Feature

Information Processing In Portland Public Schools: The Last 10 Years

BY BLAIR STIGGINS

Executive Summary

Most academic institutions keep instructional computing separate from its administrative computing. In some instances, particularly at the university level, there are often two distinct mainframe and supporting communications systems. Portland Public Schools, the largest school district in Oregon, has generally followed this organizational structure.

Recently, however, the use of computers for both academic and business purposes has progressed from finance, payroll and student registration functions to sophisticated and highly integrated business and instructional systems. This article explores the path that Portland Schools has taken during the 1980s and some of the district's plans to meet the challenges of the year 2000.

Most academic institutions, whether they are kindergarten through grade 12 school districts, a community college or a large university, keep academic or instructional computing separate from the administrative or business computing of the organization. In some instances, particularly at the university level, there are often two distinct mainframe and supporting communications systems. Portland Public Schools, the largest school district in Oregon serving 55,000 students, has generally followed this organizational structure.

In the early 1980s — when thinking about student computer literacy meant teaching students to program — Portland installed classroom labs of terminals in several high schools connected to the central mainframe. This mainframe also supported payroll and personnel systems, finance, and student registration and report card generation systems. Elaborate precautions were taken to keep the student access and use very separate from the "real business" of the central mainframe.

About this same time, the personal computer was introduced and began taking its place in both the instructional and business environments with the school district. Teachers were learning LOGO and using a computer to assist with classroom management. Expansion of the mainframe communications network was also a major area of activity during this time frame. Finance and school personnel needed access to information on a daily rather than a weekly basis. When the mainframe did not offer timely enough solutions, innovative staff members in both the administrative and instructional areas began to write their own applications using a personal computer.

In the last 10 years, the use of computers for both academic and business purposes has progressed from basic finance, payroll and student registration functions to sophisticated and highly integrated business and instructional systems. We will briefly explore the path that Portland Schools has taken during the 1980s and some of the school district's plans to begin to meet the challenges of the year 2000.

The Early 1980s

The major challenge facing the department of information services during the late 1970s and early 1980s was the implementation of an updated financial system. This system included financial reports, accounts payable checks, warehouse inventory, and requisition and purchase order processing. It interfaced with the payroll/personnel system and provided for a budgeting system that met state and federal requirements. It also included one of the first attempts by information services to put computing power in the hands of the users: the giving of terminals to finance clerks for use of an on-line batch processing and balancing system.

The selection and conversion of a financial system from another school district using a Honeywell mainframe was a difficult and challenging process. Not only was the availability of financial software limited for a non-IBM mainframe, it was also difficult to find a school district of similar size with a system that came close to meeting our needs. The conversion took place in two phases. The first phase involved adapting the acquired financial system and all of its transactions to meet our needs and integrating with the payroll/personnel and work order tracking systems. The second phase required the conversion to a more updated database management system, which involved many language changes inside programs.

The other major area for systems development in which a great deal of activity was underway was with student information systems. A significant transition from flat file maintenance of student data to an integrated, IDS-II DBMS hierarchical database was taking place. This effort included the development of the on-line capability for student registration using Honeywell's Data Management 4 Transaction Processing System (DM4TP). Many shifts in philosophy for the

processing of student information took place during this transition. For instance, in the flat file environment, which was usually organized by school, students could be enrolled in more than one school and go undetected for a period of time. In the database environment, which has the potential for multiple views, students could have only one primary association with a school. When a student transfers from School A to School B, his association with School A is automatically terminated.

On-line access for student registration was first made available to the district's 10 high schools. It represented a major training and support effort, since it was the first time that our small communications network of terminals connected to the mainframe had multiple connections outside the central administration building. It also marked the beginning of a continuing effort to integrate student information systems.

An attendance system was added shortly after the registration system was complete. A subsystem tracking special education student placements and services was also developed without the traditional batch processing accompaniment. The special education system used the student registration information already available and combined it with information specific only to special education students.

Another student-related activity involved the geo-coding of the school district for use in bus routing by the student transportation department. This system saved the district more than $1 million in its first year of implementation and, with enhancements, continues to represent significant cost savings. Geo-coded student residences are used as well to determine school boundary changes for balancing the student populations in neighborhood schools and planning for any growth or declines in student enrollment.

During this time, the emphasis was on enhancing basic business systems. The only involvement that the department of information services had with instructional computing was the maintenance of two computer labs of terminals connected to the mainframe to teach programming and computer science.

The Mid-1980s

While the first microcomputer purchase in Portland Schools dates back to 1981, significant investments in microcomputer technology did not begin until school year 1982-83, when a plan for instructional technology was developed and introduced. Superintendent Matthew Prophet placed a high priority on computer literacy for Portland's students, and the departments of information services and curriculum worked closely to implement a plan for taking technology into the schools. The plan focused on teaching students to program — experiences for students ranged from LOGO to FORTRAN, depending on the grade level. Several demonstration projects were started to put technology in the hands of teachers so they, in turn, would be able to work with students. Much emphasis was placed on student-to-computer ratios as a way of measuring equity.

