ORGANIZATION

In 1967, twenty school districts in the Twin Cities area formed the Minnesota School Districts Data Processing Joint Board, and undertook to establish a unique service called Total Information for Educational Systems – TIES.

The Joint Board was organized under a Minnesota law which provides that a local governmental unit can exercise, jointly with like agencies, the powers granted to it under Minnesota law. Each school district is represented on the Joint Board by two delegates. The Joint Board delegates elect an eight member Executive Committee which holds regular meetings, establishes policy and acts on behalf of the Joint Board. The Executive Committee is composed of four school superintendents and four school board members. The Committee employs an Executive Director of Educational Services as TIES' chief administrative officer. This organizational structure functions very much like the school board/superintendent relationship in any school district.

TIES employs a staff of 52 people, serving in the two divisions of Design-Development and Services. Each district assumes responsibility for in-district communication and data processing related activity. The major interface between the districts and TIES is embodied in a member district position titled Educational Information Systems Coordinator. The EIS Coordinator has been recruited from the ranks of educators in each district and assumes the role of communicator, coordinator, and information systems specialist for the district.

In the 1972-73 school year, TIES serves 29 school districts including one vocational-technical school district, encompassing over 230,000 students in grades K-12 and 35,000 district employees. Member districts are all within a 40 mile radius of the TIES center except for one at a distance of 120 miles, and range in size from 1400 to 31,000 students. Names of member districts appear at the end of this article. There are 36 high schools, 52 junior highs, and over 200 elementary schools in the 29 districts.

HARDWARE SYSTEMS

One major system employs two Burroughs B3500s linked to input and display terminals. It is a multi-processing system with 300 million bytes of permanent disk storage, eight tape drives, 360K of core memory, two high-speed printers and lesser peripherals. The dual B3500s share peripherals and the disk data bank.

Inquiry and update of individual file entries is done in seconds over Burroughs 9352 CRTs located in each district. Mass input such as mark reporting is sent through Bell & Howell mark readers in the district to keytapes at the computer center.

The second major system involves three Hewlett-Packard timesharing systems – 2000C, 2000B, 2000F. 84 ports are in service, with expansion to 96 ports imminent. Approximately 150 terminals are in the member districts, of which the majority are ASR-33 teletypewriters and including a number of PortaCom and Digilog terminals. Sixty of the terminals are in high schools, 43 in junior highs, with the remainder in elementary schools, district offices, or shared between schools. Nearly all such terminals have been acquired by purchase since most districts expect to be involved in computer usage permanently. Maintenance is mainly by contract with local firms at a cost of $175 to $195 per terminal per year. In conjunction with the terminals, 16 HP mark-sense card readers and two HP plotters are in use. One district has a teletype card reader system for each of its two senior highs and five junior highs.

SERVICES

Continuous in-service education and coordination activities are central to extensive, in-depth utilization and provision of services from the information and timeshare systems. Conferences, workshops and a variety of other training sessions backed by written documentation and user manuals support all systems and services. The services and coordination staff at TIES provide these in all areas ranging from cost accounting and class scheduling to field research, problem solving and achievement monitoring.

The TIES integrated data base information system is the data source from which all reports are produced whether they be a payroll every two weeks, report cards every quarter, the State Attendance Report annually or special census reports produced upon request to assist in enrollment projections. Routine reports and special reports can be produced with equal ease because of the design of the data base, which has the ability to expand both in content and types of reports which can be extracted from it. The system can generate new "products," as educators identify them, without extensive additional design or reprogramming.

INSTRUCTIONAL SERVICES

Related directly to instructional objectives, the TIES staff responsible for instruction are: Donald C. Holznagel and Norman E. Thompson, Project Managers; Linda J. Borry and James A. Sydow, Services Coordinators in Instruction; and Wilfred N. Nathe, Programmer-Analyst. These people coordinate the design, development and implementation of the following projects currently implemented or being developed.

TIES WORKSHOPS

During August of 1971, the instructional staff conducted 7 workshops covering STOP, BASIC, SIMULATIONS, COBOL and Junior and Senior High Applications. 87 teachers participated.

248 teachers attended one of five series of workshops given during the 1971-72 school year. The sites for these workshops were selected in such a way as to enable all TIES teachers to attend workshops in their vicinity. Each series was six weeks long and covered STOP, BASIC, and Elementary and Junior High Applications.

During the summer months of 1972, 107 teachers participated in at least one of the 11 workshops presented. These covered STOP, BASIC, COBOL, SIMULATIONS, Computer Science, and applications for various grade levels.

