement turned control of individual schools over to local neighborhood councils

DESCRIPTION OF ACADEMY

- o Background
 - Conceived by Leon Lederman, Lourdes Monteagudo (Deputy Mayor for Education), other Chicago teachers/scientists

 - Proposal developed through DOE-sponsored workshop--
teachers, ANL/FERMI scientists, principals,
university faculty, representatives of School
Board and union, etc
- o Purpose and Goals
 - Improve quality of mathematics and science teaching
in Chicago Public Schools using array of programs
operating during school year, summers, evenings and
weekends

 - Focus is on teachers--both current and newly hired
advanced training provided to ensure mastery of
subject matter and instructional skills

 - teachers brought into direct interaction with
research scientists at DOE labs, universities

 - Academy will also develop through research new
math/science curricula and instructional materials

 - Academy will work with university education departments
to restructure undergraduate training programs for
future science/math teachers

PROPOSED MODEL OF OPERATIONS FOR ACADEMY

- o Each fall, Academy hires 500 "novice teachers" on one year contracts including service in Chicago school
- o Novice teachers participate in three Academy training segments:
 - Segment 1: 10 weeks of Academy-based training coupled with team teaching in school with experienced teacher
 - Segment 2: 10 week period where new teacher takes over classes of experience teacher who in turn attends the Academy for 10 weeks
 - Segment 3: Another experienced teacher will be released to attend a 9 week session at the Academy
- o Following this model, 1500 current teachers will have 10 weeks each at Academy along with 500 new teachers who have had combination Academy and classroom training
 - Summer programs will provide equivalent training for approximately 500 additional experienced teachers
- o This plan would enable all of the 15,000 current science/math teachers to be re-trained by the Academy within 8-9 years
- o Model envisions that no more than 6 experienced teachers would be at Academy from an individual school at any one time

COSTS

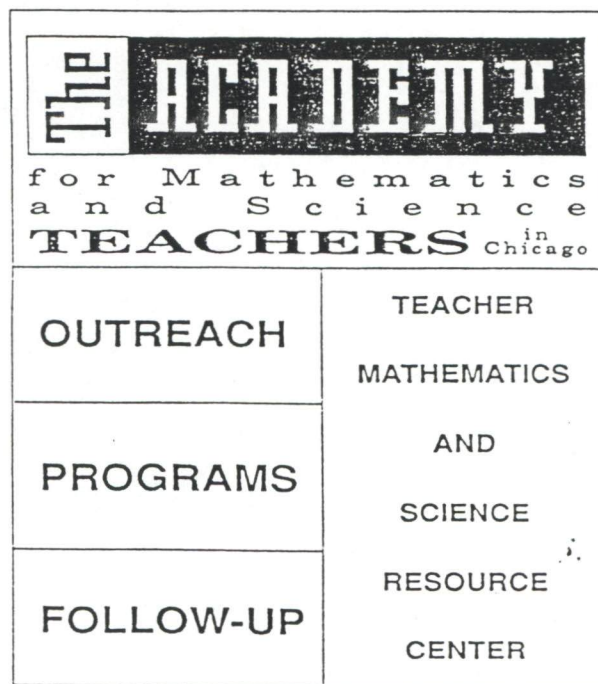
- o Academy would have staff of 100 people when fully operational
- o Start-up costs: \$5.7M FY 90 or 91
Operational costs: \$35M/year by FY 93
 - Academy teaching staff: \$7.2M
 - Academy support staff: 0.9
 - Teacher-students (novices) 20.3
 - Materials/supplies 5.0
 - Contingency 1.6
 - Total: \$35.0M (FY 90\$)
- o Principal costs would be one year salaries of newly hired (novice) teachers; Salaries of experienced teachers attending Academy would be paid by schools
- o Lederman Cost Comparison Analogy: "Costs of running the Academy are equivalent to annual salaries of 5-6 NBA superstars"

Letter from the Director Gordon Berry

Some of the Academy's plans for the coming year are described in this our first newsletter. Our primary goals of enhancing science and mathematics learning in all school of Chicago will be achieved only through the cooperation and hard work of all friends of our school students - that is teachers, parents, principals, community people, the Mayor, the politicians, the businessmen and educators in our midst.

The exciting part of the Academy is its development in tune with the democratic development of Chicago school reform. From the beginning we have been amazed at the richness of the resources in science and mathematics education within the city of Chicago. If we can coordinate and help channel those riches into helping our teachers throughout the school system, we know that we can have a tremendous effect. Just to motivate children into become explorers, enquirers, experimenters in the classroom will be enough. Such actions take place outside the schools, why not continue them inside?

