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ABSTRACT

The Special Committee on Educational Technology of the National Education Association (NEA) was given the task of reviewing the status of educational technology in the public schools and making recommendations for appropriate NEA policy and programmatic activities. Topics discussed in this report include technology and change in both the environment and the teacher's role; technology and long distance learning; collaboration and collegiality via bulletin board services and interlinked nationwide networks; and planning for technology. The policy positions presented include: (1) all teachers should have regular access to a computer and appropriate software, including classroom management software; (2) school districts and teacher associations should investigate options for teachers to have access to computers in their homes for training, instructional development, and research purposes; (3) teachers should be provided with both initial and regular inservice training in the use of technological applications for learning and management; (4) the NEA should begin planning to create interlinked, interactive networks for teachers; (5) the planning focus should be on students' needs rather than on the technology; (6) the involvement of NEA in the planning, implementation, and evaluation of long distance learning proposals and programs should be encouraged; and (7) planners need to understand the changing responsibilities of the instructional staff and provide time and flexibility for professional development, research, and planning. A list of committee members is included. (GL)

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NEA SPECIAL COMMITTEE REPORT

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EDUCATIONAL TECHNOLOGY

NEA SPECIAL COMMITTEE REPORT

Technology And Change

The public schools of America of the late 1980s are in an era of change. Change is occurring in all forms and coming from all directions.

The student is changing. Family patterns are dramatically different from those of just a few years ago. The population is graying while young people become poorer, more heterogeneous, and more likely to be side-tracked by drugs, dropout problems, teenage pregnancy, and other social dysfunctions.

The teacher is changing. The typical teacher is acquiring higher levels of training and becoming more experienced. At the same time low pay and uninspiring working conditions are discouraging teachers and creating shortages in a growing number of areas.

The school structure is changing. Reform programs, innovative projects, and restructuring proposals abound. The education reform movement that began in the early 1980s surges on, but the direction is changing, from the early emphasis on top-down efforts to further standardize and regulate to more recent efforts to decentralize, individualize, and provide more flexibility.

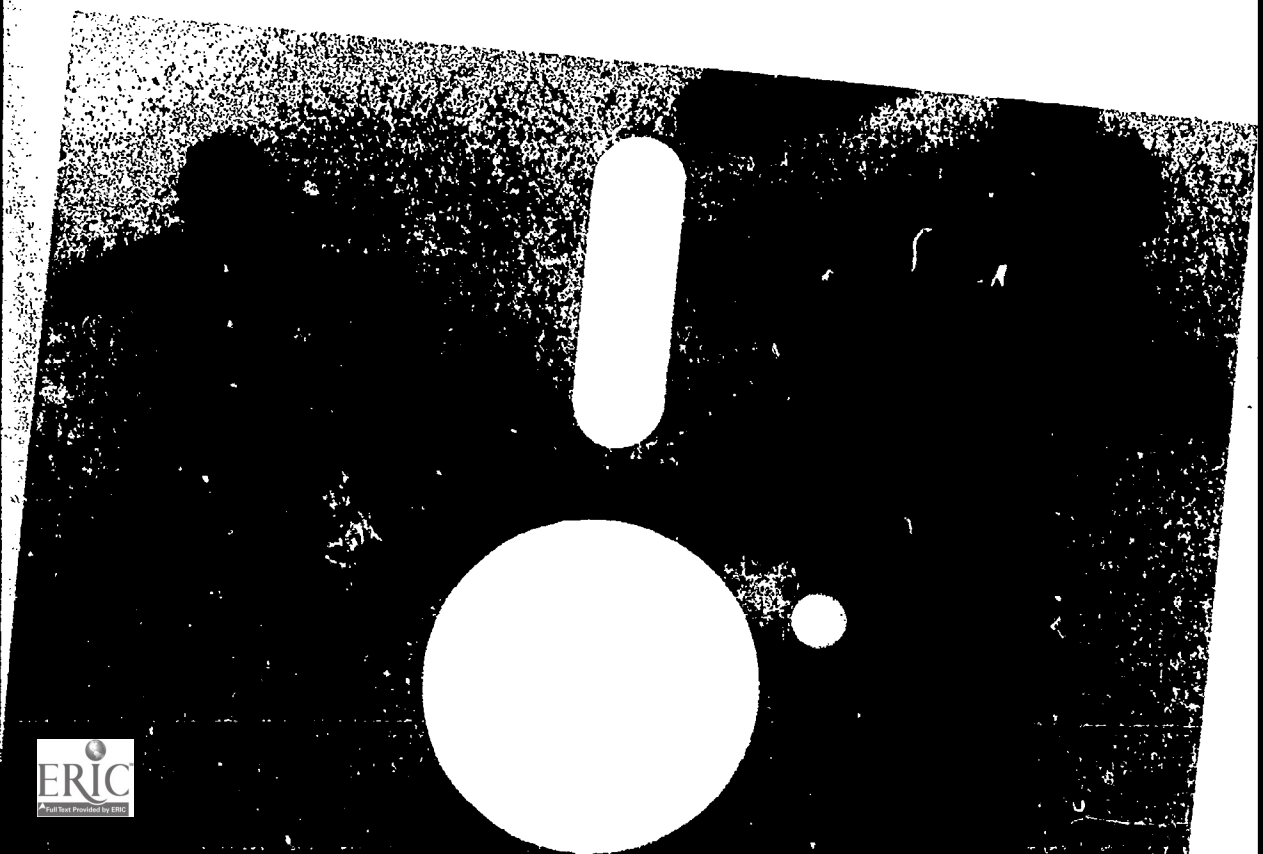
The American economy is changing. The shift from an industrial to an information and service economy signals a profound need to reexamine the school curriculum and pedagogical methods. The analytical, collaborative, innovative, problem-solving American workers needed for

