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ABSTRACT

A 50-state survey of mathematics, science, and computer education initiatives was undertaken to identify the number and diversity of responses states have made in response to the national crisis in precollege mathematics and science education. Descriptions of these initiatives (obtained from questionnaires, telephone interviews with state personnel, written materials provided by states, state newsletters, and from articles appearing in national publications) are presented in 10 sections: (1) task forces or commissions (quality or excellence); (2) task forces or commissions (computer education); (3) graduation requirements; (4) curriculum guides and performance standards; (5) science and mathematics programs; (6) computer education programs; (7) summer institutes, magnet and residential schools; (8) recognition and awards for teachers and students; (9) regional centers; and (10) teacher training and retraining. Only those state initiatives taken between 1982 and September 1983 are included. Although hundreds of initiatives were privately or locally sponsored, these are not included either, since the emphasis is on state actions. (JN)

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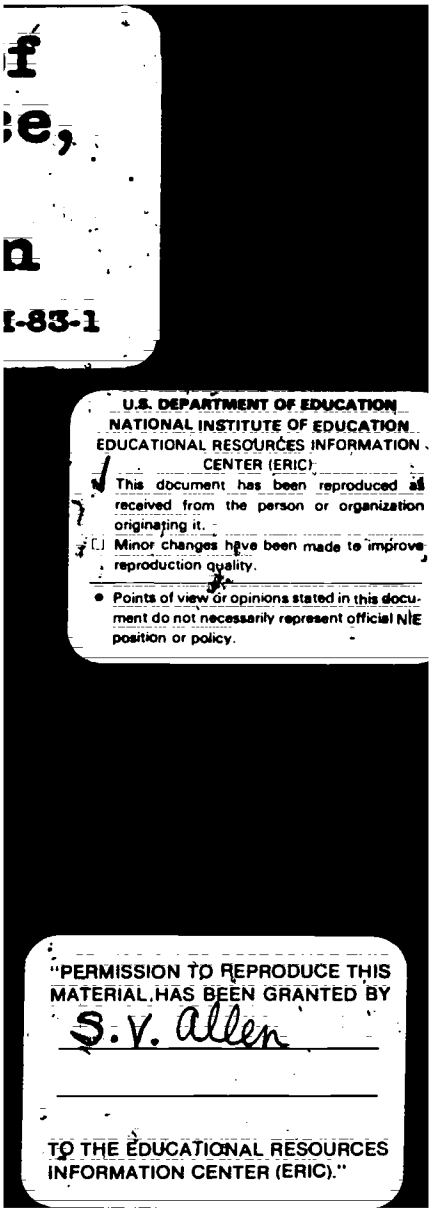

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A 50-State Survey of Initiatives in Science, Mathematics and Computer Education

No. SM-83-1

Education Commission of the States
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CONTENT OUTLINE

INTRODUCTION

This 50-state survey of mathematics, science and computer education initiatives was undertaken by the Education Commission of the States to identify the number and diversity of responses states have recently made to the national crisis in precollege mathematics and science education. Everyone is aware of the problems -- they have been described in Nation at Risk, Action for Excellence, Making the Grade, and Educating Americans for the Twenty-First Century to name a few of the recent reports on American education.

States have already begun to respond to the educational challenges. Several states have passed sweeping education reform acts in the past year; other states have earmarked millions of dollars to get computers into every school and train teachers to use them. More than half of the states have either recently raised their high school graduation requirements in mathematics and/or science or have increases pending approval. Nearly every state has taken some new initiative to alleviate the shortage of science and mathematics teachers.

The descriptions of state initiatives that follow are the result of a questionnaire mailed to every state, followed by telephone interviews primarily with chiefs of instructional divisions, governor's education aides and/or mathematics and science specialists in state education agencies. Written materials from states were used to provide additional detail. Recent state newsletters as well as articles in national publications, including Education Week and Schooling and Technology were used as additional sources of information.

The survey questionnaire asked states to describe their initiatives in grades k-12 in mathematics, science or computer education regarding: task forces or commissions; graduation requirements; instructional time; curricular guidelines or performance standards; special programs, schools, institutes or centers; and teacher training.

Only those state initiatives taken between 1982 and the present are included. Although hundreds of initiatives were privately or locally sponsored (for example, most curriculum is determined at the local level), these were not included either, since the emphasis of this survey is on state actions.

The Education Commission of the States is grateful for the support from the National Science Foundation to conduct this survey and other related activities.

I. TASK FORCES OR COMMISSIONS
(Quality or Excellence)

The Alabama Interim Commission on Elementary and Secondary Science and Mathematics has recommended a reevaluation of science and mathematics education guidelines and requirements in elementary and early childhood education. The commission has suggested 30 minutes of science instruction daily in elementary schools and thorough review of the K-9 science curriculum. It is also recommending that an additional $1 million in state funds be made available to local education agencies for science laboratory equipment. Finally, the commission supports extending the contracts of science and mathematics teachers by one month to improve preparation for the school year.

Arizona Governor Bruce Babbitt recently appointed a 20-member statewide task force to study all aspects of Arizona education. The Committee for Quality Education is chaired by John Schaefer, former president of the University of Arizona. The Committee will examine the national reports on education and report back to the governor on the status of Arizona education by October 31, 1983.

Under the Quality Education Act of 1983, a new state Education Standards Committee has been formed to recommend new curriculum standards for Arkansas public schools. The Act designates that the State Board of Education nominate 15 people, including teachers, school administrators, parents, college personnel and interested citizens. The law requires the committee to complete its study and file a report with the state board of education and with the Joint Interim Committee on Education of the Arkansas General Assembly by January 1, 1984. The committee will recommend proposed regulations, criteria and minimum standards to evaluate schools for compliance with minimum accrediting standards. New standards for the state's public schools must be adopted by March 1, 1984. The new standards would become effective June 1, 1987, allowing school districts three years to comply.

The state department of education in California has organized five task forces to develop model curriculum standards in (1) mathematics, (2) science, (3) computer education, (4) language arts and (5) history/social sciences.

Colorado Governor Richard Lamm is appointing a state task force to study recent national education reports, the status of Colorado education and its relationship to state economic growth, teacher shortages in mathematics and science, and other issues. The task force will consist of state education officials, teachers, school administrators and members of the business and industry community. The task force will present

its recommendations to the Colorado 1984 Legislature.

In July 1983, the Colorado State Board of Education established a curricular task force to study science and other subject areas within the state. The task force was created by the board's "Operation Renaissance," a project designed to upgrade education in response to the needs of a high technology society. The charges of the curricular task force are many, including increasing high school graduation requirements, basic student competencies, desirable teacher education program changes and the updating of teacher skills. The task force will make its initial recommendations in late September.

The Colorado State Board of Education appointed in 1982 a Task Force on Mathematics Education. The task force is composed of teachers, school board members, superintendents, principals and representatives from business and industry. The task force submitted their preliminary recommendations to the board in July 1983, which included: (1) three years of mathematics in grades 9-12 (the task force emphasizes mastery of skills, however, and realizes some students may reach mastery in two years), (2) three years of mathematics for the college bound and four years of mathematics for students entering mathematics- or science-related fields, (3) revision of certification and recertification standards for mathematics teachers and (4) more college preparation in mathematics for elementary teachers.

The Connecticut Professional Development Council, composed of all of the major state organizations and agencies interested in education, was formulated approximately three years ago to examine a number of issues related to the teaching profession. In April of 1982 the Council presented 25 recommendations to the state board of education encompassing four areas: teacher preparation, certification, continuing education, and beginning teacher support. The board approved their recommendations and, as a result, organized five different committees to work on specific issues. The outcomes of the following advisory groups will impact on all teaching disciplines: (1) the Certification Advisory Group; (2) the Advisory Group to Review Procedures and Standards for Approval of Teacher Preparation Programs; (3) the Testing Panel (considering entrance exams for teacher preparation programs and exit exams in the endorsement areas); (4) the Distinguished Citizens Task Force on Quality Education (considering strategies to attract and retain qualified teachers, and (5) the Professional Development Council (developing guidelines for professional development programs).

Delaware's Governor Pierre S. du Pont IV has recently established a new commission on excellence in schools, to be chaired by the Lt. Governor. The 32-member panel includes

representatives of business and industry, parents groups, universities and students as well as legislators, education leaders and heads of state agencies. The commission is charged with developing an "agenda for excellence," a plan for improving Delaware schools. To solicit citizen input, public hearings and visits to schools are planned. This group will submit its report, including recommendations and financing alternatives, to the governor prior to the 1984 legislative session.

The Delaware Committee to Insure the Availability of Professional Educators in Critical Curricular Areas was recently created by a joint resolution of the legislature. This 21-member group, representing local education agencies, colleges, community groups and industries, will study teacher shortages in all areas including mathematics, science and computer education. In September 1983 the state department of education will conduct a major survey of school districts on mathematics, science and computer education programs. This survey will examine course offerings, teacher requirements and special needs and/or problems facing local education agencies, e.g., turnover and retirement. The results of this survey will be reviewed and utilized by the committee in the preparation of its reports to the legislature and governor which are due in January 1984.

The Florida legislature recently approved the organization of the Florida Quality Instruction Incentives Council which will be composed of 15 appointed members who will oversee the development of subject area tests and teacher performance evaluation instruments; suggest appropriate distribution of funds; and oversee the implementation of educational reforms adopted by the 1983 legislature.

Present legislation in Florida (38-B) requires the commissioner of education to develop a comprehensive state plan for the improvement of mathematics, science and computer education programs in public schools. The plan will provide a framework for preparing and approving programs that address curricular goals, cost estimates for equipment and facilities, essential teacher characteristics and recommended courses of action.

In April 1983, the Florida Speakers' Task Force Report on Mathematics, Science and Computer Education was released. The recommendations served as a basis for developing new legislation to revitalize the curriculum in science, mathematics and computer education and to enhance the quality and quantity of teachers in these areas.

Governor Joe Frank Harris of Georgia has appointed the 40-member Education Review Commission, which was created by a joint House-Senate resolution. The commission is charged with defining quality basic education in Georgia and finding

mechanisms for funding it. Ten commission members are legislators; other members are business people, educators and concerned citizens. The commission has already held two meetings. It hopes to prepare preliminary recommendations for the 1984 legislative session and will complete its work in December 1984. As part of its broad look at education in Georgia, the commission is expected to study issues related to mathematics, science and computer education.

The Idaho Board of Education created a Commission on Excellence. Their recommendations in September 1982 focused, in part, on increased mathematics and science requirements for graduation from high school. The state board is now preparing to implement the recommended standards, following evaluation.

The Governor's Task Force on the Quality of Mathematics and Science Education in Illinois is composed of staff from the State Board of Education, the State Board of Higher Education and the Governor's Commission on Science and Technology. The Task Force was established to study issues such as high school graduation and college entry requirements in mathematics and science, high schools for academically talented students, methods for improving teacher computer education, mathematics and science curriculum changes and improving the quality and skills of pre- and in-service training. The task force will complete its work in December 1983 and will report its recommendations in early 1984.

The Governor's Commission on Science and Technology is an ongoing commission of representatives from industry, the Illinois Board of Education and the Illinois Department of Education. The commission is studying precollege and postsecondary education related to science and technology, salary increases for professors, the development of high-technology industrial parks, research topics and other issues.

HR 326, adopted June 28, 1983, requires the Illinois Board of Higher Education to study the range of teacher training programs and the capacity of schools to train more mathematics and science teachers. The board will also examine the number of prospective mathematics and science teachers entering training programs and the number actually receiving certificates. The age and geographic distribution of new teachers will be documented. The board will inform the House of other academic areas where teacher shortages are developing. Recommendations are due no later than March 1984.

SJR 61 establishes the Commission on the Improvement of Elementary/ Secondary Education which will study K-12 education in Illinois. The 20-member commission will report its recommendations to the General Assembly by October 1984. The commission will study all aspects of Illinois education,

including mathematics, science and computer education. Members of the commission will be appointed by the governor and will include five senators, five representatives, five members of the School Problems Committee and five people from the general public.

In March 1983, the Sunset Evaluation Committee completed a performance audit of the entire field of education in Indiana. The audit noted that the department of public instruction needed greater policy direction if it is to improve the quality of education in the public schools. The audit contains 13 findings to assist the General Assembly in developing legislation needed for educational improvements.

In April 1982, Governor Orr appointed a 9-member commission to study and evaluate Indiana's primary and secondary education system. The Governor's Select Advisory Commission for Primary and Secondary Education was asked to identify — and make recommendations for the removal of -- barriers which keep the system from attaining the highest quality education for Indiana students. Immediate recommendations from the commission are that the state develop loan and grant programs to reduce teacher shortages; establish and fund a computer training and loan program for teachers and students; expand gifted and talented programs; and appropriate sufficient funds in 1983 to address the identified needs.

The Iowa Legislature has recently established an 11-member task force to develop a ten-year workplan for education in Iowa. A final report is due in November 1983.

The Department of Public Instruction and the Governor's Office are cosponsoring 15 public forums around the state to talk about the various recent national reports on education and their implications for Iowa. These regional meetings are to culminate in a statewide meeting in December 1984.

The Education Committee of the Iowa Academy of Sciences is an advisory group that makes recommendations on science to the Department of Public Instruction and the Iowa Academy of Sciences. The committee recently completed a report on the status of science teaching in Iowa schools.

The Governor appointed a High Technology Task Force on May 18, 1982, to examine the status of high technology in the state. "The Report of the High Technology Task Force" was published November 1, 1982, and one of its nine recommendations addressed the role of technology in education, including: (1) placing greater emphasis on prerequisite courses, including computer literacy "for high technology instructional programs, grades K-16, in public and private educational institutions," and (2) providing incentives to encourage teacher preparation and retention in mathematics, science, and high technology

instructional programs to provide an adequate number of instructional staff.

In June 1983, the governor of Kansas appointed a Governor's Cabinet for Education. The 13-member panel includes directors of the state's major education organizations. Its major charge is to establish local citizen's advisory groups which will contribute to local education policy making. The local task forces will study and make recommendations on the quality of public education in their school districts. There will ultimately be about 300 local task forces. In addition to conducting the local task force advisory program, the Governor's Education Cabinet is studying education issues including the quality of science and mathematics courses, merit pay, teacher preparation and student productivity. Recommendations are due to the governor by December 1983.

The Kansas Advanced Technology Commission was created by the 1983 Kansas Legislature, and operates within the Kansas Department of Economic Development. The 13-member committee is composed of the Speaker of the House, president of the university system, and appointees of the governor and legislature. The Commission is responsible for coordinating education, research, and economic development programs in fields of advanced technology. One of the primary functions of the Commission will be to distribute monies among graduate institutions through a research matching grant program, in which a match of at least 150 percent must be met by outside sources. The Commission will also seek to maintain quality faculty and encourage additional investment by governmental and private sources in research and education programs.

The Superintendent of Public Instruction in Kentucky appointed six task forces to study problems and make recommendations on the following topics: school finance, vocational education, accreditation, extended employment for teachers, and competency testing, and assessment for teacher certification. The task forces are composed of citizens, teachers, administrators and state education agency representatives. Each group will report its findings in the fall of 1983.

The Science Advisory Council of the Kentucky State Department of Education recommended in April 1983 a "hands on" approach for teaching science to elementary students. The council also recommended identifying regional science resource teachers to provide immediate and knowledgeable support to science programs in individual schools and to serve inservice science programs.

In July 1983, Governor Brennan created the Governor's Commission on the Status of Education in Maine. The charge to the 16-member commission is to review Maine's education system

from preschool through college and to identify needed changes. Specific charges to the commission include identifying ways to improve the quality of learning in Maine's schools, assure quality teaching, improve vocational education, finance the educational system and increase public involvement in quality education. A preliminary report is due to the governor by the end of 1983 and the final report, including recommendations for legislative action, is due December 1984.

A 21-member Maine Congressional Citizens Education Advisory Committee will complement the work of the Governor's Commission. The Committee will be looking at: (1) how Maine's teachers are hired and how much and on what basis they are paid; (2) how many students are in Maine's schools and what percentage go on to post secondary education; (3) how the state pays for education; and (4) the federal role in Maine's educational system.

In June 1983, Governor Hughes of Maryland appointed the Commission to Study School Finance, which will probably consider differential pay for teachers in mathematics and science. The Maryland Board of Higher Education has appointed the Financial Aid Task Force that may recommend scholarships for people training to teach mathematics, science and other subjects in which teacher shortages are possible.

The Maryland Commission on Secondary Education, recently appointed by the state board of education, is undertaking a major three-year examination of the substance and structure of the state's public high schools. Individual task forces will examine graduation requirements, curriculum, student services and activities, instruction and instructional support, and school administration and climate. The commission will make recommendations to the state board. The analysis of graduation requirements and curriculum is to be completed by October 1984; recommendations are anticipated for changes in science, mathematics and computer education.

The statewide Commission on Quality Teaching presented its recommendations to the Maryland State Board of Education in October 1982. The board has not yet acted on the recommendations, but support seems strong for providing tuition assistance to train teachers in high-demand areas like mathematics and science.

Following a recommendation by his Ad Hoc Committee on High Technology, Maryland Governor Hughes will appoint an ongoing High Technology Roundtable made up of representatives from education and industry. The roundtable will address the needs of business and how education can help meet those needs. The particular focus of roundtable members will be engineering and technology in secondary and higher education.

In May 1983, the Maryland State Department of Education, the Maryland Academy of Sciences, the University of Maryland and the Governor's Science Advisory Council held a one-day workshop on "Potential Solutions for Maryland Science Education." Following the conference, the state board of education appointed representatives from industry, government and the schools to analyze curriculum and graduation requirements and to recommend, by October 1984, changes in science instruction in Maryland public high schools.

