

## Volume 33 Number 5 Summer 2001

# School Information Systems and Their Effects on School Operations and Culture

**Marcie J. Bober**

*San Diego State University*

### **Abstract**

*Accountability is the watchword for educators today, as reflected in the public's clamor for a wide range of student and school improvements. School information systems (SIS) help schools and districts respond quickly and accurately to their many constituents. But data management is but one outcome of system deployment. Researchers are finding that thoughtfully planned and executed rollouts lead to improved communications within and across levels of school staff, improved relations with the larger community, informed decision making (functional as well as curricular) coupled with better information handling and flow, decision-maker responsiveness, and teacher empowerment. This article reports findings from recent studies conducted on SIS effectiveness and recommends strategies for well-structured evaluations that attend to critical factors (relative to system implementation and use) that affect all schools—regardless of their size and organization. (Keywords: accountability, school information system, SIS.)*

Accountability is the watchword for educators today as reflected in the public's clamor for improvements in our education system. Specifically, these improvements range from increased performance on student achievement tests and college entrance exams to reductions in absenteeism and transience. Accountability increases the information demands placed on our schools, however. Today's school districts,

regardless of size and no matter how organized, depend on integrated information systems to manage their data loads and provide detailed information about school life to the community. Unfortunately, empirical evidence relative to the implementation and effects of school information systems is fairly lean.

This article takes an evaluative stance<sup>1</sup> to examine how tracking and reporting the nuances of school business can affect and perhaps even alter the school environment in substantive ways. Understanding, from an evaluative perspective, how school information systems influence school or district operations, culture, and community relations allows us to identify areas for improvement in product functionality, implementation, and use.

It is premised on several assumptions:

- \* A school information system is designed to help school personnel perform their assigned duties.
- \* Communication within a school and externally with others is a primary function of a school information system.
- \* Data generated by a school information system are used in the context of multilevel decision making.
- \* School information systems differ in terms of type, functionality, and scope (Visscher, 1994).
- \* A school information system may be developed in-house or purchased directly from a vendor and then customized to local needs.

## **What Is a School Information System?**

Meaningful discussion of a school information system (SIS) and its effect on school and district life must be preceded by a definition of important terms.

A SIS is a specialized management information system (MIS) that “matches the structure, management tasks, instructional processes, and special needs of the school” (Telem & Avidov, 1994, p. 192). Like the traditional MIS, a SIS integrates data from multiple sources to provide the information people need to make important management decisions (Hicks, 1990, as cited in Telem & Buvitski, 1995). A comprehensive SIS manages a school or district’s key functional data including, but not limited to, enrollment, student and staff demographics, course enrollments, class schedules, attendance, disciplinary actions, special programs, grades, standardized assessments, and health information (Telem, 1996; Visscher, 1994). Less comprehensive systems address only some of these areas. Any number of customizable reports may be generated from the information a system stores. Most data can be exported for use in spreadsheets, word processors, databases, and statistical packages. High-end systems are modular, accommodate multiple users and multiple user levels, use advanced management decision models, and feature relational databases and other standard automation tools such as propriety word processors and spreadsheets, electronic archives, electronic mail, and electronic appointment books (Telem & Buvitski). Nearly all of today’s systems are Web-based (in whole or in part). Many may be configured to work seamlessly with other technologies, such as parental voice messaging systems (Bauch, personal communication, April 23, 1999).

A comprehensive SIS is both *data* and *information* driven. *Data*, according to Ramer and Snowden (1994), are collections of facts and figures, while *information* suggests answers to questions provided by a person or agency as a service to others. In essence, then, a SIS is a data-driven system that provides *easy access* to *timely* information that has *relevance* and *purpose*, with the intention of *empowering* its users. Such a system integrates several components:

\* *applications*: programs that provide an interface allowing users to access and manipulate computer resources

- \* *networks*: computers connected via sophisticated protocols that allow resource sharing (working in groups) and computer-mediated communications (communication with a work group); and
- \* *operating systems*: the set of instructions the computer uses to operate itself and its various input and output devices (Ramer & Snowden)

The growing interest in SIS's and the trend toward thoughtful, long-range planning for SIS implementation stem from the belief within the school community that such systems allow for better site and district management, empower staff at all levels, and increase a school or district's accountability to the community it serves.

