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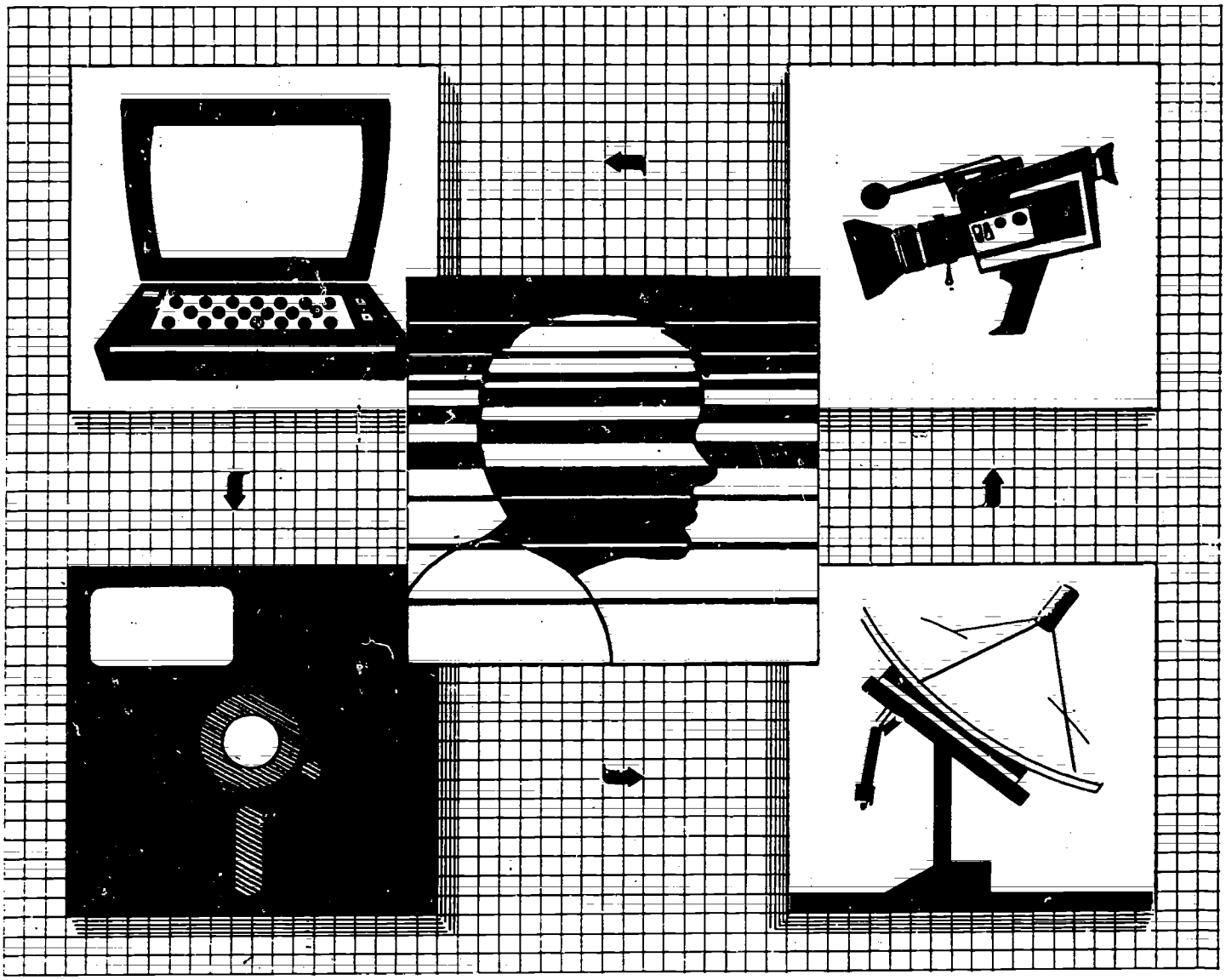
ABSTRACT

There are three primary driving forces in West Virginia for responding to problems and for directing efforts concerning technology in education: (1) the "Master Plan for Public Education," calling for universal computer literacy, provides a framework for addressing within the educational system the issues, goals, and needs of an emerging information society; (2) the installation of a model of statewide computer-assisted education network has initiated an innovative approach to education that is planned to involve every school in the state; and (3) the commitment of the West Virginia educational system to technology has been demonstrated through the appointment of the West Virginia Task Force on Technology in Education. This monograph submits the final report of the Task Force to the State Superintendent of Schools. Information is provided on: (1) implementing the Task Force action plan; (2) the Task Force position statement, intent and visions, and recommendations; (3) assumptions; (4) a definition of technology in education; (5) programmatic implementation objectives; (6) identification of fiscal alternatives; and (7) disseminating the Task Force report. A detailed description of activities conducted by the Task Force to implement its plan of action is included in the appendices. (JD)

October 1983

Excellence In Education Through Technology



Final Report Of The West Virginia Task Force On Technology In Education

Submitted to
Dr. Roy Truby
State Superintendent of Schools

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Charleston, West Virginia 25305

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Submitted To
Dr. Roy Truby
State Superintendent of Schools

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Introduction

Recent advances in technology are influencing the transition of society from an industrial age to an information age. Each day newspapers and television programs carry news items about the application and impact of technology on the stock market, the public education systems, and life in general. Also, bestsellers such as John Naisbitt's Megatrends and Alvin Toffler's Third Wave describe the characteristics of this significant societal shift in great detail. What has occurred or is occurring to cause such a major structural change in society and how does it affect education?

Context

Recent research and development efforts in the high technology corporate sector have resulted in new and innovative products and markets. For example, video games, microcomputers, and numerous electronic customer convenience mechanisms in banks, grocery stores, department stores, and homes have affected and continue to influence the way that individuals think and act. The most dramatic example of these products and their effect on the youth of the United States is the widespread availability and acceptance of video games in supermarkets, arcades, schools, homes, and department stores. The heart of this product, which was developed by industry as basically an entertainment vehicle, is a computer. It is this device and related information communication technologies which are the major factors influencing the

establishment of an information age. The relative small size, inexpensive price, and information processing capacities of a microcomputer have revolutionalized the behaviors of individuals, groups, and organizations. Interestingly, the nation's youth has adapted easily to the spontaneous imagery of video games and microcomputers in response to various gaming and educational scenarios. However, it is important to point out that educators and the public should not be misled by such obvious ease of operation. Thus, a misunderstanding of the complexity of computer utilization in teaching and learning will be avoided.

The use of desk top computers and word processors at work and in schools is influencing the way industry and education are functioning. As a result of these indicators of change and the perception of the public that society is changing toward an information based, service-oriented society, a new set of pressures has been directed toward the public schools. Basically, the outcry is for the integration of computers and related technologies into academic programs of study. In this context, public opinion is based on the notion that schools should prepare children to function in the emerging high technology society. Because of these new pressures and the fear that some students will miss the opportunity to be trained in microcomputers, parent-teacher associations are purchasing microcomputers for schools, parents are purchasing microcomputers for their children to use at home to enrich their academic tasks and outcomes, and some colleges are requiring incoming freshmen to purchase microcomputers.