Quality and excellence for the future of Massachusetts' public education are top priorities within the state. In June 1983, Governor Michael S. Dukakis appointed a commission to study elementary and secondary education, including adult basic literacy. Commission members include the commissioner of education and representatives from the Joint Education Committee, the Massachusetts Board of Regents and the state department of education. An advisory group composed of teachers, and business and industry leaders will assist the commission. The commission will study school finance, curriculum, merit pay, public-private partnerships and the relationship between technology and education. The commission's recommendations and a state education plan are due in December 1983.

The Massachusetts Department of Education sets up ad hoc task forces to study specific issues and disciplines. In 1983, three task forces are studying mathematics (finished spring), computer education (summer) and science (fall). The task forces' recommendations will be used to strengthen four state initiatives: (1) a statewide retraining program for science and mathematics teachers, (2) a computer resource bank in science, mathematics and instructional technology, (3) a state clearinghouse on education and (4) a computer software advisory service.

The Michigan Superintendent of Instruction has appointed a Task Force on Mathematics and Science to study the current status of science and mathematics education in the state and develop recommendations for action related to state policy, funding and activities that will encourage support for the improvement of mathematics and science instruction. Subcommittees are studying certification, assessment, high school graduation requirements, use of community resources, state board policy related to science and mathematics and professional development for reassigned teachers. The final report is due in June, 1984.

The Minnesota State Board of Education appointed last fall a Task Force on the State-of-the-Art of Science Education in Minnesota. The 11-person task force is composed of university faculty, teachers and science supervisors. To date, the task force has distributed a survey throughout the state and

results are being tabulated. The questionnaire surveyed teachers and principals in areas such as K-12 science curriculum, textbooks, instructional methods and use of audio-visual equipment. Results of the survey will be available in fall 1983, and plans are to relate the results to science achievement data for the state.

The Minnesota Council on Quality Education (CQE) was established by the Minnesota Legislature in 1971 to promote cost-effective innovations in public education. The council develops funding policies and procedures based on state law and recommends project grants for improving education, some of which involve mathematics, science and new technologies. The state board of education approves project grants and oversees the council. Projects funded under the program include efforts to develop new materials, design alternative education, equalize education opportunity and increase the use of new technology.

The Minnesota Alliance for Science is coordinating mathematics and science improvement efforts by business and industry, school districts, colleges of education and public agencies. The alliance was formed in early 1983 and is supported by the Bush Foundation and the University of Minnesota. Among its other duties, the alliance will develop a plan for recruiting, training and retaining more mathematics and science teachers. Recommendations will be submitted to the Minnesota Board of Education in the fall.

Minnesota Governor Rudy Perpich is planning to appoint a state commission on education for economic growth. The commission will examine education issues related to the growth of technology within the state, including the skills required by students and teachers. Improving the business/industry contribution to public education is another issue the commission will study.

Mississippi's Performance Based School Assessment is a 17-member task force appointed by the governor. The task force will propose a plan to establish guidelines and criteria for a performance-based school accreditation system in Mississippi. They are responsible for making recommendations concerning curricula and courses of study to the accreditation commission. The report is due by May 1984. The commission will be responsible for developing an interim performance-based accreditation system based on the task force report. After July 1986, schools must comply with the standards and will be audited by trained evaluators.

A 15-member Commission on Teacher and Administrator Education, Certification and Development was appointed by the Mississippi Governor for a 14-month term beginning July 1983. The certification commission is expected to set standards and

criteria for public teacher education programs, establish standards for certification and recertification, and report on current practices and issues in teacher education.

Recent legislation in Mississippi requires the department of education to study the extent to which children master one level of coursework before advancing to the next; what may be done to assure that the progression is properly sequenced; and what steps are being taken to assure that children progress toward mastery of the material.

In March 1983, the Montana Task Force on Science reported its recommendations to the office of public instruction. The charge of the task force was to assess the needs of science education, identify instructional goals and recommend actions for improving science education. Recommendations included upgrading certification standards for new teachers in grades K-12, improving the elementary school science curriculum, limiting laboratory class size and upgrading preservice science education.

The information from the Montana subject task forces for mathematics and science were used in an overall task force report, Excellence in Montana Schools. This report was completed by a committee of 26 individuals representing a variety of education and private sector interests and selected by the Superintendent of Public Instruction. The report was released in April 1983 and the Board of Public Education has adopted the report and is looking at ways to implement the recommendations.

In Nebraska the Governor's Task Force on Excellence in Education is using the Nation at Risk and Action for Excellence reports to determine the status of education in Nebraska. The 30-member panel is composed of teachers, administrators, school board members, school superintendents, state senators, post secondary educators and citizens. The task force is using townhall meetings to collect information and make recomendations to the governor by September. The governor is expected to ask for rule changes and new legislation to implement the recommendations.

Senate Concurrent Resolution No. 55, passed in the last Nevada legislative session, directs the legislature to appoint a special committee to study education in the state. The committee is required to study the report of the National Commission on Excellence and report its recommendations on Nevada's school system to the governor, the department of education, school districts and the legislature. Recommendations are due by October 1984.

The New Hampshire State Board of Education established a State Commission on Excellence in Education to examine the report of

the National Commission on Excellence and relate it to public schools in New Hampshire. The commission is composed of 30 members representing teachers, the school board association, the school principals' association, the governor, state college system, university system, private schools, the legislature and business. Six committees have been appointed to study higher education, economic impact, teacher certification, curriculum and graduation requirements, time on task and the process and effectiveness of schooling. The commission is expected to issue an interim report in October and final recommendations in January 1984.

In January 1983, the New Hampshire State Department of Education surveyed its 181 middle and secondary schools to collect statistics on science, mathematics and computer education classes. Questions covered enrollment patterns, course offerings and teachers' areas of certification. The state department is preparing a status report using the results of this survey.

The New Jersey Advisory Council on Mathematics and Science Teacher Supply and Demand issued an interim report in March 1983. The advisory council was established jointly by the commissioner of education and the chancellor of higher education in the fall of 1982. The council consists of 15 members representing secondary education, postsecondary education and business and industry. Its charge is to explore the conditions affecting the teaching of mathematics and science (particularly in grades K-12) and to make short- and long-term recommendations for improving these conditions. The interim report suggests there is a need to increase the quantity and improve the quality of mathematics and science teachers in New Jersey. It also suggests improving the training, prestige and quality of work life for teachers. Priority recommendations include: developing career education programs that emphasize science and mathematics skills, endorsing the K-12 mathematics and science curriculum improvement objectives and encouraging school districts to share equipment and resources.

Governor Kean's New Jersey Commission on Science and Technology is a 21-member commission set up in mid-1982 to study university-industry research relationships, technical manpower education and training needs, and the state's economic, regulatory and capital investment potential. In July 1983, the commission presented its initial recommendations which, among other things, call for the creation of four new advanced technology centers in biotechnology, food technology, ceramics and hazardous waste management. Underscoring the importance of these new initiatives to the state's future economic growth potential, Governor Kean noted that "the strength of our economy for the

remainder of this century is tied to whatever success we can achieve in developing a viable, in-depth program to bring high tech industry to New Jersey and to provide the workforce to service that industry."

New Mexico Governor Toney Anaya appointed a commission on higher education and a commission on elementary and secondary education to plan a major conference on education and high technology. The September conference will include legislators, school and university administrators and school board members. The conference is expected to generate recommendations regarding future links between education and high technology. The conference findings will be published and disseminated at a follow-up conference which will be held in October 1983, to solicit teachers' input. Joining in this exploration of the state's education future will be "Project Uplift," a future-oriented consortium of the state education agency, the Albuquerque school district and other local education agencies.

The New York State Board of Regents sets standards for the quality of education throughout the state with commissioner's advisory committees in each subject. The regents have begun a two year review of the goals and results of elementary and secondary education, involving citizens at regional meetings. The meetings are a continuation of highly successful regional meetings conducted for the past five years and have involved more than 20,000 participants providing the regents with valuable public and professional reactions to major educational issues.

The Business Commission on Mathematics and Science Education in North Carolina is a statewide task force of businesses which assist in developing education programs, locating resources and obtaining commitment among businesses for education. A major activity of the commission is the identification of outstanding teachers who then receive awards and scholarships. Rewards are also given to outstanding businesses.

The North Carolina Governor's Task Force on Science and Technology is composed of scientists and engineers who are examining the impact of technological change within the state over the next 20 years. There is strong emphasis on education for economic growth including issues concerning mathematics and science education in grades K-12. The task force is also studying research and training related to technological change. The task force's final report is due in November 1983.

North Carolina Governor James B. Hunt Jr. is establishing a task force to examine the relationship between education and employment within the state. The task force will be patterned

after the Education Commission of the States' Task Force on Education for Economic Growth. Governor Hunt will chair the task force and will appoint approximately 25 members representing the business, industrial and education sectors of North Carolina.

The North Carolina Mathematics Curriculum Study Committee will present the results of its two-year study to the state board of education in September 1983. The state superintendent-appointed task force has made 62 recommendations to improve the quality of mathematics instruction for all students in North Carolina. Among the recommendations are integrating technology into the curriculum from kindergarten through high school, requiring each elementary student to have 60 minutes of mathematics daily and increasing high school graduation requirements in mathematics from two units to three. The recommendations also address issues such as teacher-pupil ratios, mathematics resource teachers and increased pay for mathematics teachers.

North Dakota Governor Allen Olsen held a conference on Education, Training and Employment for the New and Emerging Technologies in June 1982. The purpose of the conference was to explore changing technology in North Dakota, the impact of that change on the state's workforce and the efforts of education and training programs to prepare students and others for the changing environment. Goals of the conference included increasing the quality of science, mathematics and computer instruction in elementary and secondary schools. Discussion groups at the conference focused on these issues and recommended what schools, business and industry, and the state government can do to help.

Governor Olsen of North Dakota convened a conference on public education in August 1982. A steering committee representing nine state agencies sponsored the conference. Discussions and questionnaire results centered on basic skills, goals of the American high school, secondary curriculum, changing social trends, teacher qualifications and test scores. Recommendations were made regarding what each state agency could do to improve the quality of education.

The Commission on Educational Excellence was established in October 1982 to assist in planning for the future of elementary and secondary education in Ohio. The tasks of the commission are to: identify and assess trends and issues that will affect Ohio schools; formulate objectives to be pursued by Ohio schools; and develop strategies for reaching these objectives. The seven major questions the commission has been asked to address are: (1) What will be the impact of technology on teaching and learning? (2) What type of delivery system will meet the educational needs of the future? (3) How can educators best equip themselves to function in a

world of rapid change? (4) What should be the outcomes of learning? (5) How can educational quality be assured? (6) How can education professionals best be prepared? and (7) How can schools become more fiscally and programmatically accountable? To expedite the work of the commission, each question is being assessed in depth by one of seven task forces composed of commission members. The commission expects to complete its work and report to the state board of education in December 1983.

The Ohio Advisory Council for College Preparatory Education has recommended that college-bound Ohio high school students take three years of science and social studies, four year of English, three years of mathematics and two years of foreign language. The council was jointly created by the Ohio State Board of Education and the Ohio Board of Regents to study issues of college preparatory education.

The Ohio Department of Education has recently released a report, Moving Toward Excellence, that documents Ohio's educational progress in light of the National Commission on Excellence's report, A Nation at Risk. Moving Toward Excellence highlights new educational standards, increasing learner productivity, strengthening teacher education, identifying instructional uses of computers, implementing school improvement programs and strengthening vocational education.

In June 1983, Oklahoma Governor George Nigh created a 25-member study commission to review the feasibility of establishing a state boarding school for mathematics and science. Such a school would be particularly beneficial to rural students who frequently do not have access to a full range of courses in secondary mathematics and science. The commission is expected to submit a report and budget to the governor in October 1984.

The Committee on Science and Mathematics Education in Oregon was formed to assist the superintendent of public instruction. The committee is studying the quality of mathematics and science education, plans to strengthen instruction, student needs and cooperative programs with businesses. The committee will submit specific recommendations to the superintendent by December 1983.

The Pennsylvania State Department of Education is currently conducting a Science and Mathematics Task Force. The Task Force is examining statewide needs over the next five years in science, mathematics and computer education and their implications for curricula, equipment, teacher supply and demand, and teacher training. The task force recommendations are due November 1983.

The South Carolina Department of Education completed two task force studies in January 1983 which provided the basis of the new "Move to Quality" program, a 41-point plan by the state superintendent. The plan will "accelerate progress and improvements" by increasing academic standards and vocational education standards, as well as target funds into mathematics and science education expansion. It is expected that the plan will receive top legislative priority in 1984. The department of education has taken the task force results into consideration and approved new curriculum guidelines and increased graduation requirements.

In June 1983, Governor Riley of South Carolina appointed a blue ribbon panel to look at the long-range question of excellence in South Carolina public education, with particular emphasis on science and mathematics. A priority of the panel is to improve education for South Carolina's growing high technology economy.

Also in June 1983, South Carolina Governor Riley appointed a 25-member business-education partnership panel to work with the educational excellence panel. The panels will recommend ways business and industry can contribute to public education policy and will study mathematics and science education.

The South Dakota Joint Boards Task Force is composed of the Board of Regents and the State Board of Education. The task force is holding hearings and forming recommendations on high school and college graduation requirements, curriculum content and education policy as a whole. The task force will continue its review into the 1983-84 school year.

South Dakota Governor William Janklow is appointing a State Commission on Excellence to study the recent national education reports and their implications for the state.

The Texas Education Agency, in response to the 1981 legislation, is seeking improvements in curriculum and changes in graduation requirements. With the assistance of various professional organizations, parents, teachers and administrators, staff at the state agency developed recommendations which include the following: (1) the adoption of essential elements that students in public schools must master in various courses, K-12; (2) an increase in the total credits needed to graduate from high school; (3) an increase in the mathematics graduation requirement, from two to three years; and (4) an increase in the science graduation requirement, from one to two years. Although computer literacy was not among the required subject areas identified by the legislature, the state education agency developed a set of essential elements for review and consideration. Citizen reaction will be considered in developing the final recommendations and implementation policies, which will be

presented to the state board of education in October.

The Texas Select Committee on Alternative Schools and the Committee on Technology, two bipartisan legislative committees formed to improve general education, have operated over the last two years and have focused much of their attention on mathematics and science instruction. Some of their recommendations were proposed to the legislature but not passed in the recent session.

The Texas Select Committee on Public Education, an 18-member panel appointed by the governor, is following up on the alternative schools and technology committees' work. The Select Committee is composed primarily of citizens and legislators and will advise the governor on issues related to mathematics and science teaching, education quality and education finance. It is anticipated that the committee on public education will present its recommendations to the governor sometime in late fall.

Governor Matheson of Utah appointed a 20-member panel of legislators, business leaders and state education officials to advise him regarding political and financial issues facing public education. The Steering Committee on Education Reform will be reviewing and discussing the implications of two national reports, A Nation at Risk and Action for Excellence, as well as current state initiatives. It is anticipated that the group will focus on three major issues: the teaching profession, technology in the classroom and the funding of state education initiatives. Members of the steering committee have commissioned a poll of Utah citizens to ascertain their major education concerns, how they feel these should be addressed and what kinds of funding alternatives would be acceptable. The committee will consider the results of this poll in designing a legislative package for the 1984 session. The public will be asked to comment on proposed programs. A final report reflecting the committee's recommendations and public reaction to proposed programs will be sent to the governor by January 1, 1984.

A legislative interim committee in Utah is currently reviewing proposals dealing with the teaching profession and will be developing a legislative package for the next session. Attention is being given to such issues as financial incentives for teachers serving in high-need areas, career ladders and improved evaluation systems.

The Utah Board of Regents and the state board of education have jointly organized and appointed the Committee for the Improvement of Teacher Education. Citizens and educators are now studying professional preparation programs, including programs in mathematics and science, and will submit a set of recommendations before January 1, 1984.

The Lt. Governor of Vermont is chairing the Vermont Seminar on Education. The panel is composed of leaders from business, industry, education and government and is studying high school graduation requirements; curriculum and instructional improvements and teacher preparation, certification and recruitment. The seminar will issue its report during October 1983.

The Governor's Commission on Virginia's Future has just organized an education task force as one of five task forces studying issues related to the future and well-being of the state. The education task force will study student achievement and performance, instructional quality, organization and governance and funding. The report is due to the governor by December, 1984.

The Governor's Science and Technology Task Force in Virginia is examining issues related to the state's economic growth and how an education system with excellent mathematics and science programs can attract future-oriented industries. The task force is composed of educators and representatives of business and industry. Recommendations are due August 1983.

In August, the Superintendent for Public Instruction in Washington will appoint an interdisciplinary statewide advisory task force to oversee the development of competencies in education. Mathematics will be the first subject addressed; science and computer literacy are tentatively scheduled for competency development in 1984-85.

In May 1982, Washington Governor Spellman established an Advisory Committee on High Technology Training and Advancement. Representatives of business, organized labor and selected state agencies, as well as educators and legislators, were appointed by the governor to: (1) examine and evaluate how the state now provides high-technology education, training and technical assistance as well as the demand for those services by Washington state employers; (2) identify programs to encourage high-technology growth; (3) identify training and technical resource barriers to high technology development and (4) develop and submit to the governor, before the 1983 legislative session, a report containing recommendations for legislation, innovative programs and other actions that will promote high technology training and advancement. The committee's initial recommendations to the governor were the basis for additions to the governor's budget request for the 1983-85 biennium and for enactment of legislation to support a package of high technology education and training programs.

In Washington, the governor will soon appoint citizens to the Coordinating Board on Technology Education, a group which will oversee implementation of the entire High Technology Education

and Training Act. This act provides funding for K-12 and postsecondary programs in technology education and training.

The Washington Committee on Education Policies, formed in 1982, is charged with conducting a review of public education systems and governance structures within the state. The promotion of quality and excellence in education at all levels, while maintaining access and equity, will be the focus of this group's efforts.

