MCGILL UNIVERSITY

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THE IMPACT OF INFORMATION TECHNOLOGY ON THE ADMINISTRATION OF SECONDARY SCHOOLS: PRINCIPALS' PERCEPTIONS

A THESIS SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF ARTS

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ABSTRACT

The study investigated the perceptions of secondary school principals concerning the impact of Information Technology (Intech) on the administration of secondary schools on the island of Montreal in the province of Quebec.

Principals believe that Intech applications are suitable for most administration tasks. They appear to be content with the amount of user documentation provided by the vendor and supplemented by the school board. The principals hold the opinion that while Intech does not threaten school administration jobs, it does not create many new jobs. Support from the governing bodies (in this case, the Quebec Ministry of Education) is limited and budgeting for Intech almost always presents a problem.

of There appear to be at least two types principals insofar as Intech use and application are concerned. The "enabling" principal provides а supportive environment to school staff for the proper use of Intech for administration purposes. The "nonenabling" principal is indifferent to Intech use in schools and actively attempts to avoid any and all contact. The study revealed the former are in a significant majority.

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RÉSUMÉ

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L'étude a examiné la perception des directeurs d'école secondaires en ce qui concerne l'impact de "Intech" (Information Technology) sur l'administration des écoles secondaires sur l'île de Montréal dans la Province de Québec.

Les directeurs croient que les applications de "Intech" conviennent à la majorité des tâches administratives. Ils semblent satisfaits de la quantité de documentation offerte aux utilisateurs par les vendeurs et complétée par les commissions scolaires. Les directeurs sont d'avis que même si "Intech" ne constitue pas une menace sérieuse pour les postes dans l'administration scolaire, Ça ne crée pas beaucoup de nouveaux postes. L'appui des agences du gouvernement (dans ce cas, du Ministère de l'éducation du Québec) est limité et le financement de "Intech" présente presque toujours un problème.

Il semble y avoir au moins deux types différents de directeurs quant à l'utilisation et l'application de "Intech". Le directeur "efficace" crée parmi son personnel une ambiance propice à la bonne utilisation de "Intech" pour des fins administratives. Le directeur "non-efficace" se montre indifférent à l'utilisation de "Intech" dans les écoles, et en évite même tout contact. L'étude a aussi révélé que les premiers types forment une majorité considérable.

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LIST OF ABBREVIATIONS

- BASIC Beginner's All-purpose Symbolic Instruction Code
- BIT Binary DigIT
- CAI Computer Assisted Instruction
- CAL Computer Assisted Learning
- <u>CBL</u> <u>Computer Based Learning</u>
- <u>CBT</u> <u>Computer Based Training</u>
- <u>CPU</u> <u>Central Processing Unit</u>
- <u>CRT</u> <u>Cathode Ray Tube</u>
- EDP Electronic Data Processing
- GIGO Garbage In Garbage Out
- IBM International Business Machines
- I/O Input and Output
- K Kilo or 1000 but 1024 in computer storage locations
- MODEM MOdulator-DEModulator
- RAM Random Access Memory
- ROM Read Only Memory
- VDU Visual Display Unit
- WP Word Processor

CHAPTER 1

INTRODUCTION

Nothing in all of education seems to shake more cages and create more debate than the word computer. Soft-spoken principals have been known to become wildly excitable at its mere mention, and teachers have developed paranoia at the thought of having to master these mysterious machines. Marshall and Bannon (1986, p. 270-286)

The microcomputer is a tool that generates a variety of emotions. Many people view it as a most significant advancement in our culture; others see it as the vilest assault on mankind. Somewhere in the middle, educators have to decide how technology can be used to enhance not only the educational but also the educational management process.

It is an inescapable fact of life that Information Technology (Intech), the combination of hardware and software into specific applications, is here to stay. Computers have penetrated into every facet of human activity. Business and medicine, engineering and biology, human kinetics and sociology, these and many more fields of study have made significant advances in the use and management of information and are employing computers increasingly. Berger, Burger and Kellner (1974) believed that Intech had become an "aspect of

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modernization that has particular characteristics that deeply affect people's lives."

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the appearance of motion pictures Since and phonographs, mankind has invented a chain of educational tools that emulate and extend the human mind. As Mecklenburger (1988) stated, "inexorably the parade's drumbeat is smaller, faster, cheaper, more capable, more reliable, and more commonplace." With each passing year computing tools have enabled individuals, families, and institutions to work more with words, music, sound, numbers and images, and to do so faster, more conveniently, more assuredly, and at less cost than the previous year.

Schools, and the field of education, have not trailed far behind in this parade. Intech is used for instruction and for administration purposes. Schools have grown in size and in the scope of their activities from their former small church-based status. Intech provides the mechanism for school administrators to keep abreast of increasing demands for current and documented information.

Secondary schools today are complex social organizations with many people fulfilling specialized tasks. The management and operation of schools have become more complex. As well, economic and social factors have adversely affected the ability to manage schools. These factors include: (a) shrinking

enrollments, (b) tight budgets, (c) an aging staff, (d) weak student performances in reading, writing and arithmetic, (e) a high dropout rate in high schools, and (f) increased racial tension where immigrant children form an increasing proportion of the school population.

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Faced with the task of administering schools within the confines of goals and expectations and limited financial support, administrators have turned to Intech and computer-based information systems. Yet, there has been considerable speculation about the positive impact of Intech on the functioning of schools. Few empirical studies in which the influence of this technology has been investigated exist. (Visscher, 1988; Isherwood and Blacklock, 1988)

Background to the Study

Scientists estimate that humankind has been on the Earth for a million years. If we were to consider that length of time as one year, then, on the same scale, the computer was invented a mere 36 seconds ago. Quoted in the Survey on Teachers and Microcomputers in the Protestant Schools of Quebec: An Overview of the Research. (May 1987)

In its early usage, Intech found its way into schools by replacing the pencil and paper in ledger keeping. Grade reporting and attendance accounting applications were developed. Later, Intech replaced the pencil and paper in solving the most complex of school technical problems. It was in the 1950's that schools started using mainframe computers to do administrative data processing.

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The promise the computer offered to education generally, educational administration and to in particular, had been a major topic of discussion in the mid-1960's. G. Ernest Anderson pioneered the programming of a fine school scheduling algorithm in the early 1960's (Grossman and Howe, 1965). With the Anderson algorithm and a mainframe computer, a school principal could improve the school's curriculum. In 1967, the well-known text The <u>Computer in American</u> Education by Bushnell and Allen was published. The authors claimed it was the "first definitive text on the potentialities and limitations" of Intech in education.

Some large schools and schools in large school

districts achieved the forecasted benefits from using computers. However, due to the high capital cost of equipment, the need for centralized service, and the cost and poor quality of high speed data transfer, the general use of the computer for administration work, and the resulting convenience and economy in its use, were not realized until the early 1970's.

In the 1980's, with the arrival of the personal computer, another technological revolution had occurred in schools. These microcomputers had large random access memories (for small computers), large disk capacity and a relatively "user-friendly" operating environment. In terms of instructional use, some schools aimed for an average of at least one computer per classroom.

The microcomputer provided interaction with data on a moment-to-moment basis. Two more texts <u>Micro-</u> <u>computers and Educational Administration</u> (Gustafson, 1985) and <u>Administrative Uses of Computers in the</u> <u>Schools</u> (Bluhm, 1987) were added to the literature on Intech in the mid-1980's.

The phenomenal growth of information storage and manipulation tools led several futurists, including Naisbitt (1982), to suggest a shift in the basic nature of society. The industrial base that focussed on hierarchical organization and memorization skills was transformed to an information base that concentrated on

the individual and globalization - the phenomenon of more widespread impact. The hierarchical model was replaced with the network model. Drucker's "knowledge workers" were using and applying information in their jobs (1977).

With the current exponential rate of growth of information challenging the human capacity to absorb it, the computer was seen by Rifkin (1983) as both the impetus for growth and the solution to the effective handling of massive amounts of information.

The School Principal and Intech

The school principal provides a vital link between a school and its governing body, be it an Orientation Committee (in Quebec), a staff council or a superior administrator. Developments in the school need at least the tacit approval of the principal. More typically, they require the principal's active involvement. The principal plays a crucial role in the success of the institution. According to Achoka (1990), the principalship is "one of the most important roles in all educational administration."

In his analysis of managerial work, Mintzberg (1974) described the administrator's work to be characterized by brevity, variety, and fragmentation. Similar observations were made in studies of principals (Wolcott, 1973; Peterson, 1977; and Kmetz and Willower, 1982). In Peterson's study, the daily activities of two

elementary school principals were observed over a period of 20 hours. Analysis showed that most activities took less than 2 minutes with 85% taking less than 9 minutes. Most of the principals' time was spent in advisement on procedures and schedules with teachers and students, and in simple clerical auditing activities. Less than 6% of the time was spent on planning and coordinating the school program and curriculum.

In general, a principal appears to play a dual role - as an "administrative manager" coordinating clerical activities and dealing with routine administrative matters and as an "educational leader" focussing on the development of a sound pedagogical program.

Visscher (1988, 28-35) p. thought that characteristics of the school would be major factors in determining the impact of Intech school on administration. But how do the principals perceive this technological evolution - the entry of Intech into their schools and offices, and the impact this technology has had on school administration?

Statement of the Problem

How do principals perceive the impact of Intech on school administration?

This study explored the perceptions of secondary school principals on three levels:

- Principals' perceptions concerning the impact of Intech in general.
- Principals' perceptions concerning the impact of Intech on school administration, and
- Principals' perceptions concerning training and experience needs of school administration personnel.

Limitations of the Study

- The sample was limited to the principals of Anglophone secondary schools in Montreal.
- The research was restricted to those principals and school boards who were willing to participate in the survey.
- Data were limited to the opinions expressed by the subjects concerning their perceptions in response to questionnaires and interviews, and brief observations made during field trips to the schools. The subjective nature of this endeavor must be considered as a limitation.
 Due to the limited sample, the results must be

generalized with caution.