Because of their early recognition of the magnitude of support issues with microcomputers, IS and curriculum worked together to set evaluation and acquisition standards for hardware and software to be used in both schools and offices. Physical plant electronics staff were trained in maintenance and repair, and emphasis was placed on staff development for both instructional and support staff. An in-service relationship for staff development credits was established with Portland State University for teaching staff to gain both credit and background in the use of computers in the classroom. Information services staff with a background in adult education and teaching began teaching support staff word processing and spreadsheet application programs.

In 1985, a specific group called user services was formed within the department of information services to serve as a training and support resource for microcomputer systems, to manage the evaluation, acquisition and placement of administrative and instructional hardware, and to support all of the student information systems. This group was also involved in the selection of teachers for, and the administration of, "Technology on the Teacher's Desk" grants that placed computers on teacher's desks for instructional materials development and classroom management activities.

The systems development group within information services continued to expand and integrate the student information systems. The grade reporting system was integrated with the student database, high schools agreed on a uniform master course directory and plans for a comprehensive student transcript were beginning to take form. Attendance tracking and support expanded with the use of computerized calling systems using information downloaded to a microcomputer. Additional accommodations to student systems for identified special populations were increasing in frequency and complexity. The communications network experienced rapid growth as middle and elementary schools were added to the network. The district quickly moved to the workstation concept for mainframe connections so that users could have both the power of the microcomputer and the mainframe within one station.

In the business area, users were beginning to develop their own applications, often duplicating or re-entering data already found on the mainframe. Users increasingly asked for downloads of information as well as for microcomputer programming and development. The finance development team continued to work on enhancements and additional subsystems for the system implemented in the early 1980s. A fixed assets system was developed and implemented as well as a school cafeteria meal planning system to assist in the preparation and distribution of meals to schools. The need to replace the payroll/personnel system was identified and a larger mainframe and expanded communications facility were acquired.

The implementation of the Instructional Technology Plan and the development of appropriate training and support systems represented a significant addition to the responsibilities of the department of information services to the instructional arena. This involvement has continued to expand.

Late 1980s To The Present

As the microcomputer matured and local area networks were becoming a major part of instructional delivery systems as well as day-to-day business operations, information processing for Portland Schools has become more and more complex and diverse. Applications development includes main-

frame and microcomputer integration as well as stand-alone microcomputer applications. For the first time, support systems are being developed that have direct impact on students and teachers rather than a supportive impact.

It is clear the personal computer has had a significant effect on the way in which Portland Schools does business. Teachers involved in demonstration projects report that they are invaluable for classroom management activities as well as an excellent tool for instructional delivery. Portland Schools currently has about 6,000 microcomputers, about 80% of which are in the district's classrooms (the rest are in support offices). The Apple IIe still represents the majority of instructional computers, though Macintosh computers are steadily increasing in number and many of the high schools use IBM PCs, particularly in the career and technical education classrooms.

Many instructional computers are networked and can be described as integrated learning systems that include courseware in language arts, math and science. Other networked computers are used in writing labs, which reflects the emphasis on writing in the curriculum of the school district. The use of overhead panel displays, laserdiscs and VCRs with computers reflect the trend toward instructional delivery via a multi-media approach. Science labs include computer probes, and drafting and design classrooms house computers with CAD/CAM software. With the use of spreadsheet and graphics software, science and math curriculum is changing because research and data analysis activities are not the tedious and difficult activities that they once were.

The nation is replacing the old card catalog system with automated library systems, and so are our school libraries. In fact, school libraries are becoming communications centers accessing primary sources of data via telecommunications, as well as tapping into each other's libraries for expensive resources that no longer have to be duplicated because tracking and access is so much easier. The emphasis for information access for students is shifting to beyond the walls of the classroom and school to a far more global approach. Students in Portland are communicating with students all over the world via bulletin board and satellite communications. In the business area, personal computers have made possible applications that were traditionally too small or too time consuming to develop for just a few users. Recently a personnel substitute system on a local area network was put into place that streamlines the tracking and assignment of substitute teachers and secretaries. The risk management group has also downsized to a networked system for keeping workers' compensation records and information. The school police track gang habits, descriptions and activity on a specially developed local area network system.

Integration issues are becoming a primary focus on the part of the systems development staff. Integration of mainframe system to other mainframe systems, to business microcomputer systems, to automated school library systems, to local student scheduling systems, and to special education IEP systems is a continuing challenge. These issues call for different skill sets among the information services staff than those of traditional mainframe programmers. They also call for an ever-widening communications system to support the interfaces.

Conclusion

The line between academic and administrative computing is becoming very fuzzy. One reason for this, as already mentioned, is that information services is developing applications for use directly by teachers and students. In the past, applications development was done only to support the business side of running a school district. For example, in conjunction with the research and evaluation department, an adaptive testing system was developed for the achievement tests that Portland Schools routinely administer. This system provides the facility for students to sit at a personal computer and respond to test items with only the enter key and spacebar. As the student answers questions, depending upon whether the answers are correct or incorrect, the next question will either be more difficult or easier. In this way, students can significantly shorten their time taking tests as the system "adapts" to the student. Test results can then be graphed and reported to teachers and principals on both an individual and class basis.