## **The SIS Vendor Community: Current Implementations**

The SIS vendor community comprises both large and small companies. Though all SIS packages do many of the same things, each product has characteristics that distinguish it from its competitors. The two companies that effectively dominate the field are Chancery Software Ltd. (examples: Open District, Win School, Mac School, eClass; [www.chancery.com](http://www.chancery.com)) and NCS Pearson (examples: SASIxp District Integration; CIMS G/T; NCS ABACUSxp). Both Chancery and NCS produce modular systems that take advantage of powerful PC servers, high-speed networks, and open database technologies that replace (or, at a minimum, augment) traditional mainframes. School personnel work with familiar desktop applications that are platform independent. Many repetitive tasks (entering attendance, recording discipline issues) are automated. Both companies promote a distributed architecture that allows systems to be phased in over a period of months or years. Both provide technological solutions for districts of all sizes<sup>2</sup> and actively market home-school gateways (see, for example, Chancery's K-12 Planet; [www.k12planet.com](http://www.k12planet.com)) that promote parental involvement and ongoing communication with teacher and administrators. Finally, both companies are active participants in the Schools Interoperability

Framework (SIF)—an industry initiative to develop open specifications for ensuring that K–12 administrative and instructional software applications work together more effectively.<sup>3</sup>

Open architecture and the advent of the World Wide Web have brought competition and active marketing to smaller districts where individual staff members have broad and varied administrative responsibilities. Companies targeting the small district (and companies that can access and act on data stored in large mainframes) tend to produce less expensive products with fewer capabilities (Smith, Nansen, & Schouten, 1998) or promote products built on nonproprietary platforms. One company seeing increased sales is Eagle Software, owned by Jerry D. Lloyd, creator of the original SASI system. Eagle's main product, marketed under the AERIES label ([www.eagle2000.com/aeries.asp](http://www.eagle2000.com/aeries.asp)), overlays Microsoft's Access relational database. EDmin.com markets its Virtual EDucation System (V-ED) as an integrated suite of Internet-based software applications that allows classified and certified staff to draw on and customize data from a district or school's existing information system. At the heart of V-ED is the Student Portfolio and Assessment System (SPAS, [www.edmin.com/assessment/acsa.cfm](http://www.edmin.com/assessment/acsa.cfm)), which tightly integrates with district or state performance standards and lets educators build a database of assignments, tests, learning resource tools, and intervention strategies.

ACE Software markets a system known as ADM-2000 which comes complete with source code that allows users to “quickly add unlimited fields, screens, and menus” ([www.acesoft.com/itemlist.asp](http://www.acesoft.com/itemlist.asp)). Like its larger competitors, ADM-2000 is designed to run in multiple environments with many different configurations. Program designers heavily promote the product's responsiveness and customizability, attributing its ease of use to the fact that nearly all significant functions stem from reference tables.

The School Technology Management System, also built on Microsoft Access, is marketed by Schooltech.com ([www.schooltech.com](http://www.schooltech.com)), a small

U.S. East Coast start-up. Its two major components are the Comprehensive Attendance, Administration, and Security System (CAASS) and the Student Assessment Module (SAM). Modules automate attendance, scheduling, grading, document imaging, and student assessment. The parent connection is not automatic; rather, the CAASS development team can enable parents to access such student information as attendance and grades through the school's home page.

Some districts or schools opt to hire consultants familiar with new versions of popular general-purpose database applications in order to design their own programs. These custom programs boast functions and features once unique to SISs, for example, multilevel sorting, exportability, multiple data layouts, and relational databases.

A review of systems large and small suggests that vendors are increasingly interested in meeting a school or district's unique information needs. For example, COMPAnion Corporation ([www.companioncorp.com](http://www.companioncorp.com)) markets sophisticated network and Web-based solutions (under its Alexandria product line) for fully automating scholastic and corporate libraries. Increasingly, one finds campuswide information systems (CWISs), usually in the form of touch-screen kiosks, that allow students to access general and personal information and conduct a variety of financial or record-keeping transactions (Willis, 1996).

