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THE INFLUENCE OF EXTERNAL ENVIRONMENT, ORGANIZATIONAL STRUCTURE, LEADERSHIP STYLE AND ORGANIZATIONAL CULTURE ON THE IMPLEMENTATION OF COMPUTER TECHNOLOGY IN AN ELEMENTARY SCHOOL SYSTEM

by

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B.A., University of Waterloo, 1980
M.A., University of Windsor, 1984

A Dissertation
Submitted to the Faculty of Graduate Studies through the Department of Psychology in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy at the University of Windsor

Windsor, Ontario, Canada
1990
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ABSTRACT

The purpose of the present study was to investigate the influence of organizational factors (i.e., external environment, organizational structure, leadership style and organizational culture) on the implementation of computer technology in a school system. It was proposed that organizational factors unique to the individual schools within the system would influence computer usage and acceptance; specifically, the organizational structure, the principal's leadership style and the organizational culture which s/he creates in the school. At the individual level of analysis, teacher involvement in decision making regarding computers, teacher training/expertise and teachers' attitudes toward computers were investigated.

Respondents were 140 teachers, 10 vice-principals and 18 principals from an elementary school system. Eighty-one of these also participated in structured interviews, as well as five school board superintendents, 2 board staff with computer expertise and 5 trustees.

The content analysis of the board and staff responses indicated that the operating environment of the school board was bureaucratic in both its leadership style and organizational culture. Schools were classified according to culture types—authoritarian, bureaucratic and participatory—on the basis of a structured interview. The findings suggested that the culture groups did not differ on the computer usage and acceptance measures. The bureaucratic culture and leadership style at the environment level was discussed as one factor limiting the use of computers in the schools.

At the individual level, teacher involvement in decision making regarding computers, teacher expertise using computers and adequate training were found to be good indicators of high computer usage.
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Finally, I would like to dedicate this dissertation to my Mother, Helen Schmidt. I thank her with all my heart for her unwavering support (both emotional and financial), encouragement and faith in my ability to complete the dissertation.
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CHAPTER I

Introduction

The implementation of computer technology in schools has not proven to be as successful as was initially anticipated. While many schools have acquired the technology, very few are fully utilizing computers. This dilemma has been addressed by researchers and practitioners alike, each supplying rules to follow and plans for success. These premeditated plans may indeed be part of the reason why schools have not been successful in computer implementation. It is proposed that factors unique to each individual school and school board must be considered prior to implementation. Only then will there be an accurate assessment of the requirements necessary for success in each school setting.

The present study proposes that four factors are influential in the implementation of change in the school setting. They are the external environment, the organizational structure, leadership style and organizational culture. The external environment is defined here as the set of organizational systems (e.g., the market, customers, technology, government regulations and larger social culture) with which the organization interacts (Nord & Tucker, 1987). Organizational structure is defined as the enduring relationship patterns among individuals, groups and units within the organization (Miles & Snow, 1978). Leadership is defined as the process by which the leader steers group members toward common, shared organizational goals (Bryman, 1986). Organizational culture is defined as the set of shared understandings (i.e., beliefs, values, norms and ideologies) jointly held by organizational members (Sathe, 1983).

Investigating these particular factors within a systems model of organizational functioning will lead to a more complete understanding of successful
or unsuccessful implementation of computer technology. The present research investigates individual schools' usage and acceptance of computers, utilizing an applied social psychological framework which takes into consideration three levels of influence—the environment, the organization and the individual.

The first section of this chapter explores the theoretical background for each of the four variables outlined in the proposed model (i.e., environment, organizational structure, leadership style and organizational culture). While it is assumed that they are mutually influential, the majority of past research has focused attention on one variable at a time. Thus, in this first section, the impact of each of these four variables on organizational change will be discussed separately.

The second section of this chapter applies this organizational research to the educational system and to the implementation of a specific change in the school system, namely, the introduction of computer technology. In addition to organizational factors, individual level factors which have been found to influence the change process will be introduced in this section.

Theoretical Background

Figure 1 illustrates the proposed relationship among the organizational factors. The four influences (environment, structure, leadership and culture) are interrelated in that the environment dictates the type of structure which, in turn, influences the optimal leadership style. The leader is seen as the prime determinant of organizational culture, and finally, the organizational culture influences the implementation of change. To a lesser extent, the leader is thought to influence the organizational structure and the organizational structure influences organizational culture. The model, which incorporates all four dimensions, was proposed in an effort to better understand
Figure 1. Four key factors influencing the implementation of change.
organizational change (see Figure 1). This model integrates the research from two disciplines, organization theory and organizational psychology.

