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ABSTRACT

The Dwight D. Eisenhower Mathematics and Science Education Program is authorized under the Education for Economic Security Act as amended by the Hawkins-Stafford Elementary and Secondary Improvement Amendments of 1988. The purpose of the program is to support innovative projects of national significance directed at improving the quality of teaching and instruction in mathematics and science in the schools and to increase the access of all students to th c instruction. This collection of abstracts describes in broad terms the scope and objectives of the 1990 FIRST Program Grants in 27 states, the District of Columbia, and American Samoa, in mathematics and science, and includes names and addresses of recipients. The abstracts are divided into five catgories including: elementary and secondary mathematics; elementary and secondary science; and other mathematics and science education projects. Included in this publication are a list of contacts for the program, a summary of the characteristics of the projects funded by the program, a list of program types, a brief list of awardees by location, and abstracts for the 63 funded projects. Abstracts provide a brief description of the project; names, phone numbers, and addresses of contact persons; award amount; and project duration. (CW)

Dwight D. Eisenhower Mathematics and Science National Programs

National Conference
Washington, DC
October 14-17, 1990

Fund for the Improvement and Reform of Schools and Teaching
Office of Educational Research and Improvement
United States Department of Education

Abstracts of New and Continuation Awards

Dwight D. Eisenhower Mathematics and Science National Programs

Presented at the 1990 National Conference:

"The Critical Role of the Eisenhower Program in Meeting the National Education Goals in Mathematics and Science"

Sponsored by:
The United States Department of Education

Office of Educational Research and Improvement
Fund for the Improvement and Reform of Schools and Teaching

Office of Elementary and Secondary Education
School Improvement Programs

Rebecca Wilt, Allen Schmieder, Editors
Michael Mitchener, Compiler

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INTRODUCTION

EXTRAORDINARY PROGRAMS TO MEET AN EXTRAORDINARY CHALLENGE

On the occasion of celebrating the 100th birthday of Dwight D. Eisenhower and gathering at the Second Joint National Conference on the Dwight D. Eisenhower Mathematics and Science Education Improvement Program, the Fund for the Improvement and Reform of Schools and Teaching Office is proud to present abstracts of the new and continuation grants awarded in 1990 under the National Program part of the Eisenhower Act. The Dwight D. Eisenhower Mathematics and Science Education Program is authorized under the Education for Economic Security Act as amended by the Hawkins-Stafford Elementary and Secondary Improvement Amendments of 1988. The purpose of the program is to support innovative projects of national significance directed at improving the quality of teaching and instruction in mathematics and science in the schools and to increase the access of all students to that instruction.

Collectively, these projects represent a vanguard of innovators in mathematics and science education who will help provide the kind of leadership needed to dramatically strengthen the quality of mathematics and science teaching and instruction in this nation's schools. These extraordinary programs focus on teacher training and curriculum change, K-12, and are directed at both increasing ongoing improvements in mathematics and science education already initiated by some of America's foremost educational organizations and institutions and developing new models of change and reform for a broad range of educational settings. There is a strong emphasis on system-wide impact and funded projects including several state-wide programs and a variety of urban and rural school system programs. Although the target for most of the projects is the total student population, some priority is given to the underrepresented and underserved as well as the gifted and talented. Many of the projects rely upon the new technologies. All projects include strong documentation coupled with evaluation components so that program results can be effectively shared nationwide. Following are some examples of the outstanding programs included in this booklet.

SECONDARY

"The program could stimulate a quantum leap in educational achievement in the sciences," stated an eminent national researcher when describing the heart of the curriculum improvement project awarded to the National Science Teachers Association (NSTA) by the U. S. Department of Education. The revolutionary national program is directed at totally reforming the scope, sequence, and coordination of secondary school science. Under this program, directed at regaining America's science education lead in the world, students will study physics, chemistry, biology, and earth/space science every year for six years. In the traditional "layer cake" curriculum, these subjects are taught in year-long, separate courses, and of those students who graduate, 80% take a biology course, 40% a chemistry course, and 20% a physics course. In each case, the one year experience in each of these very essential subjects is the last the student has in his or her high school education. Department of Education grants also support projects in California and Texas where the NSTA-led program is being piloted at the State and local levels. These projects will provide impressive examples of how reform can be accomplished in science education at the State level and in major urban school systems.

Model education-business partnerships, being developed by a number of the grantees, bring new and creative resources to bear on the current mathematics-science crisis in the schools. Utilizing participants on a state-wide basis, the Michigan Technology Council has initiated a project closely linking schools and the workplace in its teacher training and inservice programs. A regional, rural education pilot is being implemented by the Mid-Continent Regional Education Laboratory in Aurora, Colorado, which is building partnerships among rural, small schools, universities, State Departments of Education, and public and private resource agencies.

Several grants to the private sector will produce models of alternative approaches for stronger science and mathematics programs. The Rand Corporation, for example, is developing a computer-based algebra program that highlights some of the mathematical modeling, functions, and statistics needed in some of this nation's most important careers, while the Educational Testing Service is developing an inservice education program that assists teachers in developing, applying and infusing the innovative technology-based instructional perspective of "systems thinking" into existing curricula in science and mathematics. The American Association of Physics Teachers is conducting a project which has identified landmark films for teaching school physics and transfered them to videotape, carefully edited into short vignettes for classroom use, supported with interactive software lessons that will be distributed nationally in both videotape and videodisc formats accompanied by teachers' manuals and diskettes. The Exploratorium is providing a community-based science and mathematics teacher enhancement resource by developing a critical mass of teachers trained in activity-based science teaching for Chapter I schools in San Francisco. The National Audubon Society has developed a national strategy for working with inner city school systems to integrate issues of environmental hazards into science education.

ELEMENTARY

The goal of most of the elementary level grants is to restructure and reform the complete mathematics and science curriculum for grades K-6. To maximize the capacity for change, most projects incorporate an increased emphasis on practical hands on mathematics and science experiences, paired with earlier and more in depth lessons in problem solving and higher order thinking skills. For instance, the Franklin Institute Science Museum in Philadelphia is developing a statewide network for the enhancement of practical science education that is projected to reach 25 percent of the states' teachers.

An unusually high percentage of funded projects, both at the elementary and secondary levels, are based on the new technologies, especially distance learning and computer based instruction. Futuristic telecommunications are a central part of the programs conducted by the Columbia Education Center in Portland, Oregon providing support to elementary education leaders in 15 states through distance learning systems that provide staff development and curriculum improvement services to all levels of systems including small-town and rural schools. At the University of Houston, school board members and administrators are among those being trained in order to improve statewide achievement in problem solving, geometry, and probability in mathematics instruction.

This collection of abstracts describes in broad terms the scope and objectives of the 1990 FIRST Program Grants in mathematics and science and includes names and addresses of recipients. Our conviction is that these projects, which were selected from among a large number of outstanding submissions (nearly 1000) from every state in the nation, represent the best identified by an extraordinary competition and review process and will be exemplars for innovation, encouraging increased networking between education leaders committed to substantially improving mathematics and science education in this nation.

Richard T. La Pointe

Richard T. La Pointe
Director
Fund for the Improvement and
Reform of Schools and Teaching

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Other FIRST Programs:

Family-School Partnerships ..... (202) 219-1496

Schools and Teaching ..... (202) 219-1496

Fund for Innovation in Education (FIE) ..... (202) 219-1496

National School Volunteer Program ..... (202) 219-1496

Comprehensive School Health ..... (202) 219-1496

Technology ..... (202) 219-1496

Computer Assisted Instruction ..... (202) 219-1496

GENERAL CHARACTERISTICS OF PROGRAMS

1. Grant Holder Location. Grants holders are located in 27 States, the District of Columbia and American Samoa

2. Grant Service Area. Although grants are located in 27 states, all of the states in the nation will be receiving some level of services from the collective programs of the recommended projects. Many have national or multi-state audiences, and almost all are developing and/or articulating models that should have usefulness to science and mathematics educators across the nation. Approximately one-fourth of the projects are related to distance communication of one type or another. Plans are being explored to provide access to these programs by school systems and educators that are not currently linked to the program telecommunications systems.

3. Grant Holders.

    11 School Systems
    22 Institutions of Higher Education
    12 Consortiums
    8 Not for Profit Educational Organizations/Corporations
    5 ED R & D Centers
    3 State Educational Agencies
    2 Educational Associations
    2 Museums/Science Centers
    1 State Agency for Higher Education
    1 Insular Area
    1 Intermediate Educational Agency

4. Subject Distribution.

    17 Mathematics
    27 Science
    19 Mathematics and Science

5. Grade Level Distribution.

    26 Elementary
    19 Middle School/Secondary
    18 Elementary and Secondary

6. Project Length.

    32 - 3 Year Projects
    26 - 2 Year Projects
    5 - 1 Year Projects

SOME SELECTED PROGRAM TYPES OF SUPPORTED PROJECTS

Generally, programs give a heavy emphasis to system-wide curriculum reform, educational partnerships, the new technologies, and the importance of evaluation and dissemination.

- Multiple-State Regional Technical Assistance Consortiums
- National Curriculum Reform Implementation Models: at local, State, and national levels (NCTM Standards, NSTA Framework, 2061, NSF and NDN Programs)
- Model Demonstration Elementary Schools
- Model Demonstration Middle and Secondary Schools -- including State School for the Gifted
- Replication of Successful Urban Education Programs
- Improvement Programs Based on NDN Products and Networks
- National Curriculum Center - Major School System Partnerships
- Programs Directed at Strengthening Mathematics/Science Achievement of Chapter 1 Students
- Early Intervention/General Mathematics/Science Literacy Programs
- Museum and Science Center-based Programs
- Programs Directed at the Underserved and Underrepresented
- National and Regional Telecommunications Distance Learning Programs
- Scientist-Educator Partnership Programs
- Master/Mentor Teacher Programs
- New Special Elementary Science/Mathematics Certification Programs
- Special Education Programs

LIST OF CURRENT AWARDS

AMERICAN SAMOA

American Samoa Government*	Russell Aab (684) 633-5237

CALIFORNIA

California State Department of Education*	Thomas Sachse (916) 423-7187
California State University	Sharon Ross (916) 895-5700
Sweetwater Union High School District*	Harvey Warren (619) 691-5581
The Exploratorium	Robert Semper (415) 561-0318
The Rand Corporation*	Virginia Anders (213) 393-0411
University of California	Paul Saltman (619) 534-3330

COLORADO

Colorado Partnership for Educational Renewal	Carol Wilson (303) 629-6906
Mid-Continent Regional* Education Laboratory	Clare Hiedema (303) 337-0990
Mid-Continent Regional Education Laboratory	Toni Haas (303) 337-0990
St. Vrain Valley School District*	Sherri Stephens-Carter (303) 776-6200

DISTRICT OF COLUMBIA

American Association for the Advancement of Science	Marsha Lakes Matyas (202) 326-6670

DISTRICT OF COLUMBIA (continued)

National Audubon Society	Christopher Palmer (202) 547-9009
National Science Teachers Association*	Marily DeWall (202) 328-5800

FLORIDA

University of Miami	Dr. Gilbert Cuevas/Dr. Okhee Lee (305) 284-3006
University of North Florida	William Caldwell (904) 646-2496

IDAHO

University of Idaho	Terry Armstrong (208) 885-5762

ILLINOIS

Illinois State University*	Carol A. Thorton (309)438-8781

KANSAS

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KENTUCKY

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Oldham County Board of Education	Charleen McAuliffe (502) 222-8880
Ohio Valley Education Cooperative	Ken Jones (502) 452-2280

LOUISIANA

Lafayette Parish School Board	Mary Jane Ford (318) 267-7691

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Western Maryland College	Skip Fennell (301) 857-2509
MD State Department of Ed.	Patricia Murphy (301) 581-4209
MASSACHUSETTS	
Boston Public Schools*	Charlotte Harris (612)726-6200
Education Development Center, Inc.	Judith Opert Sandler (617) 969-7100
MICHIGAN	
GMI Engineering & Management Institute	David Doherty (313) 762-9869
Michigan Technology Council*	William Cassell (313) 763-9757
MINNESOTA	
University of Minnesota	Susan Henderson (612) 625-6361
MONTANA	
Montana State University	Wayne J. Stein (406) 994-3881
NEW JERSEY	
Educational Testing Service*	Ellen Mandinach (609) 734-5794
Ramapo College of NJ	Gabriella Wepner (201) 529-7530
Rutgers, The State University of New Jersey*	Rebecca L. Lubetkin (201) 932-2071

NEW YORK

Bank Street College of Education	Don Cook (212) 222-6700
Bronx High School of Science Fdn.	Vincent Galasso (212) 295-0200
City College of CUNY*	Hubert Dyasi (212) 690-4162
Rochester City School District	Douglas Llewellyn (716) 325-4560
SUNY College at Cortland	Bonnie Barr (607) 753-2467

NORTH CAROLINA

Gaston County Schools*	Jerry J. Bostic (704) 866-6462
University of NC	Peggy Franklin (919) 966-3256