District officials throughout the United States recognize the importance of selecting a SIS that meets both their immediate and future needs. American Management Systems, Inc. (AMS) is an international firm that specializes in providing solutions through business and technology consulting, systems development, and systems integration services. In the early 1990s, AMS surveyed the 244 largest U.S. school districts in an effort to gauge their efforts in acquiring new administrative information systems technology (Kory, 1991). Even then, a decade ago, 28% of the 215 survey respondents indicated they were actively seeking a system that handled one or more of the three major administrative

processes: financial, human resources, and student information. Of these respondents, 17% acknowledged procurement of all three major application types. In 1997, the National Research Council's market assessment of research and technology (as cited in Chancery, 1999) indicated that nearly one-third of the information systems managers at the nation's 700 largest school districts intended to replace their district information systems by 2001. Approximately 65% of these managers reported interest in replacing their mainframe or midrange computers with PC-based systems to take fuller advantage of emerging technologies and improve their ability to respond to diverse (and sometimes conflicting) customer needs.

Clearly, market research, whether conducted by vendors<sup>4</sup>, school and district personnel, independent researchers, or the government<sup>5</sup>, confirms that technological advances have changed the perception of SISs. Today's customers are now keenly interested in:

- \* tracking school- and districtwide information, rather than just student information;
- \* developing and maintaining a profile of each student's entire academic career, rather than maintaining separate SIS's at each school level (e.g., elementary, middle, and high school); and
- \* using data to make decisions that integrate all facets of school and district life: financial, human resource, academic/curricular, assessment, facilities, and safety.

Even those districts and schools not yet financially able or willing to modernize their hardware or infrastructure are aware of the benefits of today's technologies. (These benefits include powerful servers, high-speed networks, and modular or open architecture that allow educators and school administrators to directly access the information they need through familiar desktop applications.) They recognize that distributed client/server systems, featuring servers placed at individual school sites, relieve data bottlenecks while retaining the hallmark benefits of

centralized mainframes: reliability and the ability to accommodate heavy use (Chancery Software, 1999). Customizable interfaces let users easily switch between various information types and screens. Platform independence and the ability to transfer data through the Internet broaden a school or district's choice of hardware and increase staff accessibility to information.

## **Effect on Administrative and Instructional Roles and Responsibilities**

Research suggests that most schools are bureaucratically, professionally, and politically complex organizations (Telem, 1996). Individual schools, even those in large districts, tend to employ a small pool of administrative staff who perform a broad range of functions. Telem (1996) suggests that a school is characterized by its "loosely coupled nature" (p. 87) in that staff members, though interdependent, do not exhibit strong interpersonal ties. Moreover, the school's subsystems and the functions within them are fairly insulated from one another. Leadership is diffused rather than concentrated, coupled with an inherent respect for professional autonomy (Telem, 1999; Telem & Avidov, 1994).

The introduction of a SIS has the potential to affect a variety of instructional and administrative roles and responsibilities. Positive change in these roles and relationships is but one of several outcomes associated with SIS implementation. According to Telem (1996), the information a SIS provides is integrative, timely, reliable, and easily accessed. Not surprisingly, such data can significantly affect interrelations among the five functionaries typically assigned to a school's instruction-administrative system: principal, computer administrator, subject coordinators (or department heads), homeroom teachers, and teachers. Telem's first report of his year-long study employed several qualitative research techniques, including nonparticipant observations in diverse settings, in-depth interviews with

key personnel, and a detailed content analysis of relevant documents. Analysis of the data revealed several trends.

\* Issues that were only occasionally or randomly dealt with before SIS implementation were regularly addressed “according to predefined mandatory regulations including mandatory timetables” (Telem & Avidov, 1994, p. 203).

\* Vertical and hierarchical relationships among the five functionaries became stronger, interaction was more frequent, and individuals became less autonomous following the SIS introduction.

\* Horizontal relationships among teachers also became closer, reflecting themselves in higher competition tempered by more intensive cooperation, teamwork, and joint planning.

\* The SIS, even when just partially assimilated into daily school life, created patterns of interaction reflective of the business environment.

The results of Telem’s original work were effectively substantiated in a more recently conducted case study (Telem, 1999) of this same school, although this effort focused more extensively on the roles department heads play. Supplementing more than 50 observations<sup>6</sup> were 72 in-depth interviews with a range of school functionaries and a content analysis of relevant documents<sup>7</sup>. The objective of the interview process was to identify and characterize information flow and changes in the interrelations among departments heads themselves as well as between them and other school staff. Telem’s analysis was based on several premises.

1. The management functions of department heads fall into six categories (accountability, evaluation of instruction, supervision, feedback, frequency of meetings, shared decision making)—each of which may be affected by the SIS.
2. Interrelations among school staff may be defined as vertical, hierarchical, or not yet apparent.