Tracking of student progress has gone beyond the traditional test scores, grades, and attendance. Information services has recently developed two systems that integrate with the student information systems and provide much needed information to administrative as well as instructional staff. The service information system (ServIS) tracks and reports on all services that a student might be (or has been) involved in from traditional school enrollment and behavioral counseling services, to talented and gifted associations and special education services. This system allows those with a need to know a complete picture of a student's school experience. The other system that serves students more directly is a job resource bank for students involved in career and technical education. This bank matches students to jobs as well as jobs to students, and serves the entire school district. It has several selection criteria based on students' backgrounds as well as job location and type.

Another key example of the melding of instructional and administrative computing is in the area of staff development. Traditionally, staff development for teachers has been directly related to instructional activities with accompanying credits toward certification maintenance. However, teachers now need basic knowledge of computers in order for it to be a tool rather than a master. Training typically available to support staff in basic computer awareness, word processing, databases and spreadsheets is being provided on an ever increasing basis to instructional staff as well. Curriculum is currently being reviewed and selected that includes software that teachers must know how to use. The implication is that teachers have the necessary skills for these tasks.

The primary reason for the "fuzziness" of the line between instructional and administrative computing is the explosion of the need for greater connectivity and communications. In fact, both long-range plans for information services and instructional computing embrace a common communications plan. It is clear that most classroom personnel perform both instructional and administrative tasks and have a distinct need to communicate electronically with students, their other teaching colleagues and the support

services available to them. As support needs grow in complexity, so do the needs of staff to communicate more quickly and efficiently with their diverse colleagues throughout the school district.

Currently, the district's network planning team includes members from information services, curriculum, career and technical education, faculty, educational media, television services, architecture, electronics, and electrical support groups. This group has developed a well supported plan for acquiring local area networks, whether their primary use is administrative or instructional. It attempts to educate the end user as well as establish guidelines for cabling, hardware, software, training and support so that well informed plans and purchases can be made.

In the meantime, physical plant and information services personnel are working on setting structured cabling standards for the district's buildings. Just as fewer and fewer computers exist in a stand-alone environment, fewer and fewer classroom or office networks are self-contained. There is increasing demand to connect one to another or to the central mainframe. Also, given the nature of instructional computing with a growing emphasis on multi-media approaches and graphics, cabling plans will have to be robust enough to handle a wide variety of speeds and data types.

The school district's network planning team makeup and planning process is representative of a trend in other areas of planning across the school district. The tighter fiscal times is one reason for this shift. Oregon recently passed a property tax limitation bill that seriously limits and reduces funds available to schools. Making the most of limited resources has become even more challenging in recent years. There is also recognition of past mistakes in the implementation of systems and technology: not enough staff development; too much emphasis on the computer itself, not enough on its application to the curriculum; late recognition of the importance of adequate physical plant infrastructure to support technology; and not enough planning.

This trend, along with the technological changes that are occurring, has yielded general agreement across the school district that the development of a communications infrastructure is essential to the successful and continued use of technology as a tool for and part of our students' educational experience. With the rapid rate of increasing available information, the teacher's role has shifted from a knowledge-giver to one of a facilitator/research assistant for students. While many doubt that books will disappear, use of learning resources outside the classroom is growing at a rapid rate. Just as teachers must be able to communicate with their colleagues down the hall, across the city and around the world, so must our students, since their world is far more immediate, global and diverse than that of the school experience of students even 10 years ago.

Portland is systematically working toward building this communications infrastructure. It will be expensive given the age of many of our school buildings and the complexity of the technology. There is also clear recognition that the target is moving. However, the price of not implementing this plan will much, much higher. JSM

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tronically to the purchasing department for creation of the purchase order. Since the specification of the purchase has already been made in the system, the purchasing department no longer has to re-type the order onto a specific form. Rather, the purchase order is printed on a laser printer after verification.

The purchasing department can now use the system to determine whether the merchandise ordered has been received on campus, whether the invoice has been received, whether it has been paid and, if so, the date of payment. In the past, a number of phone calls would have been required to obtain this information.

As this example shows, access to the system from across campus is needed to utilize the system fully. An Ethernet backbone has been installed across the campus, and departments are now being attached to it. Figure 1 shows the kinds of devices attached to the network.

The "Academic LANs" in Figure 1 include academic department LANs and student computer labs. As is suggested by the diagram, any user can access any academic or administrative mainframe (if the user has a valid account on that system). It is also possible for a user on one LAN to send a message or a file to a user on another LAN connected to the backbone.

The advantages of local area networks, wide area networks and network backbones are well known to those in industry. On a college campus the challenge is to educate employees on their value and to convince people to use the network regularly. The capabilities provided by the new administrative software provide part of the incentive to learn the new technology. As departments and individuals begin to find new applications for networking in their work, word of mouth will help to attract others.

Conclusion

In terms of research on computer information systems, universities are on the leading edge; but because of differing requirements and external factors, they are often lag behind industry in applications. This article has shown some of the different problems and focii of the academic environment and the course that one university has taken. JSM

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