**External Environment**

The consensus among researchers from a variety of perspectives is that in order to function effectively, organizations must engage in a continuous process of interactions with the external environment. The organization must satisfy a multitude of stakeholders, each of whom has varying demands. Environmental domains include the government, economic conditions, technology, the market, financial resources, human resources, raw materials and industry (Daft, 1983). Each of these domains presents the organization with information critical to effective operation. The ability of the organization to respond effectively to changes in these external domains is strongly influenced by the extent to which such changes are predictable (i.e., environmental uncertainty).

This focus on the environment has shifted the research on organizational functioning from a static to a dynamic approach. In an attempt to find the "best" way to manage organizations, early theorists tended to focus on organizations as self-contained units and consequently ignored the effect of the environment (Taylor, 1911; Weber, 1947). Contingency theorists, in contrast, believe that organizational behaviour is largely determined by environmental conditions which place demands on the organization. Thus, "organizations whose internal features best match the demands of their environments will achieve the best adaptation" (Scott, 1987, p. 88).

The current model is based on an open systems perspective which considers factors both internal and external to the organization and their interrelationships. Scott (1987) stated that the open systems perspective "stresses the reciprocal ties that bind and relate the organization with those elements that
surround and penetrate it" (p. 91). Thus, the organization is a dynamic system which interacts with its surrounding environments and adjusts and readjusts to meet ongoing demands.

The process of contact with and assessment of the external environment is essential to the successful functioning of the organization. Environmental uncertainty, which is the extent to which future events cannot be accurately predicted by an organization, has been a prominent theme in the organizational change literature (e.g., Burns & Stalker, 1961; Crozier, 1964; Cyert & March, 1963; Duncan, 1972; Lawrence & Lorsch, 1967; Pondy & Mitroff, 1979; Thompson, 1967). An organization may be uncertain about future realities and have difficulty interpreting the demands made by external organizations (Pfeffer & Salancik, 1978). Monitoring or boundary spanning activities (Adams, 1980) provide information about obtaining new inputs and selling outputs, and function as an interface or buffer between the organization and entities external to it. Essentially, the organization must monitor those groups with which it interacts to make certain that they continue to supply necessary goods or services and to ensure that changes in the environment are recognized as such by organization members.

Increasingly, organizations are faced with uncertain external environments. In response, organizations open to change will meet the demands from these environments. There are various mechanisms which organizations may employ to achieve an openness toward change. Miles and Snow (1978) found that organizations operating within uncertain environments were likely to support employee involvement in decision making, less formalized job design, rapid program innovation, increased communication among employees, self-contained tasks, increased environmental monitoring (Galbraith, 1973; Thompson, 1967), lower task specialization, and less internal
consensus (March & Simon, 1958). Thus, diversity or uncertainty found in the environment may actually be beneficial, as diversity fosters opportunities for change (Pondy & Mitroff, 1979).

Organizations may modify structures to meet challenges posed by uncertain environments. Miles and Snow (1978) stated that certain (or predictable) environments were more likely to be linked with organizations that were "more bureaucratized, stable, centralized, homogeneous and introspective" (p. 254). Uncertainty, on the other hand, tends to foster decentralized, less formalized organizations (Pfeffer & Salancik, 1978).

Lawrence and Lorsch (1967) described how different environments affected organizations and their subunits. They studied high performing organizations in three environments—plastics, food, and container industries. According to Lawrence and Lorsch, to be successful in an unpredictable environment, organizational subunits (e.g., marketing, sales, etc.) must be differentiated yet integrated. Individual units within an organization have differing time perspectives (e.g., long or short), different market orientations (e.g., product quality or customer needs) and differing interpersonal styles (e.g., management style). The difficult task for the organization is to integrate these diverse subunits. As organizational cohesion is especially important during the implementation of change, the successful organization maintains subunit diversity, yet is able to function as a cohesive organizational unit. This cohesiveness facilitates the response to change.