NORTH DAKOTA

Diocese of Fargo	Donna Schwartz (701) 235-6429

OHIO

Ohio State University Research Fdn.	Greg Foley (614) 292-6471

OKLAHOMA

Oklahoma School of Science and Mathematics*	Edna Manning (401) 271-7676

OREGON

Columbia Education Center	Ralph T. Nelsen (503) 760-2346
Columbia Education Center*	Ralph T. Nelsen (503) 760-2346
NW Regional Education Laboratory	Steve Nelson (503) 275-9500
Oregon State University*	Margaret L. Niess (503) 754-4031

OREGON (continued)	
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Western Educational Support Team	Ralph T. Nelsen (503) 760-2346
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The Franklin Institute Science Museum*	Wayne Ransom (215) 448-1192
University of Pittsburgh	Lauren Resnick (412) 624-7485
SOUTH DAKOTA	
Dakota State College*	Jerald Tunheim (605) 256-5112
TEXAS	
Baylor College of Medicine	Linda W. Crow (713) 798-4613
Lewisville Independent School District	Greg Veal (214) 539-1551
SW Educational Development Laboratory	Preston Kronkosky (512) 476-6861
Texas Woman's University	Ruth Caswell (817) 898-2227
University of Houston	Mickey Hollis (713) 749-1685
VIRGINIA	
Education Network of VA	Judy McKight (703) 698-0487

WASHINGTON

Educational Service District #101	Dick Moody (509) 456-7688

WEST VIRGINIA

Science Education Enhancement Council	Mary Ellen Komorowski (304) 455-4400

* Continuation Awards

Elementary Mathematics Projects

ABSTRACT

Oregon State University

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Corvallis, OR 97331
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CURRICULUM DEVELOPMENT AND LEADER TRAINING FOR MIDDLE SCHOOL TEACHERS OF MATHEMATICS, GRADES 6 THROUGH 8

Application No:	R168D 90164
Amount of Award:	$179,734
Budget Period:	09/01/89 - 08/31/91
Duration of Project:	24 months
Project Period:	09/01/89 - 08/31/91

Step one of this curriculum development project is to integrate state curriculum guidelines and National Council of Teachers of Mathematics Standards into middle school mathematics, and next, to combine the wide range of instructional tools available to teach mathematics today including both low (manipulative) and high technology. A symposium for the identification of the major content strands and accompanying resource materials will be held at Oregon State University with a writing team developing pilot materials at the symposium's conclusion.

The second step of the project is the preparation of leaders to assist in the integration of the curriculum materials into middle school mathematics instruction. Twenty middle school mathematics teachers, grades 6 through 8, will participate in staff development and leadership training. The participants will receive 24 credit hours of graduate course work designed specifically to increase their knowledge and skills in mathematics, curriculum design, curriculum implementation, leadership skills, and instructional strategies. These teachers will return to their schools and districts in the second year as leaders to assist in the integration of these curriculum materials into mathematics classrooms, to assist in staff development, and to act as resource persons for middle school mathematics.

Contact Person: Charles Ramsey
26 Court Street
Boston, MA 02108
(617) 282-3440

"BASIC PLUS" FOR URBAN SCHOOLS

Application No:	R168A 90064
Amount of Award:	$180,000
Budget Period:	08/01/90 - 07/31/91
Total Award to Date:	$380,000
Duration of Project:	36 months
Project Period:	08/01/89 - 07/31/92

Located in Boston, Massachusetts, "Basic Plus" aims to improve mathematics instruction in grades 3-5 by refocusing instruction from that which is exclusively computation to instruction that combines computation, exploration, reasoning, communication, and technology. One goal of the program is to boost teacher quality by improving the qualifications and skills of intermediate elementary grade teachers with computers, calculators, math video tapes, and math team competitions. A second objective is curriculum development focusing on grades three through five with a teacher handbook of activities and lesson plans that successfully teaches a higher order of math skills. A third aim is to increase student achievement in standardized mathematics tests in participating teachers' classrooms by 10 points by the end of the year.

Contact Persons: Carol A. Thornton/Cheryl Lubinski
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Normal, IL 61761
(309) 438-8781

PROJECT TEAMS: TEAM APPROACH TO DEVELOPING MATHEMATICS RESOURCE TEACHERS, K-3

Application No:	R168A 90270
Amount of Award:	$115,000
Budget Period:	08/01/90 - 07/31/91
Total Award to Date:	$223,825
Duration of Project:	36 months
Project Period:	08/01/89 - 07/31/92

This project is a three-year program emphasizing a cooperative Public/Private School District/Illinois State University TEAM Approach to Developing K-3 mathematics resource teachers. The primary objective is to formulate and test a model which promotes confidence and teaching competence in 56 teachers to enable them to be effective building resource leaders for planning and implementing an appropriate primary mathematics program consonant with National Council of Teachers of Mathematics Standards (1989) and current research recommendations.

During each of the three project years, teams of two to three project teachers and a staff mentor will collaborate to co-plan and co-present one of twenty-four academic year, grade level seminars and one subsequent session on the same topic embedded in a two-week summer workshop. The major thrust is involving the teacher resource leaders in shaping primary mathematics programs that are conceptually oriented, cognitively guided, developmentally appropriate, and tied to major goals of problem solving, critical thinking and communicating. On-site activity in TEAMS teachers' classrooms during the second project year will involve collaboration between staff and individual teachers in co-planning and presenting model lessons. The third year will involve the primary specialists in demonstration teaching lessons for other grade level teachers in their building and to administrative, parent, local, regional and state teacher groups.

The project will directly affect 56 TEAMS teachers and approximately 1200 primary students. The demonstration teaching, district and state-level workshop activity carried out by TEAMS teachers increases project outreach to an approximately 200 teachers and nearly 5000 primary children.

This activity will further affect Illinois State University education majors conducting practicums/student teaching in Project TEAMS schools. Over one-fifth of all Illinois teachers are graduates of the University.

ABSTRACT

St. Vrain Valley School District

Contact Person: Sherri Stephens-Carter
395 South Pratt Parkway
Longmont, CO 80501
(303) 776-6200

IMPROVING SCHOOL MATHEMATICS: ASSURING THE TRANSFER FOR RESEARCH TO PRACTICE

Application No:	R168A 90201
Amount of Award:	$25,000
Budget Period:	09/01/90 - 08/30/91
Total Award to Date:	$211,282
Duration of Project:	36 months
Project Period:	09/01/89 - 08/31/92

This project will support and encourage practical classroom implementation of an elementary mathematics program. Teachers who successfully complete an elementary level mathematics education class (30 class hours) will be allowed to spend $300 on manipulative materials to be used in the classroom.

All teachers who successfully complete an elementary level mathematics education class (30 hours of training) will receive two days of released time to engage in grade level collaboration, coaching, or classroom visitation.

And each teacher who successfully completes an elementary level mathematics education class (30 class hours) will receive one day per quarter released time to engage in preparing materials, writing, and planning curriculum units as well as working with math specialists to implement the elementary and mathematics program.

ABSTRACT University of Houston

Contact Person: Loye "Mickey" Hollis
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Houston, TX 77204
(713) 749-1685

CALCULATOR MATHEMATICS CURRICULUM FOR GRADES 6 - 8

Application No:	R168D 00311
Amount of Award:	$87,467
Budget Period:	08/01/90 - 07/31/91
Duration of Project:	36 months
Project Period:	08/01/90 - 07/31/93

This project will create a model calculator curriculum for grades 6-8 in the Alief Independent School District as a supplement to the approved textbooks adopted for 1991-99. This curriculum will be available for dissemination to other schools in Texas; and because texts adopted in Texas are frequently in widespread use throughout the U.S., it will be available for national dissemination. The calculators to be used are fraction and scientific calculators; exploration of other hand-held technologies (e.g., graphing calculators) will be begun as such technologies become available during the life of the project.

The project will last three years: August 1990 to July 1993. In the first year calculator inservice will be offered to all mathematics teachers in grades 6-8, and inservice on the Gender/Ethnic Expectations and Student Achievement program will be provided to mathematics department chairs. Drafts of instructional activities will be developed and piloted by a team of teachers within each of the five middle school buildings. Science department chairs will serve as consultants to help tie together mathematics and science instruction. In summer 1991, materials will be revised to fit the new texts and development of assessment procedures. In the second year, instructional activities will be expanded and revised; all materials will be finished during summer 1992, along with completion of the assessment procedures. In the third year, the materials will be thoroughly tested, with appropriate data gathered so that the project will be eligible for inclusion in the National Diffusion Network. Final revisions will be made during summer 1993. The materials will be evaluated through examination of students work (e.g., student projects, responses to direct questions on ways to use a calculator, standard tests), interviews of selected students, and classroom observations.

Project teachers will also keep journals about students' reactions to the materials, problems in using the materials, etc. These journals will be used to build a case history of the progress of the intervention.

The project is a district wide implementation of a curriculum that will be thoroughly tested as it is developed in a district with a changing student population. Because this is a supplementary curriculum, it would be easily accessible for other schools nationally to use. The curriculum is based on technologies that are readily available to schools, and it also addresses technologies that will become available during the life of the project. It involves middle school mathematics, a critical period in maintaining students' interests in taking future mathematics and science courses. The evaluation component will generate information that will improve our understanding of the ways that technology can be used in teaching mathematics.

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CSMP/21: COMPREHENSIVE SCHOOL MATHEMATICS PROGRAM

Application No:	R168D 00400
Amount of Award:	$120,000
Budget Period:	08/01/90 - 07/31/91
Duration of Project:	30 months
Project Period:	08/01/90 - 01/31/93

The overall goal of the project is to develop a comprehensive elementary school mathematics program with heavy science and technology components that will develop the necessary interest and enthusiasm among all children and especially among minorities and females. The program is to include classroom materials, teacher training, and parental involvement.

The program is divided into two phases: planning and preparation/development and evaluation. Planning and preparation tasks will prepare for an efficient and effective project as well as set the stage for effective implementation, assessment, and dissemination efforts. Tasks involve soliciting experience data, identifying test and development sites, and preparing a curriculum revision framework. Development and evaluation tasks will use classroom-based experimental teaching, local testing and national pilot testing to inform the preparation of teacher and classroom materials. Development of teacher-training and parental information components will parallel that of classroom materials. Finally, the project will plan for national dissemination and continuous support.

ABSTRACT Ohio Valley Educational Corporation (OVEC)

Contact Person: Ken Jones
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Louisville, KY 40218
(502) 452-2280

PROJECT TEAMS - TEACHERS EDUCATED ABOUT MATH STANDARDS

Application No:	R168D 00269
Amount of Award:	$266,060
Budget Period:	08/01/90 - 07/31/91
Duration of Project:	36 months
Project Period:	08/01/90 - 07/31/93

Project TEAMS will provide a model of teacher training especially suited to rural and suburban school districts that could be replicated in rural regions throughout the United States. The major emphasis of training in this program is for mathematics teachers in grades 5-8.

A survey completed by 78% of the 5th-8th grade math teachers in the 13 OVEC school districts indicated that 62.8% are not familiar with the Standards, and 19.9% rank their math anxiety as high or very high. In addition, their responses to specific questions indicated that over 98.7% had understandings, beliefs and attitudes in direct conflict with the Standards. "Project TEAMS" will give teachers the knowledge and skills they need to improve their understandings, beliefs and attitudes and change these statistics. The project will also ultimately impact on student attitudes and learning.

The first year of the three-year program provides extensive training for 54 "math coordinators" (one teacher from each school housing 5th-8th graders). These coordinators will field test the new concepts and activities in their own classrooms and informally share information from their training with their colleagues. Project staff and math coordinators will be involved in the production of eight video training modules for use in the project's second year.

During the second year, training will extend to the remaining 167 5th-8th grade math teachers, via staff and the math coordinators. State and national dissemination of the project will begin during the third year.

ABSTRACT Oldham County Board of Education

Contact Persons: Betty Edwards/Chris Wilcox
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La Grange, KY 40031
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MATH CONNECTIONS: K-5 MODEL MATHEMATICS SUPPORT PROJECT

Application No:	R168D 00195
Amount of Award:	$132,478
Budget Period:	07/01/90 - 06/30/91
Duration of Project:	24 months
Project Period:	07/01/90 - 06/30/92

The Math Connections project enables a team of mathematics educators to develop and disseminate a model K-5 mathematics support program directly correlated and integrated with the Standards and the Framework. The Oldham County Board of Education is coordinating the project in cooperation with dissemination agencies and mathematics educators from the Kentucky Department of Education and state universities. The model project includes:

1. Instructional resource units correlated with the Standards and utilizing existing resources and new technologies to support instruction;

2. Teacher-training modules focusing on the integration of the resource units in classroom instruction;

3. Parent-training and communication modules preparing parents to actively support and be directly involved in the teaching-learning process;

4. A variety of performance-based evaluation techniques; and

5. Procedures for dissemination of resource units, teacher and parent training modules and performance-based summative assessments.

Math Connections is consistent with the Kentucky three year plan under the Eisenhower Mathematics and Science Education Act. The Kentucky Department of Education, Kentucky Educational Television and Kentucky Congress of Parents and Teachers will be instrumental in the implementation and dissemination of the model project. Math Connections has the potential to directly benefit the 334,232 elementary students in the 1,207 public and nonpublic elementary schools in Kentucky.