3. SIS effects may be measured by the extent to which such interrelations are tightened, loosened, or left unchanged.

Telem (1999) found that the SIS at the targeted school significantly assisted department heads in carrying out their duties. Moreover, department heads and other functionaries in the instruction-administration subsystem grew closer. It appears that teachers were more intensively supervised and evaluated; they better coordinated their activities; and they received more frequent and higher-quality feedback. Communication and accountability, however, were bi-directional. Teachers certainly expected to be held accountable for their activities, but in return, they expected to be continually informed about school initiatives and policies. A proactive stance toward information sharing allowed directives to be disseminated more rapidly and questions or concerns to be more promptly resolved. Firmer standards were enacted, allowing student evaluation to become more uniform. Among both teachers and department heads, autonomy and isolation diminished as well. Relatively unchanged, however, were the interrelations between department heads. Despite easy access to information and improved opportunities to exchange critical data, administrators remained reluctant to share unsolicited advice.

Telem and Avidov (1994) found that introduction of a SIS can lead to the new role of school computer administrator (though the position itself may take on a variety of names—for example, site lead technologist, technology resource teacher, or teacher-technologist). In some cases, this individual is a new hire with systems experience and specific technical qualifications. In other cases, a teacher or clerical person takes on the task. No matter who assumes this responsibility, the computer administrator tends to become the intermediary between the principal and other functionaries. Almost by default, this individual assumes a central role in the daily activities of the school's instructional-administrative subsystem. "Issues [the computer administrator] considered exceptional and/or demanding special attention were marked

... on the computerized reports ... [and he or she] followed up on whether and how those issues were dealt with” (p. 195).

Jesse Rodriguez (1997), director of information technologies for the Tucson Unified School District, believes that a thoughtfully planned SIS leads to positive changes in roles and relationships, both within and across a district’s schools. His experience with adaptive information systems illustrates how a SIS “that puts people’s needs first” (Rodriguez, 1997, p. 22) can impact a broad range of instructional and administrative roles. Connectivity, he argues, begins with people, not hardware, software, and peripherals. He touts the ways in which his district’s system has made communication between stakeholders significantly easier and more efficient. Former assistant superintendent Phil Bossert (personal communication, April 16, 1998) agrees, noting that “the very first thing [you notice] is that a tremendous load has been taken off everyone in the office.”

Research suggests that a successful SIS implementation leads to positive changes in information handling and flow, with data now made available at the individual level (e.g., information to students and teachers) and at the group level (e.g., summary data about classes). Telem and Buvitski (1995) found that school officials used system-generated statistical reports and comparative analyses in their daily activities and quite often initiated the production of special reports they considered necessary. As affected constituencies gained confidence in the reliability of SIS-generated reports, they became more involved in school- and student-related issues.

At the school level, a well-functioning SIS can positively affect the school principal and his or her specific task domains (e.g., clerical, management, strategic). Telem and Buvitski (1995) closely examined the roles of principals assigned to schools identified as vocational (Grades 9–12), academic (Grades 9–12), comprehensive (Grades 7–12), comprehensive-agricultural (Grades 7–12), and comprehensive religious (Grades 7–12). In-depth interviews were conducted, an informative

questionnaire was administered, and system reports were analyzed. The study's key findings included the following:

- \* Even partial system implementation led to broad changes in a school's technical system (a system shaped by such elements as equipment, facilities, knowledge, and techniques): Principals took the lead in both operating and promoting the SIS. Information handling became more standardized, and several regulations were developed regarding data entry, information production and retrieval, timetables, and confidentiality. More importantly, the ownership of information storage and distribution by school employees were virtually eliminated. The wide availability of information made its flow more efficient.
- \* Principals became heavy information consumers, with integrated system reports becoming the basis of decisions related to attainment of the school's objectives (sometimes referred to as *management control* issues) and articulation of the school's objectives, long-range planning, resource allocation, and design of instructional formats (sometimes referred to as *strategic* issues).
- \* Principals willingly took on a technology leadership role and used system reports to develop their relationships with parents and various community authorities and institutions.
- \* Principals were more aware of and quicker to respond to changes in student and teacher performance.

In other words, without adding to their workloads, principals became the equivalent of active hands-on managers running successful businesses. Taking the lead in initiating the SIS and guiding its implementation led to a more formalized method of information handling and a more dynamic flow of data. Staff members were encouraged to share information, allowing for distributed storage, and leading to increased confidence about their ability to make good decisions and solve important problems.