Teachers and administrators are faced with new needs and goals for professional development. In response to the call for action by the

public and the business world to prepare students adequately for the information age, local school boards have purchased software and hardware in many cases without adequate information for planning their educational use. Further, teachers are requesting on-the-job training in computer literacy and in the use of microcomputers as instructional tools because they do not have adequate knowledge and skills about microcomputers as a body of knowledge and as an instructional tool. This problem is compounded because higher education finds itself in a similar situation relative to faculty and curriculum development. Thus, schools and colleges must look to new alternatives for learning about high tech products and their use in education. Throughout the nation this phenomenon has mushroomed. Schools, legislatures, and the corporate sector are exploring new ways to acquire and coordinate funds for helping schools and colleges to respond to needs concerning technology in education. Task forces, study groups, legislative committees, and citizen groups are creating a number of alternatives. For example, teacher training technology centers; new guidelines, statutes, and policies; new high school graduation requirements; state-wide workshops for hands-on experiences with computers; software evaluation systems; electronic mail networks; new funding alternatives for instructional improvement through computers; computer fairs; model implementation plans for local schools; new curriculum guides to deal with computer literacy; and new teacher training standards and certification requirements have been discussed and/or implemented in various states and local school systems. Finally, the problem as to whether or not all students will have the opportunity to learn about and to use computers is emerging as a major equity issue. Equity and equal opportunity have become highly

visible issues since they relate both to computers as a means, such as computer-assisted instruction, and as an end, such as computer programming as a curricular outcome.

This sequence of events has affected education suddenly and in a comprehensive way. States and local school districts must prepare to address the emerging information age by defining education's role in this new age and then determining appropriate goals and delivery systems. Moreover, the long term implementation of information systems, microcomputers, and related technologies in the classrooms of the United States must be assured through a systematic leadership and planning effort at the national, state, and local levels.

Driving Forces Underlying Technology in Education

There are three primary driving forces in West Virginia for responding to problems and for directing efforts concerning technology in education. First, the Master Plan for Public Education provides that all students will develop to their capacity the knowledge, skills, and attitudes related to science and technology, rational decision making, and creative problem solving in order to function successfully in a high technological society. Also, the plan calls for computer literacy to be integrated into each program of study in general and vocational education at the middle childhood education, and adolescent education levels of the West Virginia public school system. Furthermore, the provisions for delivery systems described in the plan include the use of technological advances and electronic instruction as means for implementing learning outcomes within each program of study. Hence, the Master Plan for Public

Education has provided a framework for addressing within the educational system the issues, goals, and needs of an emerging information society.

Secondly, the installation of a model of a statewide computer-assisted education network has initiated an innovative approach to education that is planned to involve every school in the state. As envisioned, this educational network will allow students to process information independently with one microcomputer, between and among schools and classrooms within a county school district, with other schools and classrooms throughout the state, and with a centralized software library at the West Virginia Department of Education's center for learning at Cedar Lakes. Technically, the network will allow students to use a microcomputer at home to process information from local and state operated software libraries to complete educational assignments. Moreover, the network has the capacity (a) to allow other agencies, such as institutions of higher education, to process information concerning public school programs of study and training activities with teachers on-the-job and (b) to facilitate the implementation of curricular outcomes in locations where staff shortages may exist.

Thirdly, the commitment of the West Virginia educational system to technology has been demonstrated through the appointment of the West Virginia Task Force on Technology in Education by the state superintendent of schools. This Task Force was charged to (a) review the state of the art of microcomputer and related technology usage in education and (b) to establish programmatic and fiscal alternatives for supporting technology in education as a means for achieving the educational goals of the Master Plan for Public Education.

There are additional driving forces outside of education that will influence the application of technology in the public schools. For example, new roles and expectations in high tech job markets, more efficient and effective advertising techniques, the establishment of a global economy, the use of cable networks and satellites for broadcasting the news and other events, and the general perception of the public that something has to be done about technology in society will have profound effects on educational policies and programs.

SECTION B: IMPLEMENTING THE TASK FORCE ACTION PLAN

The Task Force worked five months to complete its charge. During that time the Task Force completed the following phases and activities.

1. An educational phase in which it received information and hands-on training from Project SLATE staff;
2. An input and data collection phase in which it (a) reviewed research reports and educational literature, (b) conducted roundtable discussions with local practitioners and state leadership personnel, (c) learned about other state efforts through videocassette recordings provided by Project BEST and survey data distributed by the Southeastern Regional Council for Educational Improvement, and (d) completed state of the art studies to assess needs derived from important policy issues; and
3. A development phase in which programmatic and fiscal alternatives were identified to address the Task Force charge.

A detailed description of the activities conducted by the Task Force to implement its plan of action is contained in Appendix A.

SECTION C: ESTABLISHING TASK FORCE RECOMMENDATIONS

Task Force Position Statement

The members of the West Virginia Task Force on Technology in Education have a shared vision. They envision a future of quality education of which technology is an integral part. The current level of available technology in education has the potential to solve many of the existing educational problems in West Virginia and to serve as a focal point for national and state leadership in utilizing that technology to assist schools in making the transition to the information age. The vision reveals what education can and should do while remaining cost effective. The following statements represent the essential ingredients of the vision which must be provided if this vision is to become reality.

1. The West Virginia Legislature, the executive branch of state government, the West Virginia Board of Education, the West Virginia Department of Education, the West Virginia Board of Regents, and county boards of education must be committed to the implementation of technology in education.
2. The West Virginia Legislature must place high budgetary priorities on technology in education when allocating funds to the West Virginia Board of Education and the West Virginia Board of Regents. New funds must be made available for program planning and the purchase of micrccomputer hardware and software, as well as equipment and materials for other types of electronic delivery systems.
3. The West Virginia Department of Education must take a leadership role in:

a. developing learning outcomes and teaching strategies in terms of computer literacy, computer science, computer-assisted instruction, and computer-managed instruction in all programs of study at the early, middle, adolescent, and adult levels of general, special, and vocational education.

b. developing microcomputer assisted management and communications systems for the purpose of enhancing the role of educators to be leaders of learning.

c. developing innovative technological solutions to the problems inherent in the educational equity issue.

d. predicting organization changes and developing new patterns of structure which enable schools to function in the information age.

e. extending the role of the Regional Education Service Agencies in the delivery of technological services as close to the local schools as possible.

f. involving existing agencies, advisory councils, organizations, and committees to effectively plan and implement the necessary policies and programs. Other committees should be developed when appropriate.

Intent and Visions

The Task Force Final Report is intended to be a catalyst for enhancing the implementation of human, fiscal, and material resources concerning technology in education that heretofore did not exist on a statewide basis. The following descriptions prepared by Task Force

members are provided to share their visions about what can be accomplished through the implementation of the Task Force recommendations.

"It was a typical day in the physics class. Sara had just entered her data in the computer for a graphical analysis of projectile motion when Bob signaled to Mr. Mullins, the teacher, that he had successfully completed his computer simulation of a landing on Mars. Meanwhile, Joe and Jennifer were discussing what action was needed to keep their nuclear reactor simulator under control. Suddenly the class mascot, Robert the Robot, announced that a special teleconference was ready to begin. Using the West Virginia Educational Broadcasting Satellite, Robert had linked the class' flat wall-sized TV to an earth station in Houston for a personal tour of the Johnson Space Center conducted by two of the astronauts. While the TV tour was in progress, a subcarrier wave transferred back to West Virginia a computer program for more accurately guiding the projector in our school planetarium."

"I see a school data base system on a microcomputer which can be connected to the Department of Education main frame computer. The data include all information needed by the county and state administration for reporting of staff information, curriculum, textbooks, enrollment, and attendance, etc. No further reporting would be necessary. All data could be transmitted via telephone lines. In addition, reams of paper could be saved by electronic data collection and an electronic mail system. The hours saved could be well spent as a leader of learning. The money saved in supplies and mailing cost would help underwrite the cost of electronic information exchange."