Specifically, the programs for this year at the Academy are illustrated by the diagram below.



Our resource center, utilizing a whole floor of the IITRI building at 10 W. 35th street is expected to open its doors in the summer of 1991 to all teachers in the Chicago area. The three programs, OUTREACH, PROGRAMS, and FOLLOW-UP are sequential school-based programs expected to reach all 595 Chicago schools within the next six years. This coming year our pilot program will reach 10 schools. We have 45 Academy teachers (just now completing 6 weeks training). These teachers will spend next semester in 10 Chicago schools (now being chosen). All the teachers in those ten schools will spend 2 days each two weeks at the Academy learning content and teaching techniques in experimental, hands-on classroom learning in integrated mathematics and science. Academy faculty will work up to one day per week in each school for at least a year following the intensive semester program.

The Academy helps to develop a **RESOURCEFUL** teacher. The school provides **RESOURCES** and **TIME**. This is the contract to give our children the chance they deserve.

THE ACADEMY FOR MATHEMATICS AND SCIENCE TEACHERS IN CHICAGO
REPORT ON THE SELECTION PROCESS
OF THE TEN INTENSIVE PROGRAM SCHOOLS

JANUARY 4, 1991

The selection process began in October and November when 135 applications were mailed out to interested schools across the city. By early December nearly 80 completed applications had been received. The following were the criteria used to sort and finally select the ten schools:

--There would be one school per elementary school district.

--The final schools chosen would as a group approximate the ethnic diversity of the city.

--In general, the schools chosen had to be medium to small because we only have approximately 40 academy teachers to send out. However, we felt we should choose at least one large school.

--The achievement levels at the schools as a group would reflect more typical Chicago Public School situations. We wanted to take some schools with very low scores; some with moderate scores and very few with high scores. The chosen schools must challenge us without presenting situations that would outstrip our resources this first year.

--We wanted the 10 schools in the main to be neighborhood schools.

--We wanted, in general, to choose schools that work with a sizeable number of children from low-income families.

--We wanted to work with schools that displayed a real openness to our program. This involved such factors as administrative leadership; teacher receptivity; and parent involvement.

Our Outreach staff in consultation with Academy faculty reviewed the applications and narrowed the field down to 23 schools in mid-December. Then all 23 of these schools were visited by teams made up of Academy outreach staff, faculty, and teachers. The visits were approximately 2 to 3 hours in length. Each visit included a principal interview; random visits to classrooms; discussions with teachers and other interested personnel; and in most cases LSC folks were also present. Then on December 20, 1990 a mass orientation was held at the Academy for all 23 schools. We requested that at least 10 people from each school attend, including parents, teachers and the principal. This number had to include at least 2 LSC parents and/or community members. This we felt would give us in some small way an idea of the level of interest each school had. Over 300 people showed up, indicating immense interest on the part of all the schools.

The gathered insights of the site visits; the accumulated data from the school applications; and impressions formed during informal conversations at the orientation all proved helpful in the difficult task of making our final choice. The Academy faculty met over a 2 day period to carefully look at and discuss all the accumulated input regarding each school. On January 4, 1991 the following ten schools were chosen:

- Jane Addams Elementary
1081 S. Avenue H
Alice O. Keane, Principal
- Christian Ebinger Elementary
7350 W. Pratt Ave.
Donald Anderson, Principal
- Medgar Evers Elementary
9811 S. Lowe Ave.
Emmerine Clarkston, Principal
- John C. Haines Elementary
247 W. 23rd Place
Gandy Heaston, Principal
- Guglielmo Marconi Community Academy
230 N. Kolmar Ave.
Eugene A. Kaide, Principal
- Helen J. McCorkle Elementary
4421 S. State St.
Jerry Johnson, Principal
- Donald L. Morrill Elementary
6011 S. Rockwell St.
Diana Gonzalez-Scatton, Principal
- William H. Prescott Elementary
1632 W. Wrightwood Ave.
Karen Carlson, Principal
- Friedrick Von Schiller Elementary
640 W. Scott St.
Ervin Bond, Principal
- John Greenleaf Whittier Elementary
1900 W. 23rd St.
Irene Damota, Principal