industry and business will require a different education from that required by an individual expected to do standardized routine work in a factory.

Some observers are advocating the expanded use of technological innovations as *the* method to respond to these many changes. While that may be too narrow a viewpoint, these changes provide an excellent opportunity to examine the potential benefits of integrating technology into the schools of America.

The 1987 National Education Association Representative Assembly approved the creation of the Special Committee on Educational Technology. In authorizing the committee, the Representative Assembly directed it to build on the work of the recently completed United Kingdom/United States project on microelectronics in education, technology projects of state affiliates, and various reports commissioned by the NEA and other organizations.

The specific charge given the committee was to review the status of technology in the public schools and make recommendations for appropriate NEA policy and programmatic activities.



General Principles

The committee believes that computers, facsimile machines, multimedia technology, interactive video, telecommunications, hypermedia, and other technological advances can hold real promise for support and enrichment of classroom instruction and classroom management. *The committee shares the hope that when conceived and implemented appropriately, technological innovation can contribute significantly to the improvement of educational opportunity, to managing the increasing knowledge base, and to improving the quality of work life for school employees.*

Restructured environment

Educators and other school employees have a unique need and opportunity to plan for the inevitable inclusion of technology in the American schools. *The committee believes that the integration of technology should be conceived in terms of a restructured school environment, not as piecemeal appendages grafted onto the current school structure and curriculum.* To the extent that resources are devoted to the research and development of the technology, similar efforts must also be devoted to matching the sophisticated technology with a sophisticated pedagogy and curriculum designed to educate Americans for the 21st century.

Indeed, the committee expresses the strong opinion that the *schools must focus the uses of technology not on more routinized standardization of the learning environment but on the opportunities to enrich instructional lessons, to individualize instructional objectives for students, to extend the shift from a centralized to a decentralized learning environment, and to support the teacher by easing the classroom management burden of reports and paperwork, thus allowing the teacher to spend more time with students.*

The teacher is central

The committee recognizes and confirms the important conclusion of the Office of Technology Assessment (OTA) in its recent report, *Power On!*,[1] that *the teacher is central to the full development of technology's use in the schools.* Technology cannot be an end in itself. The use of computers and other technologies should be seen as an integral part of the whole school curriculum, aiding and abetting the best instructional practices and curricular designs. If the implementation of the new technology is conceived improperly, one more passing fancy can be added to the unfulfilled promises of schools without walls, the discovery method, behavioral objectives, the new math, team teaching, TV courses, and many other discarded hopes for change.

[1] U.S. Congress, Office of Technology Assessment, *Power On! New Tools for Teaching and Learning*, OTA-SET-379, Washington, DC, September 1988.