Contact Persons: Mary Jane Ford/C. Whelan
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Lafayette, LA 70502
(318) 267-7691

TEACHER TRAINING FOR ELEMENTARY MATHEMATICS LEARNING: A METHODOLOGICAL APPROACH EMPHASIZING CONCEPTS, APPLICATIONS AND PROBLEM SOLVING

Application No:	R168D 00475
Amount of Award:	$70,000
Budget Period:	07/01/90 - 06/30/91
Duration of Project:	12 months
Project Period:	07/01/90 - 06/30/91

Through a series of eight, four-hour workshops and two summer courses, the project will provide in-service teachers with the training and experiences necessary to implement a series of changes in the elementary mathematics curriculum that reflect the new NCTM standards. Eighty participants will be enrolled in each workshop and the summer courses. Workshop participants will receive a stipend and tuition and materials will be provided for summer course participants. Two faculty members from the Department of Curriculum and Instruction will conduct the workshops and summer courses. The project will be administered by a steering committee composed of these two faculty members, a professor from the Department of Educational Foundations, a professor from the Mathematics Department, and the Lafayette Parish Elementary Mathematics Supervisor. Evaluation of the program will consist of pre- and post-tests for workshop participants, evaluations of the workshops, regular grading procedures for course work, and follow-up of selected participants.

This project is a cooperative effort of the Lafayette Parish School Board and the University of Southwestern Louisiana.

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701 East Main Street
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DIME: DEVELOPING INTEGRATED MATHEMATICS EXPERIENCES PROJECT

Application No:	R168D 00272
Amount of Award:	$100,000
Budget Period:	08/01/90 - 07/31/91
Duration of Project:	24 months
Project Period:	08/01/90 - 07/31/92

The DIME Project is a two-year program. In the first year, the emphasis is on mathematical problem solving and use of manipulatives. In the second year, mathematics connections and technology will be emphasized. The use of cooperative learning will be a common thread developed throughout both years. The program is designed to develop leadership expertise with one teacher from each of the ten middle schools. These ten teachers will serve as peer coaches for the other mathematics teachers in their respective schools.

All sixty middle school teachers will receive staff development training. This training will involve three days of inservice each summer followed by three-hour workshops on one Saturday each month of the school year and bi-monthly dinner meetings/sharing sessions.

Successful implementation of any new mathematics program can only be attained through leadership at the school level and through intensive staff development. The goal of this project is to restructure the way the middle school mathematics in Fayette County Public Schools is delivered to students by helping teachers redirect the present computation-based curriculum into a problem solving-based curriculum.

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PROJECT HOME: HANDS-ON MATHEMATICS EDUCATION

Application No:	R168D 00095
Amount of Award:	$20,000
Budget Period:	09/01/90 - 08/31/91
Duration of Project:	36 months
Project Period:	09/01/90 - 08/31/93

The National Diffusion Network's Virginia and West Virginia Facilitator Projects will coordinate and sponsor *Project Home: Hands-on Mathematics Education*, a two-year, five-phase mathematics in-service program for public and private school elementary mathematics teachers. Sixty (60) selected teachers from the rural and mountain counties of western Virginia and eastern West Virginia will participate.

In August of 1991, participating teachers will take part in a week-long workshop that will introduce them to a specific developmental mathematics sequence and train them to use manipulative materials, questioning, problem solving, and writing strategies to enhance mathematics literacy, as suggested by the National Council of Teachers of Mathematics' report "Curriculum and Evaluation Standards for School Mathematics." Each teacher will receive the materials and guides needed to implement and use the strategies presented.

During the 1991-92 school year, teachers will pilot strategies with their students. Implementation and follow-up will be the focus of this phase. A second week of training in the spring of 1992 will prepare teachers to conduct formal, turnkey training sessions for their peers and colleagues.

During the summer and fall of 1992, Project HOME teachers will lead in-service workshops for their peers. During the spring of 1993, teachers will come together for a final week that will focus on turnkey training follow-up and an analysis of the pre-/post-test results and other evaluation/impact data collected during the project.

All costs associated with this workshop series will be covered by this grant and the two facilitator projects, including training costs, material costs, teacher release time, and related costs for trainers and participants.

ABSTRACT

California State University
Chico University Foundation

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BEYOND ACTIVITIES PROJECT: A SECOND-STAGE PROFESSIONAL DEVELOPMENT MODEL FOR MATHEMATICS, GRADES 4-6.

Application No:	R168D 00390
Amount of Award:	$107,029
Budget Period:	10/01/90 - 09/30/91
Duration of Project:	36 months
Project Period:	10/01/90 - 09/30/93

The Beyond Activities Project will design, implement, and evaluate a professional development model which involves teachers developing thematic teaching units in conjunction with a summer Young Mathematicians Program. Objectives include:

1. Provide a professional development opportunity for 81 teachers to collaboratively develop and pilot integrated, thematic mathematics units.

2. Provide an extraordinary mathematics learning opportunity for 416 students who will participate in three summer Young Mathematicians Programs.

3. Develop, pilot-test, and revise 18 thematic teaching units.

4. Conduct workshops to disseminate nine of the thematic units which have been professionally edited and published.

In the first two summers, teachers will gather on the CSU Chico campus for five weeks to develop and to teach thematic curriculum units to students in the YMP classes. During the following academic years, teachers will pilot the developing materials in their own classrooms. In the third summer, the Beyond Activities Project model will be extended to three participating school districts. Also, during the third year, thematic curriculum units will be disseminated through other professional development programs.

The project will provide two vital resources to the reform effort. First, the thematic teaching curriculum units developed will provide concrete examples of what such instructional materials might look like. Second, teachers participating in the project will gain experience with, and enthusiasm for, the thematic unit idea. They can serve as leaders not only in their own districts but across the state.

ABSTRACT

Western Maryland College

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TEACHING FOR NUMBER SENSE NOW!
REACHING THE NCTM STANDARDS

Application No:	R168D 00134
Amount of Award:	$145,000
Budget Period:	08/01/90 - 07/30/91
Duration of Project:	24 months
Project Period:	08/01/90 - 07/31/92

Students need to understand what happens with numbers, and teachers must feel comfortable teaching such concepts. In order for students to develop flexibility in expressing numbers, they must see numbers in a variety of contexts and situations. Sometimes this will be an exact response, sometimes not. "The major objective of elementary school mathematics should be to develop number sense" (Everybody Counts, 1989, p.46). Number sense is important for all of us. It is the ability to use number concepts with the least amount of effort. Students who have number sense, understand numbers and know how and when to use them. Students with number sense have multiple meanings of numbers, operations and the use of the procedural aspects of early mathematics learning activities. The elementary student of the 1990's must have number sense. It is the basic skill of the decade. Knowledgeable teachers are the key to insuring that number sense becomes a high priority in all classrooms.

The project will produce a set of three videotapes and accompanying print support materials, to demonstrate and promote number sense, utilizing approaches consistent with and supporting the National Council of Teachers of Mathematics' (NCTM) Curriculum and Evaluation Standards for School Mathematics. The project videotapes will be designed for elementary school teachers and will involve classroom teachers actively engaged in number sense activities with children.

The purpose of the program is to inform the classroom teacher of the importance of number sense as a critical element in mathematical communication. This project will show teachers how number sense can be an integral component of their daily mathematics teaching. The project will involve NCTM, the NCTM

Task Force on Number Sense, Western Maryland College, the Baltimore, Carroll and Howard County Public Schools (MD) and the Washington, DC Public Schools.

The impact of the program is in the area of teacher and curriculum improvement. This project has r. .onal implications because, prior to the release and discussion of the NCTM Curriculum and Evaluation Standards for School Mathematics, number sense was not included in elementary teacher preparation programs. The intent of the project is to encourage teachers to use the number sense instructional activities and strategies exemplified in the NCTM Standards. Project teachers, selected from the participating school districts, will help create lessons which involve number sense and accompanying print support materials. There will be 6-7 project teachers at each of three instructional levels (grades 1-2; 2-4; and 4-5). Completed videotapes and print materials will be provided (gratis) to each state mathematics supervisor. Additional tapes will be made available through NCTM.

ABSTRACT

Montana State University

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AIM: AMERICAN INDIANS IN MATHEMATICS PROJECT

Application No:	R168D 00392
Amount of Award:	$145,000
Budget Period:	09/1/90 - 08/31/91
Duration of Project:	36 months
Project Period:	09/01/90 - 08/31/93

American Indians are severely underrepresented in such important quantitatively-based fields as mathematics, the sciences, computer technology and other technical fields. The problem is exacerbated by Indian students' low participation and inadequate preparation in mathematics curricula at the junior high and secondary school levels. In response to these concerns of national significance, the Center for Native American Studies, Montana State University (MSU), proposes to establish Project AIM, a three-year training program for American Indian students and their mathematics teachers from rural reservation schools. The objectives of the project are twofold: 1) to increase the participation of first-generation, college-bound Indian students in quantitatively-based curricula; and 2) to strengthen the quality of mathematics instruction in schools serving predominantly Native American students.

To accomplish the project objectives, the Center for Native American Studies, in cooperation with the Department of Mathematical Sciences, has designed an integrative, interactive mathematics learning support system--a learning enterprise involving Indian students, as well as their teachers and parents. The Project AIM design incorporates six major components:

1. A four-week Summer Institute in "Exploring the World of Mathematics and Computers" for 21 American Indian students who are entering grades 9 and 10. The Institute will provide supplemental computer-assisted instruction in mathematics and career exploration of quantitatively-based fields.

2. A six-week Summer Institute in "Integrating the World of Mathematics and Computers" for ten high school mathematics teachers from rural reservation schools. The Institute will provide inservice training in the integration of computer technology in instruction and curriculum development.

3. A training program involving parents of first-generation college-bound students, which will engage them in activities to support and motivate their children.

4. **Curriculum development activities designed to improve the mathematics curricula at Indian reservation schools through the integration of computer technology and culturally-relevant content.**

5. **A multi-tiered follow-up program between MSU and the participating parents, students and teachers, with an ongoing inservice training program for other, non-participating teachers in target schools.**

6. **Dissemination of the project's impacts determined by longitudinal studies of project participants' subsequent activities and academic performance, which will be published in professional journals and presented at state/regional/national conferences.**

ABSTRACT

University of Pittsburgh

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MATHEMATICAL REASONING IN PRIMARY SCHOOL: A TEACHER DEVELOPMENT AND CLASSROOM IMPLEMENTATION PROJECT

Application No:	R168D 00191
Amount of Award:	$126,172
Budget Period:	07/01/90 - 06/30/91
Duration of Project:	36 months
Project Period:	07/01/90 - 06/30/93

This project responds to national calls for early mathematics teaching that stresses the meaning of numbers and operations and the development of number sense and estimation skills. It aims to implement in a number of primary schools an instructional program built around whole class and small group discussion of children's invented solutions to arithmetic problems. Developed and tested in an inner-city school serving a largely minority population, the program builds children's conceptual understanding, produces substantial gains in computational skill, and develops children's confidence in their mathematical capabilities.

The project will implement an inservice education program for teachers that engages them in a professional process of designing a plan for their own teaching, based on research findings and concepts and the experience of teacher colleagues. In the Development Phase of the project, summer workshops and monthly inservice meetings will be led by the teachers who collaborated with researchers in developing and piloting the new instructional program. Participant teachers will read and analyze relevant research articles, plan teaching strategies and try them in a laboratory classroom environment, study and critique videotapes of small group and whole class lessons, and develop curriculum plans for their classrooms. The lead teacher and the participants will also visit each other's classrooms during the course of the two year training and implementation period. In the Dissemination Phase of the project, two participant teachers from the Development Phase will assume leadership of the workshops and inservice meetings.

University research staff will conduct a project evaluation to determine how well the instructional principles have been communicated, how participating teachers have implemented the instructional program in their classrooms, and the effects of the program on children's computational and mathematical reasoning abilities. By the end of the three-year project, 60 teachers will have implemented the program in their classrooms, and a regional network for further training and program implementation will have been created.

Secondary Mathematics Projects

ABSTRACT

The Rand Corporation

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A NOVEL COURSE IN ALGEBRA INTEGRATING COMPUTER TOOLS

Application No:	R1568D 90023
Amount of Award:	$430,365
Budget Period:	10/01/89 - 09/31/91
Duration of Project:	24 months
Project Period:	10/01/89 - 09/31/91

To implement this project, a ten-week course in high school algebra will be developed that is novel in several respects. First, the course will include several units which are not found in traditional freshman algebra curricula, including mathematical modeling, functions, and statistics. One of the units has been piloted in Rand's preliminary efforts to develop a novel algebra curriculum. Secondly, the course will be built around several computer-based educational tools. The tools will extend those Rand has previously developed and piloted in classrooms. Thirdly, Rand will provide several new instruments for assessing student learning, and finally, the project will develop and test teacher training materials and conduct and evaluate teacher training workshops relative to the computer.

ABSTRACT

Ohio State University

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COLLEGE READINESS VIA TECHNOLOGY-ENHANCED MATHEMATICS

Application No:	R168D 00369
Amount of Award:	$160,000
Budget Period:	10/01/90 - 09/30/91
Duration of Project:	36 months
Project Period:	10/01/90 - 09/30/93

This project will provide an intensive inservice experience for 144 high school teachers from across the nation--72 in Summer 1991 and 72 in Summer 1992--to prepare them to use a computer-and calculator-based approach to teaching and learning mathematics. The participants will then teach using exemplary curricular materials that emphasize concepts, problems, and processes focusing in depth on key ideas. To help ensure that the intended curricula and methods are implemented, program staff will provide follow-up inservice support for the participating teachers during the school year. Participants will be expected to carry out a plan to disseminate the approach to other teachers in their local areas.