"The opportunity for developing programs for students in small schools is limitless. A small school could easily have fewer than five students who request a specific class. The Department of Education could have that class available in a multi-media approach developed and taught by a certified teacher. Therefore, the school wouldn't need a qualified teacher in this area on staff. Lectures could be video-taped or transmitted by microwaves or carrier waves and picked up on both TV and microcomputer for interactive use. Other instructional materials could be packaged and sent to be used by the students as they work through the area of study. Any educator could be a facilitator for the students."

"The potential for developing statewide continuing education programs for all personnel in technology is exciting. The programs can be one way transmissions and/or in an interactive mode featuring outstanding professionals in their areas of expertise. The ability to reach large numbers of people while not requiring alot of travel is extremely important. Cost of the programs would be in quality of presenters not in hotel

accommodations and gasoline. All personnel could be kept abreast of the most current developments in education."

"Teachers will have more information readily available to individualize instruction for each student, to provide remediation and reinforcement immediately at the point of need, to pace students depending on their needs, and to expand curricular offerings because the need can be determined statewide."

"An individualized educational program will exist for each child because performance data can be placed in the computer in order to design and develop individualized instruction efficiently and effectively. For example, physical education skill development and attainment information about each child can be stored and retrieved from the computer. Moreover, information about individual students can be used to schedule instruction according to the skill development or need in each subject."

"Students, teachers, administrators, and support personnel at the public school and higher education levels will be able to use word processing, electronic spread sheet, and data-based management computer programs to perform their roles more efficiently and effectively."

"The use of computers will not replace the need for an immediate teacher in the classroom. However, it will allow for greater access to vast information sources that are only available today via tedious search systems. The available use of computers will allow students to conduct simulations without high expense and/or dangers that would exist in real situations, thus providing information not normally available to make decisions, design innovations, and create inventions."

Task Force Recommendations

Given the visions of the Task Force and the driving forces for technology in education, the Task Force recommendations represent a strategic plan for guiding the state and local education agencies into the information age. The Task Force recommendations include assumptions, a definition of technology in education, generic recommendations, and specific recommendations for the policy issue areas that were identified in the Task Force planning process.

The Task Force strongly urges the West Virginia Department of Education to continue its practice of involving classroom teachers,

public school administrators, professional organizations, staff of the West Virginia Board of Regents, higher education faculty members and administrators, and lay citizens in the process of bringing its recommendations to reality.

Assumptions

The recommendations of the West Virginia Task Force on Technology in Education assume that a state plan for technology in education should:

1. assure equity and equal opportunity,
2. contribute to the preparation of individuals to function in a technological society,
3. include a coordinated system for addressing needs and goals in education through technology,
4. provide for adapting to ongoing and dynamic changes in technology in a flexible manner, and
5. reflect a strong commitment to ethical practices and procedures.

Definition of Technology in Education

Technology in education is defined as the study and application of technology as a body of knowledge and the utilization of technology as a process or delivery system for the improvement of learning. Technology in this report refers to microcomputers and other electronic learning systems which deliver instructional and management support systems. Examples of these systems are broadcast television, videotape, interactive cable television, teletext, microcomputer/videodisc combin tions, or systems such as videotext, which combine telephone and television for interactive instruction. Telecommunication systems

employing microwave transmission in an interactive mode, perhaps utilizing the Instructional Television Fixed Service (ITFS) may also be included in this definition.

Programmatic Implementation Recommendations

Generic Recommendations. There is a need to establish a structure for technology in education that will ensure successful results. These recommendations transcend the educational, community, business, and industrial sectors of society. They provide the means to develop the overarching philosophical and operational frameworks necessary to implement a long term plan for technology in education and to ensure the successful adoption and use of technology in West Virginia public school classrooms and professional education training sites.

1. Define the role of public education in an information society.
2. Explore the use of subcarrier, microwave, and satellite systems through educational broadcasting delivery options to provide educational programs.
3. Expand the Regional Education Service Agencies to include technology centers with major functions in curriculum and instruction, educational personnel development, research and development, organization development, and information sharing. These centers should be interfaced with the statewide computer-assisted education network and educational broadcasting delivery options in order to demonstrate, strengthen, and maintain educational technology delivery systems. Each technology center should be governed through a consortium of county school district, institution of higher education, and West

Virginia Department of Education representatives. The centers should be a place for students; public school, higher education, and state department educators; and the public to work cooperatively on personalized and mutually beneficial goals.

4. Establish an information brokering system at the state level, including the identification of a state level person who would be an advocate for technology in education; a coordinating team structure at the state level for integrating technology into general, vocational, and special education; and a state level advisory committee for technology in education.
5. Conduct research, experimentation, and dissemination activities concerning technology in education to develop new processes and products and to inform the public and professional educators of technological applications in education and the community.
6. Provide the opportunity for extended employment for faculty and staff involved in technology in education development activities.
7. Organize a state level "think tank" committee on technology in education including educators, parents, and leaders from business and industry. This group should examine issues such as educational and occupational training needs, scholarships funded by the corporate sector to encourage the development of quality teachers for the technological age, support by industry of the West Virginia Education Fund for projects involving technology in education, tax incentives for vendors, and policies and incentives by the West Virginia Board of Regents for higher

education faculty to work on technology in education issues and projects.

8. Provide career counseling so that students will be well informed of job opportunities and training requirements related to preparing for high technology occupations.
9. Involve parents and other community members in all planning and development activities concerning the generic recommendations to enhance public awareness and support.

Curriculum. There is a need to define the expected outcomes of education concerning technology. These recommendations will lead to a common understanding among students, the public, public school educators, higher education faculty members and administrators, and state level officials of the curricular directions for technology in education.

1. Establish a definition(s) of computer literacy that provides the philosophical and conceptual bases for policy and program development at state, public school, and higher education levels.
2. Define operationally the level(s) of computer literacy expected of students in early, middle, adolescent, and adult education.
3. Clarify the concept of computer literacy as a basic skill within the context of an advancing information society.
4. Design a process for translating operational definitions of computer literacy into learning outcomes for each program of study so that computer literacy may be integrated into early, middle, adolescent, and adult educational programs.

5. Provide new programs that include such curricula as robotics, laser technology, computer-aided design and manufacturing, and micro-electronics in vocational education.
6. Provide a pre-technical vocational program which concentrates on such subjects as math, physics, language skills, computer literacy, and introduction to the technologies. This program should give students the background they need to pursue a technical program at the postadolescent education level.
7. Forecast the impact of integrating computer literacy into each program of study on resources, staff development, and organizational structures prior to implementation.

Instruction. There is a need to identify, apply, and evaluate instructional strategies that will be used to implement technology in education. Through the implementation of these recommendations, new knowledge and instructional strategies should be used, documented, and shared among educators and the public regarding the efficient and effective use of technology to help students master learning outcomes.

1. Identify appropriate uses of computer assisted instruction (CAI) and computer managed instruction (CMI) to help students master learning outcomes at the early, middle, adolescent, and adult levels.
2. Develop generic and specific criteria for the review and selection of instructional software to be utilized in public school classrooms to enhance the mastery of learning outcomes.
3. Compile and disseminate information on software to public schools, institutions of higher education, and related agencies.

4. Establish model instructional policies, strategies, and procedures for school computer use that take into account three basic factors: proper teacher training, continuing support for teachers using computers in instruction, and a proper teaching environment.
5. Utilize electronic delivery systems to enhance the mastery of learning outcomes.
6. Conduct formal and action research studies concerning the effectiveness of teaching strategies utilizing technology.
7. Identify potential electronic aids as devices to enhance the learning of exceptional students.
8. Provide computer-assisted instruction for both imparting and reinforcing basic, remedial, enriched, and accelerated instruction.
9. Provide new and more modern equipment to keep up with changes in various technological occupations.