CHAPTER 2

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LITERATURE REVIEW

This chapter contains an historical overview of Technology (Intech) the impact of Information on The overview includes some technical administration. details and advances in Intech over the years, the impact of Intech on administration in general and the impact on school administration in particular. The overview is global in nature and omits many technical details in order to capture and emphasize the major advances in Intech. The chapter concludes with a statement of the three research questions that guided this inquiry.

Historical Overview:

The Impact of Information Technology On Administration

The history of Intech began with human efforts to develop numerals and calculations. The first mechanical aid to computation was probably the abacus. In spite of its effectiveness, it was not widely adopted outside the Orient. Computations elsewhere were made with pebbles or more recently with the more familiar paper and pencil.

A quantum leap occurred as mankind progressed from "primitive" computing methods to mechanical computing means, and then on to electronic computing in this century. Rapid development took place. In quick succession came punched-card machinery, mainframe systems, microcomputer systems, local-area network systems, and now integrated office systems. Each of these is reviewed in turn.

1. Pencil and Paper Methods:

(a) Technical details and advances:

Mankind has used pencil (or quill) and paper from antiquity. In particular, paperwork mushroomed in business and government usage throughout the 19th century. (Szymanski, et al., 1988).

In the early 19th century, British astronomer and mathematician Charles Babbage (1791-1871) described a machine with the ability to do calculations. However, the mechanical-engineering technology of the time did not provide the reliability or speed that were necessary for efficient realization of his dream.

In the later part of the nineteenth century, the invention of the typewriter brought automation and increased production in the administration office. In the early part of this century, with the arrival of electro-mechanical technology, accounting machines and calculators appeared which added to the speed and efficiency of administration work.

(b) Impact on administration in general:

Prior to the arrival of writing and calculating tools (like typewriters and computers), pencil and paper were widely accepted for most administration and accounting work. They continue to enjoy a solid though grudging acceptance even today. Pen and pencil, and even slates for some, have proved quite effective over a long period of time.

(c) Impact on school administration:

In Quebec, early church-based schools (circa 1800) used the paper and pencil method for accounting. The method required little expenditure for equipment or for training. It was possible to produce hand-written documents for correspondence, transcripts and accounts. But the method was slow and lacked accuracy and precision. Also, the completeness and accuracy of records was questionable.

2. <u>Punched-Card Machinery</u>:

The impetus for the next step in data processing was the data collected in the U.S. census of 1880 that had taken almost a decade to process manually. This prompted Herman Hollerith (1860-1929) to develop a new system using punched cards to record and process the data.

In the 1930's, punched-card equipment developed by IBM was widely adopted for business data processing. By the year 1940 punched-card data processing had been

firmly entrenched in most business and government work. From the early 1950's to the mid-1960's, humankind witnessed the arrival and departure of the first (1951-59) and the second (1959-65) generation of computers.

But costs had not dropped so low as to prompt wide spread acceptance and adoption in schools. Punched card computer systems used assembly language code that was difficult to learn, and it required experts. Also, a human operator was required to reset relay switches and wiring physically before a computer program could be run. This technological achievement demanded a larger financial investment. It was more the province of industry than that of educational institutions.

(a) <u>Technical details and advances</u>:

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The first generation computers were powered by thousands of vacuum tubes. The size of these computers was large because many tubes were required to operate them. The tubes themselves were large also. They required much energy and generated considerable heat. The computer's primary memory was stored on magnetic Most data were entered into the computer on core. punched cards. In 1957, magnetic tape was introduced as a faster, more compact method of storing data. Computer output consisted of paper or punched cards. (Capron and Williams, 1982).

Early computers could run with relatively simple software systems. A loader and a library of subroutines was considered sufficient for most first generation computers. Some higher level business (e.g. COBOL) and scientific (e.g. FORTRAN) languages and compilers, as well as operating systems were developed. (Ralston ed. Encyclopedia, 1976, p. 1283).

The second generation of mainframe computers was based on transistors. Punched cards and magnetic tape remained the primary means for input whereas punched cards and printers formed the output.

The separation of hardware and software, the idea that software was superimposed on hardware in order to enhance its capabilities, persisted throughout the first and most of the second generation computers. It marked a departure from earlier punch-card systems where programs were wired - there was no software, per se.

Transistors used in these systems were smaller, less expensive, required less electricity, and emitted less heat than vacuum tubes. Also, fewer transistors than vacuum tubes were required to operate a computer. Transistors were not as fragile as vacuum tubes and they lasted longer. Since the components were smaller, the size of the computer decreased as well. (Capron and Williams, 1982). As the size decreased so did the costs. The transistors were being produced on mass scale.

(b) Impact on administration in general:

The first wave of computers permitted efficient processing of structured data in administration, such as, accounting and payroll applications. Typewriters were being improved upon with several sophisticated capabilities. In particular, early electric typewriters provided greater speed and accuracy in processing text.

Some people had unmerited fears that the impact of the computer would be elimination of clerical jobs. However, in actual fact, such unemployment was rare and isolated. Many institutions had experienced a steady or even increasing clerical force after computers had been introduced. But punched cards were inconvenient to useone misplaced card in a stack could result in hours of agonizing search and reshuffling.

(c) Impact on school administration:

Schools which adopted punched-card systems for data processing and handling reaped the benefits of improved efficiency and reduced costs in both accounting and administration work. This work was (and still is) viewed as capital investment. Also, the electronics technology available was not sufficiently advanced. As such, punched card systems were rarely used in school administration; they were more likely found in central offices.

The introduction of the transistor was a breakthrough in Intech. It was now possible to produce

a computer that was faster, physically smaller, more powerful, and more reliable. The important consequence was that it became possible to offer computers to schools. Intech could be adapted to school needs and used with some confidence.

3. <u>Mainframe Systems</u>:

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Integrated Circuits (ICs) signified the third generation of computers (1965-71). Two important developments took place - electronic devices and internally stored programs had been introduced.

(a) Technical details and advances:

As information and decision tools for management, mainframe computers had been under intense development since the mid-1960's. Integrated circuit "chips" were used for primary memory. Input and output were done on monitors and keyboards. Punched-cards lost their dominance as the major input or output device. (Capron and Williams, 1982).

A distinguishing characteristic of the third generation systems was that the hardware system was designed to operate under control of а rather scphisticated software system, and performed very poorly or not at all in the absence of such a system. In particular, the input-output functions and the management of central and peripheral storage were software system functions that were centralized and controlled. (Ralston, ed. Encyclopedia, 1976, p. 1284)

(b) Impact on administration in general:

Mainframe computers permitted the concentration of computerized accounting and administration procedures in one location. Multi-programming and time-sharing systems provided better communications and control as well as more efficient handling of information and data. They also provided timely information for decisions and helped managers project and analyze the effects of different alternatives.

(c) Impact on school administration:

Mainframe computers were smaller, more efficient, and more reliable than the punched-card systems. They could be used conveniently for school administration work.

Several schools (and school boards) were using time-sharing system services provided by commercial vendors. The costs of mainframe systems were still high. A few school boards (for example, the Protestant School Board of Greater Montreal) plunged ahead and installed mainframe computer systems. But their acceptance was not wide.

It was difficult for staff to attain technical mastery on mainframes. People dreaded the power and capabilities of mainframes. Wide acceptance among school principals did not come about instantly.

4. Microcomputer Systems:

(a) Technical details and advances:

Large-Scale Integration (LSI) circuits signified the fourth generation computers (1971 - present). LSI technology placed several thousand transistors on a single chip. This improvement was quickly followed in the mid-1970's by the development of Very Large-Scale Integration (VLSI) circuits. VLSI circuits made possible the rapid rise of the first microprocessor, and thus the microcomputer. This evolution hastened the creation of faster, more powerful micro-processors, such as the Intel 80386 and, more recently, the 80486 of today.

(b) Impact on administration in general:

Most common administrative functions are now being handled on microcomputers by the administration staff in schools. These tasks include accounting, inventory, planning, financial budgets and analysis, and word processing. The effect is better control of costs, better planning of expenditures, and a reduction of clerical time, bookkeeping errors, and paperwork.

(c) Impact on school administration:

Several schools are doing their accounting and administration work on microcomputers located within their schools. They no longer send this work to school boards to be done on mainframe systems.

Microcomputers have enabled schools to have better control of information. Information is more accurate, readily available, timely and complete. The perennial drop in the cost of microcomputers and storage devices is making them economically viable for most schools. While computer power has increased many fold, the price is now a fraction of what it used to be only a decade ago.

But computers can and do become a passion and an obsession for some of their users. Now, since more things can be done with a computer, more is expected to be done. It seems that the computer may have become an end in itself rather than a means to an end.

5. Local-Area Network Systems (LAN):

(a) <u>Technical details and advances</u>:

A Local-Area Network may be limited to a single site such as an administrative office, located in a building or spread across different offices located in distant places and linked by a modem. The heart of a LAN is a host computer whose disk drive holds applications software and files for the entire network. A LAN links together microcomputers to promote sharing and facilitate communication. (Bluhm, 1987, p. 269)

(b) <u>Impact on administration in general</u>:

A LAN provides reduced load on the host computer, quicker response time, easier access, and improved management reporting. Other purported benefits are

"cost-effectiveness, increased control over hardware and software, promotion of shared information, and increased storage capacity." (Bluhm, 1987, p. 269)

A LAN also can create the problem of maintaining consistency in programs and it may be complicated to use. Other users of computer networks (Spain, 1984, and Smith and Kaufman, 1985) have identified pitfalls, such as, a lack of an accepted standard for networking, lack of support from third-party vendors, lack of networkcompatible programs, difficulties in networking different brands of computers, electrical disturbances, heavy network demands, the risk of breaching private or confidential files, and unexpected costs and time delays.