There will be two strands of inservice--a Precalculus Strand and a Calculus Strand. The Precalculus Strand will build on the Ohio State University Calculator and Computer PreCalculus project and will develop conceptual underpinning for calculus in an interactive computer graphics environment. The Calculus Strand will build on the Oregon State University Calculators in the Calculus Curriculum project and will explore the ideas of calculus using symbol mathematics (computer algebra) systems. The activities for both strands are designed to enable teachers to use technology to establish concepts and to use graphs as tools for visualization and problem solving. In addition, calculus teachers will gain skills in using symbolic mathematical systems to help shift their students' attention from computational details to higher-order processes. The techniques and technology to be used in the project are almost directly applicable to other high school mathematics courses, especially algebra.

Elementary Science Projects

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RESTRUCTURING THE HIGH SCHOOL SCIENCE CURRICULUM

Application No:	R168D 90145
Amount of Award:	$580,000
Budget Period:	08/20/89 - 08/19/91
Duration of Project:	24 months
Project Period:	08/20/89 - 08/19/91

The purpose of this project is to create a mechanism for the restructuring of the science curriculum sequence throughout California by increasing the quantity and quality of time students spend learning science from grade 7-12, and by offering science education alternatives for the large numbers of females and minorities in situations where they would otherwise not enroll in science classes.

The proposed project would create a vehicle by which high schools (some in collaboration with middle schools) take on the task of designing and implementing one of four models developed by the National Science Teachers Association and the draft California Science Framework. This proposal would provide funds for 100 of the approximately 800 California high schools to develop a dramatically revised curriculum so that the four models would exist throughout the state. Basically, the plan is to allow principals and the leadership team for a given school to develop innovative courses and teaching techniques to improve the caliber of learning in mathematics and science. The plan here is to use the leadership of department chairs at 100 reform-minded high schools to begin restructuring of the science sequence.

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PHYSICS AND CHEMISTRY TOPICS AND ACTIVITIES FOR ELEMENTARY TEACHERS AND THEIR STUDENTS

Application No:	R168A 90178
Amount of Award:	$120,000
Budget Period:	10/01/90 - 09/30/91
Total Award to Date:	$263,828
Duration of Project:	36 months
Project Period:	10/01/89 - 09/30/92

This project will evaluate and modify a highly successful workshop and develop it into a video-assisted self-learning format that will allow nation-wide dissemination. The workshop was in response to the critical need to improve the educational content of the elementary grades in the areas of chemistry and physics. The curriculum materials and hands-on activities have undergone extensive testing at the South Dakota State University Laboratory School and in over 200 classrooms in the states of Washington and South Dakota.

Participants in this project will be instructed using two different modes of delivery. The first group of 172 teachers will be instructed in the same workshop format as used previously. The other group of 48 teachers, in subgroups of six teachers each, will utilize the video-assisted self-learning packets facilitated by another elementary teacher. The facilitator for four subgroups will be a teacher who has previously taken the workshop, implemented it in his or her classroom, and undergone a four-hour orientation session. The other four subgroups will be led by a teacher with only the orientation session for background. The two modes of instruction will then be evaluated as to their relative effectiveness in imparting knowledge to the teachers and causing implementation of the hands-on activities in the classroom. If the video-assisted materials prove to be effective, this project will extend a highly successful physics and chemistry workshop to teachers throughout the Nation.

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CESTA: COMMONWEALTH ELEMENTARY SCIENCE TEACHING ALLIANCE

Application No:	R168A 90041
Amount of Award:	$199,813
Budget Period:	09/01/90 - 08/30/91
Total Award to Date:	$398,038
Duration of Project:	36 months
Project Period:	09/01/89 - 08/31/92

The Franklin Institute (Philadelphia, PA) Science Museum Project will develop a nationally important statewide network for the enhancement of hands-on science education. Funds will support the establishment of The Commonwealth Elementary Science Teaching Alliance (CESTA), a large-scale systematic collaboration to improve the quality of elementary teachers' skills in activity-based science pedagogy. This project has the strong endorsement and support from the Pennsylvania Department of Education which was centrally involved in the initial stages of program development and has committed state funds to program implementation, pledging support to CESTA's long-range objectives and continuation.

The first three years of the CESTA project will establish six Regional Centers throughout Pennsylvania to support a total cadre of 162 teachers and curriculum administrators as 54 hands-on Science Leader Teams that will train other educators in hands-on science study. The Leader Teams will be trained in three intensive Leadership Training Institutes and the Regional Centers will be permanently supported by local community partnerships. At the conclusion of Federal support, the 54 Leader Teams will have offered 432 workshops for approximately 6,480 peers. ED funds will thus indirectly serve 194,400 students - over 23% of the elementary student population in Pennsylvania. Most importantly, CESTA will have served as a large-scale demonstration project for systematic reform and improvement in the quality of elementary science education and may serve as a national model for similar projects throughout the country.

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TECHNOLOGICAL APPLICATIONS FOR SCIENCE EDUCATION LEADERSHIP

Application No:	R168A 90034
Amount of Award:	$180,187
Budget Period:	10/01/90 - 09/30/91
Total Award to Date:	$352,803
Duration of Project:	24 Months
Project Period:	10/01/89 - 09/30/91

The Columbia Education Center (CEC), representing educational agencies in fifteen western states, will implement a two-year project that will: (1) improve the elementary science education curriculum; (2) enhance the instructional skills of elementary teachers in the area of science; and, (3) demonstrate the efficacy of technological "distance" learning systems for providing staff development and curriculum improvement services to small-town and rural schools. States participating are Alaska, Arizona, California, Colorado, Hawaii, Idaho, Kansas, Montana, Nevada, New Mexico, Oklahoma, Oregon, Utah, Washington, and Wyoming.

The project will emphasize activities to support the regional demonstration and institutionalization of exemplary methods and materials drawn from one of the nation's finest elementary science models - the STARWALK program developed jointly by the Colonial School District and McCollough Planetarium in Delaware. Selection of this exemplary program has been guided by the recommendations of CEC planners in each of the participating states.

The project's principal audience will include ninety elementary educators, six from one school in each of the fifteen states. These schools and personnel will be provided both "distance" and "in situs" services leading to the institutionalization of the STARWALK program in classrooms, grades two through six. "Distance" activities will comprise a series of monthly training sessions delivered via videotape and interactive satellite teleconferences. "In situ" training will include a two-week Summer Institute in 1990 which will prepare two representatives from each of the participating schools to become Leadership Teachers. These thirty persons will represent STARWALK in their respective states, making awareness presentations, conducting in-service workshops, and serving as downlink coordinators for satellite training activities.

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STATT: SCIENCE TEACHING AND THINKING FOR TOMORROW

Application No.:	R168A 90019
Amount of Award:	$120,000
Budget Period:	09/01/90 - 08/31/91
Total Award to Date:	$257,716
Duration of Project:	36 months
Project Period:	09/01/89 - 08/31/92

"Science Teaching and Thinking for Tomorrow" will provide a comprehensive, K-6 program for the improvement of elementary science teaching skills and qualifications in the Gaston County Schools while serving as an exemplary hands-on, high-technology model for other school systems throughout the Nation.

The purpose of the program is to provide immediate training to approximately 360 elementary science teachers over a three year period, while implementing a highly cost-effective hands-on science experiential program.

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DEVELOPMENT OF TEACHERS AS SCIENCE INQUIRERS

Application No:	R168A 90083
Amount of Award:	$125,796
Budget Period:	10/01/90 - 09/30/91
Total Award to Date:	$228,183
Duration of Project:	36 months
Project Period:	10/01/89 - 09/30/92

This project administered by the City College Workshop Center in collaboration with Community School District Five and Eight (in the Harlem and the South Eastern Bronx areas of New York respectively) is a three-year program to increase the qualifications and skills of 90 K-6 teachers in order to provide quality science inquiry instruction to elementary school children. In addition, the program will develop participants' skills to support science education of other elementary school teachers, and to help parents support their children's inquiry activities at home. The first year will train 30 third and fourth grade teachers; the second and third year will focus on 30 early childhood and on 30 fifth and sixth grade teachers respectively. Participant teachers will earn six tuition-free graduate credits towards a masters degree. The project begins with 3rd and 4th grade teachers because New York State's Elementary Science program evaluation is currently focused on the fourth grade.

Indicators of the program's success will include: (1) changes in teachers' understanding of the nature of science and of elementary school science inquiry; (2) deepened capacity to practice science inquiry focusing on common phenomena; (3) articulation of a professional rationale for science inquiry instruction; (4) evidence of sustained involvement of children in, and their attachment to, science inquiry, and; (5) teachers' proper use of related educational resources including educational technology. Additional indicators will be the degree to which the teachers support and network with one another and how they articulate their classroom practices and children's needs to parents and to other interested groups.

ABSTRACT Rutgers, The State University of New Jersey

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SCIENCE TEAMS

Application No:	R168A 90224
Amount of Award:	$241,355
Budget Period:	09/01/90 - 08/31/91
Total Award to Date:	$333,632
Duration of Project:	24 months
Project Period:	09/01/89 - 08/31/91

This project will increase elementary teachers' skills in science content and hands-on experiments, and in cooperative learning classroom management techniques. Building on a feasibility study piloted with selected New Jersey school districts, SCIENCE TEAMS will promote positively the interest, motivation and involvement of upper elementary students, especially minorities and females, in science and in science careers.

In Year I, SCIENCE TEAMS will provide training and materials in cooperative learning techniques developed at Johns Hopkins University to 30 elementary teachers from 15 racially-mixed districts. These techniques are designed to reorganize the learning environment to encourage leadership opportunities, self-confidence and opportunities for achievement in science for all students, especially girls and minorities.

During August 1990, the teachers will attend a week-long Summer Institute in environmental science at Rutgers University. This Institute, developed by the two science consultants, will provide both science content and laboratory methodology for hands-on activities appropriate for a cooperative learning approach in the fifth and sixth grade science classroom.

In Year II the teachers will get additional training and assistance to integrate the environmental science content with cooperative learning techniques in units to be field tested during the first and third marking periods in their classroom.

A multi-media training package, consisting of videotape, curriculum units and training manual, will be produced to disseminate this project nationally.

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RESEARCH EXPLORATIONS FOR TEACHERS

Application No:	R168D 00101
Amount of Award:	$60,000
Budget Period:	01/01/91 - 12/31/91
Duration of Project:	36 months
Project Period:	01/01/91 - 12/31/93

"Research Explorations for Teachers" will enable elementary teachers to join for periods of two to four weeks, University of Minnesota faculty teams engaged in scientific research. Afterwards, teachers will develop curricular material that relates to the content and inquiry-based approach of their research experiences; they will teach their curriculum modules in their own classrooms the next year. Selected modules then will be published and distributed to Minnesota school districts. Two short seminars, held before and after the research experiences, will focus on trends in recent scientific research and pedagogical issues in science education. A third seminar, held eight months after the second, will focus on the evaluation of the curricular material.

This project's collaboration between precollege teachers and University faculty will model a unique but replicable approach to improving science teaching. This model allows teachers to experience inquiry-based learning; provides them with current scientific information; supports the development of science curriculum that incorporates active learning; and fosters the formation of networks between precollege teachers and University faculty. The improved quality of science teaching that results will also significantly aid in the recruitment of students for science careers.

ABSTRACT Carnegie Mellon University

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INTENSIVE SCIENCE METHODS AND CONTENT TRAINING PROGRAM

Application No:	R168D 00219
Amount of Award:	$115,000
Budget Period:	07/01/90 - 06/30/91
Duration of Project:	36 months
Project Period:	07/01/90 - 06/30/93

This project will provide teacher training in science instruction methods and content for 280 public and private elementary school teachers in the Monongahela Valley (near Pittsburgh, PA). Elementary school teachers will be trained to implement a proven science curriculum package called DASH--Developmental Approaches in Science, Health and Technology--over a 36 month period. DASH was developed by the Curriculum Research and Development Group (CRDG) at the University of Hawaii, and has been successfully piloted by selected laboratory schools and school districts nationally, including two school districts in the Monongahela Valley for two years under the coordinating efforts of the Carnegie Mellon Children's School. These funds will allow us to extend the project to serve a much larger population (39 public schools in 12 districts and 10 Monongahela Valley parochial schools in the Diocese of Pittsburgh).

One of the most important aspects of this proposal is its component of intensive, ongoing, hands-on education of teachers, and selection of highly-qualified and prepared teachers to train other teachers in DASH methods. This will ensure that participating districts will continue to use DASH long after federal funding has expired. The plan of operation features five essential components: promoting awareness; teacher training; follow-up coaching and evaluation; trainer/coordinator training; and producing supplemental materials.

The Carnegie Mellon DASH dissemination group is the largest and most diverse in the nation and serves an urban, industrialized area. The entire nation will benefit from this group's experience in system-wide implementation, which will be carefully studied by local project personnel and CRDG. In addition, the Carnegie Mellon group will be producing supplemental materials to the DASH curriculum that will be transferable to any location in the United States, including an administrator's handbook and take-home newsletters designed to improve family participation in the education of the child. Careful evaluation during and after the 36-month funded phase of the project will show a demonstrable increase in the quantity and quality of science teaching in targeted elementary classrooms, with correlative improvement in student achievement in science.