Organization Development. There is a need to establish strategies to help schools, county school districts, institutions of higher education, and the West Virginia Department of Education to develop, improve, and change as society enters the information age. These recommendations recognize that organizations should change in a planned way to accommodate the new roles and behaviors expected of individuals in the future.

1. Assess the impact of technology on conventional governance structures, delivery systems, daily schedules, work expectations, roles, and responsibilities.

2. Establish organization development plans in county school districts, institutions of higher education, and the West Virginia Department of Education to ensure the successful long term implementation of technology in education.
3. Update existing educational programs of study to incorporate current technological hardware and software.
4. Establish closer working relationships among educational institutions, the corporate sector, and the public through cooperative programs which include related instruction and technical fundamentals and work experience in high technology industry. The admission standards, curricula, and academic standards in these programs should be commensurate with the technologies and the needs of learners.

Educational Personnel Development. There is a need to review, modify, and create teacher education and staff development programs and certification criteria and procedures to support the direction of curriculum and instruction concerning technology in education. Given that the quality of technology in education is directly related to the competencies of educators, these recommendations should be implemented.

1. Define operationally the level(s) of computer literacy and related competencies expected of educators who serve students in the public schools.
2. Define operationally the level(s) of computer literacy and related competencies needed by educators who train teachers, principals, and student support personnel.

3. Establish training interventions that incorporate technology for assisting teachers and teacher educators in matching teacher/learner styles and for fostering a multiple activity approach to teaching in order to maximize the effective use of technology in classroom instruction.

4. Determine if specific teachers should be certified to instruct students in computer literacy or whether these skills should be expected of all educational personnel.

5. Develop a statewide training program on technology in education that may be used as a basis for a discrepancy-based needs assessment at the local level by continuing education councils to determine the unique local training needs of educators.

6. Establish a statewide bulletin board of trainers available from industry, education, and related agencies and organizations to provide training to county school districts and colleges in the area of technology in education based on the results of the discrepancy analysis.

7. Provide technical assistance to county school districts in assessing training needs relevant to technology in education.

8. Assist institutions of higher education in utilizing technology, particularly microcomputers, throughout the public school educator preparation process.

9. Study the impact of computers on instructional methodology and diagnostic planning, prescriptive instruction, and formative evaluation within teacher education programs in order to prepare prospective teachers to function in West Virginia schools.

10. Assess the capacities of institutions of higher education to deliver appropriate preparation and to meet learning outcomes once defined relative to technology in education.
11. Determine the needs of institutions of higher education to provide adequate training of teachers in the area of technology in education.

Software and Hardware. There is a need to ensure that software and hardware are selected and used in cost effective ways. A cost-effective approach should involve the use of educational specifications derived from learning outcomes and programs of study in general and vocational education to review and select software. Moreover, state licensing agreements for software, networking strategies, and state and regional hardware purchasing agreements should be explored at the public school and higher education levels. These recommendations support a direction that is futuristic and cost-effective.

1. Develop criteria for selecting, utilizing, and providing compatability of hardware and peripherals at the early, middle, adolescent, and adult levels of education.
2. Develop a library and catalog of educational software and a means of evaluating such software.
3. Coordinate the placement of additional hardware provided by future legislative funding of the statewide computer-assisted education network.
4. Establish a process for ensuring the equitable purchase of computers and other forms of instructional technology for students, teachers, and staff in public schools and institutions of higher education.

5. Establish a policy concerning the use, reproduction, and dissemination of software in educational applications.

Management Information Systems. There is a need to generate, organize, store, retrieve, analyze, and share information in order to make management decisions in education. These recommendations support the concept of a statewide and coordinated management information system involving county school districts, institutions of higher education, and the West Virginia Department of Education. This coordinated system should ensure that information is disseminated in accordance with confidentiality laws and is shared in mutually beneficial ways among local, higher education, and state officials.

1. Develop an implementation plan for a management information system(s) which coordinates general, special, and vocational education information.
2. Define a set of operating procedures and personnel requirements for the system(s).
3. Provide adequate data processing software and hardware in public schools, county school districts, institutions of higher education, and the West Virginia Department of Education.
4. Provide electronic communication among public schools, county school districts, institutions of higher education, and the West Virginia Department of Education.

SECTION D - IDENTIFYING FISCAL ALTERNATIVES

The following fiscal alternatives should be considered to support the implementation of the recommendations set forth in this report.

1. Prepare an improvement package for consideration by the West Virginia Board of Education and the 1984 Legislature to provide funding to implement the recommendations contained herein.
2. Prepare a joint improvement package for consideration by the West Virginia Board of Education, the West Virginia Board of Regents, and the 1984 Legislature to provide funding for the training of educators in approved teacher education programs concerning technology in education.
3. Apply State Aid Step 7 and Chapter II ECIA funds for instructional improvement to meet county school district needs concerning technology in education.
4. Encourage business, industry, and parent-teacher associations to adopt and support technology in education within public schools.
5. Establish partnerships with local corporations to fund demonstration technology projects.
6. Develop and submit proposals for funding concerning technology in education to the West Virginia Education Fund, educational foundations such as Carnegie and Benedum, the United States Department of Education, and the Appalachian Regional Commission.
7. Coordinate funds through the Regional Education Service Agencies to accomplish technology in education objectives.
8. Apply allowable local, state, and federal special education funds to meet the educational needs of exceptional children and the educators who serve them through technology in education.
9. Establish a process for identifying common goals among federal, state, and local agencies to coordinate funds for mutually beneficial outcomes.

10. Apply Job Training Partnership Act (JTPA) funds to meet vocational education needs in technology.

11. Establish a specific line item in the West Virginia Board of Regents' budget to support research, development, and dissemination concerning technology in education in all public institutions of higher education.

SECTION E - DISSEMINATING THE TASK FORCE REPORT

The implications of the final report of the Task Force on Technology in Education have particular relevance for students, educators, the corporate sector, parents, and the general public. The need for planned growth and success in technology in education is supported by the recommendations in this report. The Task Force recognizes that the support of many groups and individuals will be needed to ensure the long term adoption and implementation of its recommendations. Hence, the widespread dissemination of the final report will facilitate an awareness and understanding of the following items.

1. The position of the Task Force on Technology in Education on the nature of what must be done in classrooms, schools, county school districts, institutions of higher education, and the West Virginia Department of Education concerning technology in education to make a successful transition to the information age.
2. The need to coordinate current efforts which involve statewide and local plans for curriculum, instruction, organization development, educational personnel development, software and hardware, and management information systems to ensure that the

educational goals of West Virginia are addressed when public funds are used to accomplish them through technology in education.

3. The commitment of the West Virginia Board of Education toward the mastery of learning outcomes as the core of its system of schooling in West Virginia.

These important trends and the Task Force recommendations necessitate that this report be reviewed at all educational levels. The report should be the basis of discussion, analysis, and additional input by county school district instructional and administrative staff, faculty members and administrators in higher education, teacher education center directors, Regional Educational Service Agency directors, professional oganizations, local and state governing boards, parent groups, and other interested individuals and groups.