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Two separate and distinct visions of the future potential of technology permeate the literature. One vision sees technology's use as a substitute or remediation for workers. This vision is based on the assumption that high quality technology can be more efficient and probably less expensive than human capital.

Schools And Technology

Technology = value added

The other vision sees technology's use to enrich human capital. This "value-added" perspective visualizes using technology to expand the employees' scope in handling and sorting information, in allowing modeling and other creative scenario building, in relieving employees from reports and other administrative burdens, and in serving as a tool that expands their discretion rather than further simplifies their jobs.

One example of the value-added approach is referenced by a noted economist in a recent report for the NEA. The report states:

> One of the key lessons to emerge from the General Motors-Toyota joint venture in California is that the Japanese automaker does not rely on automation and technology to replace workers in the plant. In fact, human workers still occupy the most critical jobs—those where judgment and evaluation are essential. Instead, Toyota uses technology to allow workers to focus on those important tasks where choices have to be made. Under this approach, technology gives workers the chance to use their imagination and their insight on behalf of the company.[2]

The committee embraces the value-added vision as the model for the expanded use of technology in education. As the OTA report notes, "Educational technologies are not self-implementing, and they do not replace the teacher."[3] The acceptance of the value-added approach is the foundation for the general principles cited above.

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[2] Robert B. Reich, *Education and the Next Economy*, National Education Association, Washington, DC, 1988, p. 16.

[3] U S. Congress, p. 16.

New teacher roles

The committee also recognizes that as schools utilize multiple technologies and restructure programs and curriculum, the roles of teachers and other educational personnel will change. The Christa McAuliffe Educators[4] devoted significant time to the examination of the question, "What are the most appropriate roles of teachers as technology becomes more available and sophisticated?" The emerging roles identified by the Educators are as follows:

1. Collaborator—initiates and nurtures relationships that expand the boundaries of the classroom and shares knowledge with colleagues. A collaborator fully participates in establishing the standards and educational climate of the school.
2. Mentor/Mentee—teaches and learns from his/her students, community, and colleagues.
3. Planner—creates a vision of the future, develops methods to achieve that vision, and structures the learning environment.
4. Researcher—accesses, analyzes, and organizes information. A researcher guides students in understanding problem-solving strategies and developing discovery and learning skills.
5. Seeker—ventures outside of the classroom to import ideas and resources.

Indeed, the concept of restructured schools (where educational decisions are decentralized and shared, where programs are tailored to meet the individual educational needs of the student, and where the principles of collegiality, cooperative learning, and creativity are nurtured) fits hand-in-glove with the value-added approach to integration of technology into the schools.

The concept of a computer lab down the hall utilized by a few teachers just doesn't cut it any more. For example, the real concern of the schools is student writing

[4] The Christa McAuliffe Institute for Educational Pioneering is designed to stimulate exploration by teachers into the state of the art and science of teaching. The Institute is a program of the National Foundation for the Improvement of Education created by the National Education Association. Each year five educators are selected to research and teach. The 1988 Educators focused on integrating technology into schools and the roles required of teachers.

skills, not word processing. The schools should not put the teacher into the electronic box. The technology can serve as a tool, a resource, a support, a supplement, an enrichment, but the teacher/student relationship is still at the heart of the process. In fact, the introduction of technology into education can enhance that relationship by creating new and additional options for learning and by giving time back to the teacher from the growing burden of nonteaching duties.

Long distance learning

One technology receiving considerable attention is the telecommunications technology of "long distance learning." This technology exemplifies the contrasting pedagogical choices.

Long distance learning has several distinct advantages when conceived and implemented appropriately. Long distance learning can broaden a classroom's horizons by channeling unique experiences from other sites through electronic field trips or live participation in historic or scientific events. It can provide opportunities for isolated rural areas to receive curricular offerings normally unavailable or impractical. Long distance learning can indeed serve as a resource, a supplement, and an enrichment.

The down side of the pedagogical choice is the option of replacing the personal student/teacher relationship with a teacher in the electronic box. An everyday replacement diet of this latter option will likely be limited by the practical problems of inflexible schedules, lack of attention to unique student needs in distant locations, and boredom from "talking heads" methodologies.