THE 10 STAFF RECOMMENDED SCHOOLS
January 7, 1991

<u>DISTRICT</u>	<u>SCHOOL</u>	<u>CAMPUS</u>	<u>ETHNIC MAKEUP</u>	<u>LOW INCOME %</u>	<u>IGAP/ITBS INDEX</u>	<u>TYPE</u>	<u># OF STUDENTS</u>	<u># OF AT'S REQ'D</u>
1	Ebinger	Closed	MC-W	50.7%	117/98	K-8	286	3
2	Schiller	Closed	PB	100%	16/24	5-8	244	3
3	Prescott	Closed	PH	86.5%	39/33	K-8	458	4
4	Marconi	Closed	PB	68%	60/59	K-8	555	5
5	Whittier	Closed	PH	92%	29/33	K-6	428	4
6	Haines	Closed	MC-B	100%	55/29	K-8	375	4
7	Morrill	Closed	MC-H	45.7%	31/24	K-8	923	7
8	McCorkle	Closed	PB	100%	21/11	K-8	474	4
9	Addams	Open	MC-WH	43.3%	111/34	K-8	381	3
10	Evers	Open	PB	81%	49/25	K-8	283	3
							<u>40</u>	

PB = Predominantly Black
PH = Predominantly Hispanic
MC-H = Multi-cultural, majority Hispanic
MC-WH = Multi-cultural, 1/2 White and 1/2 Hispanic
MC-B = Multi-cultural, majority Black
MC-W = Multi-cultural, majority white

STANDARDS FOR IGAP/ITBS INDEX:
National: 100/100
State: 137/NA
Chicago: 45/40
Dist. 1: 71/65
Dist. 2: 78/70
Dist. 3: 27/26
Dist. 4: 27/25
Dist. 5: 44/37
Dist. 6: 43/37
Dist. 7: 49/41
Dist. 8: 34/29
Dist. 9: 45/42
Dist. 10: 50/43

ACADEMY FOR MATHEMATICS AND SCIENCE TEACHERS IN CHICAGO

Program Development
Sylvia L. Peters, Director

Linda Bush
Laura Downy
Cynthia Felton
Vinita Ricks
William Mitchell
James Williams

The Program for the Academy is being developed by a group of educators who have distinguished themselves in the fields of teacher professional development, parental involvement, research and development, science, mathematics, and collaborative organizing.

Focus groups and committees have been formed to provide ongoing information and feedback regarding the needs, desires and hopes of the various constituencies the Academy seeks to serve. Teachers, parents, university representatives, science labs, business and other interested citizens have been intricately involved in the evolution of the program which is being prepared for the Academy.

The Academy will provide professional development for all of the mathematics and science teachers in the Chicago Public Schools. Its programs will provide direct services and much needed on-site follow-up to ensure that the development of staff will result in greatly improved instructional services to students. Furthermore, LSC's will be expected to participate in the Academy program along with the principal, teachers and families of the children served by the school.

Three levels of professional staff are needed to support the program. **Academy Teachers** will function as replacement staff when regular teachers come to the Academy for professional development. **Academy Mentors** are the curriculum experts who will coach the regular teachers to higher levels of cognitive awareness. The regular teachers will become **Academy Teacher/Learners** who will receive development in innovative science and mathematics programs which have been selected by the local school.

A critical philosophical component of the program is to create a community of **Academy Teacher/Learners** who have the ability to improve the learning and academic achievement of the children in the Chicago Public Schools.

Chicago Aims to Reform Teaching of Science

Physicist Tackles Math, Science Illiteracy Chicago Teachers to Get Lessons in Making Class Exciting

By William Booth
Washington Post Staff Writer

CHICAGO—Here at Prescott Elementary School, science is not a subject of adventure and discovery, but a dull grind through a textbook. Math is not something real people use, but a problem a student sees on a quiz.

At Prescott, the teachers teach science and math by the book. There are no microscopes in the classroom, no models of cells, no molecules of the solar system, no fish tanks, no chemistry kits, no insect collections, no measuring sticks, no scales—nothing. The students are bored, and they are failing.

So it is here that a Nobel prize-winning phys-

icist named Leon Lederman is launching one of the nation's most ambitious battles against illiteracy in science and mathematics. Over the next seven years, Lederman and a group of educators plan to take every single math and science teacher in Chicago and show each one how to teach math and science in a way that does not leave their students staring blankly into space.

"It is a Herculean task he has taken on," said Luther Williams, head of education and human resources at the National Science Foundation in Washington. Williams said that if Lederman and his associates can make it work in Chicago, which former education secretary William J. Bennett once called the country's worst school district, the

See SCIENCE, A16, Oct. 1



Nobel prize winner Leon Lederman, posing with Albert Einstein doll, has set out to reform teaching

To teach students math, the academy will stress solving problems of immediate interest to students. For example, if pupils are collecting information on how fast a toy car rolls down a ramp, they will take measurements and plot their data on a graph. The graph, and the math it represents, can help teach children about relationships between math, force and time—and what Lederman calls the most exciting thing of all: the ability to predict the future, or at least how far a toy car will roll down a longer ramp.