Uncertainty in the external environment makes the task of organizational maintenance more difficult. Emery and Trist (1965) outlined an environmental typology based on two dimensions: environmental uncertainty and degree of change. They classified environments according to the extent to which organizations shared the same geographical area (Scott, 1987).
Environments were categorized into four types: 1) placid, randomized; 2) placid, clustered; 3) disturbed, reactive; and 4) turbulent. They suggested that the more difficult it is for an organization to easily access resources, the greater the stress on the organization in terms of its survival. Terreberry (1968) suggested that Emery and Trist's environment types were stages in an evolutionary chain with environments becoming increasingly turbulent. This increasing turbulence will be problematic for the organization which is not able to accommodate to change and modify existing plans and procedures.

In summary, environmental uncertainty has been explored by researchers who observed that the more uncertainty found in the environment, the more the organization should function in less bureaucratic patterns and styles. This shift to less bureaucratic styles fosters employee involvement, innovation and a positive response to change. Sources contributing to environmental uncertainty include government intervention, resource or market dependencies and new technologies. Since organizations are influenced by their environment, knowing the characteristics and constraints of this environment should help to predict an organization's response to change. As noted previously, one of the ways in which organizations can deal with uncertainty is to modify their organizational structure. This factor is examined in the following section.

Organizational Structure

An organization's structure functions to stabilize the internal environment of the organization, to co-ordinate internal activities and to act as a control mechanism separating the organization from the surrounding environment. Various structural forms and typologies have been proposed (Burns & Stalker, 1961; Mintzberg, 1979); these differ in their management styles, rules and procedures, and tolerance for change. The bureaucratic-non-
bureaucratic dichotomy has been used by the majority of researchers (Benveniste, 1987; Michael, Luthans, Odiorne, Burke, & Hayden, 1981; Scott, 1987). The nomenclature varies among researchers, yet the concepts are not substantially different. Thus, the terms bureaucratic and mechanistic refer to similar domains as do the terms nonbureaucratic, organic and innovative. The problem with the bureaucratic-innovative dichotomy is that certain types of organizations are not encompassed, in particular those organizations driven by professional knowledge and/or dominated by professional staff such as hospitals, educational systems, accounting firms and law firms. Thus, the following section begins with a summary of the bureaucratic-nonbureaucratic dichotomy and continues with a discussion of alternative structure types and their impact on organizational change.

For many years the belief that control and coordination of employees led to effective, efficient organizations prevailed. Using this rationale, the idea of the bureaucratic organization was developed. Most research on organizational structure uses the bureaucracy as the basis for comparison. The bureaucracy, with its hierarchical management systems, is a structure which relies on strict control and the implementation of procedures designed to monitor employee behaviours.

Max Weber viewed an organization as "a particular type of social relationship that is either closed to outsiders or limits their admission and has its regulations enforced by a chief, usually with the assistance of an administrative staff" (cited in Miner, 1982, p. 387). Weber's theory emphasized authority, power, and acceptance of rules and discipline, elements which characterize an authoritarian system. The traditional bureaucracy is an inflexible structure, well suited to producing its standard outputs but ill-suited to adapting to the production of new outputs (Mintzberg, 1979). Despite the introduction of
a variety of alternative structural types, the bureaucratic structure thrives in a large majority of organizations.

In 1961, Burns and Stalker suggested that the type of environment dictates whether an organization will be mechanistic or organic in structure. The mechanistic organization operates in a stable external environment and as a result is hierarchically structured (i.e., has clear lines of authority), formalized (i.e., characterized by rules and procedures) and centralized, with a top-down decision making system. The organic organization, on the other hand, thrives in a rapidly changing external environment and is characterized by less formalization and centralization (Daft, 1983). The organic organization has a much flatter organizational structure with less reliance on rules and regulations. This allows the organic organization to respond quickly to situations of stress and change (Pitt & Booth, 1983).

Burns and Stalker (1961), in a study of twenty British firms, found that organizations judged to be successful were those whose organizational structure matched environmental demands. The mechanistic type operated best in stable environments, while the organic structure was most effective in unstable conditions. Scott (1987) observed that the ideal structure depended both upon the type of work being performed and the environmental demands.

Organizational structure directly influences an organization's ability to accommodate change (Daft, 1983; Pitt & Booth, 1983). As a result of prior expectancies, rules and regulations are transmitted to organizational members. Appropriate ways to respond are built into this structural system, thus regulating choices and responses made by members. Whether this structure is highly regimented or loosely connected determines to a large extent an organization's responsiveness to change.
Even though an organic organizational structure provides more flexibility and is especially appropriate when the external environment is turbulent, organizations appear to be driven toward bureaucratization (Daft, 1983). One explanation is that the very aspects which make an organic structure suitable for dealing with uncertainty undermine the stability needed to ensure coordination and continuity.