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PROJECT COPE: CHANGE ON PLANET EARTH

Application No:	R168D 00169
Amount of Award:	$150,000
Budget Period:	10/01/90 - 12/31/91
Duration of Project:	27 months
Project Period:	10/01/90 - 12/31/92

This project forms a partnership among school districts, community resources, and the University of California, San Diego (UCSD) to improve the quality of teaching science at the elementary and middle school levels (K-8) over a two-year period. The overall goal is to improve the science literacy of teachers and students and provide up-to-date resource materials to a wide range of teachers.

The year-long education program will be taught by UCSD scientists/researchers who will write timely and accessible resource materials for dissemination during subsequent inservice programs. The first year consists of ten Saturday seminars involving research scientists, community educators, resource people, and participants in presentations, lab activities and field trips. In year two, the sixty K-8 teachers will then provide inservice programs for at least ten others and thus reach 600 teachers.

This institute model, with its design and writing of materials, a year of education and a follow-up year of implementation, is designed for replication and will be made available to other areas in California where university and school districts have indicated a willingness to engage in such collaboration. Technical assistance will extend well beyond the two-year project suggested here.

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IDAHO TRAILS - TOPICALLY RELEVANT APPROACHES FOR INCREASING LEARNING IN SCIENCE

Application No:	R168D 00409
Amount of Award:	$159,861
Budget Period:	09/01/90 - 08/31/91
Duration of Project:	36 months
Project Period:	09/01/90 - 08/31/93

This project involves eight rural school districts in Idaho to serve as a base from which 16 teachers with leadership potential will be selected to receive training in science content, eight instructional themes, and validated science teaching approaches. This instruction will occur at the University of Idaho. Following the two-week summer experience, the trained mentor teachers will return home empowered to transmit to their colleague teachers the science content and methodologies that they have acquired. To assist in this phase of the project, the mentor teachers will be joined once each month via an appropriate distance learning connection to the campus instructors. At this time a review of the past unit will be made as well as a thorough introduction to the next unit. The units will then be taught to participating teachers' students and evaluated. Participants will be provided appropriate materials to insure hands-on science experiences for their students. The utilization and evaluation of a variety of distance learning approaches appropriate to each school site are an important part of the project. Effective use of available technologies is viewed by school officials as essential in providing in-service to teachers in rural communities throughout Idaho. Concomitant to the project is the formation of community alliances and strong parental involvement. Following the initial year of the project the plan will be implemented in communities contiguous to the original eight districts.

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IMPROVING ELEMENTARY SCIENCE INSTRUCTION PROJECT

Application No:	R168D 00467
Amount of Award:	$165,000
Budget Period:	09/01/90 - 08/31/91
Duration of Project:	36 months
Project Period:	09/01/90 -08/31/93

The Improving Elementary Science Instruction Project will, over a three-year period:

1. Train science teacher leaders who will provide site-based science training and leadership;

2. Conduct awareness and training for all central administration and building administrators to facilitate the advocacy and support necessary to implement a new science approach;

3. Train and enhance the skills of science resource persons to provide staff development, support, networking, resources, and coaching for elementary teachers;

4. Conduct awareness and training activities designed to increase the parent's role in promoting improved science education for their children; and

5. Support the participating schools in developing the capacity to design and implement a school-wide Science Action Plan for inquiry-based hands-on science instruction.

By the end of the final year of the project, the Cleveland Public Schools will have in place a model for implementing staff development for elementary science that will culminate in a Science Action Plan in 42 schools, thereby reaching over 500 teachers and 12,500 students.

Working with the Cleveland Public Schools provides an opportunity to examine in depth the change process required for the system-wide improvement of science curriculum in a system which is firmly committed to decentralization and school based management. It is anticipated that this project will increase the understanding of effective staff development models for enhancing the teaching of science and the successful institutionalization of effective inquiry-based science programs. Of equal importance will be the advancement of the knowledge base required for the implementation of innovation in decentralized school districts.

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FACILITATING ADAPTIVE CURRICULUM: INNOVATION IN SCIENCE EDUCATION (FACITS)

Application No:	R168D 00205
Amount of Award:	$140,000
Budget Period:	10/01/90 - 09/30/91
Duration of Project:	36 months
Project Period:	10/01/90 - 09/30/93

The FACITS Project will serve three main purposes:

1. Provide a structure by which elementary school science materials and resources developed by three exemplary national program may be adapted for use with physically-limited students in special education and mainstreamed classrooms throughout the small-town and rural West.

2. Develop a cadre of 45 master educators to function as Leadership Teachers--persons qualified to lead awareness and staff development activities for local and state peers.

3. Demonstrate a model approach by which needed staff development resources and services may be provided to small-town and rural school personnel in an effective, cost-efficient manner--with emphasis on "distance training" using videotapes and satellite TV broadcasts.

The project will first concentrate on activities in which the directors and training coordinators of the exemplary Informal Science Study, WIZE, and Hands-On Elementary Science programs will work with nationally-known special education experts to adapt their materials and teaching units for use with elementary students with varying types of physical disabilities. Draft versions will be field-tested by exemplary science program trainers during the course of their normal 1990-91 school year staff development activities. After further refinement in June 1991, these materials will be introduced to 45 master educators--Leadership Teacher candidates--from the participating states during a two-week Institute in July 1991. Each Institute participant will then be responsible for implementing one of the three exemplary science programs, as adapted, in his or her own school during the 1991-92 school year.

A second summer Institute in July 1992 will focus on developing participants' leadership skills, preparing them to make awareness presentations for professional groups and lead in-service workshops for local and state colleagues during the 1992-93 school year.

It is projected that a regional audience of 4,500 teachers and other school workers will be served in these workshops, and that benefits will ultimately accrue to an annual audience of 67,500 handicapped and non-handicapped pupils.

Another important project component will be the preparation of three training videos which will be used for both in situ and satellite staff development purposes. Broadcast of these videos has already been arranged with OERI/National Diffusion Network; other regional and national teleconference systems will also be invited to take advantage of these tapes. In addition to their other awareness and in-service activities, the project's 45 Leadership Teachers will be available as downlink site coordinators when the videos are aired.

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PROJECT 4T: TRAINING TEACHERS THROUGH TECHNOLOGY

Application No:	R168D 00204
Amount of Award:	$145,000
Budget Period:	10/01/90 - 09/30/91
Duration of Project:	36 months
Project Period:	10/01/90 - 09/30/93

The 4T project will serve three major purposes:

1. Provide a structure by which materials and resources developed by the exemplary "Hands-On Elementary Science" (HOES) program may be introduced to, and institutionalized in, seventy-five small-town and rural elementary (grades 1-5) classrooms, in fifteen "demonstration schools" in the western states.

2. Develop a cadre of thirty master educators certified to function as Leadership Teachers--personnel fully qualified to lead both awareness and staff development activities for local and state peers.

3. Demonstrate a model approach by which needed staff development resources and services may be provided to small-town and rural school personnel in an effective, cost-efficient manner--with special emphasis on "distance training" using videotapes and satellite TV broadcasts.

The project will first concentrate on activities in which the director and training coordinator of the exemplary Hands-On Elementary Science program will work with selected teachers from western elementary schools to prepare these personnel to serve as state and regional Leadership Teachers. These activities will include both "distance" (video/satellite) and in situ training opportunities.

Another important project component will be the preparation of training videos which will be used both prior to the Institute and subsequently during satellite television broadcasts. Broadcast of these videos has already been arranged with OERI/National Diffusion Network; other regional and national teleconference systems will also be invited to take advantage of the tapes. In addition to their other awareness and in-service activities, the project's Leadership Teachers will be available to service as downlink site coordinators when the videos are aired.

A variety of evaluation strategies are included in the project plan, including the use of 15 State Monitoring Teams and an independent third-party evaluator.

ABSTRACT Science Education Enhancement Council

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AFTER-SCHOOL HANDS-ON SCIENCE PROGRAM

Application No:	R168D 00452
Amount of Award:	$40,204
Budget Period:	09/01/90 - 08/31/91
Duration of Project:	24 months
Project Period:	09/01/90 - 08/31/92

The after-school hands-on science program in Marshall County, West Virginia is an answer to President Bush's call that American students should be "number 1" in science and mathematics achievements by the year 2000. The nationwide "back to the basics" emphasis in the school curriculum over the past twenty years has often relegated the teaching of science to the background. Further, the textbook-approach is usually preferred over activity-based science due to local curriculum requirements and time limitations during the school hours. This sad status of science is true in Marshall County. The low science scores of the Marshall County students in the Comprehensive Tests of Basic Skills (CTBS) clearly indicate a need for this program.

The Science Education Enhancement Council (SEEC), a non-profit organization, has joined with public and private school officials, teachers, and parents of Marshall County to offer this program to all grades 1-6 students of the community.

The plan of operation has five phases: 1) preparation phase; 2) implementation of the teachers' training workshops; 3) implementation of the program; 4) monitoring; and, 5) evaluation of the program.

The objectives are: 1) train the elementary teachers to do hands-on science activities; 2) provide their teachers with instructional materials for hands-on activities; 3) encourage parents to work with their children's teachers; and, 4) increase the time spent on science.

The program expects the following outcomes: 1) enhance children's understanding of basic scientific knowledge and concepts; 2) improve children's performance on science achievement tests; and, 3) diminish the high rate of science and math avoidance among students.

ABSTRACT

Texas Woman's University

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STRENGTHENING THE EFFECTIVENESS OF ELEMENTARY SCIENCE TEACHING

Application No:	R168D 00429
Amount of Award:	$160,000
Budget Period:	07/01/90 - 06/30/91
Duration of Project:	24 months
Project Period:	07/01/90 - 06/30/92

Critiques of elementary science education indicate it is woefully inadequate. In fact, most elementary teachers are underprepared to teach science. The goal of this project is to improve the qualifications of elementary science teachers (grades 4 - 6) and their delivery of instruction resulting in improved student learning.

The two-year project has five phases: 1) improving teacher qualifications and preparing instructional units; 2) evaluating classroom instruction and student learning; 3) revising units, enhancing teachers' knowledge, and preparing specific, related inservice; 4) evaluating revised instructional units and student learning programs; and, 5) disseminating project results. Women and minority teachers from inner city, rural, urban, and suburban schools are targeted for inclusion in the project. The existing and State-mandated curriculum is the basis for selecting the program's content.

Teachers' qualifications will be improved as they are immersed in science training which emphasizes concept instruction followed by laboratory activities. Development of critical thinking and problem-solving skills will be integrated throughout. The model classroom environment will foster conceptual understanding and allow time for knowledge restructuring, a necessity since prior misconceptions may interact with accurate concept learning. Teachers will prepare instructional units which are evaluated within a context of both instructional delivery and student learning. Unit revision and further evaluation will complete the cycle.

Bringing about positive change, the intended outcome, is accomplished by building teachers' qualifications and evaluating classroom instruction. These results, shared through conferences and dissemination to school districts, have significance for science educators across the nation.

Secondary Science Projects

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SCIENCE CURRICULUM REFORM: A WORKING PARADIGM

Application No:	R168D 90125
Amount of Award:	$559,030
Budget Period:	09/01/89 - 08/31/91
Duration of Project:	24 months
Project Period:	09/01/89 - 08/31/91

This 24-month project represents a partnership between a large urban school district, a nationally recognized, science-oriented institution of higher education, and a national professional educational organization for the purpose of establishing a working paradigm for the reform of science education. The project will allow for field testing of a completely revised curriculum, with effort beginning in grade seven and extending over a period of years through grade twelve.

The project focuses on replacing the current layer cake approach to science education, in which courses in major subject areas are taught in sequence from one year to the next, with little attempt to integrate coursework between subject areas. The reformed curriculum will present biology, chemistry, physics, and earth and space science curriculum material in every grade and in an integrated manner that is reinforcing. Seventh and eight grade coursework will focus on descriptive and phenomenological aspects of science. Ninth and tenth grade coursework will introduce the student to empirical and semi-quantitative science. Finally, the last two years of the secondary school curriculum will focus on development of abstract and theoretical scientific learning. The project will emphasize the development in students and teachers of higher-order thinking skills and problem-solving skills that are critical to scientific literacy.

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A NATIONAL INTERACTIVE MEDIA PROJECT FOR PHYSICAL SCIENCE COURSES

Application No:	R168D 90059
Amount of Award:	$590,815
Budget Period:	10/01/89 - 09/30/91
Duration of Project:	24 months
Project Period:	10/01/89 - 09/30/91

The project staff and supervisory committees, working through the American Association of Physics Teachers (AAPT) will identify outstanding, archival films for teaching physical sciences courses in secondary schools. These films will be transferred to high quality videotape, carefully edited into short vignettes for classroom use, supported with interactive software lessons, and distributed nationally in both videotape and videodisc formats accompanied by teachers manuals and diskettes. National, regional, and local teacher training workshops will be held.

The effectiveness and usefulness of these materials will be evaluated by follow-up written and oral interviews of teachers. An indication of the value of the project will be the total number of interactive lessons taught with these materials during the school year of 1991-92.