The West Virginia State Board of Education developed the "Master Plan for Public Education in West Virginia" earlier this year. Prepared with the assistance of a 99-member advisory committee, the plan is a blueprint for long-range educational change in the state.

A West Virginia statewide advisory committee, composed of superintendents, teachers, higher education personnel and others, will be appointed shortly by the state superintendent. The committee will make recommendations to the state board of education concerning adoption of learning outcomes for a number of areas including mathematics and science. Prior to the advisory committee's review, an extensive verification process will take place and will involve educators and administrators from every county in the state. It is anticipated that the learning objectives will be adopted by the state board of education before January 1984.

An interim committee of West Virginia legislators is studying science and mathematics improvement along with other issues of the "Master Plan for Public Education." The committee will make recommendations for enhancing mathematics and science programs, including forgivable loans and scholarships for prospective teachers, alternative training systems and a state mathematics-science high school.

In June 1983, the Superintendent of Instruction announced the appointment of a 29-member Blue Ribbon Committee on Quality Education in Wyoming. The charge to the committee is to address two questions: (1) Can the citizens of Wyoming expect both quality and quantity from their schools? and (2) If so, at what cost? The committee is expected to define quality education, decide what to expect of the schools and determine the costs -- in dollars and in attitudes, traditions, policies and statutes. A report is due to the state board of education by October 1984.

In February 1983, a Task Force on Curriculum and Staff Development was formed in Wyoming to make recommendations on developing and evaluating all K-12 curricula. The task force will also suggest proposals for staff development programs. Recommendations are due in the fall of 1983.

II. TASK FORCES OR COMMISSIONS
(Computer Education)

The Alabama Department of Education's newest task force is the Computer Literacy Commission, established in the spring of 1983. Its mandate is to review all curricula in grades K-12 to identify where computer education can and should fit into Alabama's public schools.

In response to the request of the Twelfth Alaska legislature, two separate task forces examined different areas of computer education and reported their findings to the Alaska Department of Education and local districts for program planning and implementation. Both groups were composed of representatives from a diversity of regions and interests from state and local education agencies, colleges and universities and the private sector involved in computer applications. The task force on computer literacy provided guidelines for developing a state plan for a computer literate population of students and adults. The Statewide Computer Literacy Study, published in January 1983, reports on the task force findings and is available from the Alaska Department of Education.

The Alaska Task Force on Computer Networking in Education studied the feasibility and cost effectiveness of local and statewide networking systems, such as electronic mail and video transmission. The task force recommended additional development of computer networking by the Alaska Department of Education in its January 1983 report.

The Arkansas State Department of Education and the Southwest Educational Development Laboratory cosponsored a conference in December 1982 to identify computer literacy competencies needed by students and teachers in the public schools. Approximately 30 representatives from school districts, colleges, community colleges and the state department of education participated, making recommendations about competencies and suggesting ways school districts or professionals could work together on implementation. The task force report is serving as a basis for discussion in the local districts and for possible new legislation.

The 1983 session of the Arkansas General Assembly passed Act 528 which provides for the implementation of computer-based educational projects in local education agencies and establishes the Commission on Improving Public Schools' Basic Skills Opportunities through Technology. The Commission, which will consist of state education agency staff, representatives of the private sector, and legislators will work with the state board of education to develop rules, regulations and guidelines for computer-based instruction in the public schools.

In November 1982, the Colorado Department of Education set up a statewide computer advisory committee to recommend department services that would be most beneficial to Colorado schools. The most important department goal, says the committee, should be assisting schools in developing computer literacy and using technology curricula. Other important goals include department-sponsored conferences for school personnel in technology applications and technical assistance to public schools.

The Connecticut State Board of Education and the Board of Governors for Higher Education formed a joint committee in May 1983 to examine the use of computers, libraries, media and instructional materials to enhance education. Their report will be released in September 1983. There is also a move to organize a computer teachers' association.

In November 1982, the Delaware State Board of Education adopted the "State Plan for Computer Utilization in Education for Fiscal Year 1984." This plan accompanied the 1984 fiscal year budget request, and the governor has included $300,000 in his recommended budget for fiscal year 1984. The plan requests funding to support the use of computers in the state educational system: (1) for planning and coordination, training of educational staff, and consultation with local districts in the acquisition of hardware and software; (2) to provide the opportunity for all students to acquire computer literacy skills before high school graduation; (3) to expand the number of students participating in computer-assisted instruction; and (4) to continue the development of the Student Accounting System and extend services to other school districts.

The state department of education in Georgia is organizing an in-house task force, with representatives from all departments, which will be charged with developing a state plan for the use of technology to support instruction and the management of instruction. The task force will also seek to identify sources of funding for equipment, software and staff development and ways to involve business and industry. Realistic plans for staff development are another priority.

The Hawaii Office of Public Instruction Services sponsors a computer education committee and a Task Force on Computer Literacy. These task forces are studying ways to integrate the computer into the curriculum and suggesting curriculum content for computer education courses.

In March 1983, the Illinois State Board of Education accepted a report on "Computer Technology in Education" that supports "the development of consortia of local school districts to provide continuing and self-supporting services . . . [for]

the purpose of providing technical assistance and inservice training, equipment for loan and demonstration purposes, and the availability of centralized software libraries to member state school districts." The report incorporates a survey of computer usage in LEAs and makes recommendations for state support in the form of seed money for the consortia approach. HR 327, adopted June 28, 1983, directs the Illinois State Board of Education to establish a computer literacy advisory committee to study the use of computers and other electronic equipment in teacher training programs. The state board will report study results and recommendations by March 1984.

In January 1983, the Indiana Superintendent's Advisory Task Group for Computer Experience in Elementary and Secondary Schools submitted its recommendations to the state board of education. These included endorsement of a definition of computer literacy, and minimum proficiencies for computer instruction, endorsement of flexibility for local education agencies to meet the goal of providing computer literacy for pupils, and opposition to a computer education high school graduation requirement.

Indiana's legislature passed HB-1981 in April of 1983, effective July 1 of this year. It establishes the Indiana Consortium for Computer and High Technology Education to: (1) "establish regional clearinghouses for computer instruction information," (2) "coordinate the training of teachers in computer instruction skills," (3) "advise the commissioner on the administration of the school technology incentive grant fund... and loan fund," and (4) report annually to the Governor and General Assembly.

Kentucky's Microcomputer Task Force was established in 1982 to determine the role of Kentucky Educational Television in computer technology education and training. The Task Force includes representatives from the legislature, the teaching profession, school administration, higher education, the state education agency, parents' groups, and Kentucky Educational Television. Because of the nature of its charge, the group has had to consider the roles of other organizations and agencies (e.g., colleges and universities, the state education agency) and the implications of using microcomputers for instruction. The Task Force's final report will be presented to the state board of education fall 1983.

Last year, Louisiana established a Superintendent's Task Force on Computer Literacy which examined the implications of requiring computer literacy for high school graduation. The ad hoc task force consisted of teachers, students, parents, college faculty, administrators and members of the department of education. The task force made recommendations to the superintendent in its July 1983 report. Recommendations included coordinating and disseminating information on

inservice education programs, software and curriculum; providing technical assistance on hardware and integrating technology and computers into K-12 instruction.

The superintendent in Maryland has appointed a group to look at the use of technology in the classroom, grades K-12, using a preliminary staff report on computer instruction and computer literacy as a starting point and making recommendations to the Board of Education.

The Massachusetts Acting Associate Commissioner appointed a Division of Curriculum and Instruction Task Force on Instructional Technology in August 1981. Their report, issued a year later, recommended the formation of an instructional technology advisory group to guide the state department of education in planning and implementing activities to: (1) propose policy for state adoption; (2) assist the state department of education in identifying and securing resources for increased use of instructional technology; and (3) recommend activities in instructional technology for the state department of education to conduct. The task force's program recommendations for the state department of education included: (1) assisting schools in the adaptation and development of instructional technology; (2) coordinating statewide efforts; (3) initiating interstate consortia to develop electronic networks for information sharing; (4) encouraging application of resources to promote equality of use of instructional technology statewide; and (5) establishing priorities and criteria for selection of materials and software.

The Minnesota Education Technology Act, passed in May 1983, required the governor to appoint a 15-member advisory committee on technology in education by July 1, 1983. Committee members include public school teachers and administrators, parents and representatives from school boards, the department of education, the Minnesota Educational Computing Consortium, higher education and business and industry. The committee will assist with planning for technology use in local districts, inservice training, technology demonstration sites and courseware package development and evaluation. The advisory committee will terminate June 30, 1985.

The Missouri Department of Elementary and Secondary Education has set up an in-house task force, the Instructional Technology/Microcomputer Committee, to study the use of computers in instruction. The Committee sponsors statewide conferences, provides technical assistance to rural districts and provides workshops for education department staff.

In May 1982, the Office of Public Instruction formed the Montana Task Force on Computer Education. Members of the task

force included teachers, university professors, school administrators and state curriculum specialists. The task force produced a handbook, The Elements of Computer Education: A Complete Program. This publication provides evaluations of hardware and software, curriculum ideas, program planning, administrative applications, staff development plans and a resource directory. The task force is considering developing videotapes for classroom instruction and is planning a statewide state development program to offer inservice workshops on instructional computers.

In Montana, a SLATE conference was held in June 1983 to determine priorities for using educational technology. Seventy-six participants attended including teachers, college faculty, state education department and state board members, the regents of the university system and industry leaders. The group recommended that a Montana Commission on Technology in Education be created by the governor to develop a state plan for using technology in education, including the training of all Montana citizens in the use of computers. They further recommended that a statewide communications network be established to exchange technology information throughout state government and education institutions.

Nebraska's Committee on the Utilization of Technology in Education was created in 1980 to identify persons in education organizations in Nebraska with an interest and involvement in computer technologies in education. The committee is an ongoing forum for information sharing in all aspects of computer use including: identifying software, maintaining a list of professionals involved in computers and technology in education, examining the use of a video-disc curriculum and creating a statewide telecommunications network. One subcommittee is examining teacher inservice education in computer use.

The New Mexico Governor's Commission on Public Schools is specifically charged to bring its findings and the findings of the September/October high technology conferences to the governor prior to the 1984 New Mexico state legislative session. It is expected that the 1984 session will be an "education session."

The Department of Public Instruction produced a "State Plan for Computer Utilization in North Carolina Public Schools" in January 1983, "to establish a philosophical basis for acquisition and utilization of computers for administrative and instructional purposes in LEAs." The plan includes: (1) suggested elements of computer literacy; (2) recommendations for using microcomputers in schools for administrative and instructional purposes; (3) a sample curriculum design model incorporating the developmental sequences of computer awareness, exploration, and specialization for grades K-12,

with suggested objectives, types of activities, and implementation strategies; and (4) a sample administrative model. strategies; and (4) a sample administrative model.

To document the growth of technology-based education in Ohio, a survey of all school districts is being conducted to determine the kinds of computer hardware being used, the grades in which technology is being used for instruction, the subject areas in which technology is used and how technology contributes to the inservice education of teachers. Other types of information being collected by the survey include the ratio of students to available hardware and software, the types of computer applications being used and the use of personal computers. The results of this survey will be used as a data base from which to form questions about the role and value of technology-based instruction.

In Oklahoma, the Governor's Council on Science and Technology oversees the Higher Education Technology Task Force and the Educational Planning and Assessment Committee of the state department of education. This "consortium" task force considers the future standards and quality of computer education as well as science and mathematics, at all levels of education, throughout Oklahoma. It also monitors competitive grants to local education agencies for microcomputer purchases for the state's gifted and talented programs.

The South Carolina state education agency has formed a Computer Literacy Committee to study, evaluate the need for, and provide information on technology to the schools. This group will also establish guidelines for the development of an information technology curriculum.

The South Dakota Department of Education and Cultural Affairs and several South Dakota colleges and universities are forming a task force on technology to examine requirements for computer literacy, computer access and related issues of technology and education.

The Tennessee Statewide Microcomputer Advisory Committee was established in 1982 to study the status of computer education in the state and make recommendations for its improvement. To date, the committee has developed a curriculum and three-year plan for computer literacy in grades 7 and 8 (Computer Skills Next). Components of the plan include: (1) goals and objectives for computer literacy curriculum, (2) teacher training in computer literacy for grades 7 and 8, (3) the acquisition of microcomputer hardware and (4) additional resources needed at the state level. The committee is presently focusing on guidelines for computer science in high school.

The Texas Education Agency supports the acquisition of a set of universal competencies for all public school professionals. The Task Force for Essential Computer Competencies for Educators in early 1983 drafted a document outlining competencies in educational applications, implementation, software, programming, informational resources, computer terminology and other related topics.

A statewide computer literacy committee made up of Utah citizens and educators is now reviewing proposals for the development of computer literacy courses in schools, K-12. This group was organized by the board of regents and the state board of education.

The state department of education helped create the Vermont Educational Computer Technology Organization (VECTOR) which implements comprehensive computer information for local education agencies. In cooperation with the Vermont Department of Education, VECTOR established a statewide computer network in the summer of 1983. The department has published Computer Considerations for Vermont Schools and offers inservice workshops on computer awareness, literacy and competence. It also conducts an annual survey of the use of computers in Vermont schools.

The Virginia Microcomputer Inservice Training Task Force is composed of 20 local teachers, school administrators and representatives from Virginia colleges and universities. The task force is studying computer curriculum for teachers and has recommended a three-tiered curriculum representing an increasing mastery of skills.

The Washington Office of the Superintendent for Public Instruction has had a Computer Technology in Curriculum and Instruction Task Force in operation for the last two years. This interdisciplinary group was organized in response to the identification, by citizens and educators, of computer technology as a high priority in education. The task force assists local education agencies in using the computer in the classroom. To that end, a handbook on computer technology was developed and disseminated to districts. This manual includes information on purchasing equipment, evaluating software, staff development, available resources (organizations, publications, etc.) and a directory of local education agencies in the state that currently use computers.

At its May meeting, the Washington State Board of Education approved the formation of a task force to review school district needs in computer education and to make recommendations concerning technical assistance to meet identified needs. Technical assistance will then be provided

through the office of the superintendent's new Computer/Technology Education unit recently established and funded through the High Technology Education and Training Act.

The West Virginia Task Force on Technology in Education is a 34-member panel of educators, parents and community leaders appointed in June by the state commissioner. It is to consider the use of computers and related technology in the classroom and recommend programs and fiscal alternatives to meet the goals of the state's master plan for computer literacy. (Within three years high schools are to have computer literacy programs; within six years middle schools are to have such programs.)

A Committee on Computers in Education has been established by the Wisconsin Department of Public Instruction to study agency policy on computers. The Committee, which is made up of representatives from all Department divisions, is reviewing the state education agency's use of computers for instruction and management purposes, the provision of technical assistance to local districts on the use of computers for administration and instruction, and the improvement of the department's internal data processing capacity to serve all programs and users. Subcommittees of this group will make recommendations concerning these and other areas.

State Superintendent Grover appointed a task force to undertake a thorough review of teaching in Wisconsin. One directive to this Task Force on Teaching and Teacher Education is to determine the implications of technology for the preparation and professional development of teachers. The task force members include citizens, teachers, business and industry representatives, and educators. The final report and recommendations are due December 20, 1983. A preliminary report will be available in October.

A recent report, Instructional Computing in Wyoming: Status and Recommendations describes the nature and extent of computer use in grades K-12 in the Wyoming public schools. It summarizes teacher's opinions about the potential uses of computers in the school and reports the recommendations that a select committee of Wyoming educators made about statewide development of instructional applications of computers.

III. GRADUATION REQUIREMENTS

NOTE: States that do not mandate high school graduation requirements are not included.

Alabama has recently increased its graduation requirements to 20 total units, including one new unit in science and a second in mathematics. Beginning with the 1985 graduating class, all students in Alabama will be required to pass an exam in reading, language and mathematics to graduate.

Current high school graduation requirements in Alaska include one credit of science, one credit of mathematics and 19 total credits for graduation. The state board of education is considering increasing mathematics and science requirements for all students and will report on changes this fall. The high school curriculum will be revised by December 1983.

Beginning with the graduating class of 1987, all high school seniors in Arizona will be required to complete two years of mathematics and two years of science. No requirements for computer education are mandated at this time, although students may take one-half year in "Computer Awareness" to satisfy one-half year of the mathematics requirement. Twenty total units will be required for graduation. In addition, the Board of Regents will require, beginning in 1987, three years of mathematics and two years of laboratory science for admission to the three Arizona state universities. Students may meet the requirements in several ways, including the attainment of specified minimum scores on standardized tests.

In 1982-83, California set no requirements for graduation (requirements have been the responsibility of school districts since 1968), other than to specify that students must take some mathematics and science. In July 1983, Governor Deukmejian signed SB 813, an omnibus school-reform bill that requires all students to complete two years of mathematics and two of science (this requirement will be met by students who graduate in 1987).

There are presently no specific graduation requirements for science, mathematics or computer education in Connecticut. However, new legislation will require 18 units for high school graduation in the class of 1987. The state department of education has curriculum recommendations in science, mathematics and computer education.

Students starting high school in Delaware in the 1983-84 school year will be required to have 19 total units to graduate, with two units mandated in mathematics and two in science.

Effective the 1984-85 school year in Florida, three credits each of mathematics and science will be required as part of the total 22 units needed for graduation. Beginning with the 1986-87 school year, the total number of units will be increased to 24 and a minimum GPA of 1.5 (on a 4.0 scale) will be required.

Georgia is considering requiring 21 units for graduation, including two units of science and two of mathematics. (Earlier requirements: 20 units in all, one in science, one in mathematics and one in either science or mathematics.) Students must pass a basic skills test to graduate.

The 1983 graduating class was Hawaii's first graduating class required to complete a total of 20 credits, including two credits in science and two credits in mathematics. These graduation requirements were first set in place in 1978-79.