To remain viable, organizations must cope with changes in the external environment while retaining internal stability. Bureaucratization maximizes stability and the reduction of uncertainty in the internal environment, but it sacrifices organizational flexibility and the ability to cope with uncertainty in the external environment. Indeed, Michael et al. (1981) have stated that bureaucratization and innovation are opposing processes. Bureaucratization outlines the rules and procedures to be followed and the division of labour in the organization. Behavioural expectations are set for employees which standardize the roles and functions within an organization. Innovation can be described as a process of adaptation whereby an organization responds to actual or anticipated changes in its environment by changing its structure. The relative amount of innovation and bureaucratization which is optimal for an organization depends, primarily, on the amount of change and uncertainty in the environment. Mintzberg (1979) moved away from the bureaucratic-nonbureaucratic dichotomy and introduced a model which includes several types of bureaucratic structures, including machine bureaucracy, professional bureaucracy and adhocracy.

Mintzberg's machine bureaucracy is analogous to the traditional bureaucracy. This type of organization is typically very large, often a mass production establishment (Daft, 1983). Key decisions are made at the top of the organization and rules and regulations provide detailed guidelines for em-
ployees. The machine bureaucracy relies on hierarchies and well-determined authority frameworks, thereby limiting the possibility of change originating from lower echelons within the organization. Often, resistance to change is a function of too many layers of structure, whether the change originates at the top or bottom of the hierarchy. By the time the change has permeated all of the levels, there is little likelihood of continued interest and energy to proceed. Often criticized for lack of innovation, the machine bureaucracy nonetheless functions efficiently in an unchanging or stable environment.

The machine bureaucracy does not handle the role of the professional very well. Research indicates that the traditional bureaucracy is antithetical to the nature of professional work and does not create an environment in which professionals function effectively or happily. According to Hall (1972) and Miner (1982), bureaucratization threatens the professional's autonomy and often creates conflicts between professional affiliation and the organization.

Perhaps the most elegant description of an alternative type of bureaucratic structure which takes into consideration the professional employee comes from Mintzberg (1979). Mintzberg's professional bureaucracy emphasizes the expertise and knowledge of individual position holders. The distinguishing feature of the professional bureaucracy is a core of "professionals" (Daft, 1983). While still considered a bureaucracy, employees are more autonomous because control is exercised from outside rather than from within the organization. Scott (1965) described organizations where professionals are monitored by external bodies rather than by internal ones. Public schools, libraries and social work agencies, according to Scott, limit professional autonomy through legislative or governmental regulations. The fact that external entities are directly able to influence an organization and regulate the activi-
ties of organization members results in increased complexity within the organization. Restrictions placed on professional employees by either internal or external forces limit their effectiveness.

The professional employee undergoes an initial training period in the form of university education or professional schooling. This period is followed by on-the-job training or an internship position. In addition, the professional spends extended amounts of time throughout his/her career upgrading and updating his/her knowledge base (Mintzberg, 1979). This substantial experience which the professional employee brings to the organization diminishes the need for extensive internal control structures within the organization.

Benveniste (1987) has also discussed management style differences between the professionally-oriented organization and the traditional bureaucracy. According to Benveniste the professional organization emphasizes governance (i.e., lack of direction from above as in a centralized organization), intrinsic motivation, working through others, conflict resolution, matrix management (i.e., focus on project teams or task forces comprised of individuals from all parts of an organization), symbols (e.g., objects or processes which represent something to members of a specific group), trust and ethics. Less reliant on rational controls, management is concerned with immediate impacts and short range planning. People and process issues are focal concerns in the professional organization. There is movement away from static performance controls to a system in which employees are able to fully participate in organizational procedures. These changes in management style fit the needs of professional employees, resulting in more harmonious relationships within the work environment.
Professional bureaucracies, much like traditional bureaucracies, are not able to function in a turbulent external environment and tend to be conservative and hesitant to change their well-established ways. Because professional employees are relatively autonomous, a high degree of consensus with regard to a potential change is necessary for successful implementation of the change to occur. Therefore, the implementation of change in a professional bureaucracy is likely to be a difficult process.