ABSTRACT

National Science Teachers Association

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DEVELOPING CURRICULUM FOR NEW SCOPE, SEQUENCE, AND COORDINATION OF SECONDARY SCIENCE

Application No:	R168D 90070
Amount of Award:	$70,000
Budget Period:	08/01/90 - 07/31/91
Total Award to Date:	$612,291
Duration of Project:	24 months
Project Period:	08/01/89 - 07/31/91

In an effort to initiate a dramatic improvement in the way science is taught in the United States, this National Science Teachers Association (NSTA) administered program will coordinate a national reform plan to completely reorganize the scope, sequence, and coordination of secondary science courses. The particular focus of the project is to work with pilot centers of reform which include schools that will trial test the new arrangement of science classes; local colleges and universities which will provide the teacher training; and, businesses and industries which will provide some of the scientific expertise and funding to implement the centers.

NSTA, working with content area and learning theory specialists, will redesign and reformat curriculum materials which will coordinate earth and space science, biology, chemistry, and physics to enable them to be taught in varying concentrations in all five years of secondary school - grades 7-12.

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THEMATIC INQUIRY

Application No:	R168D 90146
Amount of Award:	$474,153
Budget Period:	08/01/89 - 07/31/91
Duration of Project:	24 months
Project Period:	08/01/89 - 07/31/91

The philosophy of this project is that science must be more accessible and relevant to future citizens so that the power of technology to integrate information can be applied to the challenge of helping students to integrate knowledge and experience. There are major themes in the continuum of scientific disciplines, such as Energy, Evolution, Scale, Systems, Humankind, Matter, and Cycles. Each major theme can be studied through an independent scientific discipline; for instance, chemistry, astronomy, biology, geology, ecology, etc., or it can be approached on a broader scope of thematic inquiry, discovery, and problem solving. The themes become anchor points in which to tie generalized concepts, methods, and principles of science enabling students to study specific environments and habitats both inside and outside the classroom.

As the students progress through the units, themes are progressively interwoven and expanded to cut across the traditional boundaries of each scientific discipline. Curriculum development is designed to take full advantage of the power of new technologies, improving access to information and representation of information through various delivery platforms and communications modalities.

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ENVIRONMENTAL SCIENCE INSTITUTE

Application No:	R168D 00151
Amount of Award:	$210,006
Budget Period:	07/01/90 - 06/30/91
Duration of Project:	12 months
Project Period:	07/01/90 - 06/30/91

The National Audubon Society has developed a national strategy for working with inner city school systems to integrate issues of environmental hazards into science education. In 1989 Audubon joined forces with the District of Columbia Public Schools to create a model teacher training program for integrating environmental issues into the middle school/junior high school science curriculum. This proposal will capitalize on the seminal work of the National Audubon Society/District of Columbia Public Schools Science Institute. It will bring a process, materials, teacher training, and state-of-the-art technology in environmental science to public and private schools serving minority group students across the country.

During the project period the Audubon will:

- Implement Audubon Science Institutes at five school sites serving minority students.
- Design training manuals and materials for participants and trainers based on an interdisciplinary environmental science theme curriculum and a technology-based instructional delivery system.
- Adapt the finely crafted and nationally acclaimed Audubon print materials, computer software, videos, and videodisc materials for middle school science instruction.
- Train a corps of 20 middle school science and mathematics teachers largely from minority groups to serve as certified Audubon Science Institute trainers.
- Conduct a minimum of 10 teacher training workshops in school districts serving predominately minority group students.
- Conduct a feasibility study for implementing the Environmental Issues/Audubon Science Institutes nationally.

- **Plan a national dissemination conference for educators, community leaders, political leaders, and environmental advocates to publicize the objectives, materials, teacher training activities, and materials developed by the National Audubon Society.**

This proposal closely identifies the Audubon Science Institute (ASI) with the science-technology-society movement, which seeks to teach science in the context of technology and society. Audubon hopes to replicate the ASI concept in school districts across the country. They will make Audubon resources available to schools participating in this project and will assist in locating other financial resources for the continuation and expansion of the Science Institutes.

ABSTRACT Lewisville Independent School District

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TECHNOLOGY-BASED SCIENCE INSTRUCTION

Application No:	R168D 00047
Amount of Award:	$180,558
Budget Period:	08/01/90 - 07/31/91
Duration of Project:	24 months
Project Period:	08/01/90 - 07/31/92

The project is focused around five objectives and activities:

1. Increasing student mastery of physical science concepts;

2. Increasing teacher confidence and competence at incorporating technology-base curriculum into the science classroom;

3. Addressing special learning needs of students identified as at-risk due to academic, economic, cultural or social disadvantage;

4. Increasing student interest in taking additional science courses; and

5. Increasing teacher usage of questioning techniques that encourage higher level thinking.

Lewisville Independent School District (LISD) will adapt, supplement and implement the TLTG Interactive Videodisc Physical Science Program on a district-wide basis. While the TLTG program will be a primary vehicle in the project, a major emphasis will be placed on adaptations to meet special learning needs, supplementations to broaden the delivery system (networking to a file server, LCD computer-generated overhead projection, use of archival videodisc programs), special teacher training (learning styles, concept mapping, TESA, questioning techniques), peer observation for teachers, and peer tutoring for students.

The project will combine an established technology-based physical science program with other technology delivery systems, recognized motivational programs, and additional content and pedagogical training. The project also tests specific activities intended to increase student enrollment in additional science classes. The project is structured to maximize dissemination and potential replication: organized curriculum guides and reports; support of organizations with local, regional, state and national lines of dissemination; willingness to serve as a demonstration site; placing pre-service teachers from five large universities in a technology-based science setting; and intent to present findings in professional journals and meetings.

ABSTRACT Bronx High School of Science Foundation

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A MODEL PROJECT TO ESTABLISH A LOCAL, REGIONAL AND NATIONAL APPROACH TO THE ENHANCEMENT OF SCIENCE TEACHING

Application No:	R168D 00373
Amount of Award:	$180,000
Budget Period:	09/01/90 - 08/31/91
Duration of Project:	36 months
Project Period:	09/01/90 - 08/31/93

Staff at the Bronx High School of Science have long felt that scientific creativity can, in fact, be stimulated by the educational process. The school's three-year sequence in the sciences has consistently been successful in turning out student researchers who have been prizewinners in the Westinghouse Science Talent Search as well as in numerous other competitions. On a broader level, students who go through the program develop the type of questioning and thinking skills that will allow them to become productive members of society in general and the scientific community in particular.

Critical to achieving this goal is the performance of the classroom teacher in the educational process. This program will establish a teacher-training center within the science departments at The Bronx High School of Science that will provide the opportunity for teachers from both public and private schools to develop the philosophy, strategies, and techniques necessary to build problem-solving skills and creativity on the part of their students. In essence, The Bronx High School of Science will serve as a regional center for the development of a nationwide network of teacher training centers for inner city, suburban and rural school districts. Specific goals, over the three years of this project are to enhance science teaching for approximately 200 local teachers and to establish from 20-25 regional centers which can then perpetuate this project nationwide. The impact of this training program on the teacher-participants will be evaluated.

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HUDSONWATCH INSTITUTE PART II

Application No:	R168D 00025
Amount of Award:	$170,000
Budget Period:	07/01/90 - 06/30/91
Duration of Project:	24 months
Project Period:	07/01/90 - 06/30/92

At the summer Hudsonwatch Institute, Bank Street faculty, research scientists, and groups of twenty teachers who work with early adolescents will spend twelve days over four weeks in a professional development experience that focuses on "science-through-inquiry" as a way of encouraging the interest and literacy level of young adolescent students. After the Institute, Bank Street College will monitor and transfer the approach to the classroom by the Institute participants, document and evaluate the translation of the summer experiences into classroom curriculum, and disseminate that curriculum through the national network of teacher centers.

The expected outcome of the project is to create a model science education program for teachers of early adolescents that addresses four critical needs:

- The need of teachers to experience what scientific investigation really is, beyond the mandated "hands-on approach."
- The need of teachers to understand science in its proper social context--to think about science in the web of human experience--and thus to understand how children's studies of science intersect with their studies of other bodies of knowledge.
- The need for interaction among scientists, teachers and science educators.
- The need for a support group as teachers adopt new approaches to the work in their classrooms.

ABSTRACT

Maryland State Department of Education
Maryland Instructional Technology (INTEC)

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STARFINDER: THE HUBBLE SPACE TELESCOPE

Application No:	R168D 00349
Amount of Award:	$235,000
Budget Period:	07/01/90 - 06/30/91
Duration of Project:	12 months
Project Period:	07/01/90 - 06/30/91

Maryland Instructional Technology (INTEC), a Division of the Maryland State Department of Education will develop a series of 30 fifteen-minute instructional videotapes, accompanied by teacher's guides for use in the junior high and high schools across the United States. The motivation for the series will come from the Hubble Space Telescope and the Space Telescope Science Institute. The Hubble Space Telescope will offer us a chance to move forward in space science and can serve as a motivator for students to learn science concepts. The series will be broadcast over the Public Broadcasting Service (PBS) network and offered on videocassettes to schools not part of the network and without satellite dishes.

The project will design, write, and produce a series of instructional videotapes and design and write related teacher's guides. The project will be developed by INTEC staff in consultation with an advisory panel including representatives from eleven states and the Space Telescope Science Institute. Once the products are complete, the print material will be sent to participating institutions for duplication and dissemination and the instructional videos will be broadcasted through the PBS network for recording and rebroadcasting or use to fit the needs of particular participating institutions and organizations.

The video series is intended to disseminate in a timely way to teachers and students the discoveries of the Hubble Space Telescope; to make available to all science teachers across the nation a visual explanation of 30 physical and earth science concepts suitable for inclusion into the curriculum; to offer a set of print materials that emphasize hands-on experiences; and to make available to students personal conversations with individuals involved in the Space Telescope Science Institute.

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TEPE: TEACHER ENHANCEMENT FOR PHYSICS EDUCATION

Application No:	R163D 00335
Amount of Award:	$155,000
Budget Period:	10/01/90 - 09/30/91
Duration of Project:	36 months
Project Period:	10/01/90 - 09/30/93

The TEPE project will serve three major purposes:

1. Provide a structure by which materials and resources developed by three exemplary high school physics programs may be introduced to and institutionalized in classrooms in 45 small-town and rural "demonstration schools" in the West.

2. Develop a cadre of 45 master educators certified to function as Leadership Teachers--personnel fully qualified to lead both awareness and staff development activities for local and state peers.

3. Demonstrate a model approach by which needed staff development resources and services may be provided to small-town and rural school personnel in an effective, cost-efficient manner--with special emphasis on distance training using videotapes.

TEPE will offer activities in which the directors of three exemplary National Diffusion Network (NDN) programs work with western educators to prepare these personnel to serve as Leadership Teachers. The NDN programs are *PRISMS*, *Physics: Teach to Learn*, and *Mechanical Universe*. The project membership will be divided into three fifteen-person groups, one group for each of the three programs.

After a video orientation and "sampler" field testing activities during the second half of the 1990-91 school year, Leadership Teacher candidates will attend a two-week Institute in Salem, Oregon, July 1991. This Institute will concentrate on the operational specifics of the three exemplary programs and, to a degree, the use of technological systems for teacher training and direct classroom instruction purposes. After the Institute, participants will be responsible for conducting full-scale implementations during the 1991-92 academic year.

A one-week Institute in July 1992 will focus on developing participants leadership skills, preparing them to make awareness presentations for professional groups and lead in-service workshops for local and state colleagues during (and after) the 1992-93 school year.

Another important project component will be the preparation of "sampler" videos which will be used both prior to the first Institute and subsequently during satellite television broadcasts. Broadcast of these videos has already been arranged with OERI/National Diffusion Network; other regional and national teleconference systems will also be invited to take advantage of the tapes. In addition to their other awareness and in-service activities, the project's Leadership Teachers will be available to serve as downlink site coordinators when the videos are aired.

A variety of evaluation strategies are included in the project plan, including the use of State Monitoring Teams and a third-party evaluator.

Other Science and Mathematics Projects

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CURRICULUM DEVELOPMENT PROJECT FOR THE SCHOOL OF SCIENCE AND MATHEMATICS

Application No:	R168D 9033
Amount of Award:	$600,000
Budget Period:	09/01/89 - 08/31/91
Duration of Project:	24 months
Project Period:	09/01/89 - 08/31/91

The purpose of this project is designed to demonstrate the effectiveness of a model curriculum to meet the instructional needs of gifted high school students in science, mathematics, and technology. A model research-oriented curriculum in the fields of science, mathematics, and technology will be developed, tested, and disseminated. The model, to be based upon Bloom's taxonomy of learning, will be implemented through small-group or individualized instruction, on-campus research projects, and off-campus research in conjunction with a mentor. Over 300 individuals from universities and industry have volunteered to serve as mentors.

The curriculum will be developed during the first year of the project and tested during the second year. The school will serve as a site for teacher training; in addition, statewide dissemination of the curriculum is planned to improve teaching methods in the three academic fields. National dissemination of the project will be accomplished through presentations at educational conferences, publication of articles, and application to the National Diffusion Network for status as a validated program.

