Management Information Systems in Educational Organizations

Frederick L. Dembowskl
State University of New York

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by Dr. Frederick L. Dembowski

In this article, great stress is placed on the concept of the management of the computer as a tool used in the administration of a school district. The reason for this emphasis is that the computer industry is progressing so rapidly in both technological advances and applications that by the time an article is written and published, it may be essentially obsolete. Because of this, it is very important to understand the role the computer plays in the management process. Thus, this article will begin with a general discussion of Management Information Systems (MIS) and then focus on the organizational and management aspects of computer usage.

Management Information Systems

Many practitioners believe that a MIS is only the computerization of the clerical and fiscal operations of a school district. Others think it is an ultra-sophisticated computer system that will provide answers and decisions for complex problems to managers at the push of a few buttons. Both of these beliefs are partially incorrect. The concept of MIS can be understood most fully by examining the three words management, information, and systems separately.

Management consists of the activities carried out by managers. They plan, organize, and control the major activities of the organization and initiate actions. The practice of management consists of the artful application of scientific principles to problem-solving in order to select courses of action that optimize the utilization of scarce resources in achieving the desired objective. Because decision-making plays such a major role in all of the functions of management, the MIS becomes a facilitating system for developing decisions in planning, organizing, controlling, and initiating courses of action. This yields the purpose of the MIS.

Dr. Frederick L. Dembowski is an associate professor in the Department of Educational Administration and Policy Studies and director of The Educational Management Institute at the State University of New York at Albany.

Information is the raw material needed for the decision-making process and is often confused with data, but there is an important distinction between the two concepts. Data are facts and figures that are not currently being used in a decision process. Files, records, and reports not under consideration are examples. Information consists of classified and interpreted data that are being used for decision-making.

A **system** is a set of two or more elements which are joined together to attain a common objective. A system may be further delimited into sub-systems. The sub-systems and elements work more effectively together in the system than if they were working separately. A computer consists of many components all working in harmony which is why it is often call a computer system.

Putting these three concepts together, MIS is the means for connecting the operating systems in an organization by the exchange of information. The computer is only one component in the MIS. The human element is another important component in the MIS. The administrator must take an active role in the design of the MIS as the principal user, and all the users of the MIS must be accustomed to accept the MIS and trained in its efficient use.

The MIS and Organizational Structure

In order for the development and implementation of the MIS to successfully occur, three changes must concurrently take place in the organization:

1. management must become systems-oriented and more sophisticated in management techniques;
2. information needs must be planned for; and
3. a system of informational flows must be developed which ties planning and control by managers to operational systems of implementation.

The MIS collects, analyzes, stores, and displays data to management decision-makers at all levels for the management of the resource flows of supplies, equipments, and personnel in the organization. The MIS raises management skills from the level of intuitive guesswork and "firefighting" to the level of systems insights, systems information, sophisticated data processing, and systems problem-solving. Thus, it is a powerful method for aiding managers in making decisions.

The overall job of a manager is to create within the organization an environment which will facilitate the accomplishment of its objectives. In doing this, the manager plans the work of his subordinates and his own activities, selects and trains his subordinates by staffing his operations, organizes the work and task relationships, directs the work, and control results by measuring performance against plan. Many managers make the mistake of believing that a MIS can be designed and made operational without an adequate management system. However, one is dependent upon the other. Without the firm foundation of a good management system, the MIS will not provide the manager with the information needed in the form, place, and time that he needs it in order to perform his job according to the specifications of the management system.

How does a computer fit into this scheme? There are several prerequisites for a modern, effective computer-based management information system. The first is the development of a management system of the organizational arrangements, the structure and procedures for adequate planning and control, and the other management functions. Second, there must exist data and information about the organization's goals, resources, policies, operations, plans,

and performance against the plans. Third, in order to process this data, it is necessary to have appropriate equipment that will a) provide the capability for rapid retrieval of stored data, b) process this information economically and at high speed, and c) enter information into the system, retrieve and display it in the form desired. These three activities are performed by the computer. A final prerequisite to an effective computer-based MIS is information management, a capacity for designing, maintaining, and managing the required systems and procedures. This function is performed by the software.

The Human Aspects of Management Information Systems

While the hardware and software in a computer-based MIS are important, the human aspects of the MIS are equally, if not more, important. There are at least three major facets of the human component of MIS that require attention: 1) overcoming resistance to the implementation of an MIS; 2) training for efficient MIS usage; and 3) managing the MIS operation. This section of the article contains a brief discussion of each of these aspects.

Without proper consideration of the behavior of the people in the office setting, the best technically designed system is likely to fail. This is because the introduction of a new MIS represents a threat in terms of the organizational relationships and psychological needs of the people in the office. Thus, the introduction of a new MIS in the office may be resisted unless proactive steps are taken to avoid this resistance. There are a number of specific reasons for implementation resistance:

1. Threat to status—a supervisor may be downgraded below a technician in the organization.

2. Threat to ego—a key skilled clerical job is performed by an unskilled computer operator.

3. Economic threat—fear of loss of a job.

4. Job complexity—a new microcomputer requires knowledge of the DOS, programs, etc., which have to be learned.

5. Isolation—the top manager feels he will be deprived of the "personal" information now gained when he is made dependent on computer output.