Idaho requires one year of mathematics and two years of science for high school graduation. Students entering high school in 1984 will be required to take an additional year of mathematics. At that time, they can substitute one unit of computer education for one mathematics unit. For these 1988 graduates, 20 units will be required for graduation.

Minimum requirements for graduation are currently identified in rules and regulations filed by the Illinois State Board of Education. The requirements state that a student must complete at least 16 units in grades 9-12 in a four-year school or 12 units in grades 10-12. Science and mathematics requirements are currently determined by local school boards, however, two bills have just been sent to the governor that will require the successful completion of science and mathematics (and other) courses for graduation. SB 669 requires two years each of mathematics and science and would apply to 1984-85 incoming freshmen. HB 1179 requires two years of mathematics and one year of science and specifies no beginning date.

The Commission on General Education has approved the first change in Indiana high school graduation requirements in more than 50 years. Students entering schools in the fall of 1985 will be required to take four years of language arts and two years each of mathematics and science. A total of 19 units is required for graduation. Although computer education is not a graduation requirement, curriculum rules will require school systems to incorporate some form of computer literacy program or course into their Educational Improvement Program by 1984-85.

Kansas currently requires 17 total units for high school graduation with one unit required in mathematics and one in science. Beginning with the fall 1984 sophomore class, the

governor is recommending that high school graduation requirements be raised to 20 units, with two units each required in science and mathematics and a half-unit in computer literacy.

Graduation requirements for Kentucky high schools presently stand at two years each in mathematics and science, with 18 total courses required. This year the Kentucky State Board of Education approved an additional mathematics requirement and increased the total units needed to graduate to 20. For students graduating after 1986, three years of mathematics and science will be required.

High school graduation requirements in Louisiana are two years for science and three years for mathematics. The total number of units required is 22. No changes are currently being proposed.

Maryland requires 20 units for graduation, including two units of science and two of mathematics. Students must also pass a competency-based test to graduate. Under consideration are strengthening the requirements in mathematics and science and adding a requirement for computer education.

Maryland colleges and universities have recently raised admissions standards. Now required are three years of high school mathematics. The number of science units required remains two, but both must be laboratory courses and some institutions require one in biology.

In May 1983, the Massachusetts Board of Regents mandated an increase in the admission requirements to state colleges and universities: four units of English, three units of mathematics, two units of science and two units of foreign language.

Michigan schools set their own local graduation requirements. The state is piloting new graduation requirements in some districts this year that will call for two years each of high school mathematics and science.

While Minnesota's high school graduation requirements in mathematics and science are determined locally, a legislative study committee is examining the minimum number of hours spent in these areas. The state board of education will receive the committee's recommendations in November 1983, and legislation may occur in February 1984 that mandates requirements for graduation in mathematics and science and, possibly, computer education. The total number of units currently required for graduation is 15.

The Mississippi State Board of Education requires that students complete one unit of science and one unit of

mathematics for high school graduation. The State Board of Institutions of Higher Learning has just approved more stringent college entry requirements. Students entering public colleges and universities will be required to complete three units of science and three units of mathematics.

Missouri requires 20 total units for graduation, including one unit of science and one of mathematics. Raising these requirements is under consideration. With requirements at their current level, statewide averages for high school graduates are two units of science, two units of mathematics and four units of language arts.

The current graduation requirements for Montana high school students total 16 units, including two units of science and two units of mathematics. In September 1983, the Montana Task Force on Science is expected to recommend to the Board of Public Education that the science requirements be increased to three units of science for the college bound and three units for junior high school students. Other recommendations include two hours of instruction per week in grades K-3 and 3.5 hours of instruction per week in grades 4-6.

Beginning with the graduating class of 1986, Nevada high school students will be required to complete one year of science and two years of mathematics for graduation. Twenty total units are required for grades 9-12. Because graduation requirements were just recently upgraded, no further changes are being proposed at this time.

Currently, New Hampshire requires its high school graduates to complete a total of 16 units, including one year each of science and mathematics. The state board of education is drafting new secondary minimum standards. It is expected that beginning in 1984-85 students will need to complete two years of science and mathematics for a total of 18 units. Although New Hampshire does not have a computer literacy graduation requirement, the new secondary standards propose a half credit in computer literacy and that all schools offer a course in computer literacy in grades 9-12.

New Jersey students must complete one year of science and two years of mathematics to graduate from high school. Bills have been introduced into the legislature to strengthen these standards, but they have not yet passed.

Adopted by the New Mexico State Department of Education in April 1983, new graduation requirements include two units in mathematics and two units in science. These new requirements go into effect in the 1983-84 school year.

New York presently requires one year each in mathematics and science with 18 total courses required for a Regents' diploma

and 16 total courses required for a local diploma. The state board is proposing a change in high school mathematics requirements to two years in mathematics to satisfy local requirements and three years of mathematics to satisfy Regents' requirements. All students must pass tests in reading, writing and mathematics through the Regents' Competency Testing Program before graduating from high school, a program which also has checkpoints in the lower grades to afford remedial help.

North Carolina requires high school students to complete two years each in mathematics and science. Twenty total units are required for graduation. The State Board of Education is considering than an additional year in mathematics and science be required for graduation, raising the requirements in these areas to three years each.

The University of North Carolina at Chapel Hill has strengthened its high school requirements for admission. Requirements include two years of foreign language, one course in a laboratory science and three years of mathematics. Also recommended are four years of foreign language and calculus or precalculus.

The North Dakota Superintendent of Public Instruction has recently announced new graduation requirements. Students who graduate in 1985 must complete two units each of mathematics and science. Currently, students must complete one unit of mathematics and two of science. Students will be required to complete 18 total units for graduation in 1984, 19 in 1985 and 20 units in 1986.

In October 1982, the Ohio Board of Education revised its standards for high school graduation, increasing requirements from 17 to 18 units to include an additional unit of mathematics. Two units of mathematics and one unit of science will be required in September 1983. Although no computer literacy requirement is specified, the new standards encourage that every school with grades 7 or 8 offer a course that allows students to learn keyboard skills.

In 1982-83, Oklahoma instituted new graduation requirements: a total of 22 Carnegie units, including two units each in science and mathematics. This represents an increase of one unit in each discipline.

In Oregon one unit each of science and mathematics is required for graduation from high school. A total of 21 units is needed. No specific requirement for computer education has been established although it is being considered.

Pennsylvania's current high school graduation requirements include one year each in mathematics and science. Thirteen total units are required for graduation in grades 10-12. Changes in graduation requirements are pending before the state board of education and would require 23 total units for graduation after 1984 in grades 9-12. Students would be required to complete three years each in mathematics and science for graduation. Computer education would remain an elective.

The Rhode Island Commissioner of Education has appointed educators to the Joint Committee on School and College Articulation to recommend new graduation requirements. The State Board of Regents recently approved 18 total units for graduation. College bound students will be expected to complete three years of mathematics, two years of science and one semester of computer literacy. These new requirements will affect the 1984 high school freshmen class. A second phase of increasing minimum course requirements for college bound students entering high school in 1987-88 is being developed.

New South Carolina graduation requirements will be effective with the 1987 graduating class and implemented in the 1983-84 school year. Science will increase from one to two units and mathematics from two to three units. Students may take one unit of computer science to satisfy one of the mathematics units.

South Dakota presently requires one unit of laboratory science and one unit of mathematics with 16 total units required for high school graduation. The state board adopted a rule requiring two units of science (one of which must be a laboratory science) and two units of mathematics with a total of 18 units required for high school graduation by the year 1986. The South Dakota Board of Regents recently voted to require one-half credit in computer science for college admission beginning July 1, 1987.

The Tennessee State Board of Education has increased the total number of units required for graduation and the requirements for mathematics and science courses. Beginning with the 1983-84 school year, high school students must complete 20 total units for graduation and two years each in mathematics and science. No requirements have been established for computer education, although this is under consideration. The state board also requires high school students to pass the Tennessee Proficiency Test to receive a regular high school diploma. The test measures basic skills achievement in mathematics, spelling, language and reading.

The Texas Education Agency is presenting a proposal to the state board of education in October that would increase the 18 total number of credits needed to graduate from high school to 20. The proposal also recommends increasing the mathematics requirement from two to three years and the science requirement from one to two years. These changes, if approved, will be effective in the 1984-85 school year.

The Utah State Board of Education is considering a number of proposals to change high school graduation requirements to include more courses in mathematics, science and other subjects. Modifications will take into account recommendations of the report, A Nation at Risk, and proposed college admission standards in the state that would require entering students to have two years of mathematics and two years of science.

Virginia presently requires one unit of science, one unit of mathematics and 18 total units for high school graduation. The state board of education has raised the requirements to two units each in mathematics and science plus one additional unit of mathematics or science to become effective in 1984-85. An optional advanced studies diploma will require three units each in mathematics and science and 22 total units for graduation.

In May 1983, the state board of education in Washington increased the total number of credits required for graduation, as well as those required in mathematics and science. Students beginning 9th grade after July 1985 must have a total of 48 credits, including 6 in mathematics and 6 in science. (A credit is equal to 60 hours of instruction, 3 credits is equal to a one-year course.)

The governor has recommended that the Washington State Board of Education consider adopting the standards for high school graduation supported by the National Commission on Excellence in Education. These include three years each of mathematics and science plus one-half year of computer science.

West Virginia currently requires 20 units for graduation including one in science and two in mathematics. It is anticipated that the science requirement will be raised and some computer education will be required.

All Wisconsin high school graduation requirements are locally determined. Preliminary results of a study conducted by the Wisconsin Center for the Advancement of Science Education (CASE) show that many school districts are evaluating their science education programs and that at least 15 percent intend to increase their graduation requirements in science.

The Wisconsin Joint Council on College Preparation submitted a report, "Preparation for College," to the University of Wisconsin System Board of Regents in February 1983. The advisory statement identified the general competencies students should have at the beginning of college work and, in addition to other courses, recommended three required years each in mathematics and science for university entrance. Computer programming was mentioned as an "additional critical skill and experience." The Regents passed a resolution commending the recommendations. The Department of Public Instruction and the University of Wisconsin system have disseminated the report throughout the state.

IV. CURRICULUM GUIDELINES AND PERFORMANCE STANDARDS

Effective for the 1983-84 school year, a new science curriculum will be mandated in Alabama. During the following school year a mathematics curriculum will be mandated. A basic computer awareness curriculum is already taught through vocational education classes.

In past years, the Arizona State Board of Education has mandated courses of study in grades K-8 for science, mathematics and other areas. In the spring of 1983, the legislature passed a law mandating the development of courses of study for all subject areas and all grades (K-12). The state department of education is currently working to implement this new mandate.

Arkansas has developed a Basic Educational Skills Continuum in mathematics, language arts and reading that serves as a curriculum guide in grades K-8 and as a basis for minimum performance testing.

California mandates curriculum guidelines for science (latest revision: 1983) and mathematics (latest revision: 1980). New guidelines will be issued in 1984. SB 813, signed into law in July 1983, requires the superintendent of schools to develop a course of study in computer education.

The Delaware State Department of Education in cooperation with local education agencies, has established a set of minimum performance competencies in the basic skills. It is the role of the local districts to set the performance level required for these competencies. Guidelines for the new mathematics and science credit requirements have been developed by the state and may be used at the local level.

By the 1983-84 school year, each school board in Florida must develop performance standards in K-12 academic programs in which credit toward high school graduation is awarded. Policies for student mastery of performance standards must also be established for credit courses. Appropriate methods for evaluating student mastery can include teacher observations, classroom assignments and examinations. The state department of education will provide Proposed Student Performance Standards of Excellence and technical assistance to the local districts to help them comply. By July 1985, the performance standards must be incorporated into the pupil progression plan for students in grades 9-12.

New legislation in Florida allows the commissioner of education, the state board of education or the legislature to enter into a consortium with

other interested states for the purpose of developing and recommending strategies to raise the quality of instructional materials in the public schools.

The state of Georgia does not directly mandate curriculum guidelines. It has, however, developed a comprehensive, hierarchical list of essential skills and a curriculum framework in all subjects, grades K-12. It sets standards for schools which include instructional guidelines determined by the curriculum framework.

The Hawaii Office of Public Instruction provides curriculum guidelines, for grades K-12, in science, mathematics and computer education. The year of the latest revisions are mathematics, 1978; science, 1981; and computer education, 1983.

Each year since 1979 the Iowa Department of Public Instruction (DPI) has published updated versions of A Tool for Assessing and Revising the Science Curriculum, which is used by 4,000 teachers from 200 school districts. In 1982 the DPI published A Commitment to Excellence--Directions for the 1980s, which presents guidelines schools can follow in curriculum development and other aspects of mathematics programs. The Iowa Plan for the Statewide Use of the Computer for Education, first prepared in 1976, was updated in 1982; also in 1982 a statewide consortium (made up of representatives from local education agencies, area education agencies, and vocational schools) was organized to help implement the plan. Use of these guidelines and plans is not mandatory in Iowa.

The Kentucky Department of Education has published a Teacher's Guide to Computer Courses which is a curriculum guide to the introduction of computers as well as computer mathematics and programming.

Louisiana mandates curriculum guides for K-12 science and mathematics. The mathematics guides were updated during the 1982-83 school year, and nine separate science guides are available for grades k-12. Science guides were updated in 1983. Guides for computer education for all grades are currently being considered.

Mandated science guidelines were instituted in 1983 in Maryland; guidelines for mathematics are being prepared and are expected to be in place in 1984; guidelines for computer education are in progress. In 1982-83 the state funded curriculum development grants to modify the curriculum framework for gifted science students.

Mississippi has adopted a program called Accountability/Instructional Management in grades K-12 as a basis for accountability and as a standard for accreditation. This program defines methods of instruction and evaluation and will provide the framework to implement the performance standards required by the recent Education Reform Act.

Missouri does not mandate curriculum guidelines but it does set curriculum objectives. In March 1983, teachers, education officials and members of the state Science Advisory Committee wrote objectives for ten areas of the

elementary science curriculum that are intended to serve as models for school districts.

The Montana State Board, the Office of Public Instruction and the university system are developing curriculum guidelines for using technology in the classroom, including integrating the computer with existing courses as well as developing new courses. The university system is beginning to develop software to meet the needs of Montana schools.

Nevada mandates courses of study for K-12 science and mathematics. The courses of study, developed in 1974, are currently being revised. The department of education is working with superintendents and staff to evaluate and rewrite the guidelines. A first draft has been developed; a revised draft is due in October 1983. A curriculum for computer education will be suggested.

Senate Concurrent Resolution No. 55, passed in the last Nevada legislative session, directs the state universities and public high schools to work together to improve instruction in mathematics and other areas. University representatives are required to report annually to school districts and high schools the proficiency of high school graduates and "the extent to which the levels of competence necessary for college-level work have been achieved." The Nevada Department of Education and university representatives are directed to meet annually to develop a program for improving the competence of pupils in mathematics, reading and writing.

The New Hampshire State Department of Education has scheduled two groups -- one for science and the second for mathematics -- to convene this fall to prepare a statement for each area on what should be taught and how it should be taught. Results of these two study groups will be disseminated to local districts to guide their curriculum development efforts.

The New Jersey Department of Education has developed mathematics and science K-12 curriculum improvement objectives covering curriculum review, revision and development of textbooks, teachers' manuals, parent booklets and technical assistance to local districts.

The 1980 Guidelines for High School Graduation Requirements set graduation standards for New Jersey students. The standards include: a statewide assessment test; explicit levels of proficiency in reading, writing and computational skills; guidelines for the development of graduation standards by local boards; and guidelines for remediation. In June 1983 the state board of education adopted a new 9th-grade basic skills test that will be more rigorous than the minimum basic skills test it replaces.

New York has curriculum guidelines in all areas of curriculum in grades K-12 with the exception of computer literacy. These guidelines cover a broad range of skills. The mathematics guidelines were revised in 1981, and the guidelines for science and writing are currently being revised.

North Carolina mandates curriculum policies for both mathematics and science, grades K-12. These policies were last revised in 1979. The

state board of education recently completed detailed curriculum studies in science and mathematics. Computer literacy is not mandated; however, a state plan was developed in 1983 by the department of instruction and guidelines are available for district use. Higher order skills are being emphasized in the teaching of mathematics, science and computer education in all grades.

In October 1982, the Ohio State Board of Education revised the standards for elementary and secondary schools. The standards emphasize student achievement and strengthen high school graduation requirements. School districts will be required under the proposed standards to develop competency programs in the basic skills. Pupil performance objectives will be established by each district, and students will be tested for their competency at least once in every grades 1-4, 5-8 and 9-11.

The Oklahoma State Department of Education has mandated new curriculum guidelines for science and mathematics; implementation begins during the 1983-84 school year.

The Pennsylvania State Board of Education mandates curriculum guidelines for K-12 science, mathematics and computer education. These guidelines are being updated at the present time.

New South Carolina guidelines set by the department of education require school districts to offer a minimum of five mathematics units and five science units. This is part of the department's response to the $1 million appropriation for training/retraining mathematics and science teachers that Governor Riley signed into law in June 1983.

South Dakota has developed standards of excellence in reading, mathematics and communication that include a focus on problem solving and critical thinking skills that can be enhanced through computer assisted instruction.

In May 1984, the Tennessee State Board of Education adopted guidelines for developing computer technology courses in high schools. The guidelines cover introductory computer courses, computer programming and advanced placement computer science. It is expected that the guidelines will be reevaluated before courses are adopted as part of the high school curriculum. The state has mandated curriculum guidelines for K-12 mathematics and is developing guidelines for K-12 science courses.

In Texas a new state-curricular framework, which includes essential elements of the 12 content areas identified by the legislature, is currently being developed. Use of this K-12 framework will be required for maintaining school accreditation.