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SYSTEM THINKING AND CURRICULUM INNOVATION NETWORK HIGH SCHOOL MATHEMATICS AND SCIENCE

Application No:	R168D 90006
Amount of Award:	$535,687
Budget Period:	10/01/89 - 09/30/91
Duration of Project:	24 months
Project Period:	10/01/89 - 09/30/91

This project will provide support to enable twenty-four teachers of science and mathematics in seven schools in California and Vermont to develop curriculum materials and instructional strategies for the systems thinking approach. The project will offer new methods of inservice programs to assist teachers to develop, apply, and infuse the innovative technology-based instructional perspective of systems thinking into existing curricula. The curriculum materials produced in content-specific teacher networks will be disseminated for use by other teachers in the project schools, and eventually to other locations where the model for teaching with systems thinking will be implemented.

These goals will be accomplished through intensive teacher preparation inservice settings and interactions with networks of systems experts, mathematics and science educators, curriculum specialists, and other teachers.

ABSTRACT Michigan Technology Council

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IMPROVING QUALITY OF TEACHING AND LEARNING IN MATHEMATICS, SCIENCE, AND COMPUTER LEARNING THROUGH THE COOPERATION OF RCTC AND MTC

Application No:	R168D 90088
Amount of Award:	$386,652
Budget Period:	09/01/89 - 08/31/91
Duration of Project:	24 months
Project Period:	09/01/89 - 08/31/91

A collaboration between the Michigan Technology Council (MTC) and the Ypsilanti Public Schools will establish a business, industry, and education partnership in Washtenaw County to educate teachers and students in a working application of math, science, technology, and communication skills.

The first part of the project, the MTC Quest Program, regularly exposes teachers and students to business experiences with the latest technologies. In part two of the project, designed by the Ypsilanti Public Schools under the guidance of the Regional Career Technical Center (RCTC), curriculum modules will be developed over a two year period and made available for use throughout Washtenaw County.

ABSTRACT

Comanche County Board of Education

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CONSOLIDATION BY COMMUNICATION FOR MATHEMATICS AND SCIENCE REFORM

Application No:	R168D 90055
Amount of Award:	$538,245
Budget Period:	10/01/89 - 09/30/91
Duration of Project:	24 months
Project Period:	10/01/89 - 09/30/91

Our aim is to improve the opportunity for access to updated, quality instruction in mathematics and science for students in ten small, isolated rural school districts in Southwest Kansas. To attain this goal, the participating schools and cooperating colleges, universities and private agencies will consolidate by communication, using the instructional resources of ten small rural isolated school districts in southwestern Kansas and incorporating full motion-analog television for instructional delivery. Next, the project will upgrade and strengthen the mathematics curriculum available in the secondary schools to include four years of mathematics and opportunity for advanced placement in mathematics at all high schools in the consortium in accordance with National Council of Teachers of Mathematics recommendations. There also will be an upgrading and strengthening of the science and technology curriculum for grades 9-12 to include four years of science with a strong focus upon laboratory activities a 1 the use of extensive computer simulation in all subjects, and advanced placement opportunities at all schools. Finally, plans will be developed for vertical integration of the educational opportunities found in the ten school districts with two or more community colleges and at least one comprehensive state-supported university as a means of facilitating programs of advanced placement for school students, and adult or continuing education for professionals including teachers and school administrators.

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RURAL SCIENCE AND MATH HIGH SCHOOL WITHOUT WALLS

Application No:	R168D 90013
Amount of Award:	$485,494
Budget Period:	10/01/89 - 09/30/91
Duration of Project:	24 months
Project Period:	10/01/89 - 09/30/91

Using technology partnerships among rural and small schools, universities, State Departments of Education, and public and private resource agencies, this project seeks to reform teaching in three ways. First, the project will expand the science, mathematics and technology course offerings available to students attending rural high school; secondly, it will provide access to content specialists; and, thirdly, provides on-going professional development opportunities for teachers in rural schools.

The Rural Science and Mathematics High School Without Walls uses existing higher education staff to assist with advanced courses. The delivery of instruction includes a combination of campus institutes, local seminars of students from neighboring schools, and electronic networking using affordable technology. The basic structure is a cluster of school districts networked with an institution of higher education.

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SAMI: SCIENCE AND MATH IMPROVEMENT PROJECT

Application No:	R168A 90376
Amount of Award:	$60,000
Budget Period:	10/01/90 - 09/30/91
Total Award to Date:	$169,505
Duration of Project:	36 months
Project Period:	

The "SAMI" (s-ah-me) project seeks to improve science and mathematics instruction in elementary schools in American Samoa by training and motivating teachers and developing peer support teams in all participating schools. Teacher workshops spanning a two year period will focus on the attitudes, knowledge, and skills needed to implement instructional improvement. Annual science and mathematics instructional conventions will be planned for teachers. A growing team of support teachers will be developed throughout the three year cycle to sustain the program's activities and to further act as a model for isolated, rural school districts.

ABSTRACT Northwest Regional Educational Laboratory

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THE SMART PROJECT: SCIENCE AND MATHEMATICS ACADEMIES FOR RURAL TEACHERS

Application No:	R168D 00183
Amount of Award:	$250,000
Budget Period:	08/01/90 - 07/31/91
Duration of Project:	36 months
Project Period:	08/01/90 - 07/31/93

The SMART Project is a regional capacity building alliance of Pacific Northwest teacher educators who have a demonstrated commitment to improving the quality of mathematics and science instruction in small, rural schools through teacher preservice, induction and inservice.

Ten teacher education institutions in the Northwest will form an alliance to strengthen the quality of mathematics and science instruction in rural schools through regional and state-level summer academies over the next three years. Fifty master teachers of mathematics and science will form a leadership cadre to supervise student teachers in rural settings and serve as mentor teachers for new staff.

The significant outcomes will be five-fold:

1. Increase recognition and incentives for veteran teachers of mathematics and science in economically disadvantaged small, rural schools;

2. Increase the quality and number of field practicum placements in small, rural schools of prospective mathematics and science teachers;

3. Increase the quality of teacher induction in small, rural schools;

4. Enhance the range of instructional strategies introduced in mathematics and science teacher education appropriate to small, rural schools; and,

5. Demonstrate the generalizability and effectiveness of regional alliances of higher education institutions and science-technology centers for improving the quality of educational opportunities for students and teachers.

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COLORADO PARTNERSHIP MATHEMATICS PROJECT

Application No:	R168D 00328
Amount of Award:	$150,000
Budget Period:	10/01/90 - 09/30/91
Duration of Project:	36 months
Project Period:	10/01/90 - 09/30/93

The Colorado Partnership Mathematics Project (CPMP) will reform mathematics education in elementary and secondary schools in the five Partnership school districts. Reform will be addressed through the process of collaborative inquiry which involves teachers in developing the habit of examining what they do and why they do it, and continually seeking new knowledge about mathematics education in a supportive, collegial environment. Drawing on ideas, principles, and recommendation in current research, the CPMP will address teacher knowledge of mathematics, instructional practices, and the process of change. The project will:

1. Expand the mathematical knowledge base of teachers;

2. Expand teachers' use of instructional strategies for engaging students in active learning and problem solving;

3. Develop a cadre of lead teachers who will continue to serve as change agents in the reform of mathematics education;

4. Develop a set of guidelines for conducting collaborative inquiry that focuses on mathematics education; and

5. Improve student attitudes toward mathematics.

Ten schools across five districts will become centers of collaborative inquiry and models of exemplary mathematics teaching. Lead teachers and lead support teachers from each of the schools will be identified to work with their colleagues in intensive ways that support ongoing growth in understanding and teaching of mathematics. These teachers will be supported by district mathematics supervisors and educators, mathematicians from the three higher education institutions, and Partnership staff.

The schools will become centers of mathematical inquiry charged with disseminating and networking the principles and processes of the project in the additional 227 schools of the Partnership and the three teacher education programs. The CPMP will also link with other mathematics reform efforts through the 14-state National Network for Educational Renewal.

ABSTRACT GMI Engineering and Management Institute

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TUNE IN TO MATH AND SCIENCE

Application No:	R168D 00225
Amount of Award:	$376,250
Budget Period:	08/01/90 - 07/31/91
Duration of Project:	12 months
Project Period:	08/01/90 - 07/31/91

This is a collaborative project involving higher education, urban school districts, corporate employers, organized labor, professional societies, foundations and state and federal government. It is building upon a $1 million dollar pilot science and mathematics project currently being implemented in five predominantly minority school districts at the middle school and early high school levels with immediate plans to include upper elementary.

The project employs cutting edge technology, NSF sponsored and validated curricula, highly selected master teachers, model staff development techniques, corporate mentors, parent participation and supportive community intervention to excite, motivate, teach and support students and teachers, especially in urban school districts.

Currently funded by corporate, NSF, foundation, labor and state sources, with extraordinary infusion of in-kind support, the project will expand within the pilot school districts and to at least five additional large urban districts in at least three states, as it continues to assess its progress against the NCTM standards and the AAAS Project 2061 and to pursue serious inquiries to collaborate and expand nationally.

GMI Engineering and Management Institute has borne the financial risk of the pilot project to demonstrate the efficacy of the program as a response to the MIT Commission on Industrial Productivity treatise, Made in America, and as a necessary prelude to a full year project in a multistate region. It is intended that GMI's corporate partners, acting out of enlightened self interest will become the primary advocates and catalysts for the program in their respective communities.

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AN INTERDISCIPLINARY TEACHING MODEL TO ENHANCE ACHIEVEMENT OF ELEMENTARY STUDENTS IN SCIENCE AND MATHEMATICS

Application No:	R168D 00439
Amount of Award:	$89,411
Budget Period:	07/01/90 - 06/30/91
Duration of Project:	24 months
Project Period:	07/01/90 - 06/30/92

The project is designed to enhance elementary student (4th-6th grades) attitude toward and achievement in science and mathematics through an interdisciplinary curriculum which focuses on real world problems. This is to be accomplished through a teacher enhancement program and an academic year support program which facilitates program implementation, promotes parent involvement and utilizes a multi-faceted student assessment plan.

Teams of four intermediate level teachers from eight elementary buildings will participate in the project. Participating schools are located within a 60-mile radius of Cortland and will be equally divided between rural and inner city populations.

The eight-teacher teams will participate in an intensive two-week summer institute to be held on the SUNY College at Cortland campus during August, 1990. During the Institute teachers will explore the curricular linkages between science and mathematics which can be nurtured to make instruction in both disciplines more meaningful and relevant to students. The teachers will participate in a hands-on model unit which integrates Level III understandings on the Ecosystem (NYS Elementary Science Syllabus) and Geometry and Measurement standards (NYS Elementary Mathematics Syllabus and NCTM Standards). During the Institute, teacher teams will prepare parent involvement and student assessment plans.

During the academic year, 1990-91, the project staff will serve as consulting teachers for the participating teams. Consulting teachers will serve as co-teachers, help implement the interdisciplinary unit, "Geometry and Measurement in the Environment," support the development of a second interdisciplinary unit, and aid in implementing the parent involvement and the student assessment plan. Each participating teacher will be visited eight times during the academic year.

Assessment of project results will be measured by pre- and post-attitude surveys administered to students, teachers and parents; scores on PEP and ASPET tests; teacher journals and student portfolios.

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PROJECT WHY

Application No:	R168D 00173
Amount of Award:	$170,000
Budget Period:	08/01/90 - 07/31/91
Duration of Project:	36 months
Project Period:	08/01/90 - 07/31/93

Project Why is a collaborative endeavor between Ramapo College of New Jersey, a four-year undergraduate liberal arts State College, the Englewood Public Schools, and Corn Products Company International (CPC). Parents, teachers, administrators, college faculty and CPC professionals will work together to improve mathematics and science teaching and instruction in grades pre-K to 7, by: (1) improving teacher attitudes toward the subjects and toward the teaching of them, (2) improving teacher knowledge of content and methodology, (3) improving teacher instructional effectiveness, (4) increasing the quantity of mathematics and science instructional time, (5) improving student attitudes toward the study of mathematics and science; and improving student achievement.

These objectives will be achieved through intensive in-service teacher training during the school year and during two weeks in the Summer of 1991. Concurrently, adequate and effective support services for students and teachers will be collaboratively designed and implemented.

Project Why will develop confidence in teachers which will result in improved instruction, increased instruction, improved student attitudes and improved student achievement. Ultimately, better student achievement and attitudes at the elementary level will result in raised expectations, a strengthened and enriched curriculum and improved success on the secondary level and beyond.

ABSTRACT Southwest Educational Development Laboratory

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PASO PARTNERS PROJECT

Application No:	R168D 00166
Amount of Award:	$181,365
Budget Period:	09/01/90 - 08/31/91
Duration of Project:	36 months
Project Period:	09/01/90 - 08/31/93

Southwest Educational Development Laboratory (SEDL) has organized the Paso Partners--a partnership of three public school districts, two institutions of higher education, and staff from SEDL's Follow Through Program-to mount a coordinated assault on the problems of poor mathematics and science achievement among limited-English-proficient (LEP) Hispanic students in kindergarten through the third grade.

Among the nation's 42 million school children, some 1.5 million are in LEP programs. The majority of these are Hispanic. These students have the special problem of learning not only science and mathematics but also a new language at the same time. SEDL's 21-year-old Follow Through Model is a language-development approach for organizing and conducting instruction and parent involvement to foster not only English-language skills but also academic skills and foundations in core subject areas. The Paso partners Project will combine this proven Follow Through Model with the best emerging strategies and materials for teaching mathematics and science and will train teachers (including inservice teachers, teacher aide interns, and student teachers) and provide technical assistance to help them implement the strategies in up to 33 classrooms in three poor, primarily Hispanic school districts on the U. S./Mexico border near El Paso, Texas.