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APPENDIX A

Task Force Activities

First Meeting of the Task Force

Organizing the Work of the Task Force

Because of the relative newness of microcomputers and related technologies in education, an assistance component was established to help the Task Force members to enhance their awareness of technical developments and products. Project SLATE, a federally funded state-assistance group, made its services available to the Task Force to address this need. At the first meeting of the Task Force, Project SLATE staff provided (a) demonstrations of selected educational software applications; (b) information through presentations, videocassettes, and slides concerning emerging technology industries; (c) specifications of educational software standards and evaluation methods; (d) ways that states can get more out of the market place regarding hardware and software acquisitions; (e) hands-on demonstrations for Task Force members with various hardware and software; and (f) technology applications and trends. In addition, information and studies disseminated by the Southeastern Regional Council for Educational Improvement were provided to the Task Force.

Because of the Task Force charge to address the provisions in the Master Plan for Public Education related to technology in education, officials of the West Virginia Department of Education highlighted (a) the standards and provisions of the plan regarding the relationships between and among learning and technology and (b) recent developments to select and implement a statewide computer-assisted education network (Appendix - B). Other Department of Education staff were assigned as ex-officio members to the Task force in order to form a collaborative working relationship. Also, the Task Force received information from West Virginia practitioners about a school district plan for microcomputers. Finally, the Task Force agreed to adopt a systematic planning approach for addressing its charge.

First Planning Session

The group process of "brainstorming" was utilized to capitalize on the wide range of expertise and experiences of the Task Force members to organize the work plan of the Task Force. Initially, the Task Force discussed the impetus of technology in education to establish a common base of understanding concerning motivations and directions related to technology in education. Next, the Task Force specified planning assumptions to establish the boundries of its work. Finally, the Task Force identified policy issues and concerns. The policy issues were recorded, reproduced, and distributed for use in subsequent activities (Appendix - C). In essence the policy issues formed a benchmark for guiding the work of the Task Force.

Second Planning Session

In its second planning session, the Task Force worked in a large group setting to develop a first draft of a working definition of

technology in education. Next, the Task Force worked in small groups to refine the policy issues and the working definition of technology. The data generated in the small groups were printed and distributed to all Task Force members. Returning to a large group setting, the Task Force structured a plan of action including a schedule for completing its work (Appendix - D). Finally, the Task Force selected through a volunteer process a steering committee to refine, expand, and coordinate the work plan. The Task Force agreed that a chairperson should be selected for the Steering Committee who would also act as the chairperson of the Task Force.

First Steering Committee Meeting

At the first meeting of the Steering Committee, the following items were accomplished subsequent to the appointment of a chairperson to lead the work of the Steering Committee and the Task Force.

1. Broad categories were identified for analyzing the policy issues generated in the first meeting of the Task Force.

2. The policy issues identified in the minutes of the first Task Force meeting concerning the broad categories were reviewed, discussed, and categorized.

3. The working definition of technology in education developed in the first Task Force meeting was revised based on discussion by the Steering Committee.

4. The broad categories were analyzed and collapsed into six broad categories. These categories were analyzed in terms of their intent and their relationships to the policy issues.

5. A process for completing the work of the Task Force on Technology in Education was developed (Appendix E). This plan included details regarding the continuous input of the Task Force members to committee activities, products to be developed, and target timelines for completing tasks.

6. The Steering Committee members were assigned to work on state of the art teams in cooperation with Department of Education liaisons to prepare a data base for each of the broad categories.

7. Preliminary reports of the state of the art study teams concerning the broad categories were identified for completion by a certain date.

8. A format and instructions to be used in preparing state of the art reports were developed.

9. The Steering Committee decided to prepare a strong statement about technology in education based upon the information provided by the Task Force regarding driving forces in technology in education. The Steering Committee agreed that this statement should become a major piece of the final report of the Task Force.

10. A communications system was established that would promote an open approach to the work of the Task Force with the media, the public, and educational practitioners.

State of the Art Teams

In accordance with the Steering Committee decisions, collaborative teams were established between West Virginia Department of Education liaisons and Steering Committee members to develop the state of the art reports for (a) the Task Force definition of technology in education, (b) curriculum and instruction, (c) educational personnel development, (d) software and hardware, (e) management information systems, (f) resource allocation and coordination, and (g) a statewide delivery plan. This process involved the establishment of need statements that were based on information received from Project SLATE, research reports, videocassettes of other state accomplishments, practitioner input, and Task Force member expertise. The need statements formed the basis for programmatic and fiscal alternatives that would be discussed at the next meeting of the Task Force.

Second Meeting of the Task Force

The Task Force was updated on the activities completed by the Steering Committee subsequent to the first meeting of the Task Force. The work of the Steering Committee was reviewed relative to the plan of action that had been adopted by the Task Force at its first meeting and the Steering Committee's process for completing the work of the Task Force.

State of the art reports were presented based on the work of the collaborative teams involving Department of Education staff and Steering Committee members. In this setting, the full Task Force was alerted to the need statements and, in some cases, objectives regarding the definition of technology in education, curriculum and instruction, educational personnel development, software and hardware, management information systems, and a statewide computer-assisted education network.

An important segment of the second meeting involved presentations by related groups and practitioners. The Executive Director of the West Virginia Educational Broadcasting Authority made a presentation concerning the delivery systems of that agency and how the systems might be incorporated into the recommendations of the Task Force. Discussions were completed with teachers, teacher trainers, and supervisors who are actively involved in technology efforts at the classroom and school building level. A videocassette recording produced by Project BEST was presented to the Task Force concerning the efforts of California, Ohio, Tennessee, Vermont, and Puerto Rico. The Project SLATE liaison to the Task Force provided insights and considerations based upon his experiences with other states. All of these presentations were used to review and verify the policy issues, need statements, and objectives that had been developed by the Task Force and state of the art teams. In addition, the Task Force updated its working definition of technology in education based on new information. The Task Force established a first

draft of assumptions governing a statewide delivery plan for West Virginia. Also, the Task Force raised issues and ideas as to how learning outcomes expected in the public school programs of study could be achieved through computer-assisted instruction. The Steering Committee was assigned the responsibility to summarize the results of the second meeting and to prepare a working draft of the Task Force final report.

Second Meeting of the Steering Committee

The Steering Committee decided to utilize the characteristics of an information society as criteria for structuring the working draft of the final report of the Task Force. The Steering Committee decided to provide recommendations that would be generic to the issues and needs discussed during the Task Force meetings. The generic recommendations included many of the activities that were learned about in reports, videocassettes, discussions with practitioners from within West Virginia, and surveys involving educators across the nation. The Steering Committee directed the Department of Education liaison staff to begin structuring the working draft of the final report based on the Steering Committee recommendations, the needs and objectives of the state of the art teams, ideas and recommendations of Task Force members, and input from practitioners and Project SLATE data bases.

Third Meeting of the Steering Committee

The Steering Committee reviewed the efforts of the Task Force, the state of the art teams, and a preliminary draft of the Task Force final report. As a result of discussion and editing tasks, a working copy of the final report was prepared for distribution to the Task Force. The Steering Committee decided to recommend that the third meeting of the Task Force be directed toward achieving concensus on the substance of the final report.

Third Meeting of the Task Force

The Task Force conducted a page by page analysis of the working copy of the final report which had been prepared by the Steering Committee. As a result of this procedure, the Task Force achieved consensus on the substance and format of its final report to the state superintendent of schools. The Task Force agreed that the chairperson should prepare a cover letter for transmitting the final report to the state superintendent of schools. Also, it was agreed that a small delegation of Task Force members, including the Chairperson and the Task Force Director should request a meeting with the state superintendent of schools to discuss the final report. Finally, the Task Force recommended that some of its members be considered for inclusion on new advisory councils concerning technology in education in order to facilitate continuity of efforts.