Utah has no state-mandated performance standards for mathematics, science or computer education. The state education agency has, however, developed guidelines for mathematics and science. Competence in these subjects is required prior to graduation from high school; the measurement of competence is left to local districts.

The Vermont Department of Education is, through the Vermont legislature, proposing new performance/curriculum standards and guides in all subjects taught in Vermont schools. The department proposal, if accepted, will lengthen the school year by five days. Current curriculum guidelines suggest that four units of science and four units of mathematics be taught in grades 9-12, but districts decide how many units students must take.

Virginia specifies student performance objectives for each grade and each course in science and mathematics.

Development of competencies in education will begin soon in Washington state. In August, the superintendent will appoint an advisory task force to oversee the project. Mathematics has been chosen as the first subject to be addressed; science and computer literacy competencies are scheduled for development in 1984-85.

In West Virginia, learning outcomes for mathematics and science have been developed and will be verified in the next few months. The state board of education is expected to adopt these outcomes before January 1984 and incorporate them into curriculum guides for grades K-12. A competency based curriculum guide for computer education has been developed for grades K-12.

The Wisconsin Department of Public Instruction is developing new K-12 curriculum guides for mathematics, science and computer literacy. The guides will serve as models, not mandates. State advisory curriculum committees will be established to help department staff develop the guides.

To improve science and mathematics curricula in Wisconsin, the legislature will consider in its next session (October 1983) a proposal to establish a limited number of competitive grants for school districts to develop new curricula. The proposal will request $300,000 to be distributed among six school districts that have the potential to develop exemplary programs in mathematics or science. Three grants in mathematics and three in science will be distributed among small, medium and large school districts. Grants will average $50,000 and may be renewed if satisfactory progress is demonstrated.

V. SCIENCE AND MATHEMATICS PROGRAMS

The curriculum guidelines for mathematics that will be reissued in California in 1984 will streamline the presentation of high school mathematics, de-emphasizing some traditional material and emphasizing both the use of computers and the type of logic that aligns with computer logic.

The Colorado Minority Engineering Association sponsors a Mathematics, Engineering and Science Achievement (MESA) program in public and private schools in Colorado. The MESA program selects 7th-grade minority students and encourages them to stay in mathematics and science courses by providing tutoring and career counseling; students are also eligible for summer employment with industry or public agencies. MESA officials are assisting the Colorado Department of Education with minority programs for 1983-84 in mathematics, science and other areas.

The mathematics supervisor and the science supervisor at the Delaware State Department of Education provide technical assistance to local districts in the design and conduct of inservice training and in curriculum planning and development. They also represent the state education agency on a variety of local, state and national committees and task forces.

New legislation authorizes the Commissioner of Education in Florida to promote academic out-of-school learning activities sponsored by schools and community organizations. Mathematics, science and their application will receive special emphasis.

At Governor Orr's request, Project Primetime, a basic skills program for grades K-2 was recently given a six-fold increase in funding in Indiana. The program is designed to improve the skills of low achievers in mathematics, reading and language arts.

Under way in Iowa in 1983 with $6,500 from the state legislature and to continue next year with $40,000 in funding is a project that applies technology to improve the science curriculum and the teaching of science. This pilot program uses telephones and interactive computers to train biology teachers to teach physics.

In early 1983, the Kansas Department of Education created a committee to identify exemplary science and mathematics programs in the state. By spring 1984, the committee will establish the criteria of noteworthy programs and will share the features of selected programs with districts throughout the state.

Louisiana's Department of Education supports advanced courses in science for senior high school students.. Funding comes from the gifted/special education budget and from school districts. Advanced science courses are available during the summer for students in grades 6-8. Advanced placement programs are being emphasized; secondary students receive

college credit if they pass advanced placement examinations.

The Massachusetts Department of Education has set up a clearinghouse for science, mathematics and computer education, scheduled to begin fall 1983. The clearinghouse will provide teachers and school districts with information on successful programs, preservice and inservice training/retraining opportunities, public-private partnerships and coordination of joint efforts to improve quality and exchanges of personnel among districts. A proposed computer resource bank in mathematics, science and instructional technology would provide information about curriculum materials, consultants, hardware and software.

The Nebraska State Education Association contracted with Nebraska Instructional Television to develop programs based on computers. "Think About" is a program on decision making for 5th graders and "Math Wise" is a program that enhances problem-solving skills.

The New Jersey Department of Education is currently identifying exemplary programs in science and mathematics across the state. The project will develop a data base on model programs to share with local districts.

Under its Master Plan for the Improvement of Mathematics and Science Education, the North Carolina State Board of Education is proposing funding of $240,000 to establish programs of excellence in mathematics and science. Eleven secondary schools will be selected to provide examples of excellence for other school systems. The objectives of the mathematics and science programs are to improve student attitudes toward these courses, raise enrollment, improve student performance and increase the number of students entering postsecondary mathematics and science programs.

The North Carolina Council for Minorities in Science, Mathematics and Engineering is identifying talented minority students in grades 5-7. The state-level council networks with local businesses to track students over time and provide them with long-term assistance. Students are selected into the program based on their interest and grades in school and also upon the recommendations of principals, teachers and others. The long-term goals of the program are to provide students with summer employment, role models and college support.

Many North Dakota schools are considering using a number of innovative programs in science and mathematics classes. Examples include an NSF project, "Sci/Math," and Project CLIMB. A calculator mathematics program has been developed to supplement the junior high school mathematics program. Computeronics is designed for gifted students and is currently used in two schools and will be expanded to 17 schools this year.

Recent curricula efforts in Pennsylvania include the use of audio-visual media for science education and a full year program in nuclear science for secondary students. A model computer literacy course for students has been developed by the department of education and piloted in 20 school districts. The goal is to have every student take the course before

graduating from high school.

Tennessee's Basic Skills First program is a new elementary curriculum in mathematics and reading. The teacher-designed curriculum establishes 1300 skills children should learn between kindergarten and 8th grade. The program proposes that by 1990, every nonhandicapped child should pass a basic skills competency test before entering 9th grade.

The state office of education is working collaboratively with Utah universities to develop two proposals to the National Science Foundation. One program would retrain mathematics and science teachers at summer institutes using computer-assisted instruction. The other program would provide direct instruction to students using master teachers and a telecommunications network that is now being set up in Utah.

Governor Richard A. Snelling of Vermont has initiated the Early Childhood Program for children aged 3-8. The program, which began in 1983-84, strongly emphasizes the early introduction of science and mathematics.

During the summer of 1983, the Governor's Institute on Science in Vermont sponsored a computer problem-solving contest for about 35 students selected by statewide committee. With the Math League, the Institute sponsored a mathematics contest.

Washington's High Technology Education and Training Act, also passed this year, included support for mathematics, science and computer education programs for students and computer technology inservice training for teachers. Funding will be available over the next two years, primarily for student activities.

West Virginia's Bureau of Learning Systems, which recently examined results of the State County Testing Program for the last six years, noted that performance had improved markedly, but key curriculum and instruction adjustments were needed. Included among the major findings of the study, "Academic Achievement of West Virginia Students as Measured by Comprehensive Tests of Basic Skills," were the following: (1) across all grade levels, mathematics instruction should put less emphasis on merely solving mathematics problems and more emphasis on using mathematics to solve real-life problems; (2) improvements may be lagging at high school levels in science achievement because students simply lack interest in the subject; the current emphasis on content should be balanced with hands on and problem solving activities.

In October 1982, a conference was held at the Wingspread Center in Racine to establish a model for science education in Wisconsin. The science educators attending the conference made recommendations aimed at increasing science achievement for secondary students through raising high school graduation requirements, updating curriculum, developing new levels of public support for science education and broadening career awareness.

The first annual Science World, piloted by the Department of Public Instruction and the Wisconsin Academy of Sciences, Arts and Letters, was held July 10-16, 1983. Science World is a summer camp designed to

motivate junior high school students to pursue specialized secondary programs and to consider careers in science and technology. Science teachers selected for excellence lead teams of students in laboratory and field investigations. In addition to seven hours of immersion in science and technology daily, students meet with scientists and technologists from the university community and business and industry. Forty eighth-grade students participated in the 1983 pilot project; as many as 360 young people may participate in 1984 if funding is made available.

VI. COMPUTER EDUCATION PROGRAMS

The Governor's Interim Commission (March 1983) proposes that the state of Alabama provide $10.2 million to local education agencies for the purchase of 4,000 microcomputers for elementary and secondary schools and for teacher training workshops. Staff at the Alabama Department of Education provide assistance to local districts in the review, evaluation and selection of education software.

The Alabama Council for Computers in Education, representing K-12 teachers, is primarily a clearinghouse/communications organization for the Alabama local education agencies.

The Alaska Office of Educational Technology and Telecommunications (OET&T) was formed in 1981 by combining the Educational Telecommunications for Alaska Project (ETA) and the Office of Educational Technology and Telecommunications, which contained Alaska's Instructional Television unit. The goal of the office is to design, develop and implement applications of technology to education for specific education needs. The learn/Alaska Television network includes statewide video and audio conferencing services as well as 150 different TV series covering a wide range of subject matter. The network is received in over half of the cities and towns in Alaska and is on the air 18 hours a day, 7 days a week for viewing both in school and at home.

Alaska's Office of Educational Technology provides for credit computer-based high school courses. The Individualized Study by Technology (IST) is designed for self directed, self paced student learning and requires little teacher preparation time.

In a policy statement issued in January of 1983, the Arizona State Board of Education supported the use of computers for classroom instruction and coursework to orient students to the uses of computers. Since then the state education agency has sponsored state and regional workshops on educational technology for teachers and other school personnel.

In April 1983, Governor Babbitt signed SB 1187 to allow the Arizona Department of Education to operate a clearinghouse of information on instructional software. The department will provide information to the state school board and local school boards and help them coordinate bulk purchases of highly rated software. The department will also recommend software criteria for school use. One component of the software criteria will be evidence that the software is effective in improving learning.

In July 1982, the Arkansas state education agency established a microcomputer laboratory for school personnel. The laboratory provides teachers and administrators with the opportunity to review and evaluate hardware and software for instructional uses. As part of its technical assistance to local districts, the state education agency has also compiled Microcomputers in Education, a resource document.

The 1983 session of the Arkansas General Assembly passed Act 528 which supports local projects to teach basic skills, computer literacy and computer proficiency. The Instructional Microcomputer-Based Program for Arkansas Children (IMPAC), will identify specific coursework, develop a staff training component and field test the basic skills programs at grades 4-6 in 12-20 Arkansas schools. The $1 million appropriated for Act 528 for the 1983-1984 school year will also provide funds for a statewide Commission on Improving Public Schools Basic Skills Opportunities through Technology and state education agency technical assistance to local education agencies.

In January of 1983 the Educational Technology Local Assistance Program was established in California. Funding for this program will support state department of education technical assistance to local school districts, teacher training and parent involvement activities, matching funds for equipment purchase and maintenance, and statewide coordination among various groups concerned with educational technology programs.

Colorado's state education agency issued a Position Paper on the Role of Technology in the Educational Process in December 1982. The paper considers instructional microcomputer use, telecommunications and satellite technology. The paper describes a suggested role for the state department to include such activities as research and evaluation of technology-based education, coordination with public and private sector groups involved in the development of technology in education, and the dissemination of outstanding practices and materials.

Colorado has joined two educational computing networks, the Minnesota Educational Computing Consortium (MECC) and the University of Wisconsin project (WIS). As an institutional member of these two projects, the Colorado Department of Education provides local districts with access to software and new curricula on computer literacy. The department sponsors workshops to train district personnel in the use of classroom computer materials.

In November 1982, the Delaware State Board of Education adopted the "State Plan for Computer Utilization in Education for Fiscal Year 1984." The plan identifies four priority areas for computer use in the state education system: technical assistance to local districts, including training and coordination; development of computer literacy classes for high school students; expansion of computer-assisted instruction; and improvement of the Student Accounting System. The state department of education is also developing a comprehensive five-year plan for the use of computer technology in the educational system.

The state board of education in Delaware has recommended to all school districts that a nine-week computer education course be incorporated into the high school curriculum and that all college bound students take at least one course in computers.

The Delaware State Council on Computer Education, located in the state education agency, is a statewide educational and coordinating body.

Established in 1973, it initially provided advisory services to the state board of education. In 1979-80, the council's role changed to one of coordination, promoting the compatibility of microcomputer hardware systems in the local education agencies. The council began reviewing and approving local district purchases of computer hardware and software. Under this system, local education agencies must demonstrate that they have reviewed their needs and must state their intended use of microcomputers prior to approval for acquisition. The council also provides computer literacy workshops for teachers and is now expanding into the development of computer literacy courses for students.

Project Direct, a Delaware network linking all public schools, provides instructional computing services. Funding for the consortium which comes primarily from user fees and state department aid, supports field staff who work with teachers in helping them to employ computers in the classroom.

Each spring the State Council on Computer Education, along with the Delaware Council of Mathematics Teachers, local universities and the Delaware Council of Science Teachers, sponsor a Computer Fair. This day and a half event includes displays, workshops and demonstrations for parents, students, teachers and the general public. Highlights of this event are computer programming and calculator contests for school-age children and youth in grades K-12.

The Florida Legislature appropriated supplemental funds of $30 million to increase students' exposure in grades K-12 to laboratory experiences in mathematics, science and computer education. Ten million dollars have been earmarked for local districts to expand computer-assisted instruction in mathematics and computer literacy in grades K-12. Eighteen million dollars have been set aside to build or renovate science laboratories; another $2 million is allocated for laboratory equipment and supplies in grades 9-12.

In March 1983, the Educational Technology Section of the state education agency produced Florida Computing Activities. This document describes instructional computing activities of local education agencies and universities, lists instructional computing contacts for local districts and suggests the computing activities of the education department's divisions concerned with effective use of technology.

In 1983, the Hawaii Office of Public Instruction launched a seven-year plan to advance computer education. This plan includes the development of courses in computer literacy, computer-assisted instruction and computer-managed instruction. The plan offers an "exploratory" computer curriculum for all students, K-12, a more advanced computer curriculum in secondary education and a second computer curriculum emphasizing vocational education application. Up to this point, computer-assisted instruction has been used only to teach basic skills, although wider applications are being planned. The office of public instruction plan calls for inservice training of 250 teachers this year and 1,000 teachers during the next year.

Computer workshops are provided by the Hawaii State Education Agency, and pilot programs include Advanced Placement Computer Science, the K-6 Exploratory Computer Literacy Program, the 7-12 Exploratory Computer Literacy Program. The computer science curriculum framework is in draft form, as is the curriculum guides for the K-6 and 7-12 computer literacy programs. The Hawaii Legislature recently funded a special project which provides local education agencies with monies to purchase hardware/software. The project, Exploratory Computer Awareness Interim Program provides computer experience for all seniors.

In March 1983, the Illinois State Board of Education received a report on "Computer Technology in Education" that supports the development of consortia of local school districts for the purpose of sharing information and providing technical assistance and training.

The state department of education in Illinois has established a repository of microcomputer programs for computer-assisted instruction, organized workshops on various aspects of computer usage and provided technical assistance to local education agencies in the purchase of hardware and in management applications of computer technology.

SB 124 authorizes the Illinois State Board of Education to make grants to school districts and regional superintendents for equipment, software and training. The grants will assist districts in developing computer literacy programs and upgrading computer awareness in the schools. The bill was sent to the governor on July 18, 1983, and is one initiative within the Larger Computer Consortium program.

In Illinois HB 997 authorizes school boards to sell or market any computer program developed by a teacher as a result of the teacher's duties with the district or through the use of school resources or facilities. The bill allows both parties to enter into a contractual agreement in marketing the program. Both legislative houses passed the bill on June 28, 1983, and it has been sent on for the governor's approval.

Iowa supports (although it does not operate) the Iowa Educational Computing Consortium. Members of the consortium are the 15 area educational agencies and vocational/technical community colleges. One activity is arranging for group purchases of computer hardware and software. Iowa has an institutional membership in the Minnesota Educational Computing Consortium (MECC) that gives it access to MECC's software library and allows it to duplicate and distribute software throughout the state. A project at the University of Northern Iowa's Price Laboratory School will integrate microcomputers into the middle and high school mathematics curriculum.

In progress is an effort, initiated by the Iowa State Department of Education and funded with $250,000 from the state legislature (through House File 532, a major education bill that became law in May 1983), to establish a computer software clearinghouse in Iowa by July 1984. The coordinating committee that will oversee the clearinghouse is working to develop a "Request for Proposal" for the establishment of the clearinghouse. HF 532 makes several other important provisions for

mathematics, science and computer education in Iowa.

In 1981, 1,500 microcomputers were in use in more than half of the Kansas school districts. In 1982, the department of education created its own Education Assistance Section to assess state computer education needs, provide microcomputer inservice training and evaluate software.

In September 1982 the Kansas state education agency adopted a one-year educational technology initiative. Program areas to be addressed over the next 12 months include: the identification of skills needed for teachers to effectively use microcomputers in the classroom, for teachers to effectively use microcomputers in the classroom, the development of a mobile unit equipped with microcomputers and software for use in small rural schools, and training for district personnel in successful educational applications of microcomputers.

The Kentucky Department of Education has taken a leadership role in helping local school districts to implement computer literacy courses. These services include workshops for local districts to assist teachers in the effective use of computers. Most of Kentucky's vocational schools have computers installed in their business and office programs. Also, local districts that participate in gifted programs often chose to spend their time and money in computer education.

The Louisiana state department of education currently provides technical assistance in computer education and applications to local districts including seminars on computer awareness and the evaluation of hardware and software, the dissemination of information about instructional uses of computers, and the organization of a statewide network to facilitate the development and distribution of instructional computing resources and services to educators.