(c) Impact on school administration:

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LAN systems have been adopted by a very few large school boards (such as, the Lakeshore School Board in Quebec). Due to information being available on-thespot, these school boards have direct and efficient lines of data communication with the schools under their jurisdiction. They have inter-active access to information.

A LAN system can reduce hardware costs because several computers and users can share common peripheral devices such as laser printers, hard-disk drives, color plotters, and modems, and users share the data. A school thus can be connected within a network and share

common resources with other schools or its parent school board.

A LAN can prove expensive due to the cost of transmission, software required, and the overlapping of equipment (such as disks in cases of replicated data bases). However, the LAN should be considered a capital as opposed to an annual operating expense, at least when it is installed. A LAN can operate for, say, a decade. In the long run, these costs may be recovered by efficient use of resources available.

A LAN must get the data to its destination, transmit the data correctly, and prevent unauthorized users from gaining access to that data. Schools possess confidential information, such as medical records about pupils and staff. Security is a paramount concern of educational administrators who are using or planning to use LAN.

6. Integrated Office System (IOS):

(a) Technical details and advances:

According to Tapscott, et al (1985, p. 13), a significant technological development pushing us towards integrated systems in the 1980's and the 1990's is the convergence of three traditional technologies:

- . computer technologies of data processing or management information systems
- . office technologies such as typing devices, photocopiers, microform and facsimile machines

. telecommunications technologies such as telephones,

telex, and private branch exchanges (PBX)

An IOS combines traditional office procedures, computers and telecommunications technologies. It includes the manmer in which information is generated, reproduced, copied and filed, and communicated within an institution. As Tapscott, et al. put it, these three technologies are converging to a point where it is difficult to discuss them separately. (See Figure 2.1) The 1940's (and earlier) were characterized by Paper and Pen Ledgers, the 1950's by Electro-mechanical Technology (or Unit Record Equipment), the 1960's by Electronic Technology (mainframe computers), the 1970's by Digital Technology (stand-alone personal computers) and the 1980's and 1990's by Integrated Technology including Local Area Networks.

Tapscott, et al. also give a useful list of 8 levels at which integration can take place. (See Table 1). Integration, as they see it, must be complete so that the effect is felt throughout the organization.

Szymanski (1988) postulated that "an office is not really fully automated until all the electronic elements are linked." IOS provides the links so that the equipment and people can communicate electronically through the network using electronic files and other data and hardware resources within an organization. Several departments thus share the data and equipment.



Figure 2.1 Evolution of Office Technologies

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Tapscott, Don, Henderson, Del, and Greenberg, Morley. 1985. <u>Planning for Integrated Office Systems: A</u> <u>Strategic Approach</u> Toronto: Holt, Rinehart, and Winston.

Table 1.

Eight Levels at Which Integration can Occur.

- 1. Integration of the tools, for example, so information can be taken from a corporate database; analyzed using a decision support tool; translated into graphic output; inserted into a text file; sent as a text message; with voice annotation on the message; and an automatic reminder going into a to-do list and tickler to follow up on the action item.
- 2. Integration of the media of data, text, voice and image, resulting in the notion of the compound document.
- 3. Integration over distance, so that the end-user can access the system from several locations.
- 4. Integration over time, leading to systems that can be upgraded and so evolve.
- Integration with other technologies in the office, such as photocopier/printers, microform, telephone systems or the corporate mainframes.
- 6. Integration with the social and environmental components of the overall work system, so that jobs, procedures, organizational structures and the physical environment are jointly optimized with the technology.
- 7. Integration with paper-based information systems (which will be around for some time to come) so that they can be managed and items found more easily.
- 8. Integration of the user interface the commands, graphics, format and language which stands between the person and the workstation. This integration reflects an underlying integrated software architecture enabling, for example, a universal presentation mode and consistent command syntax and semantics, where the word "read' means the same thing wherever you are in the system.

Tapscott, Don, Henderson, Del, and Greenberg, Morley. 1985. <u>Planning for Integrated Office Systems: A</u> <u>Strategic Approach</u> Toronto: Holt, Rinehart, and Winston.

(b) Impact on administration in general:

As computer, telecommunications and office technologies converge and mature, their potential to directly affect the work of all office personnel up to the chairman is being revealed. And when office systems are linked to production and transaction systems, decision-makers are put in closer touch with their institutions and their environment.

The impact of office systems is not simply to reduce administrative costs. They enable personnel and institutions to do things in new ways, and with the reinvestment of saved time, to do other things. (Tapscott, et al., 1985, p. 27)

(c) Impact on school administration:

IOS affects everyone in the school administration office. It can change a school's operation and make it more productive, efficient, and competitive. IOS reduces administrative expenses.

But, IOS implementation requires capital investment in hardware, allocation of resources for software development, institutional changes, and administrative skill in the smooth transition to electronic processing. Due to budgetary constraints, school administrators have not been able to justify the introduction of IOS in the sample schools.

IOS may involve integrating word processing with database management. This would permit administrators

throughout the school access to this subsystem. A problem in IOS implementation is the resistance faced when changing the traditional secretary-principal bond.

Some Relevant Studies

Using Intech for administration purposes in schools has received little attention in the educational literature. This is surprising because schools are spending considerable amounts of money and energy on computer applications for administration. Most schools and school boards realize that the most immediate and impressive gains in productivity are to be obtained from computerizing the administrative functions of the school system.

Intech has received a superficial and grudging acceptance in educational administration. Visscher (1988, pp. 28-35) observed that often the computer was used primarily by clerical staff and less frequently by school managers. He found little impact of Intech on administration of schools beyond the automation of former applications. He recommended further research to investigate the impact of computers in terms of labor guality and productivity.

Are educators supposed to take a leading role in setting the trends in a society? Bruner (1966) thought so. He stated that education by its very nature must take a leading role in providing the skills needed to manage and control societal changes. He felt that each

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new generation must redefine the goals of education.

But where are the educational leaders? Maddux (1988, pp. 35-44) took a pessimistic view. He felt that educational computing was suffering from the phenomenon of "leadership crisis". Educators were introducing Intech in their schools without regard to any logic other than expediency - as a stopgap measure to overcome an immediate problem. Seldom have educational leaders (i.e. school administrators) been held responsible for the problems in a school. Maddux thought there may be some incompetents worth purging among school board and school administrators.

For example, the Columbia Public Schools in the United States (Merriman, 1988, pp. 171-182) got on to the computerization bandwagon in the 1979-1982 period. They soon realized that "ventures of this nature require extra-ordinary communications efforts" on part of the implementors and users. As well, Maddux noted that administrators who had little or no interest or expertise in Intech were called upon to make crucial decisions about educational computing. He lamented that all too often this resulted in dismally poor decisions.

Yet, Mecklenburger (1988, pp. 183-187) warned the time had now come for educational administrators to "march in the electronic parade, not just to watch it 'emerging'."

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Unfortunately, most educational decision-makers

are hemmed in by their limited knowledge of Intech. Their awareness level is often restricted to the applications provided by the commercial vendors. Unless this knowledge barrier is broken, school-based Intech may simply take the role of a glorified record book or a sophisticated calculator, as noted by Visscher.

schools Intech in may be violating Also, established legal rights of students and teachers. For a long time, school administrators have toyed with the idea of complete automation of school administration. According to Wholeben (1988, p. 36), several issues like "instructional supervision, learning progress evaluation, human subjects rights and privacy, ethical deployment of resources" have to be confronted. For example, who will decide and what will go into a student database or student files, and who will have access to this information - the parents, the teachers, the principal, the school board, the future employer or the government?

Several authors (Helms, 1989; Case, 1988; Bloom, 1989; Montgomerie and Richards, 1988) have stated that computerizing school administration has many potential benefits. They include: (a) more efficient management and communications; (b) ability to store and manipulate vast amounts of student and administrative data such as class lists, student demographic records; (c) automatic generation of report cards, timetables / class schedules

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and library systems; (d) ability to produce current and accurate financial reports and documents; and, (e) ability to handle more smoothly other standard operational procedures, including electronic mail, payroll, purchasing, and budget planning.

Computers can be used to store, sort, organize, manipulate, and communicate large amounts of vital information. Montgomerie and Richards (1988, p. 6) have produced an excellent table (Table 2) of the possible administrative uses of microcomputers in schools. This model though not perfect is comprehensive. It includes the more important and most common uses of computers in school administration.

Table 2.

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Possible	Administrative	Uses of the	Microcomputer

Student Applications

- 1. Master timetable builder
- 2. Student scheduling
- 3. Report card generation
- 4. Grade and transcript generation
- 5. Daily and summary attendance accounting
- 6. Student and family demographic information
- 7. Health records
- 8. Guidance information
- 9. Instructional management
- 10. Test scoring and summary information
- 11. Tuition and fees statements
- 12. Student athletics
- 13. Individualized letters to parents or students
- 14. Student marks

Facilities/Equipment

- 1. Room locations/capacities
- 2. Room assignment/utilization
- 3. Equipment inventory
- 4. Equipment scheduling
- 5. Maintenance scheduling
- 6. Energy utilization/control
- 7. After hours facilities scheduling

Financial Applications

- 1. Budgeting/accounting
- 2. Accounts receivable/payable Library/Media Center
- 3. General ledger
- 4. Purchase order generation
- 5. Salary schedule analysis

- Personnel Applications
- 1. Payroli checks and deductions
- 2. Personnel records
- 3. Staff assignments
- 4. Certificate records
- 5. Health records
- 6. Tax information

Food Service

- 1. Cost analysis
- 2. Nutritional analysis
- 3. Food sales revenue accounting
- 4. Participation accounting

Research/Planning

- Applications
- 1. Budget forecasting
- 2. Bus routing
- 3. Statistical analysis
- 4. Test item analysis
- 5. Project planning/ evaluation (PERT)

Office Applications

- 1. Filing systems
- 2. Word processing
- 3. Mailing lists and labels
- 4. Supplies inventory

Applications

- 1. On-line catalog
- 2. Circulation
- 3. Cataloging
- 4. Purchasing
- 5. Access to public educational databases

_ _ _ _ _ _ _ _ Montgomerie, T. Craig and Richards, Donald M. 1988. The Evaluation of Complete Microcomputer School Administration Packages. Annual Conference of the Canadian Association for the Study of Educational Administration Windsor, Ontario.