Mintzberg's third type of bureaucratic structure is the adhocracy. The adhocracy brings together "experts drawn from different disciplines into smoothly functioning ad hoc project teams" (Mintzberg, 1979, p. 432). The organization is highly organic, having little formalization, with jobs based on formal training and individuals working in small groups or on project teams. This structure fosters innovative problem solving and functions well when change occurs. The adhocracy allows employees to join forces with other professionals from various disciplines to work in unison on projects. Thus, the adhocracy responds to change more favourably than any of Mintzberg's other structural types.

To summarize the discussion thus far, some forms of bureaucracy may be capable of responding to change over a period of time. For example, in contrast to the traditional bureaucracy, the professional bureaucracy does take into account employee professionalism. While professional bureaucracies function best in a stable environment, they are more able to cope with change than are the traditional bureaucracies. An even looser organizational structure, the adhocracy, goes further, having fewer layers of managerial personnel, less rigid rules and informal, flexible working (e.g., team) arrangements. The increased flexibility found in the adhocracy structure probably makes it
the one most capable of adjusting to change originating within and outside the organization.

Bennis (1966c) predicted that the rapid growth of science, intellectual technology and research and development would ultimately bring about the demise of the bureaucratic structure. He stated that these advances would necessitate alterations beyond the innovative capacity of the traditional bureaucracy. Mintzberg's (1979) expansion of the bureaucratic structure to include alternative forms addresses this concern. Nonetheless, the traditional pyramidal structure continues to be prevalent in hierarchical organizations, with many layers of bosses and subordinates. Organizational structure influences both leader and follower behaviours, the topic to be discussed in the following section.

Leadership Style

The third major factor influencing organizational response to change is leadership style. Leaders project an image for their organization based upon their individual attitudes and behaviours; this image directly influences individuals working in the organization. Recently, there has been much discussion about the leader's role in organizational change. According to Joiner (1987), "leaders inspire others into action; they create a sense of purpose and direction; and they personify the values of the organization" (p. 159). The notion that the leader provides the ingredients for change or the vision of a desired future state and attempts to instill this vision in the minds and hearts of his/her employees is widely acknowledged (Allaire & Firsito, 1984; Beckhard & Harris, 1977; Beer, 1980; Bennis & Nanus, 1985; Bryman, 1986; Burns, 1978; Byrd, 1987; Gagliardi, 1986; House, 1977; Kouzes & Posner, 1987). Byrd goes on to state that effective leaders have a vision that remains persistent and consistent over time. Anderson, Phillips, and Kaible (1985), in a
study of seventeen firms that had changed from poor to superior performers over a time span of five to ten years, found that a "championing leader" was the key factor in the successful efforts. Furthermore, they stated that championing leaders tended to fight for their ideas, were more ideological than leaders in less successful firms and set a positive example for potential leaders in their organizations.

The leader plays a major role in steering the organization through all phases of the change process. It is often the leader who by his/her role definition is the innovator of the change (Stogdill, 1974). Kouzes and Posner (1987) agree, stating that "leadership is inextricably connected with the process of innovation, of bringing new ideas, methods, or solutions into use" (p. 37). The effective leader is able to insure that the innovation is accepted and likely to be implemented by his/her followers. Schwartz and Davis (1981), in a study of a banking division, found that less skilled leaders had difficulty managing complex change.

Leaders structure the expectations of their followers. Bennis and Nanus (1985) interviewed 90 leaders using open ended questions. Four themes emerged from their interviews. The first was that leaders stimulated followers' attention through a vision, and the second that they actively communicated these visions to bring about shared meanings among their followers. Third, they fostered trust by being consistent and sticking to their planned agenda, and fourth, they utilized their own optimism and excitement to inspire similar feelings in their followers. In other words, they created a set of expectations that positively influenced followers in the organization (Beer & Walton, 1987; McCall & Lombardo, 1978).

People hold implicit theories about leadership. Their notions of leadership and the myths surrounding the leader's actions influence the leader's
behaviour as well as the followers' attributions and expectations (Calder, 1977; Chemers, 1987; McCall & Lombardo, 1978). Hornstein, Heilman, Mone and Tartell (1987) conducted a series of studies focusing on subordinates' perceptions of managerial behaviour. Using scenarios that described either appropriate or inappropriate behaviour (according to popular contingency leadership theories), they asked subjects to evaluate the manager and his/her actions. They found that subordinates preferred managers who behaved participatively, supportively and with a greater concern for relationships than for tasks. The results tended to support the contention that there is one best way to lead as opposed to leadership being situationally dependent (Hornstein et al., 1987). Hornstein et al. concluded that employee perceptions of the leader and the leader's actions may be the most crucial variables in determining leader effectiveness. Similarly, Likert (1967) stated that effective leaders modelled behaviours that employees perceived as supportive of their needs. Finally, Hollander and Julian (1969) stated that to continue in a position of leadership, the leader must be responsive to follower needs.