Louisiana provides financial assistance to local parishes for the purchase of computer equipment. During the 1982-83 school year, $180,000 was allocated to ten elementary schools across the state in increments of $18,000 apiece. Computers, peripheral equipment and software were purchased with the funds. The Management Information System (MIS), a department of education agency, reviews and evaluates software. MIS also sponsors conferences on computer literacy.

The section on Gifted Services of the Louisiana Department of Education began a program three years ago to spread computer literacy to teachers and students across the state. The program has provided workshops and created a computer telephone network for a successively larger number of teachers each year. The 232 teachers who have joined the program work with gifted student programs in every parish of the state.

Maine's department of educational and cultural services recently established a staff position to provide inservice technology training for school personnel. A Microprocessor Review Committee serves to educate the department's staff about current activities related to the use of computers, to review instructional and administrative software, and to

advise the classroom consultant.

Maryland's state education agency has established a state data base to share evaluation information about instructional software with local districts.

Massachusetts' state department of education has developed a resource bank of information (on curriculum, hardware, software, etc.), investigated hardware/software advisory services, and developed and distributed advisory papers on all aspects of computer use to local districts.

The Minnesota Educational Computing Consortium (MECC) is a cooperative venture that provides the state's 435 school districts with access to a timeshare system, discounts on microcomputers, a lending library of educational courseware and inservice training for teachers. The Minnesota State Department of Education is working with MECC to develop and review commercial software. MECC has expanded and now offers membership services to other state education agencies and local districts around the country.

The state department of education, the Minnesota Association for Supervision and Curriculum Development, and the Minnesota Association of School Administrators have produced A Compilation of Considerations Regarding the Use of a Computer to Help Teach the School Curriculum. This report contains information on a variety of topics including hardware and software selection, teacher training and software development.

The Minnesota Education Technology Act, passed in May 1983, appropriates $5.7 million to improve the use of technology in elementary and secondary schools. School districts are encouraged to develop written technology utilization plans and will receive state aid if the proposed plan complies with the legislation. Districts that receive approval on their plans will receive additional funding for inservice training and technical assistance from the Minnesota Educational Computing Consortium (MECC). By January 1984, the state board will designate from 8 to 10 districts as technology demonstration sites and award each district a grant for use during the 1983-84 and 1984-85 school years.

The Minnesota Department of Education will receive $200,000 to compile, publish and distribute to school districts a list of high quality courseware packages for use in public elementary and secondary schools. The funding is part of the Minnesota Education Technology Act, passed in May 1983. The department will update the list every six months. An additional $1.1 million will be available to school districts to subsidize courseware packages that qualify as high quality.

In May 1983, the Minnesota legislature appropriated $250,000 to the Minnesota Educational Computing Consortium (MECC) to develop and design courseware packages to meet school district needs and which are otherwise unavailable or too expensive to purchase. The department of education will evaluate the courseware packages and MECC is authorized to sell the courseware to other states.

Mississippi's state department of education has documented the use of computers in schools and is currently providing information related to computer technology to local districts. Plans related to technology are now being developed for review and discussion by the state board of education.

Missouri's state department of education provides assistance to local school districts which includes funding the development and dissemination of an automated system for individualized education plans, providing guidelines on selecting hardware and software for instruction, and conducting inservice training programs.

In the spring of 1983, the Missouri Department of Elementary and Secondary Education sponsored three conferences on the use of the computer for instruction. Missouri is a member of the Minnesota Educational Computing Consortium and a strong supporter of the Agency for Instructional Television (headquartered in Bloomington, Indiana). The agency is now moving into software with the development of eight interactive software/video packages.

The Montana state board of education adopted "A Proposal in Computer Education" in 1982 to begin developing programs to meet the computer challenge. Priorities identified were the training of teachers in the use of computers in the instructional process and the education of students concerning computer applications and use.

Computer courses are available in some of Nebraska's schools, with regional science, mathematics and computer programs available to high school students through colleges and universities.

Nevada's state department of education has created a Microcomputer Resource Center to assist local districts in using microcomputers to enhance their effectiveness in administration, classroom management, and instruction. The Center will allow educators to review and evaluate instructional and administrative software prior to purchase, to interact with a variety of hardware and software products, and to receive training in a variety of topics related to computer technology.

The New Mexico Computer Users Consortium was formed recently to develop curricula and provide workshops and inservice training programs.

In 1980, the New York State Education Department initiated a "futuring" project which resulted in a core program to be recommended as a mandate for all K-12 students. The core program includes learning about computer technology. Although a state mandated curriculum in computer literacy does not yet exist, the state department of education provides technical assistance in computer education and software evaluation. The state department of education has recently established the Center for Learning Technology whose purpose is to organize and disseminate information on microcomputers, software and curriculum to elementary and secondary schools.

In New York, the Division of Occupational Education appointed a statewide committee to examine future occupational opportunities. Computer-related technologies are part of a core program in occupational education.

The New York State School Computer Services System is a state-sponsored program to promote local school district use of computers in conducting administrative activities. Recent proposals, developed to meet the needs of teachers in computer literacy, have been submitted to the New York State Education Department for funding.

In January 1983, the North Carolina Department of Public Instruction released a state plan for computer use in the public schools. Among its other recommendations, the department urges the use of microcomputers as an instructional tool for all content areas and grades and the development of opportunities for all students to become familiar with computer operations. The state department's Educational Media and Technology Services Division assists local districts by providing workshops, hardware contracts, a computer laboratory, techical consultant services and courseware review.

The North Dakota Department of Public Instruction has established a separate computer section and broadened the mathematics, science and computer areas in the Guide for Curriculum Planning. Computer education courses must fit into one of three categories (literacy, programming or advanced programming) and be approved by the department for students to receive credit.

The North Dakota State Computer Committee is currently working on a plan to suggest directions schools should follow in using and integrating the computer into the classroom.

North Dakota has purchased membership in the Minnesota Educational Computing Consortium (MECC), enabling local districts to purchase software at reduced prices. The agency has also secured bids for group microcomputer purchases at reduced prices.

The Ohio Department of Education has a new handbook that describes a process for integrating the use of microcomputers into the classroom. The handbook is a step-by-step guide to establish a district-level computer use committee, select hardware and software, establish inservice programs and identify other resources.

Ohio has established Basic Education Skills through Technology (Project BEST) to build an interstate communications network. The objectives of Project BEST relate to several of the priorities set by the state board of education in Mission of the 80's: A Blueprint for Excellence. The objectives include improving basic skills, improving curriculum and providing vocational education that includes basic skills. As part of this project, the state department of education is compiling a directory that describes resource persons and programs in Ohio.

The Oklahoma Department of Education has a new Instructional Computer Resources section, which consults and advises local districts in hardware and software selection. The department of education provides inservice workshops for teachers throughout the state in science, mathematics and computer education. Three computer camps are organized at East Central State University in Oklahoma. Students can select a camp and all offer courses on awareness, literacy and programming.

The Oregon Educational Computer Consortium (OECC) includes approximately 95 local education agencies and has been evaluating and selecting software for the past two years. The Agency for Instructional Television (AIT) has produced "Solutions Unlimited," a video/computer problem solving skills development program. The Oregon Department of Education participates in the Minnesota Educational Computing Consortium (MECC), Project BEST, the U.S. Department of Education's Information Network and will be involved in the Region X Department of Education's Computer Literacy Project.

Pennsylvania participates in a statewide computer network, PENNLINK, which links the state department of education, intermediate units and local districts. The department's information center offers training courses in hardware and software for its staff. The department recently has developed a computer literacy course for students and teachers, teleconferencing activities and a tracking system for special education.

The Rhode Island governor has undertaken a state initiative that will put $8 million in resources over a two-year period to bring microcomputers into every public school. Of the $8 million, $3 million will be spent on elementary and secondary schools, $1 million on vocational and technical schools and $4 million on public institutions of higher learning. For elementary and secondary schools, the state will pay 60% of the total cost and the local district will furnish 40%. The state will cover the 10% of the total cost reserved for teacher training. State aid will reimburse local districts for up to 75% of their 40% match. The program will help train Rhode Island students for the jobs of tomorrow. This initiative is designed to increase computer literacy in Rhode Island, enhance the education system and act as a strong drawing card for prospective employers.

Computer Skills Next introduces Tennessee students in grades 7 and 8 to a new computer curriculum. The curriculum plan calls for 15 hours of computer literacy training in each grade for a total of 30 hours of classroom instruction, which will be mandated in the 1985-86 school year. The state board of education has recommended that components of the plan (including teacher training, hardware and software purchases and technical assistance for local schools), be funded by the Tennessee General Assembly. The program has been piloted in 14 schools. One-third of all junior high and middle schools will participate in an incentive pilot program beginning January 1984.

The director of computer technology at the Texas Education Agency provides information and technical assistance to local districts on the design, development and implementation of computer-based instruction and

management systems. The department has published a Guide for Selecting a Computer Based Instruction System for use by local districts. It provides a plan to integrate the computer into the instructional program.

The Texas Education Agency funds the Texas Education Computer Consortium which includes six educational service centers. The consortium's primary focus is the development of computerized management information systems. Schools in the consortium have access to orientation and training sessions related to computer use.

The state education agency in Utah has a working group in technology that is studying issues of computer-assisted instruction and computer management systems. This group is assisting in the establishment of a statewide Microcomputer Information Laboratory that will give school districts an opportunity to evaluate hardware and software and will train teachers and administrators. The state education agency technology group is also assisting in the development of a statewide consortium of computer users in education. Through this consortium, information on users, hardware and software and other topics related to computer technology will be made available. A long-range objective is to establish a statewide computer network.

The Vermont Department of Education has published the first of a series of booklets on computer education. Computer Considerations for Vermont Schools outlines the state's computer education philosophy and provides a curriculum matrix showing computer applications in grades K-12. Staff members from the state department of education serve as computer consultants to school districts and teacher groups and have published School Use of Computers in Vermont.

The Virginia legislature recently appropriated $280,000 to assist school districts in purchasing computer equipment. The appropriation is in addition to a tax incentive bill that encourages businesses to donate computer equipment to the schools.

In 1982 the Virginia State Department of Education established the Division of Instructional Media and Technology to organize all media management, assist local districts in developing, disseminating and producing computer courseware and provide workshops and statewide conferences.

The Virginia State Leadership Assistance for Technology in Education Project maintains a software review and evaluation center at the state department of education and offers staff development programs for local districts in computer usage.

Washington's High Technology Education and Training Act, passed in 1983, includes state funding for K-12 student programs, inservice training, the establishment of regional computer demonstration centers and technical assistance staff at each educational service district and in the office of the superintendent. Over the next two years, funding will be available for student mathematics, science and computer education. A small portion of this amount will fund inservice training. The regional computer

demonstration centers, which are to be operational by the fall of 1983, will be managed by people who have computer backgrounds or who have used technology in the schools. The centers will serve the entire state and allow districts to review hardware and software before making purchase decisions, serve as training sites for teachers and administrators and provide technical assistance and consultation to school districts in computer/technology education. Finally, part of the Act's funding will support two professional staff at the office of the superintendent. The staff will provide technical assistance to local districts, the educational service districts and the state eduction agency and will administer the K-12 programs.

The Washington Office of Public Instruction through the educational service districts, conducted 25 orientation sessions for school district personnel on the use of a handbook developed by the Computer Technology in Curriculum and Instruction Task Force. This interdisciplinary group, convened by the superintendent of public instruction, produced and disseminated a manual that includes information and suggestions for developing plans to acquire the necessary equipment and materials to begin using the computer. Software evaluation, staff development and available resources (organizations, publications, etc.), are addressed in the handbook. A directory of local education agencies in the state that use computers is also included.

Microcomputers are used for instruction in every county in West Virginia. Their purchase and use increased 200% within the past school year, according to a statewide department of education survey completed in April 1983. This increased availability, along with other factors including computer literacy requirements recommended in the state's master education plan, prompted a recent appropriation by the legislature for the development of a computer network. In June, at the request of Governor Rockefeller, over a million dollars was appropriated for the network, which will eventually include all of the state's public schools. The microcomputer network system will allow for the teaching of computer literacy, for computer assisted instruction and for the teaching of the computer skills required for occupations.

West Virginia is one of four states participating in a research study conducted by the Appalachian Regional Education Lab. The study will determine if 9th and 10th graders can use microcomputers to remedy basic skills deficiencies.

The West Virginia Department of Education was instrumental in the design, development and implementation of a computer-assisted mathematics laboratory now operational in one local school district. The lab has provided much information about the effectiveness of educational software. The department is currently disseminating information to local districts about this and other topics related to computer technology in the classroom.

Wyoming is a member of the Minnesota Educational Computing Consortium (MECC) which allows each district the opportunity to purchase MECC materials and services. The state also participates in Project BEST and

its teleconferencing activities. Wyoming provides each school district with membership to the Math-Science Teaching Center located at the University of Wyoming. The center has a software library available to members.

VII. SUMMER INSTITUTES, MAGNET AND RESIDENTIAL SCHOOLS

The Arizona Legislature recently appropriated $50,000 to the Board of Regents to establish mathematics and science centers at state universities for outstanding high school students. The centers, which are operating this summer at three universities, coordinate coursework and counseling in cooperation with high school teachers. Students are selected on the basis of merit and need, and some funding is supplied for tuition and living expenses.

SB 813, signed into law in California in July 1983, targets funds for the development (1984-85) of specialized high schools in high technology and the performing arts. SB 813 also calls for the establishment of summer schools in mathematics, science and other critical academic areas.

For the past four years, the Delaware Department of Education and the DuPont Corporation's Committee on Educational Aid have sponsored a three-week summer institute in mathematics and verbal skills and computer programming for outstanding 8th grade students who qualify in the Johns Hopkins Talent Search. Parents pay part of the cost for this program which includes an opportunity for students to use computers.

The Governor's School for Excellence, a one-week residential summer program at the University of Delaware, is designed to recognize outstanding students in both public and private schools who have completed 10th grade. Participants are chosen on the basis of academic achievement and leadership abilities. It is hoped that through this experience, students' high motivation will be reinforced so that they can have a positive effect on their peers during the next school year.

Recent legislation allows the Florida Department of Education to award grants to public school districts, higher education institutions and science museums and centers to conduct summer camps for students in mathematics, science or computers.

The Governor's Honors Program in Georgia has strong science, mathematics, and computer components: "rising seniors" and recent graduates attend six-week summer sessions at North Georgia College (200 students) and Valdosta State (400 students) that provide intensive three-day experience with computers before students move into their special interest areas (in all subjects).

The state department of education in Georgia provides consultation to school districts that develop magnet schools. About 25,000 students are

now enrolled in magnet schools which are organized for the most part around mathematics, science, the arts, the humanities or international education.

SB 338, which has passed both houses and been sent on to the governor of Illinois, appropriates $800,000 to establish summer institutes for gifted students and teachers. The institutes will emphasize mathematics, science and computer technology; they will be conducted by the Illinois State Board of Higher Education. The board will provide traineeships for talented undergraduate mathematics and science students and will award fellowships to graduate students who are interested in working with gifted children.

HR 328 directs the Illinois State Board of Education to investigate the feasibility of establishing the Illinois School of Science and Mathematics. Students with high aptitudes in these subjects would attend the residential high school. The State Board will report its recommendations by March 1984.

Kentucky began in 1983 a Governor's School Program at Centre College for 250 high school juniors to study "Science, Technology and Kentucky's Future." Those students selected will attend this program through state funding. The approach will be theoretical rather than technical and is intended to proceed beyond the instruction given in secondary schools. Also, several of Kentucky's universities have federally supported programs in science, mathematics, psychology and computer science for high ability high school students.

The state-supported Louisiana School for Mathematics, Science and the Arts is located in Natchitoches on the Northwestern State University campus. The school is patterned after the North Carolina School for Science and Mathematics and accommodates 700 11th- and 12th-grade students. The first class, composed of talented students nominated by school systems, will enter in September 1983. A full curriculum in computer education will be offered.

Maryland supports numerous one and two-week summer institutes for gifted students (grades 5-12) that are held on college and university campuses, at science museums and at other institutions around the state. The program is large; mathematics, science, and computers are among the subjects taught (total enrollment in these subjects in 1983 is 1,325) but other areas are covered as well. Applicants are screened by selection committees on the basis of achievement tests, teacher recommendations and a student essay describing special training, honors and interests. Courses offered include, for example, aquatic biology, environmental science, problem-solving, computer programming, computer-oriented mathematics, advanced topics in mathematics, physics, energy, optics -- and even a space science course taught at NASA. The state department of education runs the project and pays for at least 50% of costs; parents pay a registration fee, as well as some room-and-board expenses for residential two-week courses.

Michigan has many summer enrichment programs for gifted students in computers, mathematics and science developed by and held at state colleges and intermediate school districts. Some of Michigan's larger school districts have magnet schools with mathematics and science components. The state board of education cosponsors with selected universities a two-week summer institute for the arts and sciences for talented high school students.

Summer institutes in Mississippi offer enrichment programs to high school students at Jackson State and the University of Southern Mississippi.

Mississippi has a Governor's School at the Mississippi University for Women in Columbus. Juniors in high school must be nominated by their schools to gain admission. The Governor's school offers a balanced enrichment program in all curriculum areas.

The Nebraska Scholars Institute at the University of Nebraska in Lincoln is a two-week enrichment program in its first year. It offers mathematics, science and other courses to 200 gifted high school students.

New Jersey is beginning a three-year plan to open new governor's schools. The Governor's School of Global Studies, the result of a public-private partnership, will open in the summer of 1983 at Monmouth College. Participants are 100 high school juniors and seniors chosen on the basis of their scholastic records. In 1984, a Governor's School of Science and Technology will open.

During the summer of 1983, the New Mexico Department of Education provided a science-mathematics seminar for high school students at Highlands University.