The research of Kempen (1976) showed that successful automation depended on several factors such as: (a) the degree in which the goals of the automation process were clear, (b) the users participated in the process, and (c) the deadlines for the realization of (sub)goals like necessary activities and facilities had been determined.

To these, Visscher (1988) added his lament that the automation process often was not given the careful and well-considered attention that it required because of its complexity.

Isherwood (1985, pp. 5-9) has emphatically maintained that as administrative and instructional leaders in their schools, principals must be literate concerning the application of Intech for administration and instructional uses in education. With extensive acceptance of microcomputers and ease of access to mainframe computers, many principals already use a broad array of computer applications to facilitate their daily administrative functions.

In 1987, Samuels and Holtzapple-Toxey did a survey of school principals. They found that elementary school principals perceived the greatest need for training in computers. Secondary school principals believed they had low training needs and that they should not become computer "experts"; they wanted to be simply computer "users".

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Bahniuk (1983) recommended that administrators conduct a feasibility study to justify the investment in equipment to automate schools. In the same year, Patterson and Patterson urged that "before you become lured into automating everything", check to see if computerizing the administrative applications did the following: (a) save time and money, (b) yield more accurate and detailed data, (c) help in decision-making and (đ) free human energy for more productive They proposed that the criteria check-list activities. for computer selection should include at least: (a) software choice, (b) ease of use, (c) durability, (d) reliability, (e) documentation, and (f) expandability.

The buzzwords of the 1980's and the 1990's have been "office automation", "integrated office", "paperless office", "electronic office", and "office of the future". (See Glossary of Terms in Appendix). Several futurists, like Naisbitt, have created interesting scenarios of the times to come.

We have now reached a stage where the presence of microcomputers in practically all schools is an established fact. Beach and Vacca (1985, pp. 31-46) believed the degree to which Intech was successfully implemented and integrated in organizations appeared to "rest firmly at the administrative level". At the same time, they thought schools have lagged far beyond the Intech curve in making optimum use of computers for

administrative purposes. Few schools have used the full capabilities of Intech to increase administrative efficiency and to enhance the educational process.

Several groups want to have a say in school board policy making. Isherwood and Blacklock (1988, p. 339) thought computing policy development was one issue on which various work groups, interest groups, coalitions or individuals sought to gain power - to define board policy. Isherwood and Blacklock added another dimension - that of political pressures at work in one school board. They underlined the restraining nature of the political process in technological development within the school board.

As Long (1987) put it, discussion of the future and indeed current - impact of Intech frequently shed more heat than light. What has been the impact of Intech on the design and content of school administration jobs? How have communications and decision-making processes in schools been affected? Has the school principal's role change? Has Intech enhanced the effectiveness of school administration or increased its efficiency? The final word on these and many more questions is yet to be spoken.

Research Questions

The purpose of this study was to assess secondary school principals' perceptions of the impact of Intech on the management of school administration. A simple random sample of the principals of Anglophone secondary schools on the island of Montreal was taken.

This study sought answers to the following questions:

- 1. What were the school principals' perceptions concerning the impact of Intech in general?
- 2. What were the school principals' perceptions concerning the impact of Intech on school administration?
- 3. What were the school principals' perceptions concerning the training and experience needs of administration personnel in order to use Intech in schools?

CHAPTER 3

RESEARCH METHODOLOGY

In this chapter, the research methodology employed in this study is presented. First, the survey method is explained, the sampling is described and the criteria used in selecting the sample are listed. This is followed by a description of the instruments used survey mail questionnaire, personal interview and direct observation techniques. Finally, the reliability and validity of these methods and the statistical analysis done on the data are given.

The data were collected between January and March of 1990. It was subsequently entered into the IBM PC XT compatible computer and analyzed using the STATPAK statistical application software package. The data obtained from responses to the questionnaire and the produce: (a) interview were used to frequency distributions, (b) descriptive statistical analysis of data (means, medians, modes, standard deviations and variances), and (c) correlation and linear regressions. observations made during the field trips were The recorded and have been reported in text form where necessary and relevant.

The Survey Method

The purpose of the survey method is to gather data not available in published form. Several methods may be used to collect the needed information; one of these is a Mail Questionnaire. For the current study, the following approach was used: A random sample of 35 principals was selected to each of whom a letter and two questionnaires were mailed over a three-month period. The questionnaires sought details on (a) principal and school information, and (b) the principal's perceptions. A few weeks after the letter was mailed, the principal concerned was telephoned and an appcintment for an interview in his/her school was arranged. After the interview, a short tour of the administration area/s where computers were placed was requested. During this tour, the school's computer usage was observed. Where necessary further clarification of points raised or comments made in the questionnaire and the interview was sought during this tour.

<u>Sampling</u>

A sample is a subset of a population chosen to draw inferences about characteristics of that population. "The quality of the inferences drawn about the population characteristics from the sample data is directly related to how well the sample represents the population". (Pfaffenberger and Patterson, 1981, p. 13).

For this study, senior officers in the computer and data processing centres in the eligible Anglophone school boards on the island of Montreal were approached. They were presented with the original research proposal and the two questionnaires. Some preliminary information about the schools under the jurisdiction of these boards (including schools' names and addresses and principals' names) was obtained.

Selection Criteria:

The criteria for selection of principals for this study were as follows:

- Respondents must be principals of Anglophone secondary schools on the island of Montreal, holding full-time and permanent positions.
- Respondents' school must be publicly funded and must fall under the jurisdiction of a public school board on the island of Montreal.
- Respondents must be willing to participate in the study.

A random sample of 35 was drawn. In the final analysis, 30 principals who completed the questionnaires were interviewed. The data consisted of responses to questionnaires, responses obtained in interviews and notes of observations made during visits to schools. For the questionnaire, Likert-type questions were used. During the interview, descriptive responses were encouraged to the semi-structured questions. For the

observations, the computer hardware and software used by the principals and other administration staff in the schools were viewed.

Instrumentation - questionnaire and interview

Data collected included principals' perceptions of topics related to computer usage for administrative purposes in their respective secondary schools. The locations where the computers were placed and the usage (or lack of) by principals and other administration personnel were observed.

Mail Questionnaire:

Two questionnaires developed by the investigator were used in this survey (See Appendix D). The questions were partly derived from the Survey on Teachers and Microcomputers in the Protestant Schools of Quebec (May 1987). The questions were based on an ordinal measurement scale as follows: Strongly Disagree, Disagree, No Opinion, Agree and Strongly Agree.

The Principal and School Information questionnaire had questions about demographic information on schools. This included personal details and administrative experience of the principal. Confidentiality was ensured by assigning coded numbers to each questionnaire.

Personal Interview:

Universities and professional survey organizations conduct personal interviews to uncover people's views on issues. Pfaffenberger and Patterson (1981, р. 13) believed that in most situations, the best method for eliciting information from individuals was by the interview. During the interview, it is possible to establish and maintain rapport with the respondents or least to find out when rapport at has not been established. The interview also provides a means of checking and assuring the effectiveness of communication between the respondent and the interviewer. For these reasons, the interview was used as well in this study.

Personal contacts expensive, are more timeconsuming, and inconvenient for the interviewer than mailing out survey questionnaires. They rely heavily on the skill and competence of the interviewer/s. Semiinterviews are built around a structured core of structured questions from which the interviewer branches off to explore issues in depth. Information which is more accurate and complete may be obtained. It is possible to examine the underlying factors or the relationships which may be complex or elusive to straight-forward questions. Semiencompass in interviews require training and structured skill to probe at critical points and to avoid biasing tendencies. Many researchers combine the questionnaire

and interview approaches.

The interview protocol that was followed and a sample of topics raised at the time of interview are included in Appendix E.

Direct Observation:

The direct observation technique is perhaps the most expensive data gathering technique. The success of observation depends heavily on the skills of the observer, and the cooperation of the respondents. It is a very reliable method of investigation. A respondent may provide erroneous information on a questionnaire or even in an interview, but such lapses can be detected through observation.

Strictly speaking, observation is not just "watching" which is too narrow a view. It involves listening and reading and includes the full range of monitoring behavioral and non-behavioral activities and conditions. Emory (1976, p. 289) has classified these activities and conditions as follows:

- Non-behavioral observation which includes Record Analysis, Physical Condition Analysis, and Physical Process Analysis.
- Behavioral observation which includes Nonverbal Analysis, Linguistic Analysis, Extra-linguistic Analysis, and Spatial Analysis.

Non-behavioral (physical condition) and Behavioral

(non-verbal analysis) observation techniques were employed in this research (See Appendix F).

Preliminary Survey / Pilot Study

There are several advantages of a pilot study. Isaac and Michael (1977, p. 5) have listed the following:

- It permits a preliminary testing of the hypotheses that leads to testing more precise hypotheses in the main study. It may lead to changing some hypotheses, dropping some, and developing new hypotheses when called for.
- 2. It often gives the research worker ideas, approaches, and clues not foreseen before the pilot study. Such ideas and clues greatly increase the chances of obtaining clear-cut findings in the main study.
- 3. It permits a thorough check of the planned statistical and analytical procedures, thus allowing an appraisal of their adequacy in treating the data. Needed alterations also may be made in the data-collecting methods, so that data in the main study may be analyzed more efficiently.
- 4. It greatly reduces the number of treatment errors, because unforeseen problems revealed in the pilot study may be overcome in redesigning the main study.