The outcome of this work--as a three-year project--will be educational impacts on some 840 LEP children, an array of education professionals trained and equipped to continue the strategies with similar children for years to come; model curriculum guides developed by the teachers for kindergarten through third grade; and regional and national exposure of the project and its effects through professional presentations, a regional dissemination conference, and integration of the concepts into other federally funded service projects at SEDL for bilingual education programs.

ABSTRACT

Rochester City School District

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SCIENCE/MATH DEMONSTRATION MODEL WHICH OFFERS TEACHING TRAINING, RESOURCES AND INSTRUCTIONAL SUPPORT IN SCIENCE AND MATH

Application No:	R168D 00104
Amount of Award:	$140,000
Budget Period:	09/01/90 - 08/31/91
Duration of Project:	36 months
Project Period:	09/01/90 - 08/31/93

Using elementary School No. 12 as a demonstration site, the District will implement a model elementary science center operated by a certified elementary teacher with the assistance of a part-time scientist as well as part-time clerical staff. The James P.B. Duffy School No. 12 enrolls 912 students. Sixty-five percent of the students are minority students. This demonstration model will be developed, implemented and evaluated over a three-year period, thereby allowing adequate time for full program implementation, assessment, and for District-wide implementation once the program has been fully tested at the demonstration site.

The Science Connection Center, as the focal point of science education for the school, will provide all classroom teachers with a variety of support activities. For all participating teachers, the program will result in improved proficiency in knowledge and skills in the teaching of science and math as well as a positive attitude toward science and math. Consequently, the most important objective is to achieve improvement in the knowledge, the skills, and the attitudes and abilities in science and math for the elementary students in the system.

Key components of the Science Connection Program include teacher training, instructional support for science lesson guides, team teaching with a scientist, science materials for hands-on activities, transportable science equipment and materials, and science/math resource materials and special activities and events.

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PROJECT BEAM - BOOSTING EDUCATION AWARENESS IN MINORITIES

Application No:	R168D 00090
Amount of Award:	$120,115
Budget Period:	09/01/90 - 08/31/91
Duration of Project:	36 months
Project Period:	09/01/90 - 08/31/93

Project BEAM is directed toward capable secondary school minority students who have not selected college preparatory programs. It seeks to provide them with the necessary background, through specialized summer mathematics and science coursework, so that by graduation they will be as well prepared as those who began the college track earlier.

Sixty ninth-grade minority students from high schools in Duval County, Florida, with identified potential for college but who have not selected college track coursework will be selected to participate in specially developed coursework in mathematics and science during the summers following their 9th, 10th, and 11th grades. To alleviate their need for summer employment, modest stipends will be paid for their participation in the six-week special summer sessions. Students who succeed in all three summer sessions and graduate within the following year will be assured of admission as freshmen into the University of North Florida (UNF) upon graduation.

Teams of UNF mathematics, science, and education faculty will work with master teachers from Duval County during the academic year to develop the special courses. The master teachers will deliver the courses on the UNF campus. Teacher education students from UNF will serve pre-internships in these summer programs and thereby gain experience in the special educational needs of these minority students.

ABSTRACT

American Association for
the Advancement of Science

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PROYECTO FUTURO - IMPROVING ELEMENTARY AND MIDDLE SCHOOL SCIENCE AND MATHEMATICS EDUCATION FOR HISPANIC CHILDREN

Application No:	R168D 00110
Amount of Award:	$160,000
Budget Period:	09/01/90 - 08/31/91
Duration of Project:	24 months
Project Period:	09/01/90 - 08/31/92

Proyecto Futuro is designed to mobilize the Hispanic community to work in partnership with schools to improve science and mathematics teaching and learning. Project goals include:

- Developing and cultivating a coalition of local school councils, principals, teachers and parents;
- Developing materials that facilitate a hands-on/inquiry/problem-solving approach within the curriculum framework mandated by local and state guidelines and materials that are culturally-relevant for Hispanics;
- Providing training, technical support and resources to implement instructional strategies that incorporate scientific process skills and culturally-related activities; and
- Providing parents with specific strategies for encouraging children in mathematics and science.

Project sites include 10 schools in the Chicago area with high populations of Hispanic students. Community groups involved in the project include the Hispanic Alliance for Career Enhancement, ASPIRA, LULAC National Educational Service Center, El Hogar del Nino, Association House, and the Society for Hispanic Professional Engineers. Products developed will include a teacher guide on science and mathematics instructional strategies for use with Hispanic students. Materials developed will be disseminated by AAAS and national Hispanic community-based organizations.

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STATEWIDE IMPROVEMENT IN ELEMENTARY MATHEMATICS AND SCIENCE INSTRUCTION THROUGH PEER TEACHER TRAINING

Application No:	R168D 00258
Amount of Award:	$350,000
Budget Period:	08/01/90 - 07/31/91
Duration of Project:	36 months
Project Period:	08/01/90 - 07/31/93

This three-year project is an extension of a very successful pilot project recently completed by the Mathematics and Science Education Network in North Carolina. The project design includes a leadership development/peer training/school-based planning model in which two lead teachers and a principal from 12 elementary schools at each of 10 sites (240 teachers and 120 principals in each of two years) will conduct school assessments and produce plans for improving either mathematics or science education at their schools. Lead teachers will receive training from University faculty and master teachers to assist them in becoming peer teachers; the school assessment and subsequent training will focus on meeting the new professional standards at the elementary level. During subsequent years, lead teachers will train their colleagues and implement plans for improving mathematics or science instruction at their schools. Selection of participating schools will focus on reaching the traditionally underserved--i.e., schools with high minority populations, schools in economically depressed areas, and schools in remote rural areas. Throughout the project, outcomes will be documented, and results will be widely disseminated.

The project will make a significant impact on the quality of mathematics and science instruction by providing training for the entire faculties at 240 historically underserved elementary schools. In addition, the program will serve as a model for statewide school improvement that can be replicated throughout the nation.

ABSTRACT

Diocese of Fargo

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IMPROVING THE QUALITY OF TEACHING AND LEARNING THROUGH SATELLITE DISTANCE LEARNING

Application No:	R168D 00054
Amount of Award:	$113,400
Budget Period:	10/01/90 - 09/30/91
Duration of Project:	36 months
Project Period:	10/01/90 - 09/30/93

Utilizing satellite interactive distance learning, this project will provide expanded opportunities for improved curricula in mathematics and science for elementary and secondary students and classroom teachers.

The three year, system-wide curriculum improvement project will implement new math and science curriculum into 13 private schools in eight towns and cities in the eastern half of North Dakota. These schools comprise the Diocese of Fargo school district.

The project is based on a downlink from a validated satellite interactive distance learning program that will provide: 1) enrichment programs in mathematics and science for elementary and junior high students, 2) expanded course selections (with college credit options) in mathematics and science for high school students, and 3) in-service opportunities for teachers, administrators and support staff to improve the quality of teaching and instruction in mathematics and science.

During each of the three years, an evaluation will be conducted to assess the impact of satellite interactive distance learning on teaching and learning, particularly as it affects students' knowledge, attitude, behavior and opportunity, and teachers' professional development and use of instructional strategies.

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GEMS BY SATELLITE: AN INNOVATIVE MODEL FOR ACTIVITY-BASED SCIENCE IN-SERVICE VIA SATELLITE

Application No:	R168D 00040
Amount of Award:	$220,000
Budget Period:	07/01/90 - 06/30/91
Duration of Project:	24 months
Project Period:	07/01/90 - 06/30/92

"GEMS by Satellite" will use satellite technology to provide public and private rural schools in Alaska, Idaho, Montana, Oregon and Washington an opportunity to improve K-8 science instruction through an in-service model designed to lead to a systematic district or building implementation. Despite the distances between participating schools and their teachers, this model maintains the interactivity of an on-site, hands-on in-service model. This model also involves administrators, parents and community members to provide a broader base of support for necessary changes.

Great Explorations in Math & Science (GEMS), developed at the Lawrence Hall of Science, is an exciting and effective curriculum and in-service program that has been tested by hundreds of teachers nationwide. The GEMS curriculum was selected by the National Science Foundation for wide scale national dissemination. Through the NSF funded project, staff from the Lawrence Hall are working with 2,000 educators. This distance learning program will make GEMS available to teachers in rural areas who do not currently have access to the GEMS Nationwide Network.

The project will use a premier distance learning program, Educational Service District 101's Satellite Telecommunications Educational Programming (STEP), to bring live, interactive science in-service to 60 remote school districts in the five designated states. The design, production and broadcasting of "GEMS by Satellite" will result in 'live-to-tape' and video segments which will be edited into a GEMS training package consisting of 13 two-hour videotapes for use by the Lawrence Hall of Science in its efforts to continue disseminating GEMS as NSF funding expires. Furthermore, with the initial costs of design and preproduction removed, satellite technology provides an economical way of reaching increasing numbers of school districts with satellite dishes. In other words, the "GEMS by Satellite" program will continue to be offered to school districts without the need of additional support.

ABSTRACT

University of Miami

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MSRT: MATHEMATICS AND SCIENCE RESOURCE TEACHER PROJECT

Application No:	R168D 00102
Amount of Award:	$138,349
Budget Period:	08/15/90 - 08/14/91
Duration of Project:	36 months
Project Period:	08/15/90 - 08/14/93

Recent national reports in education have highlighted the need for reform in curriculum, teacher education, and student assessment practices. A gap exists between these global recommendations and what is specifically needed to accomplish the national objectives. The proposed project addresses one particular aspect of the national call for reform: improvement of staff development in mathematics and science. The overall purpose of the Mathematics and Science Resource Teacher Project is to improve the quality of mathematics and science instruction and teachers at the elementary level, in order to facilitate the access of elementary school students who have been underserved and underrepresented in mathematics and science education. The specific objectives of the program are:

1. Implement a staff development model which emphasizes: a) upgrading content knowledge of mathematics and science teachers, b) development of instructional skills consistent with the recommendations of recent national reports, c) development of leadership skills for teachers to serve as resource and staff development facilitators for colleagues, and d) institutionalization of the program at the University of Miami.

2. Evaluate the implementation of the model with a group of inner-city teachers of a large metropolitan school district.

3. Develop materials for national distribution to be used by districts in the replication/adaptation of the program.

4. Disseminate project materials and conduct staff development workshops at regional, state and local levels during the last year of the project.

The project will involve 40 elementary school teachers divided evenly between teachers from predominantly Hispanic and Black enrollment schools. Upon successful completion of the project, teachers will receive a specialist degree in mathematics and science education.

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THE EXPLORATORIUM AS A COMMUNITY-BASED SCIENCE AND MATHEMATICS TEACHER ENHANCEMENT RESOURCE

Application No:	R168D 00310
Amount of Award:	$140,076
Budget Period:	07/01/90 - 06/30/91
Duration of Project:	18 months
Project Period:	07/01/90 - 12/30/91

The Exploratorium has two teacher enhancement programs: the School in the Exploratorium, which serves K-6 teachers, and the Exploratorium Teacher Institute, which serves middle and high school teachers. The program will focus the activities on Chapter 1 schools in the San Francisco Unified School District.

In San Francisco, the percentage of Chapter 1 schools is extremely high, and with the city's diversified ethnic and racial mix, the already widespread problem of sparking students' interest in science and mathematics is complicated by cultural and linguistic obstacles. Generally speaking, and through no fault of their own, teachers at the elementary, middle, and high school levels have been inadequately trained in methods of teaching science to their classes. Faced with concerns about providing "science literacy" and the increased pressure to follow demanding new curricula, many teachers have felt demoralized and unsupported. The Exploratorium's teaching programs have been developed so that staff will work continuously with teachers at all levels to give them both the self-confidence and the practical skills that will allow them to communicate to their students that science and mathematics can be fun and personally meaningful.

The main objective is to develop a "critical mass" of teachers trained in activity-based science teaching by concentrating on Chapter 1 schools in San Francisco through intensive 80-100 hour workshops and follow-up activities based on successful models developed with NSF and Eisenhower State and local funding. Over the course of 18 months the Exploratorium we will work with 68 teachers at the elementary level, and 45 teachers at the middle and high school levels--all from Chapter 1 schools in San Francisco. As part of this intensive focusing, the Exploratorium we will recruit ESL teachers to participate in its workshops, structure a series of field trips for participating teachers' classes, and invite teachers to special events at the facilities. Avenues of communication will be initiated among teachers at all levels by having elementary teachers participate in secondary school activities and secondary school teachers will be included in the elementary enrichment programs. The third major goal is to use the Exploratorium's developing network of community relations as an aid to attracting parents who traditionally resist participating in school-based events.

By increasing the "critical mass" of teachers in Chapter 1 schools, the program will contribute significantly to the quality of science and mathematics teaching in San Francisco, and will help develop a cadre of qualified and motivated teachers who will be better able to take an active hand in developing curricula and working as mentors and role models for their colleagues. Through this work the Exploratorium will demonstrate the efficacy of using a community-based science museum as a direct resource for the enhancement of science teachers.