The North Carolina School of Science and Mathematics, located in Durham, is a state-funded, public school that brings roughly 400 gifted 11th- and 12th-graders to its residential campus. The school was established in 1978 by the General Assembly and receives additional support from industries and foundations. The 1983 budget is $3.3 million. Students are selected on the basis of their mathematics and science aptitude and contribute to their tuition and board costs through work and service in the school and community. A distinguished faculty of highly skilled individuals and consultants from industry and education provides an enriching atmosphere for the students.

Two Governor's Schools in North Carolina offer summer residential programs for gifted junior and senior high school students. Their purpose is to assist gifted young people achieve their full potential, to encourage schools to establish and improve programs for gifted students, and to train teachers to teach gifted students. The Governor's School West is located in Winston-Salem; the Governor's School East is at St. Andrews Presbyterian College in Laurinburg. Four hundred students participate at each campus. Students are nominated by local school districts. The schools offer a wide variety of courses, including mathematics and science.

The Ohio Department of Education, in cooperation with a major state university in Ohio, sponsors a one-week School for the Gifted each year. About 60 gifted high school juniors undertake academic and artistic pursuits at a level beyond that possible in most of their hometown high schools in a week of lectures, hands-on activities, field trips and performances.

The Pennsylvania Governor's School for the Sciences has been established at Carnegie-Mellon University with state funding and support from Pennsylvania foundations. In 1983, the school accommodated 60 students about to enter their junior and senior years in high school. Future programs will attempt to expand the number of students. The school emphasizes mathematics, science and technology and offers guest lectures by international speakers. Students are selected solely by ability, as determined by teacher recommendations, SAT scores, grades and other measures. The state department of education piloted the project in 1982.

The Rhode Island legislature established a commission in May 1983 to determine the feasibility of starting a magnet school in science, mathematics and computer education. The state department of education will report to the legislature early next year.

Over the past four years, the South Carolina Governor's School for Science, Mathematics and Computer Science has provided summer programs for gifted and talented students. Students are selected on the basis of demonstrated abilities and capabilities. Funding for the school comes from state appropriations, supplemented by tuition and private scholarships.

South Dakota provides summer programs funded by state and private sources for the enrichment of high school students in mathematics and science and other areas.

As part of the Tennessee Better Schools Program, residential summer schools for gifted or talented juniors and seniors are being proposed. The schools would serve several hundred students in science, mathematics and the performing arts. If funding for the schools is approved, the program would be administered through the state's special education program.

VIII. RECOGNITION AND AWARDS

The Alabama Interim Commission on Science and Mathematics in Elementary and Secondary Schools has proposed developing recognition programs for outstanding teachers and students.

Beginning with the 1983-84 school year, the Arizona Department of Education will sponsor an Academic League to foster competitive academic events. The program will include competitions in mathematics and science as well as in other subjects.

SB 813, which became law in California in July 1983, institutes Golden State High Achievement Tests for high school seniors to obtain honors at graduation. It also funds a pilot program to reward high schools for improving student academic achievement (1984-85).

Each year the Delaware state education agency cosponsors (along with the Delaware Council of Teachers of Mathematics) mathematics leagues for elementary, junior high and senior high school students in public and private schools. There are regional and state winners and a mathematics league banquet.

Computer programming and calculator contests for school-age children and youth are held each year at the State Computer Fair which is sponsored by the Delaware Department of Public Instruction, the State Council of Mathematics Teachers, local universities and the State Council of Science Teachers.

The Delaware State Department of Education and Johns Hopkins University sponsor an annual talent search among public and private school students in the 7th and 8th grades. A test is administered and those who meet the criteria are invited to a special Talent Recognition Ceremony.

The Florida Academic Scholars Program has been initiated to recognize and reward outstanding performance and academic achievement of public and nonpublic school students. The commissioner of education will make this award beginning with the 1983-84 school year to all students who meet the requirements which include: four years of progressively advanced instruction in language arts, science and mathematics; three years of instruction in social studies; two years in a foreign language; and one year in either art or music and physical education. Students must meet other state board requirements as well.

The Georgia Scholars Program, begun by the state department of education in 1983, recognizes the achievement of graduating seniors who have high test scores and a 3.75 grade average, have completed a rigorous program (including three units of science and four of mathematics) and have been leaders in extracurricular activities. Excellent teachers will be identified in 1984, excellent schools in 1985 and excellent school systems in 1986.

This year Minnesota schools will receive $641,000 in state categorical aid to support programs for gifted students in science and mathematics. The appropriation includes $5.7 million for computer aid to the schools; however, the funding is not limited to use only in gifted programs.

The Minnesota Academic Excellence Act, passed in May 1983, creates a foundation to promote academic excellence in Minnesota public schools through public-private partnership. The Academic Excellence Foundation will advance programs of recognition and awards for students demonstrating academic excellence; summer institute programs for students with special talents; recognition programs for teachers, administrators and others who contribute to academic excellence; summer mentorship programs with business and industry for students with special career interests and high academic achievements; governor's awards ceremonies to promote academic competition; and consider the establishment of a Minnesota high school academic league. The legislature appropriated $150,000 to develop the foundation. Additional funds will be sought from private sources.

The North Carolina Scholars Program is a state-supported program for gifted students in the public schools. The program encourages secondary students to take a heavier load of rigorous courses prior to graduation. Two plans of study are available to students. Both require students to complete 22 total units for graduation; however, in the first plan the emphasis is on mathematics and science, requiring students to complete four years of mathematics and three years of science. The second plan is a well-rounded selection of various learning areas. Students apply to their local districts to participate in the program, and selection is performed locally. A Scholars' Program brochure will be available by late summer, 1983.

Tennessee high school seniors who are selected for recognition in the Tennessee Honors Program receive public recognition and a certificate of merit from the governor and the state department of education. Students are nominated by their principals in one of eight scholastic categories, including science and mathematics. Students are judged by two committees on the basis of grade point average, class rank, performance on standardized tests and other criteria.

This year the governor of Utah designated a mathematics and science week during which outstanding teachers in those disciplines were honored.

The Washington Office of the Superintendent for Public Instruction participates in the President's Awards for Mathematics and Science, a nationwide program to recognize outstanding mathematics and science teachers in grades 7 to 12.

The Washington State Mathematics Council sponsors regional mathematics contests annually for high school students and conducts a competition to determine the state winner. The Washington Scholars Program recognizes the accomplishments of three graduating seniors from each legislative district. Students are nominated by their high school principals chosen on the basis of their academic achievements, leadership abilities and

community service.

West Virginia is currently participating in the President's Awards for Mathematics and Science, a national program with established standards for recognition. The department of education has great interest in developing other awards programs and opportunities for recognition such as science fairs, competitions and institutes.

IX. REGIONAL CENTERS

The Florida Department of Education is authorized to award grants to public school districts and to public and private postsecondary institutions to establish five regional centers of excellence in mathematics, science, computers and technology. Regional centers will aid in the development and dissemination of new instructional strategies, the recruitment and training of minority and female students for technical careers, and the operation of a computer education laboratory and library. Two hundred thousand dollars has been appropriated to begin the development of the first two centers.

In July 1983 Georgia's state department of education established a staff development center to provide teachers and administrators with training in educational management and administrative uses of technology. It is anticipated that an additional five centers will be added within the state over the next few years.

The Indiana Consortium for Computer and High Technology Education is planning the development of regional clearinghouses for computer instructional information. The resource centers will be used by local district personnel to review computer hardware and courseware, to obtain training and gain access to current information on using technology in instruction.

The Massachusetts State Department of Education began in the summer of 1983 to offer curriculum information through a "Resource Information and Referral" service provided to its regional education centers. Banks of information are now available on writing, reading and curricula for gifted and talented students. By the fall of 1983, information is expected to be available on international studies, foreign languages, instructional technology, mathematics and program evaluation.

In June 1983, the New Jersey State Department of Education established regional curriculum service units to provide districts in a seven-county region with high-quality, cost-effective curriculum products and services based on district education objectives.

The Center for Learning Technologies has recently been established in New York. The center will provide technical assistance to schools and implement new programs emphasizing computer literacy, interactive technology, program production and inservice training. The state-funded center is located within the New York Department of Education.

The University of North Carolina is proposing to establish a Network of Mathematics and Science Education Centers. Up to seven centers could be created over a five-year period (1983-88), depending on the need and available resources. Resources would be drawn from three sources: (1) state funds, (2) the instructional resources of each participating institution and (3) other public and private funds. The centers would serve primarily the education needs of middle and high school mathematics teachers by improving preservice programs, conducting continuing education

programs and undertaking special studies to improve North Carolina's public schools.

The North Carolina Department of Public Instruction has created eight regional education centers with staff in several curriculum areas including mathematics and computer education. The staff of these centers provide training and technical assistance, among other services, to the schools in the regions.

North Dakota has nine teacher centers which serve the regions of the state. They are administered by a policy board of schools within a district and frequently located within a school or on a college campus. These centers identify and respond to the needs of teachers in the region, make resource people available to schools and disseminate information.

Texas has 20 educational service centers that provide inservice training for mathematics and science teachers. Computer awareness and orientation sessions are available to teachers and administrators.

The Texas Education Agency funds the Texas Education Computer Consortium which includes six educational service centers. The consortium's primary focus is the development of computerized management information systems. Schools in the consortium have access to orientation and training sessions related to computer use.

The Utah State Office of Education funds five regional service centers that provide a limited amount of inservice training in mathematics, science and computer education.

The nine educational service districts in Washington organize needed inservice training programs, including sessions in mathematics, science and computer education for teachers and administrators.

West Virginia's eight regional education service agencies provide computer awareness sessions for teachers and administrators. It is anticipated that they will soon offer more computer education programs such as programming and systems analysis.

X. TEACHER TRAINING AND RETRAINING

Alabama governor George C. Wallace's Interim Commission on Science and Mathematics has proposed increases in funding for scholarships and loans for students who agree to teach mathematics and science in Alabama's school after graduation. The loans would be retired at the rate of one year of tuition for each year of teaching.

The Alaska Office of Educational Technology and Telecommunications also offers inservice training for teachers and administrators through audio or teleconferencing. The Alaska Manual for Educational Computing and other related publications help keep teachers up to date on research software and new instructional applications.

As part of the Education for Economic Renewal program, the Arizona legislature appropriated $100,000 for a loan program for prospective mathematics and science teachers. The Board of Regents will administer this program, which helps students train as mathematics or science teachers. After students graduate, one year of the loan total will be forgiven for each year they teach in Arizona public schools. Teachers from other disciplines seeking recertification in mathematics or science are also eligible for loans.

The Arizona legislature appropriated $250,000 to the Board of Regents for the creation of mathematics and science institutes at Arizona's three universities. Because the initiative became effective July 1, 1983, the institutes are not expected to be in full operation until summer 1984. The institutes will improve skills of teachers in mathematics and science.

The Arizona Department of Education conducts regional computer awareness workshops to show teachers how to integrate computers into the basic curriculum. Under consideration is K-12 computer-assisted learning programs. The department houses a computer clearinghouse and laboratory. The state board of education is considering computer literacy as a requirement for teacher certification.

One recommendation of the Arizona Free Enterprise Task Force is the development of a special certificate to allow nonteachers with expertise in mathematics and science to teach in the public schools. The task force, created in the fall of 1982 through the department of education, consisted of approximately 65 people from business, industry and education. The purpose of the task force was to define more clearly the content of a required high school class, "Essentials and Benefits of the Free Enterprise System." Students receive one-half credit for the class. The task force completed its work in May 1983.

In April 1983, Arkansas legislators approved a program that provides loans to undergraduate students studying to be mathematics or science teachers. A loan can cover up to 50% of education expenses, and the state will forgive 20% of the loan for every year a graduate teaches in Arkansas.

Fifteen "TEC" Centers (Teacher Education and Computer Centers) were established in California in 1982. In cooperation with state universities, the centers offer inservice training for teachers in computer literacy, mathematics and science. SB 813, which the governor signed in July 1983, funds these centers for another year.

California teachers who take university-level summer courses in mathematics, science and other fields receive a stipend from the state through a program administered by school districts.

SB 813, signed by Governor Deukmejian of California in July 1983, allows schools to hire teacher trainees who have college degrees and passing scores in CBEST and subject-matter examinations, provided that the trainees have the assistance of a mentor teacher and an individual training plan. The bill also creates the mentor program: experienced teachers who help develop curricula and serve as mentors to beginning teachers receive a stipend of $4,000. The plan gives teachers the deciding vote in the selection of mentors and frees districts from the usual collective-bargaining procedures. SB 813 also creates a loan-assumption program whereby students who are training or retraining to teach in shortage areas, particularly mathematics and science, receive loans that are forgiven if they subsequently teach those subjects.

SB 813 raises salaries for beginning California teachers by 30% over three years, requires people obtaining teaching credentials after September 1, 1985, to complete 150 hours of continuing education in each five-year period thereafter, and sets up a variety of other requirements and programs that will affect all teachers, not only teachers of mathematics, science and computer education. The bill provides $800 million in additional funding for the fiscal year that began July 1, 1983.

In July 1983, the Connecticut Legislature passed SB 948 authorizing state colleges and universities to use unallocated bond funds for a loan forgiveness program for teacher candidates in subject areas with teacher shortages. The funds are distributed using a formula based on the percentage of certified graduates from each of the state's teacher training colleges and universities. Teacher candidates are eligible for loans of up to $5,000 during their junior and senior years of college; loan balances would be reduced by 20% for each year recipients teach in Connecticut.

The Connecticut Project to Increase Mastery of Mathematics (PIMM), in conjunction with the Connecticut State Department of Education, sponsors a summer mathematics institute for 100 teachers in grades 4 through 8. The institute introduces techniques for teaching various topics in mathematics while strengthening knowledge of mathematical content in ways that readily transfer to classroom practice.

The Delaware state education agency provides inservice training in mathematics, science and computer education.

The Delaware State Council on Computer Education has been conducting many inservice teacher training workshops. More than 2,200 teachers have taken one or more of these workshops. Under consideration is a requirement that all teacher candidates have some coursework in computer education.

Recent legislation in Florida has established the Teacher Scholarship Loan Program to attract promising students into the teaching profession. Loans are awarded for no more than two years and are not to exceed $4,000 per year. Two years of teaching in Florida's public schools pays back one year of the loan.

Another new program in Florida is the Tuition Reimbursement Program. Certified teachers can receive up to $78 for nine semester hours each year for four years while retraining in an area of critical teacher shortage.

The Florida Loan Forgiveness program provides up to $2,000 per year (up to four years) for undergraduate students in Florida's teacher preparation programs, or up to $5,000 per year (up to two years) for graduates of teacher education programs in areas of critical shortages.

Under the new Educational Reform Act, Florida has created the Florida Quality Instruction Incentives Council to advise the state board of education and the legislature about the development and use of teacher tests and performance evaluations.

Various Georgia universities offer summer training for teachers who teach advanced placement courses in science, mathematics and other subjects; some teachers will train at a technology center at a Macon vocational-technical school.

The state department of education in Georgia has received $135,000 in state funds for FY 84 for loans to graduate and undergraduate students in mathematics and science education. Maximum loans are $1,500 per full-time academic year. For each year the recipient of a loan teaches mathematics or science in a geographically underserved part of Georgia, up to $1,500 of the loan is forgiven.

The Hawaii Office of Public Instruction provides four special resource centers to serve its local education agencies. These include science resource centers, mathematics centers, computer education centers and a teachers resource center.

In Hawaii, the Science Institute and the Mathematics Institute provide workshops during the summer and courses during the school year for both students and teachers. This year the Mathematics Institute is providing teacher training programs; the Science Institute is providing advanced courses and innovative programs for gifted students.

One initiative of the Governor's Education for Employment Program in Illinois will create seven sites for intensive inservice training of 200-250 vocational education teachers in applied mathematics and science. Each site will receive $80,000 the first year. Curricula will include

computer education, technology and physical science courses with business and industrial applications. Selection criteria for teachers are currently being finalized and will likely attract teachers from secondary schools and community colleges. The inservice appropriation is $150,000; technical assistance programs will receive another $150,000; and the remaining $250,000 will be used for equipment purchases.

SB 570, sent to the governor of Illinois on July 22, 1983, permits scholarships for teachers who return to school to qualify to teach mathematics and science. Specifically, the bill authorizes the Illinois State Board of Education to award annual scholarships to certified teachers who wish to take additional courses and teach at the secondary level. The scholarships would provide for tuition at public or private colleges.

The Illinois Legislature appropriates $1 million to develop computer consortia for training school personnel in computer education. Eighteen consortia were funded through Chapter 2 monies ($350,000) so that every Illinois school district belongs to one consortia. The consortia will conduct inservice training and staff development programs, develop and maintain software libraries and acquire equipment for loan and demonstration. The program is appropriated through general revenue funds and began June 1983.

HR 329 directs the Illinois Board of Higher Education and the State Board of Education to study and make recommendations about the use of nonteacher experts in mathematics and science in the public schools. The experts would serve as adjunct faculty to certified teachers. Recommendations are to be reported by March 1984.

A bill to establish a Loan Repayment Assistance Fund was enacted in 1983 to help repay the college loans of students who remain in Indiana to become teachers in mathematics, science or other shortage areas. The Indiana State Student Assistance program will administer the program beginning July 1983. The program has been funded at $50,000 per year for the next two years. Students can borrow up to $10,000; up to $2,000 per year of a loan can be forgiven as long as the recipient remains in the Indiana public school system and teaches mathematics or science. $100,000 has been appropriated for 1984-85.

The Teacher Retraining Grant program in Indiana provides a grant of $1,000 each year for up to two years for licensed teachers who wish to retrain in mathematics and science.