- It may save the research worker a major 5. expenditure of time and money on a research that will yield nothing. project Unfortunately, many research ideas that seem to show great promise are unproductive when carried out in the field or laboratory. The pilot study gives enough data for the research worker to make a sound decision on the advisability of going ahead with the main study.
- 6. In the pilot study, the research worker may try out several alternate measures. He may then select those that produce the best results for the main study without some tentative evidence that they would be productive.

In this study, the original questionnaire for the pilot study was shared with three secondary school principals and two directors of school board data processing centers. These individuals completed the questionnaires and volunteered to be interviewed for the pilot study. Based on these contacts and the comments made therein, two of the instruments (the questionnaire and the interviewing protocol) were modified.

Since the study was carried out by one investigator, it was difficult to ensure internal reliability. "Internal Reliability" is the extent to

which multiple observers would agree. (Repp, et al., 1988). Regarding validity, the topics raised at the time of the interview were structured loosely and the respondents were encouraged to comment freely in giving their point of view. Pilot testing and subsequent instrument adjustments were deliberately attempted to improve upon the validity of the study.

Statistical Analysis

All analyses were done using the STATPAK statistical application software package using IBM PC XT compatible computer. Analysis of data included several descriptive statistics, including: (a) cental tendency or "averages" measures (mean, mode, and median), (b) frequency distribution or "spread" measures (standard deviation and variance), and (c) comparisons and relationships measures (correlation analysis and linear regression) on selected variables.

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CHAPTER 4

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ANALYSIS AND FINDINGS

In this chapter, the sample will be described and the major research questions of the study will be addressed. The data were obtained through the means of questionnaires, interviews and observations.

Description of the Sample

The sample consisted of 30 principals selected at random from amongst the Anglophone secondary schools on the island of Montreal in the province of Quebec. Virtually all the Anglophone school boards on the island were represented in the sample. These included the largest (Montreal Catholic School Commission) and the second largest (Protestant School Board of Greater Montreal). Tables 3 and 4 show the representation of schools in the sample from each school board and from each geographical location by postal code.

Table 3.

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Anglophone School Boards on the Island of Montreal and the Number and Percentage of Schools in the Sample				
School Board	Number Percent			
A B C D E F G H I	4 13.3% 2 6.7% 2 6.7% 4 13.3% 1 3.3% 4 13.3% 4 13.3% 4 13.3% 1 3.3% 6 20.0%			
10	30 100.0%			

Table 4.

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Location of Schools over the Island of Montreal.

Postal Code	Number Percent
H1	5 16.7% 2 6.7%
H3 H4 H7	1 3.3% 5 16.7% 4 13.3%
H8	2 6.7% 5 16.7% 1 3.3%
J3J4	2 6.7% 1 3.3%
 11	30 100.0%

Twenty-seven principals (90%) in the sample were male, only three (10%) were female. Most principals (60%) were less than 50 years old; some (37%) were 50 or more. Their administrative experience was mostly (73%) in the middle range (between 11 and 20 years) or low range (up to 10 years). Those with extensive experience (over 20 years) accounted for about one-fourth (27%) of the sample.

The average number of students in the secondary schools surveyed was 790 with one-third of the schools having 500 or fewer pupils, 37% having between 501 and 1000 pupils, and 30% having over 1000 pupils.

The sample schools had an average of 50 teachers on their faculty. About one-fourth (27%) of the schools had no more than 30 teachers, over half (53%) had between 31 and 70 teachers, and one in five schools (20%) had more than 70 teachers.

Most schools (77%) in the survey had few computers (from 0 to 6) dedicated for administration purposes; the remainder (23%) had more than 6 dedicated computers. Further analysis revealed that 40% of the schools surveyed had between 0 and 3 computers dedicated for administration use.

The vast majority of secondary schools (83%) used IBM or compatible computers; the remainder (17%) used Apple (or Macintosh) computers.

Figures 1 to 16 in Appendix G graphically depict these details of the sample as determined from responses

to the questionnaire on Principal and School Information.

<u>Principals' perceptions concerning the impact of</u> <u>Information Technology on administration</u>:

Principals' perceptions about Information Technology (Intech) affect the amount of support they are willing to provide for the use of this technology in school administration. It is assumed that if they are strongly committed to Intech, they will encourage its use; they will foster an enabling environment. In particular, we need to know their perceptions about the of available technology for educational aptness administration, the "friendliness" of this technology, the adequacy of accompanying documentation, the effect of technology on jobs, and the supportive environment provided by the controlling bodies, including their school board and the Ministry of Education.

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<u>Perceptions about the aptness and friendliness of</u> <u>available Intech applications for school administration:</u>

Several questions dealt with school principals' perceptions concerning the impact of Intech in general (Table 5). First, the majority of principals (77%) thought that available applications (scheduling, grade reporting, attendance accounting, etc.) met their needs. Only a few principals (6%) did not hold this view while seventeen percent had no opinion. In short, principals were satisfied with current in-place applications.

Table 5.

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Principals' Perceptions Regarding Intech in General and Their Commitment to Intech Mail Questionnaire Question Strongly No Strongly Disagree Disagree Opinion Agree Agree Necessary support from M.E.Q. forthcoming 33.3% 33.3% 20.0% 13.3% 0.0% Computers mainly support private enterprise 30.0% 66.7% 0.0% 0.0% 3.3% Jobs will be created by computers in administration 16.7% 43.3% 6.7% 30.0% 3.3% Computer technology increases users' workload 40.0% 33.3% 10.0% 10.0% 6.7% Computer increases individual autonomy at work 0.0% 16.7% 10.0% 63.3% 10.0% Computer documentation available is adequate 0.0% 13.3% 26.7% 53.3% 3.3% Computer applications commonly meet most user needs 0.0% 6.7% 16.7% 66.7% 10.0% Personal Interview Don't Not Some Lot/ know much what fully Future of computers 20.0% 0.0% 20.0% 60.0% Computers applied to fullest potential 6.7% 70.0% 3.3% 20.0%

Perceptions about the adequacy of Intech documentation:

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Documentation serves an important function in Intech usage. If documentation is clearly written, readily available and not too voluminous, it will more likely be used and, by implication, Intech will find greater use. In truth, the instructions that come with the hardware and software (already a sign of technical mystification) were frequently incomprehensible; often Intech made simple things unduly complex. When school principals were asked whether they thought that adequate documentation was available for current applications, over half (57%) answered in the affirmative, a few (17%) were in disagreement and some (26%) did not have any view. It appeared that available computer documentation did not entirely meet principals' expectations. School principals were divided on the adequacy of current documentation; some saw it as ample while others did not.

<u>Perceptions concerning the impact of Intech on the</u> administration work of secondary schools:

Intech was widely used for most school administrative tasks including attendance accounting, grade reports, and timetable scheduling. It seemed that principals had accepted this usage as a fact of life in their schools and had learned to depend on it. A few principals in the survey preferred not to use or understand Intech. They were dependent on their staff and subordinates.

Intech may permit users to do some work faster, and thereby provide time for other activities. Most principals (73%) stated that this was true. Some (17%) did not think so while ten percent had no comment. On the other hand, Intech may also increase a user's workload. Again, most principals (73%) believed that Intech did not increase users' workload; a few (17%) believed that it did while ten percent did not take a position. In other words, principals perceived that administrators now had more time for other activities. They also thought that technology had effectively reduced the secretary's workload. Since much of the former routine paperwork was handled by Intech, the school administrator and secretary could now concentrate on other aspects of their jobs.

Did the computer have a positive effect on school administration work? Most principals (77%) agreed that it did while some (17%) did not agree. Most (60%) also thought that Intech did not have any negative impact. But one-third (33%) found Intech had some adverse consequences. From the interviews, it appeared that this latter group blamed the computer whenever reports with erroneous data were produced. It seemed as if "the poor workman guarrels with his tools." Perhaps this was a case of finding an excuse to simply "pass the buck."

Principals pointed out that running an efficient school administration required consideration of a variety of factors. Nost of them (67%) agreed that the

proper use of Intech for school administration was one factor responsible for administrative efficiency. In the final analysis, the human side of administration made the difference. In fact, some (23%) believed that Intech had nothing at all to do with efficient school administration. Intech for all its worth was secondary to human activity. School principals thought that Intech was clearly just a tool whose careful application would depend largely on the people using it.

Perceptions concerning the impact of Intech on school administration jobs:

Was Intech responsible for the elimination or creation of office jobs? Most principals (60%) were skeptical about the job-creating potential of Intech in school administration. Some (33%) thought Intech was responsible for the existence of some new jobs such as data-entry operators. In effect, most principals were not ecstatic about the potential positive impact of Intech on the educational job market.

Principals did not expect that many new jobs would be created due to Intech. Also, most (90%) did not think that administrators would lose their jobs because of technology. Only a few (7%) thought that school administrators would lose their jobs.

It may be that the profusion of Intech in school administration came about because of a strong marketing campaign from private enterprise. An overwhelming majority of principals (97%) did not subscribe to this

point of view, however. They believed that Intech in school administration existed on its own merits and not due to the aggressiveness of computer marketeers.

Perceptions concerning the future of Intech and the effects of Intech on school administration:

Principals were asked several guestions to uncover their perceptions about the impact of Intech on school administration (Tables 6 and 7).

Most principals realized that Intech was not simply a passing trend in school administration. Intech was here to stay. The majority (83%) predicted that Intech would make work even more interesting for administrators in the schools. Very few (3%) did not think so; some (13%) had no opinion. School principals felt as positively about the impact of Intech on school administration as they had felt about its impact in general.

In the interviews, several principals (60%) expressed a belief that there was a far-reaching future for Intech which would affect administrators. The remainder (40%) were divided between those who saw little new future and those who saw no future for Intech. These few dissenters believed that Intech would not survive in educational administration for a long time.