The crucial yardstick differentiating between the two choices is the availability of a licensed teacher in the receiving classroom to introduce the instructional material, monitor the presentation, answer questions of and interact with each student, evaluate the progress of the learning activity, and make adjustments for each student as necessary. Quality teaching is a matrix of professional decision making, which requires on-site attention.

The committee believes that *the Association and its affiliates should be involved in the planning, implementation, and evaluation of long distance learning proposals and programs to provide students the highest quality learning experience.*

Teachers And Technology

The OTA report presents several findings of importance to understanding the relationship between teachers and technology.[5] While most teachers report a desire to use technology in their teaching, only half of the nation's teachers report that they have used computers in instruction despite the presence of computers in almost all K-12 schools nationwide. The report comments, "Teachers are not the problem, and without them there can be no solution. Most teachers want to use technology, but few have found ways to exploit its full potential."

There are real and substantial reasons for the above circumstances. It is true that quality and technical problems exist, but of critical importance is the fact that schools are not doing enough to help teachers become familiar and comfortable with computers.[6]

To learn to play a piano, one must have an instrument personally available and quality time to practice. Using a computer is no different. The policies of priority placement of computers for student use and minimal training opportunities for teachers will not produce computer-using teachers. OTA reports that only about one-third of

[5] U.S. Congress, pp. 87-88, 114.

[6] Henry Kepner, "What Ever Happened to the Computer Revolution?", *NEA Today*, October 1988.

all K-12 teachers have had even 10 hours of computer training.[7]

One author described the lack of teacher access to computer technology as disrespectful. He stated, "Truth be known, almost all of us have so far been deeply disrespectful to teachers, in our failure to give them personal access to the developing microcomputer technology.... Increasingly, we expect to see computers on the desks of business people, scientists, engineers, doctors, lawyers, social scientists, writers, even some artists and composers. In short, we have come to expect computers on the desks of everyone outside of school who's most intensely involved in the literate activity that school is supposed to teach and promote. Yet we have not stood up and shouted that computers should also be on the desks of teachers, to use as their own personal machines."[8]

If the teacher is essential to the integration of the technological potential in education, the critical elements for the teacher are ***access, training, and time.*** The committee supports the following:

1. *All schools should develop and implement a plan to install a computer with adequate software on the desk of each teacher by 1991.* In addition to educational software the teacher may be using with students, the teacher should have access to a word processor, a database management program, and other productivity tools such as test creators, gradebooks, and worksheet generators. Only when teachers begin using computers on a personal basis will schools experience an upsurge in the use of technology.

   The committee visited a recently constructed high school where computers were installed on each teacher's classroom desk as well as in each academic department office, where all teachers had a private desk and study area. The computers were linked together on a network and also linked with the student computer labs. Every teacher had access from both the classroom and the office to all student work and records as well as a full menu of applications programs. While exceptional today, this configuration should become the norm.

[7] U.S. Congress, p. 98.

[8] David Grady, "Giving Teachers Their Due," *Phi Delta Kappan*, September 1988, p. 31.

2. *Classroom management software designed for teacher use to manage the instructional process (e.g., word processing, gradebooks, attendance records, test development, and so forth) should be made available for all teachers and be compatible throughout the school district.* Approximately 40 percent of a teacher's time is spent on nonteaching duties. In the 1986 NEA survey of K-12 teachers, the aspect of teaching with which teachers were most dissatisfied was the amount of time spent on recordkeeping and clerical duties.[9] An unchallenged benefit of computers is the ability of the machine to handle routine clerical and administrative tasks. This function in education needs higher-priority attention.
3. *The school district and the teacher association should investigate options for teachers to have access to computers in their homes for training, development of instructional materials, and research purposes.* The options could include "take home privileges" and discounted purchase options with employer funding participation.
4. Teacher-planned training opportunities must be provided for teachers. *Practical, hands-on, and regular training in technological applications for learning and managing should be provided during school hours at the school's expense.* The training should focus on how to use technology to enhance instruction and personal productivity.
5. *Training in the use of technology to enhance instruction and professional productivity must be a part of the preparation of every entry-level teacher.* This expectation will necessitate major changes in the availability of curricular offerings and available hardware and software in colleges of education.
6. *Teachers should be provided encouragement, time, and resources to experiment with and research applications of technology, and to integrate technology into the curriculum.* The focus should be on helping teachers to make up their own recipes rather than following the cookbook. Experimentation and innovation are necessary in such a new and developing area of expertise and knowledge.