APPENDIX B

Statewide Computer-Assisted Education Network

APPENDIX B

State of West Virginia
Department of Education
Charleston
25305

ROY TRUBY
STATE SUPERINTENDENT
OF SCHOOLS

MEMORANDUM

TO: County Superintendents
County Vocational Directors
Directors of Multi-County Vocational Centers

FROM: Roy Truby, State Superintendent of Schools R.T.

DATE: September 9, 1983

After a great deal of deliberation, the State Board of Education has awarded a contract to IBM for the purchase of equipment for the proposed statewide microcomputer network. We feel this will be the best statewide network system in the country. In a memorandum to you on June 22, 1983, I asked that you withhold purchases so that county boards of education could take advantage of the price and quotations negotiated in this contract and benefit from compatibility by purchasing the same equipment that will make up the statewide network.

Provided in the contract will be approximately a 30% discount on equipment purchased as a part of the initial purchase. All hardware and software listed on Attachment A may be purchased at the prices quoted. Additionally, all professional educators in the State of West Virginia may purchase for their personal use any of the equipment and software at a 20% discount. Students will also be provided a discount through local dealer-negotiated agreements. The conditions for school systems, professional educators, and student purchases are explained in Attachment B.

The issue of compatibility with existing machines of other brands is also addressed by this proposal by utilizing the Corvus Omninet and the appropriate interfaces. A number of other vendors' equipment can be attached directly to the local area network at the designated sites with the addition of network attachment hardware (approximately $500/machine). Counties should check with the state technical coordinator (to be appointed) to assure compatibility. Telecommunications is also available as a second method of accommodating file transfer. This will allow the state to make the best use of existing equipment while increasing the communications capability among the remote sites. Seminars addressing the methods of network attachment and use are planned to accommodate those currently using different types of computers. The system being purchased is described in Attachment C.

Should you have questions concerning this matter, may I suggest that you talk with Ed Morrison (348-2348) of our Vocational Bureau.

RT:ljw

Attachments

ATTACHMENT A

HARDWARE AND SOFTWARE REQUIREMENTS FOR REMOTE SITES

The following hardware and software items are required to set up a 20-station comput network.

Hardware

Quantity	Description	Retail Price	Department of Education Price	Extende Price
1	IBM PC with 128K memory and Asynchronous Communications Adapter and (1) 160K diskette drive	$2,484	$1,737	$ 1,737
19	IBM PCs with 128K memory and (1) 160K diskette drive	2,029	1,419	26,961
19	Monochrome Display/Printer Adapter	335	234	4,446
20	IBM Monochrome Displays	345	241	4,820
3	IBM Graphics Printers (80 cps dot matrix)	595	416	1,248
1	NEC Spinwriter Printer (35 cps letter quality)	2,290	1,724	1,724
1	Tractor Feed for Letter Quality Printer	265	231	231
1	Friction Feed for Letter Quality Printer	115	111	111
4	Printer Cables	55	38	152
1	Corvus Omninet 20 meg disk with Mirror	5,085	4,019	4,019
1	Corvus Omninet disk server	990	832	832
20	Corvus Omninet transporter cards for the IBM PC	495	396	7,920
20	IBM PC Disk Operating System Version 1.1	40	28	560
	A twisted pair wire cable is required.	*	*	*
	Hardware Total			$54,761

Additional Requirements

A full-duplex modem will be required at each site for bi-directional communications to allow for the sending and receiving of files and software between the central and remote sites. A 300/1200 BAUD transmission modem device is recommended. The Hayes Smartmodem or equal is required to work on the Omninet.

Approximately $500 should be budgeted to acquire needed supplies to initially set up a 20-station computer network.

*Special cables are required for connecting printers or other peripherals. These cab can be custom-made by local dealers upon request.

Options

Hardware

	Retail Price	Department** of Education Price	Extended** Price
Color Display	$680	$476	$476
Color/Graphics Display Adapter	244	170	170
Printer Adapter	150	105	105
Modem - 1200 BAUD Smartmodem	669	592	592

**For these options, total systems will be provided at a 30% discount. Individual component parts will be discounted at the standard educational discount of 20%.

Software

Presently software is being evaluated, and local network licensing agreements are being negotiated.

Public domain and computer-assisted software are available and being evaluated. Recommendations will be made at the earliest possible date.

ATTACHMENT B

To purchase additional hardware and software beyond that specified in the contract, the ordering procedures are as follows:

School Systems

Contact your local IBM representative. Also, you may contact John Harbour or Scott Robinson of the Charleston IBM office at 347-7300.

Faculty and Professional Employees

The Department of Education will appoint a technical coordinator to assist in configuring the IBM Personal Computer and completes the order authorization form. Order forms are forwarded to the IBM Branch Office for order entry. When the order is ready for shipment, the technical coordinator and the participating authorized dealer will receive notice of shipment. The technical coordinator notifies the employee of the shipment, collects payment, and provides authorization to the individual. The employee uses the authorization to obtain the product at the designated authorized dealer. The customer is subsequently invoiced by IBM.

Students

Agreements will be negotiated with authorized IBM Personal Computer dealers within the state for student purchases. Upon presentation of certification that the computer to be purchased is for student use only, the dealer will sell the units at a discounted price.

ATTACHMENT C

The solution IBM is proposing is one they feel meets the objectives of the project as set forth in the request for proposal as well as giving the State the flexibility to grow and expand the system, ultimately implementing a statewide computer-assisted instruction system in the public schools. The proposed solution is based around the IBM Personal Computer and the Corvus Omninet local area network system. Implementing a network utilizing the preceding products will allow the State to take advantage of current technology, while positioning it to easily utilize future technological enhancements.

The Omninet system is based around the Corvus disk. With a Corvus Omninet disk server, the information on the hard disk can be made available to all Personal Computers on the local area network, thus acting as a "library" of files and programs. IBM has run several programs currently available for the IBM Personal Computer on an Omninet system. Some programs will successfully load to the Omninet disk and run problem free (within the limited scope of their investigation), such as PeachText word processing. IBM found that Corvus has made modifications to the PC's operating system (DOS 1.1) which require about 7K of memory beyond that required by an unmodified version of the operating system. This means that some programs which will run in a 128K PC not attached to Omninet could require additional memory to run in an Omninet environment. This shows that each piece of software must be individually evaluated for compatibility with a customer's specific system configuration. Testing has demonstrated that it is possible to utilize existing Personal Computer programs to build the "library" and "sub-libraries" compatible with an Omninet IBM PC system. Programs which run on the IBM Personal Computer XT (with built in hard disk storage) have a good probability of being compatible with Omninet/IBM PC. It is necessary to test a specific package for compatibility with a particular system configuration.

The Department of Education must negotiate specific terms and conditions for individual software products with the vendor of that software. It is IBM's understanding that various software vendors have plans available for education and/or large procurements. The State will contact vendors for their terms and conditions. Moreover, Corvus is working with various software vendors to make arrangements for these vendors' programs to run on Omninet. IBM will work with the Department of Education in building its instructional software libraries.

At each location there will be an Omninet disk and disk server, which will allow a "sub-library" to be set up which the local students can utilize completely free from and independent of the central "library." This fact will also allow each location to acquire any specific software that is deemed valuable in its specific environment. The Private Tutor authoring system will allow individuals to develop courses to meet their specific needs, free from intervention or help from the central "library," thus adding to their own "sub-library." Utilizing Personal Computers with 128K memory will allow larger, higher function programs to be tested or even developed at each location. This adds significant flexibility to each local area network.