The news is not all positive, however. Visscher and Bloemen (1999) recently conducted a usage study that focused on the three SIS systems used by the majority of Dutch secondary schools. A set of four surveys was sent to approximately 500 schools: one survey designed for the school principal, another for the SIS administrator, a third for a teacher not involved in system administration, and the fourth for a clerk or secretary. Though the response rate was relatively low (195 respondents from 63 schools), and the schools themselves differed considerably on crucial variables (for example, extent and length of system use), the results may, in fact, reflect some common *initial* effects or outcomes with SIS implementation. Of particular interest to Visscher and Bloemen was the extent of system use and for what tasks, the respondents' opinions about system quality, and individual experiences (both positive and negative). Much of the analysis was positive, focused on users (rather than nonusers) who reported improved insight about school functions, better assessment of school performance, improved use of resources, improved internal communications, and better information for curriculum planning. On the negative side, however, were perceptions of increased stress and workloads. Also distressing was the fact that so little of each system's functionality was tapped and so few of the direct users were school principals and teachers. Both users and nonusers were relatively dissatisfied with the training they received; one-third of users reported dissatisfaction with technical assistance provided when problems occurred. A significant contributor to disinterest in regular module use was that the systems were poorly promoted.

## **Educational and Administrative Benefits of SIS Implementation**

Reported benefits of SIS implementation are largely anecdotal. As noted earlier, few empirical studies have been conducted to verify such claims. Nonetheless, the personal accounts are powerful, suggesting increased accountability at the classroom, school site, and district levels. "There's no excuse for teachers not to know what's going on . . . There's no excuse for the office not to know what's going on . . . There's no reason

for a kid to fall through the cracks,” comments Doug Boehme (personal communication, March 18, 1998), assistant superintendent of the Hilmar Unified School District. Bossert (personal communication, April 16, 1998), former assistant superintendent for the State of Hawaii, concurs, noting that “intermodule flags” allow schools to set “tickers” that are triggered by a broad range of events—for example, a GPA that varies by more than one point in a quarter, newly prescribed medications, divorce, a relative’s death, or a change in parental employment. Kory (1991) reports on the varied educational benefits associated with the implementation of an integrated SIS into a district of some 70,000 students in an area surrounding Annapolis, Maryland. Results from preliminary introduction of the system’s instructional components revealed substantial improvement in student performance in math and reading, as determined by the California Achievement Test (CAT). It appears that the system contributed to increased teacher effectiveness by automating the measurement of individual student needs, plans for meeting those needs, and performance tracking. In addition, the district reported administrative improvements related to financial discipline and control, access to key information, and timeliness in reporting.

Hilmar’s Boehme (personal communication, March 18, 1998) believes that implementation of a SIS in his district led to an improved instructional program for all students. “For us,” he explains, “savings in personnel costs became available for instructional materials. Instruction is the goal, after all.”

Tucson’s Rodriguez (1997) speaks more directly to a SIS’s ability to create learning communities. “[Our system] allows staff and students to take advantage of resources well beyond the classroom” (Rodriguez, p. 22).

A successful SIS implementation can change the image a school or district presents to its community. Boehme (personal communication, March 18, 1998) believes that his district now projects a sense of professionalism, something missing in years past. “Report cards [are]

finally on time, they are more comprehensive, and they have a consistent look.” The system-generated reports let teachers speak from knowledge, from a student orientation. “[Teachers] feel confident that they’re speaking from data ... not conjecture.” A SIS integrated with voice messaging—which allows administrators to program criteria that generate a call home—promotes parent involvement. Although the voice-messaging component of a SIS system may need to be well promoted to ensure its use, Bauch (personal communication, April 23, 1999) maintains that the benefits of parental access to student data appear to accrue across traditional socioeconomic and ethnic boundaries.

Boehme (personal communication, March 18, 1998) contends that experience with a SIS empowers teachers and fosters instructional self-reflection and introspection. “Teachers ... are constantly [using the reports] to evaluate themselves ... to determine if they’re falling into patterns that warrant adjustment of some kind.” He also feels that access to a common base of information encourages teachers to share information and to design systematic, holistic solutions to common problems they and their students face.