The teachers will be taught to teach the new way at a newly created Academy for Mathematics and Science Teachers, where they will spend two or three days a week, every other week, for 20 weeks. In addition to the new curriculum, teachers will be taught to hold the students' interest and to get away from textbooks and into experiments and hands-on teaching.

While the regular teachers are away, substitutes, already prepared to teach the new way, will be sent into classrooms.

How much change realistically can be expected in this poverty-besieged environment?

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program could work almost anywhere. They have picked a tough site for their experiment.

The program is based on two ideas. One is that many science and math teachers have a poor understanding of their subject and, sometimes, an outright fear of it. As a result, they force-feed textbooks into their students, drowning them in a boring compendium of facts.

The second idea is that children have a natural enthusiasm for science and math but not for the way the subjects are usually presented. In the new method, students will be allowed to do experiments and to experience hands-on science, even if their experimental tools are only a rubber ball or a simple set of spheres and shapes. General principles will be stressed over memorization of facts. For example, the new system considers it more important for students to see how vertebrates share the same skeletal plan than to memorize the names of all the bones. Math that is used to solve real problems, supporters of the new method say, is better than math that appears to have no relevance to the student's life.

The children of wealth and privilege have largely abandoned the Chicago School District for the suburbs or private institutions. The 500 pupils at Prescott Elementary come from working-class families. Mostly Hispanic, some of the youngest do not speak English. More than three-quarters of them are poor. They get a free school lunch. Because there are gangs in

the neighborhood, Prescott operates as a "closed campus," meaning the students come at 8:30 a.m. and do not leave the building or grounds until 2:30 p.m.

In Helen Hogan's math class, the seventh- and eighth-graders work in their workbooks. Hogan is a disciplinarian. There is no cutting up in her class. The children grind through their exercises, back and forth to the blackboard, learning their fractions. On their last report cards, half of Hogan's students failed.

"They do math in a vacuum. It has no relevance to their lives. Why should they care?" said Gordon Berry, the acting director of the teacher's academy.

In Emma Fogarty's seventh- and eighth-grade science classes, the students also work from a textbook. There are no calipers, no balances, no measuring sticks, no spheres, no graduated cylinders. The students do science without ever touching anything but the textbook.

Jerry Hayes, program director at the academy, compared the experience to learning physical education by memorizing the great basketball and football games of the past but never picking up a ball.

"We're failing our kids," said Karen Carlson, Prescott's new principal. "We are not even meeting them halfway."

"I went to school here. They haven't done anything here since I was a student 20 years ago," said Jim Gruber, a locksmith in the neighborhood and member of the Local School Council, which hired the new principal.

"Our problem is our students don't dream [beyond]... what they see right in front of them," said Deria Barajas, mother of three Prescott students and chairman of the Local School Council.

Berry and his colleagues from the academy were impressed when they visited Prescott to see if the teachers and community were truly interested in what they had to offer. "The halls are clean. You wouldn't believe what some of the halls look like," Berry said. "The principal is inspiring. The community is ready for change."

"I want to believe in this," Carlson said. "I want our kids to succeed. I hope that it works. Not everyone will change, but enough of the teachers might."

To start the academy, Lederman last summer raised several million dollars from federal, state and private sources. He says he needs \$35 million a year to do the job right. "I was so desperate for money, I even went to the Department of Education," Lederman said in an only half-joking allusion to the lack of imagination shown by the traditional education establishment.

The academy will work something like this: It will hire and train several hundred teachers. They will be sent into the schools to substitute for teachers who come to the academy for science and math training several days a week for three or four months. Then both the academy teacher and the school teacher will

teach together, giving the school teachers the time and encouragement to use what they have learned.

NSF's Williams said he is impressed by the plans to follow up on the teacher training. Lack of such follow-up has been a failing of previous efforts. He is pleased that Lederman and his colleagues are attempting to retrain the entire Chicago school district instead of a few "magnet" schools. "There's no reason to get excited if we have a great program in a few schools," Williams said. "We need good programs in every school."

Williams said it is too early to tell whether Lederman will succeed, Lederman agreed.

"But I think we have a better chance of succeeding than people think," Lederman said. "Kids want to learn science. They're naturally curious. Until now, we've just been doing our best to spoil it for them."