6. Superior/Subordinate relationships change—new information flows produces new balances between the superior and subordinate.

7. Job ambiguity and loss of control—planning and control is performed largely by the MIS except for special occasions that occur randomly.

8. Time rigidity—the total system requires "programmed" coordinated actions similar to a mass production assembly line.

9. Interpersonal relationships changed—former informal work groups and working relationships are broken up.

There are three actions that my be taken to reduce to perception of a threat from one of the nine causes listed above. First, a climate for change must be created by getting the managers and clerical staff dissatisfied with the present system. This may be accomplished by holding a series of meetings with discussions focusing on what is wrong with the present system and ways to revise the present system. Participants should be left with a feeling that changes were needed, that changes would be made, and that their views were being taken into account before any specific changes were made. Second, effective agents for change must be developed within the organization. Within any organization, there are informal leaders to whom

other members of the work group look for protection and security. These key actors must be identified and their support for the MIS must be gained. Finally, modify the organizational requirements as specified by the MIS to more closely fit existing arrangements if such adaptations enhance the effectiveness of the MIS. The "required" organization is a mechanistic technical organizational design. However, rearrangement of the organization into one that is not "technically" ideal may be made to achieve working relationships that are far more productive.

Once the resistance has been overcome, the staff needs to be trained in the use of the MIS, and the MIS needs to be managed on a day-to-day basis. The training that is required is dependent upon the type of MIS that is implemented. If the MIS is designed for the sole use of the manager as an extremely sophisticated desktop planning tool, the training required would most easily be accomplished by sending the single user to a training program at the local microcomputer dealership or college. However, if the MIS is designed for multiple uses by a wide variety of staff, the complexity of the required training is substantially increased.

Once the MIS has been implemented, and the staff trained in its use, the management procedures of the MIS deserves some attention next. Successful use of the MIS is dependent upon an infrastructure or supporting system. The first step in establishing this support structure is to specify a set of procedures to control how and by whom the MIS is to by used. This should include rules and decision standards for issues arising in every day usage: Who may use the machines and for how long? For what purposes? What work takes priority? How are support resources to be allocated? Remember that working on the microcomputer becomes addictive, and the same people that were complaining over its implementation are likely to be the same people complaining that they do not have enough access to it!

Another management task is providing any resources that the computer used may need to solve problems of implementation and use. Complete documentation of hardware and software is necessary. In-house consultants should be readily available because going outside is too time consuming and expensive. Encourage workers to help each other, share experiences, and engage in group problem solving. This may result in some lost time initially, but the rapid gain in computer expertise will rapidly make up for this loss. Information should be shared vertically with the management also. If encouraged and rewarded, management will discover problem areas and successes quickly enough to initiate timely action.

The third element in the support system is control an security. MIS equipment is vulnerable to accidents, theft, and misuse. There are a number of security concerns: 1) maintaining security of sensitive information when the MIS is in use; 2) securing the hardware and software from theft of vandalism; and 3) securing the MIS from accidental damage. The value of the information stored in files far exceeds the value of the hardware and software because hundreds of hours of staff time was invest in creating those files. Electronic storage media such as floppy and hard disks can be damaged by exposure to static electricity, electromagnetic fields, x-rays, high temperatures, bending, scraping, and fingerprints. Simple backup procedures for files and operating instructions for all personnel that come into contact with the MIS will help avoid a catastrophic loss.

Theft of misuse of information is an equally dangerous possibility. Procedures must be established for coding and

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protecting sensitive files, such as personnel data. Logs and signout rules for file users should be established. Where microcomputer systems are linked to mainframes, the problem of security extends to files maintained on the larger systems.

Security against theft or damage to the hardware requires both organizational support and physical resources. Users must be trained in the proper use of the equipment. The sugar content in a can of soda can erode the electrical connections in the keyboard, bringing all operation of the MIS to a stop until the problem is resolved. A single static charge can wipe out files on a floppy disk. Theft and accidents can be avoided by establishing and enforcing simple but reliable procedures. Hardware and software manuals detail many of the most common problems and how to avoid them. Physical security for the MIS installation may require additional hardware purchases, such as special microcomputer workstations that may be bolted to the floor and locked up after working hours. Placing floppy disks in locked file cabinets may be necessary.

Finally, the manager of the MIS should ensure that an adequate supply of printer paper, ribbons, print heads, daisy wheels, disks, fuses, etc. are maintained and readily available for use as needed. The complete list of needed supplies depends on the specific work site, but might also include dust covers in dusty areas, voltage surge protectors and backup power supplies, disk drive cleaning kits, anti-static sprays, binders for output and documentation, disk storage containers, special purpose printer papers such as labels, etc. The amount of supplies needed for computer operations typically exceeds expectations, so a reserve budget for these items is necessary.

The design of the operating environment of the MIS is as important as the design of the hardware and software aspects of the MIS, and the successful implementation and operation of the MIS is dependent upon the people that use the system. The manager of the MIS must attend to all these facets in order to gain the full benefit of the investment in the management information system.

Educational Considerations