## **Challenges Associated with SIS Implementation**

The overall success of a SIS, whether implemented at the site level, across a district or county, regionally, or statewide, is predicated on several key factors:

- \* Development of a shared vision as a foundation for subsequent decision making
- \* Planning cycles that are comprehensive and long range
- \* Awareness of a SIS’s associated costs
- \* Recognition of resulting cultural changes
- \* Thoughtful and comprehensive training opportunities
- \* Recognition of data sensitivity

Each of these factors is briefly detailed below.

### ***Development of a Shared Vision as a Foundation for Subsequent Decision Making***

Walter Gibson (1991), former superintendent of the Exeter-West Greenwich Regional School District in West Greenwich, Rhode Island, believes that district- or schoolwide development of a shared vision is a critical first step. The process requires recruitment of individuals with a stake in the system's success as well as individuals with knowledge about computer technology and "a keen interest in the educational landscape of the future" (Gibson, p. 38). Committee members must be dedicated to doing their homework. They must elicit the information they need to define the district or school's data needs, programmatic as well as technical, and then develop the criteria that can form the basis for acceptable solutions. Only then should the committee embark on a systematic search for potential SIS vendors, according to Rodriguez (1997). Rodriguez also recommends that the committee submit a requirements document to each vendor it considers and insist that any product demonstration focus on those specifications. Committee members must also be willing to formulate a method for evaluating the system's performance and its impact on invested constituents.

### ***Planning Cycles That Are Comprehensive and Long Range***

Like Gibson, Kory (1991) argues that the selection and installation of a SIS must be treated like any other long-term infrastructure investment. Planning and implementation cycles of 7 to 10 years are not uncommon, according to Kory, and each phase should focus on issues of real significance to the school. The following high-level questions are relevant to long-term planning: Is the approach robust (i.e., based on the needs of all major institutional functions: financial, administrative, technical, and instructional)? Can the approach support alternate business models (centralized or decentralized)? Do the technical components have a track record of integrating new technology over

time? What is the likelihood that particular components of the infrastructure will become obsolete?

Thoughtful planning, then, means that the system's capabilities match both current and future needs—considerations that, at a minimum relate to usability, component integration, security, customizability, flexibility, accessibility, exportability, and upgradability.

### ***Awareness of a SIS's Associated Costs***

The success of a SIS is partly dependent on the degree to which the school or district is prepared to assume its financial costs. Says Boehme (personal communication, March 18, 1998), “All stakeholders must realize that technology planning is a long-term investment, one that more than pays for itself [over time] in terms of saved salaries and a better learning environment.” Boehme points out that costs can be divided into several categories—among them, software, hardware, training, and ongoing maintenance. District personnel must overcome a desire to cut costs or spend lavishly on one component at the expense of others. But Rodriquez (1997) warns that “skimping” on the hardware (e.g., purchasing low-end equipment or too little equipment) or the network on which the system runs can lead to installation of a SIS that will be poorly received and rarely or inappropriately used. Rodriquez recommends standardization of hardware wherever possible to reduce system maintenance costs. He also advocates the hiring (contractually or on a full-time basis) of one or more people with the talent and know-how to maintain the system.

### ***Recognition of Resulting Cultural Changes***

Contributing to the successful implementation of a SIS is the recognition of the cultural changes it may promote. Telem's (1997) close work with schools in technological transition suggests that the introduction of a SIS may propel changes in staff responsibilities, work and information flow, and performance and time management expectations. New personnel

roles may also be created, and new communication lines may be established. In essence, he argues, a SIS affects a school's psychosocial infrastructure (e.g., its human resources, group dynamics, communication lines, and leadership roles). Telem also points out that cultural change at the district or school level eventually affects the entire community. He calls for parents and other community members to be informed about the system and have opportunities to provide input as to their needs and access to selected portions of the database. As important, the community must be assured (and occasionally reassured) that the data and all system-generated reports are secure, accurate, verifiable, and managed under guidelines that adhere to ethical procedures mandated by the federal government (including the U.S. Department of Health and Human Services).

### ***Thoughtful and Comprehensive Training Opportunities***

Training is key to the successful implementation, says former assistant superintendent Bossert (personal communication, April 16, 1998). "A change this big can't simply be 'introduced,' and you can't simply train one person—the registrar, for example—and expect him or her to selflessly train others." Training that is valuable, he notes, must be holistic, consistently implemented, and ongoing. The goal is for everyone, from superintendents to secretaries, to feel comfortable with the system and bear some level of responsibility for its functioning. Administrators and staff must understand:

- \* how to use the system's outputs effectively,
- \* how to think in terms of *information* developed by the staff in the course of their work—not just numerical *data* compiled by the system,
- \* how to use the system to improve the school pedagogically as well as administratively, and
- \* how to become active seekers of information (rather than its passive receivers).