Principals' Perceptions Regarding Intech for Administration Purposes in Secondary Schools Mail Questionnaire Question Strongly No Strongly Disagree Disagree Opinion Agree Agree Computers for administrative use is just a trend which will pass 73.3% 26.7% 0.0% 0.0% 0.0% Technology will make work more interesting for administration personnel 0.0% 3.3% 60.0% 13.3% 23.3% Administration personnel will lose their jobs due to introduction of technology 33.3% 3.3% 56.7% 3.3% 3.3% Computers cannot be useful for administration tasks 63.3% 36.7% 0.0% 0.0% 0.0%

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Table 6.

Principals' Perceptions Regarding Intech for Administration Purposes in Secondary Schools Personal Interview No opinion 1 2 3 4 > 4 Possibilities of computer applications for admin. use 10.0% 23.3% 40.0% 16.7% 3.3% 6.7% Don't know No way Some way Many ways Computers help in school administration work 46.7% 3.3% 0.0% 50.0% Computers hinder in school administration work 3.3% 60.0% 23.4% 13.3% Positive effect on school administration work 6.6% 16.7% 50.0% 26.7% Negative effect on school administration work 3.3% 60.0% 33.4% 3.3% Great deal Not really Somewhat Computers responsible for efficient administration 23.3% 66.7% 10.0% Many factors No opinion Some factors Factors to consider for computer in administration 33.3% 3.3% 63.4%

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Table 7.

Microcomputers and Intech have enormous power the power of doing considerable repetitive work in a relatively short time with low costs. But have school principals used Intech to the fullest capability? During the interviews, it was found that most principals (70%) thought that Intech had not been exploited to its fullest potential. Only 20% felt that it had been applied fully. Principals speculated that Intech could do a lot more. It was obvious that most principals saw a bright and prosperous future for Intech in which its fullest potential would be realized. However, in the interviews, it appeared that they were rather vague and unclear as to what exactly the future might hold.

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Perceptions concerning the support provided by the controlling bodies:

Schools in Quebec have depended on the Ministry of financial Education for support to conduct their pedagogical and administration activities. They have raised only a small part of their budget through local taxation. While principals were positively inclined towards the use of Intech, their efforts were hampered by the lack of corresponding support from the Ministry. Most principals (67%) thought the Province was providing little or no directly earmarked support for Intech in school administration. Some principals (20%) expressed no opinion on this issue while a few (10%) surmised that the Province provided sufficient support for Intech. School principals were forced to cut corners to find

funds from their annual operating budgets to invest in Intech - typically a capital expense. Not one principal saw Intech as a capital expense as opposed to an operating expense.

<u>Perceptions concerning Intech knowledge requirement and</u> <u>its impact on school administration:</u>

Principals' knowledge and understanding of the factors to be considered before introducing Intech for school administration use may affect its proper and effective utilization. These factors include costs, available personnel, and training. Several principals (63%) could name only a few such factors. Some (33%) could list several factors. If the principals vere inadequately informed or uninformed above Intech, they would likely make poor decisions. Their schools would not reap the benefits of this technology. The present study found that principals were not fully informed about Intech. This supports similar findings in the research literature. In 1988, Maddux (1988, pp. 35-44) that school administrators with little or no said interest or expertise in Intech were called upon to make crucial decisions about educational computing. He found that the awareness level of most decision-makers was often limited to the computer applications provided by commercial vendors. School principals in the present study were constrained by their limited knowledge of the available technology. They relied heavily on school board personnel or computer merchants for technical

support and guidance.

Consistent with their view that available computer applications met most user needs, principals emphasized that Intech was suitable for school administration work. This line of investigation was probed further during interviews. Most principals (67%) could easily enumerate at least two computer software applications used in school administration. A few (7%) could list more than four applications. Almost all (97%) thought that Intech was a useful aid in school administration. They believed that reports were more accurate and timely, and could be quickly produced. The majority (60%) were so positive about the impact of Intech that they could not think of any way in which technology had any negative consequences on the administrative work of their schools. The remainder said there was now greater dependency on Intech; these principals were bewildered when the tools of Intech (such as computers, disk drives and printers) were not in operation or when reports had produced manually. to be Effectively then, as one school principal put it "Intech appeared to be an irritant in the school administration work rather than a convenience".

Principals could be technically illiterate about Intech, yet, they could feel positively about its impact. Several were willing to create a supportive and enabling environment for Intech in their schools (Table 8).

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Table 8.
Principals' Perceptions Regarding Computer Training
and Experience Needs for Computer Literacy
Mail Questionnaire
StronglyNoStronglyQuestion Disagree Disagree Opinion AgreeAgree
     Strongly No
Staff should know pros and cons of computers
        0.0% 0.0% 3.3% 50.0% 46.7%
Principals should be good programmers
       30.0% 60.0% 0.0% 6.7%
                             3.3%
From the total sample of 30, the following results were
obtained concerning principals' use of computers at home:
Number
                           Percent
Use computers for:
-- word-processing
                   16
                             53.3%
-- spreadsheet
                    7
                             23.3%
-- database
                    6
                             20.0%
                             0.0%
-- telecommunications
                    0
-- systems programming
                    0
                              0.0%
                     3
                             10.0%
-- applications
-- other work
                     2
                              6.7%
Personal Interview
Not Some Great
                 really what deal
Principals need to be computer literate
                   6.7% 73.3% 20.0%
Principals should be able to develop computer policy
                   6.7%
                        53.3% 36.7%
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This study revealed that virtually all principals thought that the school administrative staff ought to know the advantages and disadvantages of Intech. In this case, a principal's lack of literacy with Intech would be balanced by a more knowledgeable staff. Many thought a principal should be a "jack of all trades and master of none." It fell to other staff members to become "expert" in the field of Intech.

It was observed that principals who felt positively about Intech made every effort to upgrade their technical skills and those of their administration personnel. They took a keen and continued interest in the professional development of their staff and also encouraged staff training programs in Intech. They provided an enabling environment for their staff. Principals thought vice-principals and secretaries could undertake a greater variety of work by using Intech.

During the interviews, most principals (73%) agreed that they ought to be at least somewhat literate in Intech. Some (20%) felt that they should know a great deal while a few (7%) said it was not important for them to know much about Intech. Overall, principals thought that at present they were not sufficiently literate in Intech; breath, in the same they acknowledged that they needed further training.

Why else do school principals need to be literate about Intech? One reason may be that they would be able to participate fully in the development of school policy

for Intech. Over half the principals (53%) emphasized that they should develop such policy. A few (7%) did not consider that it should be a necessary part of their job. Some (37%) thought that they should develop and implement school policy for Intech.

In employing Intech, it is one thing to apply the technology and another to develop it. Only a few principals (10%) agreed to a suggestion that they should be qualified programmers. The majority (90%) disagreed. In effect, principals saw themselves primarily as users, not developers of Intech.

Principals' use of Intech at home may have had a bearing on their perceived training and experience needs. If they used a computer at home, then their training needs might not have been as great. They might also be better aware of the possibilities and limitations of Intech for school administration use. Sample principals used microcomputers at home for the following purposes: word-processing (43%), spreadsheet applications (23%), database applications (20%), and programming applications (10%). Not one principal used the home computer for more advanced features, such as, data communications or systems programming. In effect, principals who owned home computers used them primarily for word-processing; for few used them other applications.

Some comments on the principals' commitment to Intech:

It was clear that Intech in school administration was a reality which principals were learning to live with. Some principals were openly supportive of Intech even though they were not developers of new applications. Most principals were "users." These same principals created an enabling environment for their coworkers to learn and master applications, applications that did reduce the drudgery in administration.

A few principals rejected Intech. They did not provide an enabling environment, they left Intech to subordinates without providing training or support.

Most principals provided an enabling environment in their schools for the use of Intech. They used Intech themselves and/or had their subordinates, such as vice-principals or secretaries, use it. They were committed to this technology and expected that it would be used properly, for example, for the generation of documents and reports. On the other hand, some principals were uncomfortable with Intech. They tended to delegate their work; a few even yielded some of their authority to their assistants in order to avoid contact with Intech.

A few principals who believed Intech played a limited role had avoided using it. They did not provide an enabling environment for the use of Intech in their schools. These principals left staff members to learn Intech on their own. In a few cases, expensive pieces
of Intech equipment deteriorated in school storage areas and gathered dust. In other cases, Intech equipment was either barely used or used much below its power and capabilities.

In general, principals held positive perceptions about the impact of Intech. They appeared to be genuinely committed to its use. They either used Intech themselves or required subordinates to use it. But, lacking technical expertise most could not envisage new applications in school administration.

CHAPTER 5

CONCLUSION

In this study, principals' perceptions concerning the impact of Information Technology (Intech) on school administration were investigated. For this purpose, a survey of principals of Anglophone secondary schools on the island of Montreal was done.

In the earlier chapters, the purpose of the study was stated, related literature reviewed, the research methodology described, and the analysis and findings presented. In this chapter, a summary and discussion of the results is given followed by some comments regarding their implications for practice and further research.

Summary and Discussion of Results

The underlying question of this study was, "How did secondary school principals perceive the entry of Intech in the administration offices of their schools and what was the impact Intech had on secondary school administration?"

It was found that secondary school principals on the island of Montreal had positive perceptions about the impact of Intech; many appeared to be committed to the use of Intech.

Intech is only a few decades old. Some secondary schools in Montreal began using Intech in the early 1970's. It would be unfair to state that schools have been slow in adapting to changing technology. In fact, some educational institutions embarked on the administrative technology bandwagon as soon as it became available in the marketplace, although perhaps not on as big a scale as industrial organizations.

The aptness and friendliness of Intech applications for school administration use -- as the principals see it.

Anglophone school principals on the island of Montreal clearly believed that Intech existed in school administration because it seemed to enhance, and perhaps extend, prior applications. They did not think that Intech used by administration personnel was a fad or was meant only to support either the computer industry or private business interests.

Intech documentation -- too much or too little?