In addition it should be mentioned that by installing the proposed IBM Personal Computer, the Department of Education will be able to use an ever-expanding library of educational, curriculum software. This is of particular importance as the State moves toward putting computers in all the schools. A

great deal of software is currently available; but most importantly, many major educational publishing firms are developing integrated courseware to run on the IBM Personal Computer. This will allow the schools to utilize the Personal Computers as enhancements to instruction, not just as separate, nonrelated aids.

A key element in the IBM proposal is the capability of communications between the various sites within the network. This will be accomplished using the IBM Personal Computer Asynchronous Communications Support between IBM PC's or a similar program available from another vendor. One Personal Computer per location will be equipped with the hardware and software necessary for it to perform asynchronous communications with another similarly equipped Personal Computer. This will allow transmission of both programs and data files from the central "library" to any and all "sub-libraries," as well as the transmission from any "sub-library" to the central "library" or from any "sub-library" to any other "sub-library" without an intermediate transmission to the central "library." All the enumerated communications can be accomplished over commercial dial-up telephone equipment. This implementation will allow all users within the state-wide network to obtain a copy of information from another site if they so desire. If Fayette County developed a program Kanawha County desired to implement, it could be transmitted directly between the two points. If this were a program that should be available to all sites, it could be transmitted to the central "library" at Cedar Lakes and stored there for a future controlled distribution. (This could also be accomplished from any remote site as well.)

In essence the IBM Asynchronous program will read the information from the Omninet disk, transmit it across the phone line to another site where a similar program will receive the information, and write it to another Omninet disk.

At each remote location IBM is proposing 20 IBM Personal Computers to connect to the Omninet network and disk. By being attached to the network the PC's can share data and programs residing on the hard disk, but at the same time can be limited to accessing only certain things on that disk. This gives the teacher in the classroom an element of control over what individual classes or students might do. In fact, a teacher can even have a private area which only he or she could access, an area for grades, courses under development, and so on. With all of these capabilities, each Personal Computer will still function as if it were a stand-alone unit, thus giving the student operating experience equivalent to training on a stand-alone PC. This should allow the students to operate similar units in the business environment. If for some reason a school should want to operate a PC in a true stand-alone mode, it can be disconnected from the network and run by itself without modification.

IBM is proposing Omninet for a number of reasons. The State has an existing inventory of non-IBM microcomputers and has stated the desire to continue utilizing them in the new local networks. Corvus Omninet allows microcomputers from different vendors to share the same hard disk and other network facilities. Even though each different micro may require its own application software, it can share the same hardware storage facilities with the IBM Personal Computers, which will be the centerpiece of the new system. The flexibility of Omninet should allow future products to be added easily to the existing networks. With a limit of 64 devices on a given local network, there should be no problem adding compatible equipment to the local networks to be implemented in the schools.

In addition, it is IBM's understanding from Corvus that they are working on various products which will enhance the capability of Omninet and which will be compatible with the State's installations. It should be reiterated that the IBM Personal Computer's open architecture allows many non-IBM devices to be attached to and work in conjunction with it. This, combined with Omninet's flexibility, should allow the State considerable latitude in adding generic equipment as time passes.

Another positive aspect of Omninet is its ease of installation. The process is a simple one, and discussions with users have verified this. In addition, the users IBM has talked to have also emphasized the ease of adding devices to the network after it has been installed. These two features make this network even more attractive in a school environment. A great deal of technical skill is not required to install the network, thus the task of installation could probably be handled by current employees of the school systems. In addition, in a school environment which will doubtless expand and change, the ease with which Omninet allows this to be accomplished can only be considered a major advantage.

In short, the combination of the IBM Personal Computer and the Corvus Omninet local area network offers an outstanding solution to the Department of Education's request for proposal. The IBM Personal Computer is a powerful, expandable microcomputer which is setting standards for the industry. The selection of peripherals and software available for the PC from IBM and other sources offers its users choice and growth. The Corvus Omninet network is a proven local area network for microcomputers which works very well in conjunction with the IBM PC.

APPENDIX C

Policy Issues

APPENDIX C

POLICY ISSUES

1. What will be the fiscal constraints of the work of the task force on technology in education?

2. How will subsystems be linked to avoid duplication of effort in technology, e.g., coordination of general, special, and vocational education?

3. Will the task force consider both content and delivery of technology?

   a. Content is defined to include the study of technology as a body of knowledge.

   b. Content includes the study of conventional curricular areas, e.g., math, social studies.

   c. Delivery is defined as the modes of instruction using technology to teach about technology and the conventional curricular areas.

4. How will technology change our conventional perspective of curriculum?

5. What are the facility constraints in our schools for implementing high tech objectives?

6. What is our capability to change current facilities to accommodate technological advances?

7. What are the implications for new training models for the initial preparation and continuing development of educational personnel to implement high technology?

8. There is a need to look at a "high tech - high touch" supportive environment to facilitate the implementation of technology.

9. What is the appropriate setting for education in a technological context, e.g., the home, the school, and industry?

10. How should the school and the local school system be organized to accommodate high tech educational applications?

11. How will the "piracy" of educational software be addressed in West Virginia policy and program development?

12. How can we get a handle on understanding high tech since it is an ever-changing, dynamic process and format of content?

13. How will the issue of evaluation of courseware and equipment be handled?

14. What should be the pupil/teacher ratio in a microcomputer context?

15. Given our current educational resources in West Virginia, how can technology be used to shift resources from one place to another to address priorities in education?

16. What are the opportunities for new types of educational markets in a high tech environment?

17. What does the research on learning say about computers and learning?

18. What will be the nature of articulation among public education, community colleges, and regional configurations of education in a high tech setting?

19. What are some procedures for retraining adult learners in the new technologies?

20. How will we communicate about technology in West Virginia?

21. How will the need for personnel and certification regulations be addressed?

22. Will the schools be required to teach ethics relative to a high tech society?

23. With the private sector guaranteeing a certain score on the scholastic aptitude test, what pressures will be placed on education in terms of productivity and accountability?

24. What is the role of the teacher in a high tech setting?

25. What are the responsibilities of schools to make equipment available to students?

26. How will issues of equity be addressed?

27. What are the roles of other educational agencies and their personnel in a high tech society?

28. How can we review other experiences of states and interstate activities so that we do not reinvent the wheel?

29. How will we assess the effectiveness of technology in education in West Virginia? What are the criteria that should be used?

30. Will the task force address computer-assisted instruction, computer-managed instruction, computer-management, and general communications?