[9] National Education Association, *Survey of NEA K-12 Teacher Members 1986*, Research Division, p. 12.

Collaboration And Collegiality

The 1988 NEA Representative Assembly charged the Committee on Educational Technology to study the feasibility of a computer network for NEA locals. This concept is parallel with the committee's thinking on the importance of increasing the collaboration and collegiality among teachers and other school personnel. The sharing of ideas and experience needs to be encouraged. Colleagues have much to learn from each other.

Bulletin board services

In fulfilling the charge, the committee reviewed several networking options. The NEA is already operating two long distance computer networks for NEA leaders and members.

The NEA Instruction and Professional Development (IPD) unit maintains a toll-free electronic bulletin board. The Bulletin Board Service (BBS) operates 24 hours a day. Services available on the BBS include messages, special conferences, bulletins from the NEA, and data files. Files on dozens of education reform issues and policies are available for downloading. Local leaders and members can use the IPD electronic bulletin board for communications and the sharing of ideas. The access number is 1-800-541-0816.

The NEA and the International Business Machines (IBM) Corporation recently established a joint project linking all of the NEA Mastery in Learning Schools together in an experimental computer network. The network also includes several research universities and the federally funded regional educational laboratories. The network is based on a new experimental IBM software package called "People Sharing Information NETwork" (PSInet). PSInet has the technical capability of linking thousands of teachers together on an interconnected system based solely on microcomputers.

Interlinked, nationwide networks

The committee encourages the continued utilization of the IPD Bulletin Board Service and believes it provides an immediate tool for teachers and Association leaders to communicate and share information with each other. Such dialogue is particularly critical because of the traditional isolation among teachers. The committee is also aware that other bulletin boards are being installed by several state and local associations and many school districts. That development should be encouraged.

The committee believes that *the NEA must commence the planning to create interlinked, nationwide interactive networks for teachers.* It is understandable that the full potential of such networks resides several years in the future, but basic development work needs to be done now. The empowering potential for teachers and other educational employees of such networks is worthy of Association advocacy.

There is still a great deal of anxiety expressed by educators about the integration of technology into the school environment. Technophobia is a real and flourishing malady. The committee believes that careful and deliberate planning can constructively advance the uses of technology to improve learning and teaching.

Planning For Technology

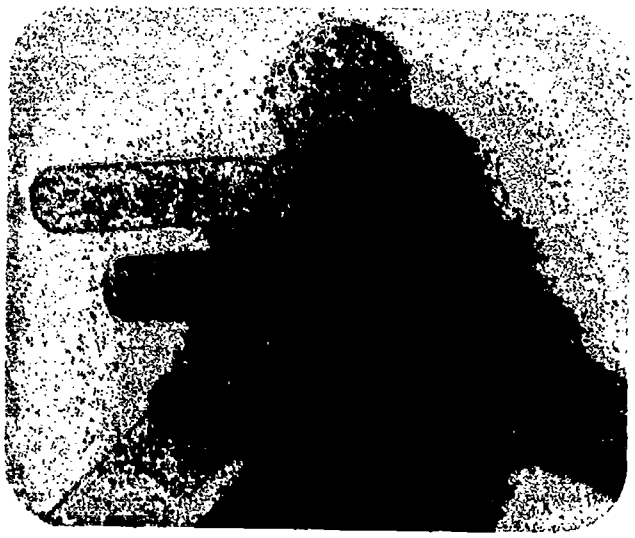
The committee has come to the following conclusions:

1. Understanding our mission is very important. One educator stated our central purpose very clearly. He said, "Will technology transform education? No. That transformation must take place first in education's true workplace—the minds of its decision-makers. It requires a shift in focus from what technology is or does to what it enables educators to do."[10] *The planning focus should be on the individual educational needs of students and how educators meet those needs rather than on the technology.*
2. Educators and other school employees have a unique opportunity to plan for the inevitable inclusion of technology in the American schools. *Policymakers should recognize the inherent value of full participation and collaboration by all involved parties in planning for technology integration into the schools.* Full involvement is valuable not only because it creates ownership but because it can help perfect the quality of the final result.
3. Resource planning has often focused on hardware needs only. *Resources for technology in education must be adequate to provide balanced support for staff development, software, hardware, and research into curriculum integration and development.* It is folly to think that the development of a sophisticated pedagogy to match and utilize the sophisticated technology will come into being without a major investment. The transition to technology-based learning and management will in the short run increase costs to schools. It is a falsehood to assume that the inte-