The 1972-73 in-service workshops conducted by the TIES staff include ADVANCED BASIC, COMPUTER SCIENCE, INFORMATION PROCESSING AND SOCIETY, COBOL, FORTRAN, ELEMENTARY SCHOOL APPLICATIONS as well as one day training sessions held for terminal supervisors, guidance counselors, administrators, and others on the various instructional services.

These are rough estimates of the number of students using the system.

High School	10,800
Junior High	10,000
Elementary	2,400
Guidance	1,200
Non-TIES schools	2,500

About 2/3 of high school and junior high use is general problem solving. Elementary use is split between drill and practice and introduction to computers.

TERMINAL SUPERVISION

To facilitate communication and implementation, personnel are needed who are close to teachers and classroom activities, who can disseminate information, assist with in-service activities, and schedule and control terminal usage. Every TIES school having a terminal has identified a teacher as Terminal Supervisor to carry out those functions. Monthly sessions are held for them with TIES instructional project managers to discuss problems, present ideas, and maintain human contact between TIES staff and teachers in the classroom. The degree and success of instructional computer usage in a school depends in large part on the Terminal Supervisor.

Since the member districts pay for the entire TIES operation on a per student basis (currently $6.25/student/year), their share of timesharing time and storage are allocated on the same basis. System ports and school day hours are finite and so usage must be controlled. Currently, districts are allotted 45 hours of on-line time per 1000 students per month, and 57K words of storage per 1000 students. The EIS coordinator and Terminal Supervisors determine the distribution of these resources within the district according to their priorities and needs. The time allotment covers only the hours between 8 AM and 4 PM daily which are the hours of heaviest demand. Usage outside those hours is unlimited.

TOTAL INFORMATION FOR

DRILL AND PRACTICE

During the 1971-72 school year, 19 districts experimented with the Hewlett-Packard Arithmetic Drill and Practice Package. This package is a series of programs designed to drill students on computational skills. At the end of the four week experimental period, each district was asked to complete an evaluation form. As the response was generally quite favorable, it was decided that closely controlled research should be done during the 1972-73 school year to obtain data on the effectiveness of the program.

As part of a short term study, 780 students used the Drill and Practice Program for six weeks during summer school in 1972.

The research project is taking place during the 1972-73 school year and involves an experimental group of third and fourth grade students from 7 districts, representing a cross-section of ability levels. Some students use the program on a daily basis, with others using the terminal only every other day. Non-experimental students in each participating school serve as a control group.

CAM (Comprehensive Achievement Monitoring)

The experimental work initiated by Hopkins District 274 under an E.S.E.A. Title III grant has proceeded with TIES taking over the processing and creation of computer reports for CAM. In September of 1971, TIES ran parallel with the University of Minnesota Computer Systems for a few courses on the CAM Project and then assumed more courses throughout the year. By June 1972, 62 courses were being processed at TIES. These involved 8 TIES districts as well as a few non-TIES districts working on the project with over 7,000 students enrolled in the courses. Currently, about 12,000 students in 100 courses are being served. Future plans include running reports for all courses at TIES and having TIES assume an increased role in controlling and distributing the input and output of data.

The Evaluation Center at Hopkins is promoting the following activities in implementing this program:

- **Collecting performance objectives for each course on the program together with test items to measure the attainment of each objective.**
- **Operating computer programs, using existing computer facilities, to process the data so that results may be returned to teachers and students within a day or two.**
- **Assisting teachers in the writing and choosing of behavioral objectives and test items and in the use of evaluation results.**
- **Developing training materials to explain the program, its capabilities and the procedures to actually use it in the classroom.**
- **Cooperating with selected schools outside the Hopkins district so that the program may be more widely demonstrable.**

BATCH SYSTEM

To improve the instructional applications using the Burroughs B3500, there has been an effort to develop a systematic method of handling BATCH compilations of COBOL and FORTRAN programs. During the school year 1971-72, use of COBOL by districts in instruction increased three-fold. COBOL programs written by students now are transmitted over the scanners and processed daily and returned by a delivery service. From one school in 1969-70, to three schools in 1970-71, the service now is being used by ten high schools with continued growth expected in 1972-73.

In addition, BATCH BASIC has continued to be used for running BASIC programs where the on-line turn around is not necessary. This past year there has been a growing interest in FORTRAN instruction, and therefore, more demand for FORTRAN compilations on TIES computer systems. To meet this demand, Instructional Services has developed BATCH FORTRAN processing on both the Burroughs system and the Hewlett-Packard system. It is anticipated that BATCH FORTRAN will be handled in much the same way as BATCH COBOL in 1973.