Superficial training can lead to reduced user satisfaction and limited system use, as demonstrated in a study (involving students enrolled in a university-level MIS course) conducted by Yaverbaum and Nosek (1992). They found that, while education and training typically lead to better understanding of the system, orientation that fails to match identified user needs and expectations results in remarkably little tolerance for system errors and functional shortcomings.

### ***Recognition of Data Sensitivity***

Finally, districts with successful SIS implementation track records are those whose staff members appreciate the sensitive nature of system-generated data. Both administrators and certified and classified staff must accept without question that some information in the database is personal and privileged and that access to this information must be limited to specific individuals with a true need to know. According to Telem (1996), strict criteria on the ethical and legal use of information, including data security, should be formulated and explained to school employees to prevent breaches of confidentiality and protect the safety of data. However, neither he nor other researchers delve into the strategies or criteria by which school officials determine which data are restricted and from whom. School officials with whom I spoke on condition of anonymity worry that information selectivity, whether intentional or unintentional, compromises the instructional process, allows negative stereotyping of particular ethnic and racial groups to persist, promotes consolidation of power among cadres of school officials, and allows a particular political agenda to flourish.

### **Conclusion**

As anyone who attends educational technology conferences can attest, the SIS market is clearly burgeoning. Growth in the market suggests that an increasing number of school officials (regardless of functional levels) rely on these systems as they plan for academic and professional

development programs and facilities management. The time is ripe, therefore, for well-structured evaluations that describe:

- \* the types of management activities or functions for which schools and districts typically use a SIS;
- \* the ways a SIS affects school or district decision-making processes;
- \* how a SIS affects communications within a school, between a school and the district in which it is located, and between a school and the larger community of which it is a part;
- \* how a SIS contributes to changed perceptions of information needs—specifically, from student-specific to comprehensive (e.g., school- or districtwide);
- \* how SIS automation affects the productivity of school and district personnel;
- \* how a SIS affects accountability at the classroom, site, and/or district levels;
- \* the effects of a SIS on administrative and instructional roles and responsibilities;
- \* the educational benefits resulting from SIS implementation (e.g., positive changes in how instructional programs are planned, delivered, and assessed for effectiveness);
- \* how a SIS affects teacher and administrator self-reflection;
- \* the challenges associated with SIS implementation, including creation of a shared vision and accommodation of cultural differences among constituencies;
- \* how school and/or district size plays out as a factor in SIS planning, purchasing, implementation, and maintenance;
- \* the effects of differential access to data among system users; and
- \* how a SIS affects the way information is packaged and disseminated.

With so much at stake, including our children's readiness for a fast-paced, technological world and team-based, highly competitive work

environments that call for incisive decision making and problem solving, such a research agenda cannot be ignored.

## **Contributor**

Marcie J. Bober is an assistant professor in the Department of Educational Technology at San Diego State University, where she specializes in program and product evaluation. Since 1995, she has served as lead evaluator on three Challenge Grant initiatives: Triton, ACT Now!, and Patterns—collectively, programs designed to stimulate effective use of advanced technologies in the classroom that result in improved student learning and student readiness for the 21st-century workforce. She is also the lead evaluator on Learning through Cyber-Apprenticeship, a technology-infusion grant (funded under the Preparing Tomorrow's Teachers to Use Technology, or PT3, initiative) targeting preservice educators/schools of teacher education. Dr. Bober is a frequent presenter at technology conferences focused on the design, development, and evaluation of technologies aimed at improvement human performance, and consults extensively with organizations interested in assessing the effect of technological interventions on organizations and their members.

## ***Contact***

Dr. Marcie J. Bober  
Department of Educational Technology  
MC-1182  
San Diego State University  
San Diego, CA 92182  
bober@mail.sdsu.edu

## **References**

Chancery Software Ltd. (1999). *Breaking the district reporting bottleneck: A guide to using open systems to manage student information*. Burnaby, BC, Canada: Author.

Gibson, W. (1991). Computer information system connects district. *AS&U*, 64(1), 38.

Kory, R. (1991) School district information systems: Infrastructure of the '90s. *School Business Affairs*, 57(5), 20–22.