[10] Lewis A. Rhodes, "We Have Met The System—And It Is Us!", *Phi Delta Kappan*, September 1988, p. 30.

gration of technology can be a budget reduction strategy.

4. The OTA report points out that the very opportunities opened up by the computer can create more work for the teacher, making the job harder initially.[11] *Planners need to understand the changing responsibilities of the instructional staff and provide time, resources, and flexibility for professional development, research, and planning.*
5. *Education planners must make strong efforts to insure that all teachers and students have equitable access to the new technologies.* Equity of computer use means providing comparable educational opportunities for all students to have "hands-on" activities which create an environment that enriches each student's learning style.



[11] U.S. Congress, p. 88.

Policy Recommendations

The Special Committee on Educational Technology recommends the following general principles and policy positions:

General principles

1. When conceived and implemented appropriately, technological innovation can contribute significantly to the improvement of educational opportunity, to managing the increasing knowledge base, and to improving the quality of work life for school employees.
2. The integration of technology should be conceived in terms of a restructured school environment, not as piecemeal appendages grafted onto the current school structure and curriculum.
3. Schools must focus the uses of technology not on more routinized standardization of the learning environment but on the potential enrichment of the teacher's instructional lessons, on the capacity to individualize instructional objectives for students, to extend the shift from a centralized to decentralized learning environment, and to support the teacher by easing the classroom management burden of reports and paperwork, thus allowing the teacher to spend more time with students.
4. The teacher is central to the full development of technology's use in the schools. For the teacher personally the critical elements are access, training, and time.

Policy positions

1. All schools should develop and implement a plan to install a computer with adequate software on the desk of each teacher by 1991.
2. Classroom management software designed for teacher use to manage the instructional process should be made available for all teachers and be compatible throughout the school district.
3. The school district and the teacher association should investigate options for teachers to have access to computers in their homes for training,

development of instructional materials, and research purposes.

4. Practical, hands-on, and regular training in technological applications for learning and managing should be provided during school hours at the school's expense.
5. Training in the use of technology to enhance instruction and professional productivity must be a part of the preparation every entry-level teacher receives.
6. Teachers should be provided encouragement, time, and resources to experiment with and research applications of technology, and to integrate technology into the curriculum.
7. The NEA should commence the planning to create interlinked, nationwide interactive networks for teachers.
8. The planning focus for educational technology should be on the educational needs of students and how educators meet those needs, rather than on the technology.
9. The planning must recognize the inherent value of full participation and collaboration by all involved parties in planning for technology integration into the schools.
10. The Association and its affiliates should be involved in the planning, implementation, and evaluation of long distance learning proposals and programs to provide students the highest quality learning experience.
11. Resources for educational technology must be adequate to provide balanced support for staff development, software, hardware, and research into curriculum integration and development.
12. Planners need to understand the changing responsibilities of the instructional staff and provide time and flexibility for professional development, research, and planning.
13. Education planners must make strong efforts to insure that all teachers and students have equitable access to the new technologies.

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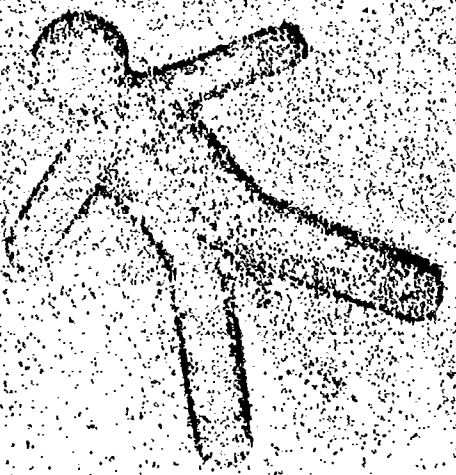

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