BUSINESS EDUCATION AND COBOL

This past year a committee of business education teachers representing six TIES districts have been active in creating some guidelines for business education curriculum using the TIES computer facilities. The discussions and workshop activities held have led to some excellent suggestions relative to the data processing and the business education curriculum.

The start at getting a library of programs for business education using the Burroughs computer system proceeded during the summer of 1972. Anticipated in the library are programs which will apply to BOOKKEEPING, MARKETING, ACCOUNTING, OFFICE MACHINES as well as DATA PROCESSING courses offered in the business education curriculum. The increased interest in offering COBOL instruction mentioned above in the BATCH SYSTEM developments has also created the interest in these further curriculum developments.

SIMULATION

Simulation programs and packets of related instructional and resource materials produced by the NSF sponsored Huntington Two Project were being tested and evaluated by students and teachers in 8 TIES schools during the 1971-72 school year. The programs were related to Physics, Biology and Social Studies. Critical comments and suggestions were relayed to the Huntington Project for use in improving the materials. Ten packets have been tested since January 1971, and all ten are available inexpensively through Digital Equipment Corporation. Huntington Two has received an extension of NSF support and will continue to produce packets through 1972-73, with TIES schools continuing to evaluate the first drafts.

A proposal developed by TIES for the purpose of training social studies teachers in computer applications for the social studies classroom has been approved by the Minnesota Council on Quality Education. The project takes advantage of the computer resource at TIES, the social studies expertise of the Social Studies Service Center of the Twin City Area, and the programs and materials developed by the Huntington Two Project. A series of inservice workshops are being conducted during the 1972-73 school year, and assistance to teachers in classroom implementation of simulation programs are being provided. Programs and materials will be revised and improved, and new ideas for useful programs will be collected for development.

COMPUTER SCIENCE

There has been effort this past year to acquaint TIES schools with the introductory study in computer science. Computer science has a variety of definitions so it is necessary to give the TIES Instructional Projects Staff's opinion. We feel computer science should introduce students to the hierarchy of computer languages including machine language, assembly language, and compiler languages. The major emphasis should be on problem solving but in addition, many non-numerical type situations are included in the study of the computer as we see it. As more expertise is developed using the timeshar computing system, there has been an increased demand for additional study about computers. This extension of computer study will be enhanced with the improvements in the hardware available in the timesharing mode over the next two or three years.

TIES INSTRUCTIONAL VIDEO-TAPE

In February 1972, the Hewlett-Packard Company and TIES Instructional Projects Staff planned and recorded a video-tape program covering the various instructional activities in TIES member districts related to the Hewlett-Packard timesharing systems in use at TIES. Many classrooms were visited during the week of taping, and TIES staff comments were recorded. The footage was edited to about twenty minutes in the final version. The tape will be circulated nationwide by Hewlett-Packard as an example of successful classroom use of timesharing computers. Copies are available at the TIES office for local use in presentations to groups of teachers, administrators, and parents.

LOGO LANGUAGE

In cooperation with Bolt, Beranek and Newman, TIES has been experimenting with a version of LOGO since the summer of 1971. Bolt, Beranek and Newman, and MIT have been developing and testing LOGO for several years as a tool for teaching elementary students a set of concepts related to programming to provide a natural foundation for the teaching of mathematics and the art of logical and rigorous thinking. It has been found useful with students at the college level as well. In the present year, 1972-73, the finishing touches are being put in the language program. As materials become available and teachers become interested, limited classroom experimentation will begin.

GUIDANCE INFORMATION SYSTEM

In cooperation with Time Share Corporation, TIES is supporting the Guidance Information System developed by Interactive Learning Systems. The system provides remote access to college data, vocational and specialty school data, occupational data and scholarship and financial aid data through the Hewlett-Packard timeshare computer system. In addition to the TIES network schools, Minneapolis and St. Paul schools are participating in the use of G.I.S. for their guidance and career information purposes.

More information about TIES may be obtained by writing Norm Thompson or Don Holznagel at TIES, 1925 West County Road B2, Roseville, Mn. 55113.

TIES MEMBER DISTRICTS 1972-73

Anoka	Bloomington
Burnsville	Chaska
Columbia Heights	Edina
Fridley	Golden Valley
Hennepin Voc-Tech	Hopkins
Inver Grove	Lakeville
Minnetonka	Mound
New Prague	Orono
Osseo	Richfield
Rosemount	Roseville
Shakopee	St. Louis Park
Stillwater	Spring Lake Park
Waconia	Wayzata
W. St. Paul	White Bear Lake
Willmar	

TIES EDUCATIONAL SYSTEMS