Leadership styles also differ in the way in which they define power. In the extreme authoritarian style, power (i.e., authority for decision making, control, reward and punishment) resides in the leader. In the democratic style, these responsibilities are typically shared in some way with group members (Handy, 1976). Thus, organizational power is shared when participatory leadership styles are employed (Krausz, 1986), making competition with co-workers less desirable. When personal power is enhanced, a feeling of competence is found among employees. Kanter (1977) reinforced this idea of the benefits of sharing personal power. In her study of a business organization, she found that those in power were secure and therefore were willing to allow subordinates freedom and power. This empowerment led to positive
outcomes and successes for both the subordinate and the leader. Sashkin (1985) concurs that leaders achieve goals through others and leader effectiveness is enhanced by empowering others (cited in Beer & Walton, 1987).

In a case study which focused on a superintendent's use of transformational leadership (i.e., a clear organizational vision, a participatory, supportive leadership style and the empowerment of subordinates) in response to a budget crisis, Roberts (1985) found that this leadership style resulted in the implementation of an innovative program that was fully supported by all concerned stakeholders. Buller (1988) noted that the involvement of key personnel (whether external stakeholders or employees) fostered commitment to and acceptance of the change. Similarly, Berman and McLaughlin (1978) concluded that a participatory leadership style was the key to successful implementation outcomes. On the other hand, Greiner (1967) found that unsuccessful change programs resulted when an authoritarian style dominated the design and implementation of such programs.

The promotion of employee participation in decision making may not always result in the anticipated positive outcomes. Several reviews of the vast literature on employee participation have outlined contrasting findings, some advocating participatory leadership (Margulies & Colflesh, 1982; Miles, 1965; Perrow, 1972), others noting that it is not as beneficial as assumed by many researchers (Locke & Schweiger, 1979; Lowin, 1968; Wall & Lischeron, 1977; Yukl, 1981). Bryman (1986) stated that "while there is a fair amount of evidence to suggest that participation contributes to satisfaction, as well as performance (to a lesser extent), and other supposedly 'good' outcomes (e.g. low turnover and absenteeism), there is too much unsupporting evidence to be too confident" (p. 99). Some of this uncertainty, according to Bryman (1986), may be resolved by studying the effect of moderator variables which
influence participation, namely, task characteristics (e.g., routine vs. complex) and personality characteristics of the subordinates (e.g., the desire to participate, the perceived rewards and costs associated with participation).

Bass and Valenzi (1974) found that when tasks were more complex subordinates were more likely to respond positively to being involved. Ramsay (1976) reported that employees wanted increased participation in decisions affecting their own work (84%), while only 37% felt that they would like to have more say in company level decisions. Abdel-Halim (1983) found that followers' reactions to participative decision making were dependent upon their personal desire for participation. Thus, participatory leadership may depend more on individual employee preferences and needs than on a global notion of increased inclusion in decision making processes.

Leadership has been one of the most researched social science topics of the past seventy years. Early theories focused exclusively on traits or personality dimensions of the leader. Then, Fiedler's (1967) work (the contingency model) introduced the idea that leaders may need to have different characteristics to be effective in different situations. The contingency model emphasizes the interaction between leader personality and the situation. Leadership effectiveness is determined by the interaction of these two factors. Both the trait approach and Fiedler's work focus heavily on leader personality.

Hersey and Blanchard's (1982) Situational Leadership Model, House's (1971) Path-Goal Theory and Vroom and Yetton's (1973) Normative Decision Theory suggest that leadership styles are situation specific, that is, leadership styles are contingent on situational conditions. In other words, the effectiveness of leader behaviour is contingent upon the demands imposed by the situation.
Finally, leadership style theories emphasize leader actions and behaviours as opposed to personality dimensions or traits. They are often referred to as the "one-best style" theories. These theories maintain that the effective leader is a "high-high" individual, high in both initiating structure and consideration (i.e., high in direction and high in support). This participative leader allows employee autonomy and involves employees in decision making (Bryman, 1986). He/she emphasizes democratic, participative, relations-oriented and considerate leadership (Bass, 1985). Powell and Butterfield (1984), in an investigation of the applicability of the high-high effective leader profile, concluded that variations in group performance affected the way people perceived and evaluated a leader's behaviour. They noted that "whether or not high-high leaders are the most effective, they were certainly seen to be present, and effective, when group performance was high" (p.75).