Owston (1987, p. 52) has defined documentation as the "supporting materials and instructions that accompany the software, including the printed materials provided as well as the supporting information available on the screen." Whereas most school principals thought that microcomputer documentation was adequate, they did not necessarily imply that the documentation was useful or practical. All too often, computer manuals had been

conveniently stacked away on high unreachable shelves where they gathered dust and served no effective purpose. Frequently, it was sufficient for school personnel to use the summarized and customized quides prepared locally. At several large school boards, technical staff prepared condensed versions of manuals from the bulky originals that came with the original software and equipment supplied by vendors. These quides were made available by the boards to the schools under their jurisdiction. It appeared that the "condensed" quides found use, as one principal put it, due to their "translation into simple, understandable language".

The impact of Intech on school administration work -- principals' perceptions.

The tools of Intech provided the flexibility, accuracy and reliability needed in school administration work; principals perceived that Intech played a useful role in much of their work.

Principals' use of Intech at school was at most two hours per working day. Yet, over half the sample principals did not use Intech at all for administrative work, they relied on their secretaries who typically used Intech more than two hours per day.

It may be that the secretaries used Intech to create documents and reports that were not needed. They were increasing their dependence on Intech. But it was

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also true that most secondary school personnel were using Intech for production of quick and accurate reports. Some principals (and other staff members) however were obsessed with Intech; they were trying to automate "anything and everything". As Brown (1983, pp. 14-15) cautioned, "it may be tempting for administrators to organize the school around the capabilities of the computer system: should this be allowed to occur, school operations and attitudes might be adversely affected."

Principals felt that they had benefitted from the use of Intech for administration work. The responses on the survey questionnaire affirmed that there was no reason for them to think otherwise. In an earlier study (Tamblyn, 1988), principals felt that school operations and attitudes were enhanced since accurate and complete information could be shared with staff to help with the decision making process.

Principals thought there were many user-friendly software packages available in the market place. They believed that most needs of school administration could be readily fulfilled with the available computer applications programs.

As well, principals thought that Intech played a time-saving role when large amounts of data had to be manipulated. Montreal's public secondary schools had fairly large student enrollments (sample mean 790). This entailed large amounts of record-keeping and data-

handling needs. Intech thus found increasing suitability in secondary schools. It was capable of performing a host of multi-faceted tasks as well as the routine and mundane administration work of the schools.

Availability of Intech equipment may have a bearing on the perception of the principals. If Intech was available, it would be readily employed for administration tasks, and in that sense, principals may hold positive opinion about something which was readily accessible. Most Anglophone secondary schools on the island of Montreal had few computers dedicated for use by administration personnel. On average, there were 6 computers dedicated for administration uses such as grade and attendance reporting, time-tabling and library. It is the author's opinion that in the future, this proportion will certainly change. If the current trends are indicator, there will be more a good computers for administration use per school.

Most principals expected Intech to make work more interesting for school administration personnel. As well, they did not believe that school staff would lose their jobs due to the advent of Intech in secondary school administration. Not one principal agreed with the idea that Intech was not suited for administration work in the school. Principals and their staff had adapted to Intech; they found it to be an invaluable tool which had made work more challenging on the one

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hand and had not displaced staff on the other.

Principals in the survey perceived that Intech users had more freedom in their work. As one principal put it, users "could be as imaginative in their approach as they wished." But how creative and autonomous one became at one's work was limited only by one's own inhibitions towards and fears of Intech.

Montreal's principals felt enthusiastically about the positive impact of Intech on school administration work. However, with technology in a state of constant Ghange, it had become necessary to make planned and periodic adjustments in manpower training, physical plant layout and report formats. This presented a challenge for some and an opportunity for others. School principals who were computer "illiterate" found it a challenging task - more often a problem to be overcome. On the other hand, those who were computer "literate" considered it an opportunity to practice their skills and knowledge in integrating technology into their day-to-day work.

Principals who felt that Intech increased the users' workload quickly asserted that since more could be done due to Intech, more was expected to be done. In fact, the net workload had actually increased rather than decreased after Intech had been introduced in school administration.

Intech equipment set aside for the administration work in the school was typically located in the general administration areas as opposed to the principal's office. This was to be expected since the equipment had to be readily accessible to secretaries and other staff.

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Most sample schools used the IBM personal computer or compatible machines for administration work; a few used the Apple (and Macintosh) computers. As DeLamarter (1986) asserted, Big Blue IBM had "dominated" the computer business since the dawning of the age of modern computers in the early 1950's. It effectively faced "no significant domestic or foreign competition" that threatened this dominance. It enjoyed such overwhelming political, financial, and technological power that what competition it faced existed at its sufferance. In the author's opinion, in the future too, preference for IBM and compatible personal computers for administration use will continue in Montreal secondary schools.

The widespread use of IBM and compatibles in secondary schools reflected a mirror image of the trend in the industry. The power and capability of the Apple Macintosh computers had not yet propelled a need for their adaptation for administration work in schools. Invariably, IBM and compatible computers currently in operation in these schools were doing just fine. There was no compelling reason to switch to another brand. The philosophy, "if it ain't broke, don't bother fixing

it" seemed to dominate.

The impact of Intech on school administration jobs -- principals' perceptions.

Most principals in the sample were skeptical about the positive impact of Intech on the creation of new jobs in school administration. They thought that while Intech may make work more interesting and may result in a net increase in the amount of administration work, it may not necessarily mean that more jobs will be created in school administration.

In 1984, Rogers and Larsen (p. 189) said that Intech was an example of "two-tier society" with no mobility across the great divide. At the top were the society's entrepreneurs who lived in the industry's fast lane and at the bottom were the production workers for whom the new technology meant "low-wage, dead-end jobs." In public schools, few new jobs were created at the clerical level but there was a dearth of well-qualified technical personnel.

Principals speculated that school administration personnel need not feel insecure about their jobs due to the introduction of Intech in the secondary schools. In the same breath, they felt that Intech, on the whole, would bring some adverse effects on the job market, i.e. some low-level clerical jobs would in fact be eliminated.

The future of Intech and the effects of Intech on school administration -- principals' perceptions.

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In the past, educators generally had been led by industry when it came to adopting and implementing innovating technology; there were few cases where educators took a leadership role. (Martin and Willower, 1981).

Several principals in the sample had planned for increased use of Intech for administration purposes in their schools; others did not envision any significant Intech activity in the future. But, with the speedy advancement of Intech, it appeared from the comments made by some principals that they were actually trying to "catch up" rather than to "stay ahead". These principals had been intimidated by Intech; they were trying hard to stay abreast with developments in the field.

(1991, p. 11) thinks a sustainable Gellman advantage requires that organization an build а capability that "links one activity with another." Given the state of Intech use in Montreal's schools, they will need to "move up the hierarchy of information systems", that is, not simply to automate their administrative tasks but to enhance them too. Obviously, there is more to Intech than simply putting some computers for administration use in schools.

The support provided by the governing bodies -- principals' perceptions.

Generally, support funds from the provincial government to the secondary schools in Quebec for both capital and operating expenditures were channelled through the boards to which the respective schools were affiliated. School principals used their discretion in allocating their operating budgets. Some principals diverted these operating funds to the purchase of capital items, such as Intech equipment (including computers) by treating them as operating expenses. Strictly speaking, the tools of Intech were capital items to be capitalized and used over a period of time.

Perhaps, Intech should be institutionalized, that is, the computer department structured in a manner that it became an arm of the school administration upon which all personnel and departments could draw as a resource. This would prevent administrators from engaging in a constant search for money from fund raising, foundations and special grants. Intech deserved regular and continuing funding budget lines in the same manner as textbooks, supplies, and other educational resources. Probably, this was where the long-term solution to the educational funding dilemma lied!

Some school boards on the island of Montreal had made a major commitment to the use of Intech in their schools, both for instructional as well as for

administration purposes. Generally, schools (and school boards) in Quebec have been faced with competing claims on their resources. Yet, both have somehow managed to find monies to finance expensive acquisitions in the purchase of Intech equipment. This has changed, however, in recent years. Money for Intech equipment for schools has now become tight.

In 1989, Quebec's school boards spent only \$12.8 million (as against Ontario's \$70 million) on Intech hardware, teacher training and software development. Also, for Quebec's 1,035,247 students there were 40,000 computers versus Ontario's 1,828,963 students who had 101,392 computers (i.e. about 26 Quebec students per computer versus 18 Ontario students per computer.) (Swinimer, 1990).

Intech knowledge requirement and its impact on school administration -- principals' perceptions.

All principals in the survey favored the idea that staff in administration positions should know the pros and cons of Intech usage. Only a few principals said they should know how to program. Principals were aware that they needed to be computer literate, but not necessarily to become computer experts.

It was found from the survey that 43% of the school principals had microcomputers in their homes. In comparison, a survey on Teachers and Microcomputers (PSBGM - May, 1987) revealed that only 25% of school teachers had microcomputers in their homes. Like the teachers, the principals typically used them for wordprocessing. This in spite of the fact that Intech enthusiasts had promised "the new technology will do

more than merely replace the slide rule, the typewriter, and the filing cabinet." (Roszak, 1986, p. 60). Most principals used the personal computer as a glorified typewriter. Few secondary school principals (20%) in the survey used the microcomputers for other purposes, such as spreadsheet or database applications. Fewer still used them for programming applications or other work. Obviously, a lot remains to be said about the school principals' effective use of computers.

Ironically, several microcomputers were being used for little more than playing games. These machines had wasted their promise in "frivolous and lightweight" uses that had no serious relevance (Roszak, 1986). The shelves of high-tech retailers were, in fact, packed with video games, exercise programs, household budgeting, recipes and horoscopes. In 1986, Roszak (p. 171) complained that it was "the proliferation of such funware, gameware, and a great deal of junkware" that passed for the Information Revolution.