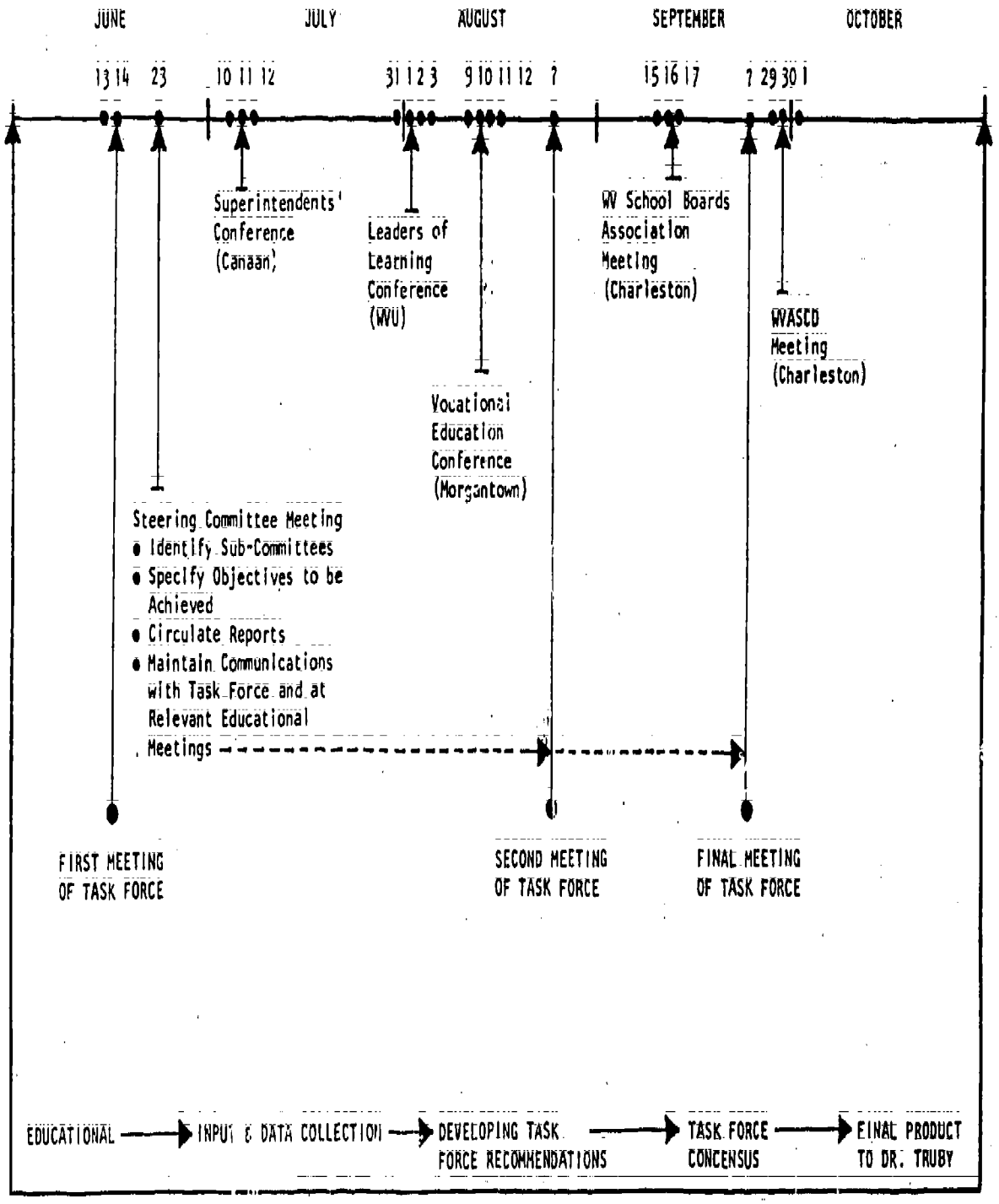
31. What are the major issues relative to man vs. machine in a technological society?

32. Where are the sources of information for education in a high tech society, i.e., the school, the home, the community, the individual, industry?

APPENDIX D

Task Force Plan of Action

TASK FORCE ON TECHNOLOGY IN EDUCATION
"Plan of Action"



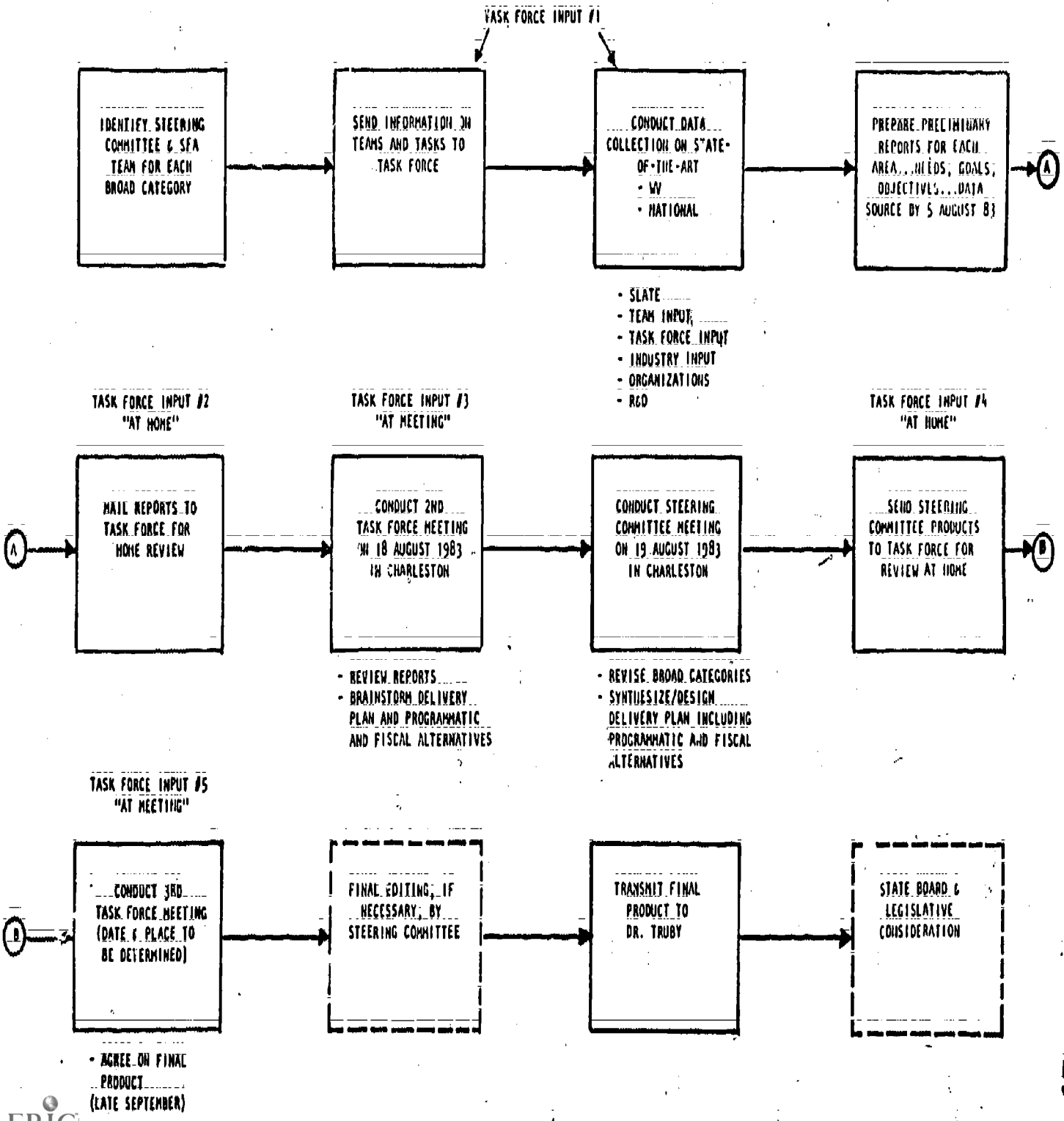
Planning Suggestions

1. Use technology to conduct the work of the task force.
2. Involve industries for assistance.

APPENDIX E

Process for Completing the Work of the Task Force

TASK FORCE ON TECHNOLOGY IN EDUCATION
PROCESSES FOR COMPLETING THE WORK OF THE TASK FORCE AS DETERMINED BY THE STEERING COMMITTEE MEETING ON 23 JUNE 1983



APPENDIX E