Through Iowa's HF 532, students training to be teachers of mathematics or science are eligible for loans, $1,000 of which will be forgiven for each year they teach mathematics and science courses in Iowa schools (up to $6,000). Certified teachers who go back to school to get recertified in mathematics or science are eligible for loans of up to $1,500; if they then teach mathematics or science for one year in Iowa schools, one-half of the loan is forgiven; if they teach two years, the entire loan is forgiven. The same bill provides $40,000 for the fiscal year beginning July 1983 and $140,000 for fiscal years thereafter for inservice programs

to improve the teaching of mathematics and science.

Kentucky has instituted a mathematics/science scholarship program to encourage more education students to become certified or recertified in these areas of shortage. The program allows $2,500 of the loan to be forgiven for each year teachers teach mathematics or science within the state.

The Kentucky Department of Education has provided tuition for one person from each school district to participate in a three hour graduate course on computers conducted at the eight state universities this summer. Also, teacher training was provided to all teachers in the state while students competed in the Kentucky Computer Problem Solving Contest in April 1983.

To date, the Kentucky Department of Education has sponsored two awareness conferences and four indepth computer conferences for approximately 1,200 participants. Participants included classroom teachers, administrators, school board members and college personnel.

The Louisiana Legislature recently passed a forgivable college loan program to encourage students into mathematics and science teaching. Under this bill, students could qualify for loans up to $9,000 over three years and for each year of teaching in the state, one-fifth of the loan would be repaid. Governor David Treen signed the bill but action is pending because of similar legislation before the U.S. Congress. To further advance teachers' ability in mathematics, science and computer education, Louisiana exempts tuition for advanced college work in certified areas. Extra pay incentives are granted to teachers for experience and advanced study under the Professional Improvement Points (PIP) program. The department of education offers inservice computer education courses. In addition, colleges of education are developing major and minor fields in computer-related courses.

The University of Southern Maine has initiated a program this year to attract people from other professions into teaching. The six-month program seeks individuals who are interested in a mid-career change and already have a bachelor's degree. Fifteen students have been selected to participate in a six-week summer session, which will be followed by eight weeks of independent study to prepare for internships in the Portland school system. Each candidate will be supervised by a master teacher and faculty advisor. The experimental program will be evaluated to determine its future.

Michigan now has a group who will recommend alternatives to upgrade certified teachers' skills in mathematics and science. The Michigan State Department of Education has formed a Mathematics and Science Committee that will make recommendations for upgrading the skills of certified mathematics and science teachers. The committee is composed of representatives from business and industry, colleges and universities, teachers and administrators. The committee will report the findings sometime this fall.

In May 1983, the Minnesota Legislature appropriated $500,000 for inservice training of school district staff. The first year will be devoted to training elementary and secondary staff in mathematics, science and social sciences. The state commissioner will recommend to the legislature subject areas for which inservice training is needed in subsequent years. The training programs will be designed to include activities requiring active participant involvement. The appropriation was made under the Technology and Educational Improvement Act.

The Minnesota Legislature appropriated $936,000 for inservice training in the use of technology under the Minnesota Education Technology Act. Technology includes, but is not limited to, computers, telecommunications, cable vision, interactive video, film, low-power television, and satellite and microwave communications. Each school district with an approved technology utilization plan may apply for state aid to provide inservice training for elementary and secondary public school staff. By June 30, 1985, the department of education must provide supplemental regional or statewide inservice training for local districts in the use of technology.

Loans will be available in Mississippi to students enrolled in teacher education programs who plan to teach mathematics or science. Teachers certified in other fields may apply for loans up to $1,000 per year to go back to college during the summer for retraining in mathematics or science. To receive a loan, teachers must agree to teach at least one semester in high school for each semester they accept the loan. Teachers are expected to complete their retraining within three years. $900,000 is available for this program.

Another Mississippi loan program approved by the legislature is designed to attract college students into mathematics or science teaching. College juniors and seniors can receive up to $3,000 in loans per year -- if they agree to teach one year in Mississippi for each year they receive the loan.

The Education Reform Act requires the Mississippi Department of Education to conduct a study by July 1, 1984, to determine the extent to which teachers are teaching out of their fields of certification, the conditions that promote such practice and appropriate remedies.

Southwest Missouri State University and Northeast Missouri State University have established summer mathematics institutes to provide 11 credit hours to 30 elementary school teachers who retrain to teach mathematics in junior high. Tuition is $450, $350 of which is paid by the school district and $100 of which comes from the state department of education. The University of Missouri and Marysville College provide inservice training to limited numbers of mathematics and science teachers.

The Montana Council of Teachers of Mathematics (MCTM) takes a very active role in mathematics education throughout the state. The council oversees, organizes and directs the applications and use of National Science Foundation grants; provides inservice teacher workshops; and attracts over 2,000 teachers to its annual state meeting.

This year the Nebraska State Legislature passed a bill to provide loans at 5% interest to mathematics and science education majors in state colleges and universities and also to certified teachers studying mathematics or science education. There are also workshops in computer literacy for education department staff members and for some school districts.

In New Jersey, more rigorous teacher training standards have been adopted by the state board of education and higher education. Prospective teachers are required to have a 2.5 GPA or better to enter and maintain status in a teacher training program. More stringent requirements for field based preservice experience have been mandated. Further revisions are currently being considered.

The New York Department of Education conducts an inservice computer literacy course for K-12 teachers. The training consists of an introduction to computers and the opportunity for hand-on experience.

The New York Board of Regents and the state education department are proposing legislative initiatives to promote preservice and inservice training for mathematics and science teachers. Proposals include undergraduate scholarships and graduate fellowships for prospective teachers of mathematics and science, funding for inservice training for public school teachers and establishing consultantships in elementary and secondary mathematics and science.

North Carolina provides retraining, loans, scholarships, fellowships, extended contracts and provisional emergency certificates for teachers in mathematics and science. The state is studying the development needs of teachers and teacher supply and demand. A $1 million summer program recently went into effect under which mathematics and science teachers instruct inservice teachers during six-week workshops. Certified mathematics or science are also eligible for scholarships to upgrade their training under the program. Three hundred mathematics and science teachers have been offered six weeks of summer employment in the public schools. The Mary Reynolds Babcock Visiting Instructor Program allows selected high school teachers to teach a reduced load at the North Carolina School of Science and Mathematics.

To ensure appropriate certification of new teachers in North Carolina, the state board of education is creating a Quality Assurance Program (QAP). During the first two years of employment, new teachers will work under the close supervision of local school people and people from teacher training institutions. New teachers will receive permanent certification after two years of successful teaching. Considerable inservice training is part of the QAP program.

The North Dakota Department of Public Instruction is cooperating with the North Dakota State University to conduct a teacher training program in mathematics. It is designed to lessen the shortage of qualified high school mathematics teachers by allowing interested teachers to complete a 12-week summer course for four credits. When participants complete a

total of 19 credits selected from six fields of mathematics education, they can be certified to teach mathematics.

During the fall of 1982, the Ohio Department of Education conducted a study on teacher supply and demand and found neither a surplus nor a shortage. The department then published brochures for prospective teachers suggesting areas that are overcrowded and those in which employment prospects are most likely.

SB 198 appropriates $300,000 to encourage students to enroll in mathematics and science teaching programs in Pennsylvania and to encourage graduates certified in mathematics and science to enter the teaching profession. The bill amends the Pennsylvania Higher Education Assistance Agency Act by granting $100,000 in forgivable loans to students who teach mathematics or science in Pennsylvania's public schools. The balance of the appropriation is earmarked for retraining science and mathematics teachers and for developing public/private partnerships to improve instruction. Governor Thornburgh signed the bill in July 1983.

The South Carolina legislature has funded programs that will begin in the 1983-84 school year which allow elementary and secondary teachers to receive credit for inservice training in science, mathematics and computer education. Programs provide up to six credits of science and mathematics and special training in computer literacy, curricula applications, and the teaching of programming.

The South Carolina Board of Education and the Department of Education have encouraged the investigation of additional activities to ease the shortage of mathematics and science teachers. Three ideas have received attention: (1) the recruitment and training of adult professionals from business and industry to work part-time in schools; (2) the creation of a "teacher corps," a team to teach mathematics, science and other subjects in high-need counties; and (3) retraining of teachers who wish to switch fields. The first idea appears to have received the greatest attention, as evidenced by the fact that four teacher preparation institutions are expected to have adult apprenticeship training programs for special education in operation by the beginning of the 1983-84 school year. These four institutions have been working with the board of regents to develop a new training model that allows professionals in a variety of fields, including those where shortages exist, to accelerate their training for teaching. Under this new training program and restyled permit standards, adults holding baccalaureate degrees who have professional experience in a particular field would have the option of entering teaching without completing the traditional teachers' college program. One of the stumbling blocks to development of a similar pilot program in mathematics has been the availability of funding.

The South Carolina Department of Education is proposing summer institutes for retraining teachers of mathematics and science and training other teachers in these disciplines. South Carolina does not yet face shortages of mathematics and science teachers, but the department anticipates that enrollment in these disciplines will rise markedly. Thus, the department is especially concerned to encourage teachers in other disciplines to work

toward certification in mathematics and science. Certification renewal now requires six credit hours of inservice training in the subject(s) for which a teacher is certified: the department proposal would allow all six hours to be taken in mathematics and science.

South Dakota has state board requirements for certification of teachers who teach computer courses in local districts. These teachers will have to complete a minimum of eight hours of college credits in computer courses. Also, state conferences and regional workshops provide sessions on computers in education for local staff development. Regional inservice days are held to upgrade teachers' knowledge of mathematics and science. South Dakota is discussing special loan programs for mathematics and science teachers.

The Tennessee Department of Education completed in 1983 a teachers' guide for computer literacy in grades 7 and 8. As part of the Computer Skills Next program, the state is implementing a two-year plan to train teachers in the new computer literacy curriculum. The Microcomputer Advisory Committee has recommended training 60 inservice experts, who will then train 4,300 7th and 8th grade teachers. Seven hundred teachers will receive additional training as computer literacy teachers. By 1985, nearly all 7th and 8th grade teachers will be computer literate.

SB 50, passed in the 1981 Texas legislative session, mandated two kinds of competency tests for teachers, one a test of basic skills upon entry into a college teaching program and the other a test in the major subject area upon completion of the program. These tests are now being administered on a pilot basis throughout the state.

A bill passed by the Texas Legislature this year provides funds to develop innovative approaches to training mathematics and science teachers.

The severe shortage of mathematics and science teachers in Texas necessitated the issuance of more than 500 emergency teaching permits in these subjects last year. Lawmakers have been studying a variety of proposals to address the shortages. Among the bills considered were the following: (1) a bill to fund a loan forgiveness program for teachers who switched to mathematics and science from other fields; (2) a bill to provide low interest loans to students in mathematics and science education; (3) a bill that would allow districts to hire mathematics and science teachers from industry if no certified applicants were available.

A bill that would allow districts in Texas to run summer programs for retraining mathematics and science teachers passed both houses of the legislature, but the funding provision in the bill has been removed. Lawmakers did pass and fund a bill to develop innovative approaches for training mathematics and science teachers.

The Utah Office of Education and the Utah Council of Teachers of Mathematics are sponsoring a two-week workshop in mathematics this summer. The program is designed to provide intensive training to teachers who have little or no college-level mathematics. Superintendents nominated teachers who will be teaching mathematics, often for the first time, this

fall. (In Utah, teachers are not certified by subject area. Once they receive a secondary-level certification, they can be placed wherever they are needed.)

The University of Utah has adopted a program to award $1,500 scholarships to students who are pursuing secondary-level certification in mathematics, science or a foreign language and who plan to teach in Utah.

It is anticipated that the Microcomputer Information Laboratory currently being developed in Utah will train teachers and administrators.

The Vermont Legislature passed a bill in May to establish a $50,000 loan program for teacher education candidates in science, mathematics or computer education. The program will begin this fall and students may apply for up to $2,000 per year. A portion of the loan will be forgiven for each year taught in the Vermont public schools.

Vermont has recently increased funding for the Vermont Student Assistance Loan program (VSAL) by 14%. In May 1983, the governor signed a loan-forgiveness bill. Beginning in the fall of 1983, Vermont students majoring in science, mathematics and computer science education can receive state loans of up to $2,000 annually. These loans will be forgiven at a rate not to exceed 25% of the principal and interest for each year the recipient teaches in Vermont public schools.

The Vermont Department of Education organized a pilot workshop in the summer of 1983 to improve the teaching skills of science teachers who include elementary teachers preparing for the new early-childhood program that begins in the fall of 1983.

The Vermont Department of Education is also setting up a teacher placement service to help districts locate teachers to fill vacancies. The department will advertise openings in Vermont and nearby states.

While the Vermont Department of Education has not mandated a computer education curriculum, it recently issued regulations that require teacher preparatory programs to train teacher candidates in uses of computers.

A scholarship program has been established in Virginia to help teachers add science and mathematics to their certifications and to attract new teachers to these fields. The department of education has also proposed a loan forgiveness program in its 1984-86 budget, offering up to $1,000 for teacher candidates in mathematics and science.

This year, as part of the governor's budget, the Washington Legislature provided funds to the Office of the Superintendent for Public Instruction for inservice training in mathematics, science and computer education. A total of $244,000 will be available over the next two years to local education agencies and educational service districts that respond to requests for proposals issued by the state.

Washington's High Technology Education and Training Act, also passed this year, includes funding for inservice training. Regional computer

demonstration centers, also to be established with funding from this Act, will serve as computer technology training sites for teachers and administrators.

In other legislation, Washington lawmakers this year authorized forgivable loans for students who have declared mathematics or science education as their major, who meet state requirements for need and who maintain a 3.0 grade point average. The loan program, which is for undergraduate students and teachers returning for an additional teaching endorsement in mathematics or science education, is being administered by the Council for Post-Secondary Education. A total of $500,000 will be available over the next two years for these loans. Each student who meets the eligibility criteria can receive a maximum of $2,500 per year for each academic year. Ten percent of the loan plus interest is deducted for each year a teacher teachers in a public middle, junior high or high school in the state. If a teacher teaches for 10 years, the loan is entirely forgiven. Funding for the loan forgiveness program will be available by the fall of 1983.

All four sections of Policy 5100 (Assuring the Quality of Learning in West Virginia Schools: Plan for Professional Development of Educational Personnel), including preservice testing of teachers by September of 1985, are the focus of much planning and discussion in the state. Adopted by the state board of education in April 1982, Policy 5100 is being phased in to redefine objectives in basic skills, general education, content areas of specialization and professional education. Task forces and study groups examining each of the four areas are now submitting their recommendations to the state board of education and state board of regents.

To improve mathematics and science teaching in Wisconsin and to enlarge the supply of mathematics and science teachers, the state superintendent is proposing the following initiatives that will be considered by the legislature in October: (1) grants of $4,000 to present mathematics and science teachers to return to school for one year; (2) grants of $8,000 to secondary school teachers to retrain in mathematics or science; (3) scholarships of $2,500 to undergraduates majoring in science or mathematics; (4) master teacher positions to staff teaching centers; and (5) grants to vocational teachers to improve their skills in mathematics and science.

Effective July 1, 1983, the Wyoming State Superintendent of Public Instruction will award scholarships to secondary school teachers seeking to improve their skills or prepare themselves to teach in the fields of computer science, telecommunications, higher mathematics, foreign languages and science (particularly chemistry and physics). Each scholarship of $250 is to be supplemented by an equal amount from the school district where the teacher is employed. An amount of $2,500 will be available for scholarships. The act expires June 30, 1986.

APPENDIX A

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ECS 50-State Survey of Initiatives in Science, Mathematics and Computer Education

August 1983

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APPENDIX B

Additional ECS 50-State Surveys

The Education Commission of the States has completed 50-State surveys on teacher policies and school improvement programs. These are:

Survey of State Teacher Policies contains state-by-state teacher information on teacher training, certification, and staff development; on incentives to attract new teachers or to reward exemplary teaching, and on programs to retrain teachers or to deal with statewide teacher shortages.

State Programs of School Improvement updates the 1982 ECS 50 state survey of school improvement activities sponsored by the states, including state developed curricula or curriculum guidelines, changes in accreditation standards, "effective schools" programs, local building programs, and new strategies of student testing.

These surveys may be obtained from the Education Commission of the States, 1860 Lincoln St., Suite 300, Denver, CO 80295.

APPENDIX C

Summary of Survey Questionnaire

ECS 50-State Survey of Initiatives in Science, Mathematics and Computer Education

1. What are the current (1982-83) state high school graduation requirements for science, mathematics and computer education?

   How many total units are required for graduation?

2. Are changes in graduation requirements currently being proposed in science, mathematics and computer education?

3. Has your state mandated any increases in time spent on instruction in science, mathematics or computer education?

4. Does your state have mandated curriculum guidelines or state board requirements for science, mathematics or computer education?

5. Has there been a recent effort to emphasize the teaching of higher-order skills (such as understanding, application and problem solving in science, mathematics or computer education?

6. Does your state support special programs in the public schools for gifted students in science, mathematics or computer education (such as a scholars program)?

7. Does your state support special schools (such as magnet schools) for students in science, mathematics or computer education?

   How are students selected?

   About how many students participate each year?

   What grades are included?

   Where does the financial support come from?

   What are the names and locations of these schools?

8. Does your state support summer institutes (usually at colleges or universities for students in science, mathematics or computer education?

   How are students selected for admission?

   Approximately how many students participate?

What types of courses are offered?

9. What state initiatives in science, mathematics or computer education are sponsored by the SEA or others in the following areas: workshops, pilot programs, new or revised curricula, special centers/regional centers/consortia, software development, software review/evaluation/selection, enhancing teachers' knowledge and ability to teach mathematics, science or computer education, dissemination o information.

10. Does the state provide special financial assistance to loca districts for equipment purchases or special projects?

11. What task forces, commissions or committees are currently underway (or recently completed) which deal with issues related to science, mathematics, computer education or technology in grades K-12?

    Name of task force, commission or committee

    Issues being studied

    Recommendations and their due date