Tools of Intech had become part of the furniture in some school offices as they had become in some homes, and were being treated as such - to keep coffee mugs or ivory decoration pieces, for example. These "smart boxes" and "electronic wonders" had come to be used as sophisticated typewriters. In 1987, Samuels and Holtzapple-Toxey found that secondary school principals wanted to be simple computer "users" and not computer

experts. They were content in being able to do simple tasks - or in some cases, no tasks at all on their micro-computers.

Some comments on the principals' commitment to Intech.

All secondary school principals in the survey felt that Intech was here to stay. The common theme that emerged was that sooner rather than later every one would have to accept the inevitability of using Intech. Whether one liked it or not, the tools of Intech were by no means only a passing trend - they were here for good.

Montreal's secondary school principals considered themselves as overall supervisors of administrative (and pedagogical) activities in their schools. Some thought however that if they spent a lot of their time on the personal computer, they would be accused of abdicating their "real" responsibilities. They generally felt that they should not be "perceived" as spending too much time on the computer in the office. They were nonetheless committed to the use of Intech in their schools.

The "enabling" versus the "non-enabling" principal.

Most principals in the sample held positive attitude towards Intech. They had enjoyed the fruits of technology. Perhaps that was why they felt warmly about Intech. They encouraged the use of Intech and supported their staff in its increased use. In effect, they provided an "enabling" environment for the use of Intech

for administration work in their schools.

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There were some principals who, by delegating the decision-making tasks, appeared to be losing power and control over their schools. They could not provide the strong and effective leadership expected of them; it appeared that they were being led by their technically superior staff. These principals had not accepted Intech and were consciously and/or sub-consciously discouraging its use in schools. They did not provide an "enabling" environment for the use of Intech for administration work in their schools.

Many people want to use Intech to improve their personal and professional lives. Some of these people plunge easily into the Intech mainstream. For a lot of these people, as Joseph Weizenbaum of M.I.T. (1976, p. 169) once described, Intech is a "solution in search of problems." Then, there are others who would like to get into Intech, but they hesitate to take the plunge; they are scared that Intech is overwhelming, too technical, and too unfamiliar. Still others have these same fears, they are not at all attracted to Intech: and unfortunately, they are being pushed - that is, being demanded by their superiors or their employers to use technology.

Isherwood (1985, pp. 5-9) labelled the fearless user of technology amongst principals as "prince" and the rest as "paupers".

"The Prince can: work inter-actively with the database, generate reports from school that database with a few keystrokes, print report cards from the database, analyze questions about teacher practices, print mailing lists grading for teachers or groups of teachers, schedule the school from the school office, merge database reports with word-processing documents, answer student progress parents questions about or attendance, analyze student attendance over a span of years, re-schedule the entire school in midyear, and analyze teacher attendance patterns. In contrast, the Pauper is left to paper files, hand updating, printing report cards and attendance records on a cyclical basis, and maintaining multiple files for secretaries, counselors and administrators."

Continuing on the dichotomy of principals defined at the beginning of this section, i.e., the "enabling" vis-a-vis the "non-enabling" principals, it appears that the "enabling" principal is similar to Isherwood's "prince" whereas the "non-enabling" principal is Isherwood's "pauper".

Isherwood's modification of the above model.

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Isherwood (1991) has expanded on the above model with respect to the characteristics of school principals vis-a-vis their support for Intech. He feels there are really four types of principals - the "developers", the "enabling", the "acceptors", and the "not interested". The "developers" are, by far, the most advanced group of principals insofar as Intech is concerned. They know how to program and to resolve the technical problems related to Intech for their staff. They are highly knowledgeable about Intech and are in command of the technical side because they possess the necessary

expertise. The "enabling" principals meet some or none of the above criteria. They are also forthcoming in their support of Intech in school administration. They are villing and keen to provide the necessary tools of technology to ensure and encourage the proper use of these tools. They provide an "enabling" environment for use of Intech in school administration. The "acceptors" are those who have accepted the inevitability of Intech use in school administration. They are not unusually enthusiastic about the full-scale adaptation of Intech in their schools but are not making any serious attempts to discourage its use. They have accepted Intech in school administration as they have accepted other But they really don't feel any innovative ideas. personal commitment towards the efficient utilization of Intech in school administration. The "not interested" principals constitute a small minority in Montreal's Anglophone secondary schools. They did not want to be They did not want to have bothered with Intech. anything to do with it. They avoided the use of Intech. They were not interested in providing any support to administration staff who wanted to use it. In short, they were not only indifferent to the use of Intech in school administration work but where possible they actively discouraged the use of Intech in school administration work.

School principals come of age.

In the next decade, four out of ten principals who participated in the survey will be of retirement age. In the near future, school boards would have to plan staff training and recruitment programs for the new and younger group of secondary school principals which will replace the present batch. The perceptions of the new younger group of principals about the impact of Intech on school administration will be different too.

Overall, the principals in the survey had a short range of administrative experience. This group of principals (brought up in the midst of phenomenal technological progress) had grown up with a conscious or sub-conscious acceptance of Intech as part of their everyday lives. Given their experience, they had thus formed a favorable opinion of Intech.

Intech in school administration -- the principals' headache.

School principals in the sample had encountered problems of various kinds, such as inadequately trained personnel, computer down-time and seemingly long problems installation period. The persisted at different levels of the system life cycle including the introduction, development, implementation and maintenance phases. However, the problems did not remain. In a short time, they were satisfactorily resolved.

Often, problems associated With technology integration rested at the administration level. In this respect, Beach and Vacca (1985, pp. 31-46) felt it was the responsibility of administrators to ensure that Intech did not become the "exclusive domain" of one group of people. Intech use must permeate all groups of users in the school administration system. Intech could and did become a principal's nightmare if only some individuals or groups knew how to operate or maintain it.

<u>Impact of Intech on school administration vis-a-vis</u> industry.

Intech for administration use in the schools has achieved a grudging yet widespread acceptance in the last decade. Most secondary schools in the Montreal area obtained their first computer in the 1980's while few had theirs for more than a decade. This trend parallels neatly with the trend in the industry where microcomputer use increased in the early 1980's, too. The impact of Intech on school administration began to be felt at approximately the same time as it was being felt on industry in general.

Intech - does the survival of the school depend on it?

The overwhelming majority of sample principals acknowledged that Intech was of vital importance in their schools; only a few thought it had limited value.

Most principals thought that school administration in its present form probably would "not be able to exist without computers." For such reasoning, Roszak (1986, p. 67) had commented that the "survival power of the mind itself" had come to be concentrated in the devices of Intech. He cautioned that we ought to withdraw and reflect upon this "cult" of information that had become so important to us. For a few principals, Intech had became a way of life in school administration - perhaps the very purpose of school administration. Love it or hate it, it was omni-present and omni-potent and had made everybody its "slaves". There appeared to be an overkill - anything that could be automated was being automated. Perhaps such schools and principals were losing the human touch.

Our dependence on Intech is broad, deep, and intensive. This phenomenon causes concern and anxiety about using Intech ourselves, about dealing with the Intech around us, and about the effects of Intech on our society. Somewhere along the bandwagon, a moratorium may be required and a line may be drawn so that one can separate fact from fiction, reality from illusion.

Implications of Survey Results

From the survey, it was found that few females held positions as principals in the Anglophone secondary schools on the island of Montreal. This in spite of the fact that women had been in the teaching profession for

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a long period of time and in fairly large numbers. According to the Montreal Gazette (March 5, 1990), there were 11,450 teachers in Montreal's public schools of which some 65.4% were women, that is, about two out of every three. Yet, among school principals, department administrators and managers, women were outnumbered three to one. Affirmative action programs have a way to go before this discrepancy in top positions for women in secondary school administration will be overcome. It may be interesting to see if women as principals would perceive the impact of Intech on secondary school administration differently from male principals (since this survey was of primarily male respondents).

The principals' age variable can be looked on at three levels:

- a) by the end of this millennium several principals will be of retirement age - and these will be replaced by a new batch of principals,
- b) with the aging population of school principals in particular and the coming of age of the baby boom generation in general, the present plateau of retirement age at 65 known as the "golden age" may have to be re-examined and most likely increased to an older age,
- c) having had enjoyed the fruits of Intech in their lifetime, the survey principals felt

favorably toward its use in school administration.

As school principals and other administrators were beginning to be more adept in the use of Intech they were expecting that more tasks could conceivably be done using Intech. Their expectations were growing. Intech was fast becoming an integral part of the school system, and administration personnel were coming under increasing pressure to use the tools of Intech.

The survey principals mused that the IBM brand was selected because it was readily available. A few principals thought that they had been guided by software considerations. But they knew all along that their respective school boards had purchased all Intech equipment on their behalf. In fact, they had little choice but to accept what was provided to them.

The perception about Apple Macintosh personal computers had not changed. Apple continued to be viewed as an "educational" computer whose use in schools was suited for pedagogical purposes mainly. IBM and compatible computers, on the other hand, continued to enjoy wide acceptance for use in school administration.

Implications of findings for practice.

Few females held positions as principals in the Anglophone secondary schools on the island of Montreal. The "man in the principal's office" (Wolcott, 1973) is indeed a man. The female teacher in the classroom or

the female secretary in the administration office may never become the principal or the top administrator in the school or the school board. But, Naisbitt (1932) thinks the trends are changing. It would be interesting to see if the female principal or administrator would perceive the impact of Intech on secondary school administration differently from the male principal administrator.

The principals' age variable will require new and different approaches. Principals' retirement age of 65 may have to be increased to an older age.

The current batch of principals had enjoyed the fruits of Intech in their lifetime and felt favorably toward its use in school administration. The new batch would have had even greater experience with Intech, and would perceive its impact on school administration in a much wider sense.

School administration personnel are already using the tools of Intech on a regular basis. Continued widespread use will increase their dependence on them. The most important implication for practice would be for vendors to ensure that these tools are simple and reliable to use. The role of computers will not be seen as simply a tool for the collection of data and information. Computer generated support systems are no replacement for educational decision makers, rather they are a means of adding to the process of creativity