Ramer, M. H., & Snowden, M. (1994). Using a management information system effectively for contract education programs. *New Directions for Community Colleges*, 85, 35–46.

Rodriguez, J. (1997). Building an adaptive information system. *The School Administrator*, 54(4), 22–25.

Smith, R., Nansen, C., & Schouten, J. F. (1998, March). Programs that manage: A look at the giants in school-management software. *Electronic School* [Online serial]. Available: [www.electronic-school.com/0398f9.html](http://www.electronic-school.com/0398f9.html).

Telem, M. (1996). MIS implementation in schools: A systems socio-technical framework. *Computers & Education*, 27(2), 85–93.

Telem, M. (1997). The school computer administrator's (new) role impact on instruction administration in a high school: A case study. *Computers & Education*, 28(4), 213–221.

Telem, M. (1999). A case study of the impact of school administration computerization on the department head's role. *Journal of Research on Computing in Education*, 31(4), 385–401.

Telem, M., & Avidov, O. (1994). Management information system (MIS) impact on the loosely coupled nature of a high school: A case study. *Planning and Changing*, 25(3/4), 192–205.

Telem, M., & Buvitski, T. (1995). The potential impact of information technology on the high school principal: A preliminary exploration. *Journal of Research on Computing in Education*, 27(3), 281–296.

Visscher, A. J. (1994). A fundamental methodology for designing management information systems for schools. *Journal of Research on Computing in Education*, 27(2), 231–249.

Visscher, A. J., & Bloemen, P. P. M. (1999). Evaluation and use of computer-assisted management systems in Dutch schools. *Journal of Research on Computing in Education*, 32(1), 172-188.

Willis, W. (1996). Student information systems are integrating more functions. *T.H.E. Journal*, 23(9), 12–20. Available: [www.thejournal.com/past/april/64tr1.html](http://www.thejournal.com/past/april/64tr1.html).

Yaverbaum, G. J., & Nosek, J. (1992). Effects of information system education and training on user satisfaction. *Information & Management*, 22, 217–225.

## Endnotes

1. There is no single agreed-on meaning of *evaluation*. For purposes of this article, however, the definition offered by Worthen, Sanders, and Fitzpatrick (1996) seems most appropriate: In their words, evaluation is “the identification, clarification, and application of defensible criteria to determine an ... object’s value (worth or merit), quality, utility, effectiveness, or significance in relation to those criteria” (p. 5).

2. The general consensus is that a school district with more than 25,000 students is large, although clearly the information needs of a 30,000-student district (Sweetwater Union High School District,

[www.suhsd.k12.ca.us](http://www.suhsd.k12.ca.us), for example) are dramatically different than those with hundreds of thousands of students (e.g., Los Angeles Unified School District, [www.lausd.k12.ca.us](http://www.lausd.k12.ca.us)). Midsized districts are those with enrollments between 5,000 and 25,000 students; small districts have student bodies of less than 5,000.

3. Participants in the SIF initiative include companies marketing software to manage school/district administration, libraries, food services, classroom instruction/curriculum, gradebooks, human resources, and finances. A corporate participant must sign a letter of support, actively participate in one or more of several working groups (e.g., cafeteria, transportation, infrastructure, reporting/data warehousing), and commit to shipping compliant product(s) within nine months after specifications have been released and compliance criteria have been defined ([www.siiia.net/sif/overview.html](http://www.siiia.net/sif/overview.html)).

4. See, for example, the white paper produced by participants of the SIF, available at [www.siiia.net/sif/news.html](http://www.siiia.net/sif/news.html), or an information piece prepared by Education TURNKEY Systems, Inc. for Chancery titled *Using Federal Funds to Purchase a Student Information System*.

5. Just one example of the government's efforts to promote systemic and systematic technology planning is *Technology @ your Fingertips: A Guide to Implementing Technology Solutions for Education Agencies and Institutions*, developed through the National Cooperative Education Statistics Systems with funding from the National Center for Education Statistics (NCES) of the U.S. Department of Education and support from the Council of Chief State School Officers.

6. in the principal's office, with support staff, in the teachers' lounge, and at staff meetings

7. reports, school policies and regulations, letters and memoranda between the principal and department heads, correspondence with parents

8. Modules used most often focused on assessment (student test scores, final examinations) and school finances. System use at the management level tended to be administrative; use for higher-order managerial purposes such as simulations or pattern analysis, was limited (Visscher & Bloemen, 1999, p. 186).