The concept of leadership style has been used to understand leader behaviour. The primary research distinction has been between task-oriented or authoritarian leader styles and people-oriented or participatory leader styles. Task-oriented leaders emphasize the importance of the accomplishment of work goals, while the people-oriented leader is driven by a concern for the employee and democratic principles. Researchers have developed models based on this continuum of leadership styles. McGregor's Theory Y (1960), Likert's System 4 (1967), Argyris's Model 2 (1976) and Blake and Mouton's Managerial Grid (1964) all suggest that effective leaders are participative and democratic, concerned with both task behaviours and relationship behaviours.

Tannenbaum and Schmidt (1958) described leadership styles ranging from boss-centred to subordinate-centred. Using these as end points, they formulated seven types of leadership; at one end is the authoritarian, highly
directive style (task orientation) and at the opposite end is the participatory style (people orientation). Likewise, McGregor's (1960) dichotomy using Theory X and Y emphasizes the two extremes of managing behaviours. Theory X assumes that people need to be persuaded, rewarded and coaxed into performing, while Theory Y values self-determination and emphasizes greater participation in the workplace.

Blake and Mouton's (1964) Managerial Grid scenarios also focus on leader behaviours or styles. The leader and his/her followers are asked to describe the leader's style by choosing among descriptive statements which are, once again, based on the authoritarian-participatory dimension. Blake and Mouton's Grid framework is illustrated in Figure 2. The Grid is a graphic representation of the five key leadership styles. Two dimensions are used to determine leadership style—concern for people and concern for production. Concern for people refers to working with and through others, while concern for production focuses on results or the "bottom line" (Blake & Mouton, 1968).

Blake and Mouton's five leadership styles include impoverished (1,1), authority-obedience (9,1), organization man (5,5), country club (1,9) and team (9,9) styles. This framework provides a solid basis for understanding differing leadership styles in terms of the way a leader plans, directs, controls, resolves conflict, releases creativity and motivates employees (Blake & Mouton, 1968).

In conclusion, the leader plays a pivotal role in determining change. Participatory leadership styles facilitate change as a result of shared power and employee involvement in decision making. This is especially true when job-related decisions are being made. Empowering employees through visions of future possibilities, the skilled leader who is responsive to follower needs will be more likely to successfully implement change. While the high-
<table>
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<tbody>
<tr>
<td>Impoverished management</td>
<td>Authority-obedience</td>
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<tr>
<td>Exertion of minimum effort to get required work done is appropriate to sustain organization membership.</td>
<td>Efficiency in operations—results from arranging conditions of work in such a way that human elements interfere to a minimum degree.</td>
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<th>1,9</th>
<th>9,9</th>
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<tbody>
<tr>
<td>Country club management</td>
<td>Team management</td>
</tr>
<tr>
<td>Thoughtful attention to needs of people for satisfying relationships leads to a comfortable, friendly organization atmosphere and work tempo.</td>
<td>Work accomplishment is from committed people, interdependence through a “common stake” in organization purpose leads to relationships of trust and respect.</td>
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**Figure 2**

*The Managerial Grid®*

high leader style (i.e., where the leader places a great deal of emphasis on both task and person factors) is preferred by the majority of employees, the leader who considers situational factors when making judgments is the most versatile.

Change often originates in the environment; therefore, the astute leader will monitor the environment and be constantly prepared to meet new demands. Sherwood (1988) reported that leaders carefully monitor and interact with the environment surrounding the organization (e.g., demands and expectations from customers, suppliers, government, community, competitors). Protecting the organization from uncertainties in the environment, the leader attempts to maintain stability and order within the organization, even though the external environment introduces flux and uncertainty. Consulting with relevant stakeholders whose backing is necessary for success, effective leaders acquire the commitment necessary to implement an innovative project. The leader in many respects determines the organizational culture, which is discussed in the next section.

Organizational Culture

The notion that organizations have cultures has been proposed frequently in the past decade (e.g., Deal & Kennedy, 1982; Handy, 1976; Ouchi, 1981; Peters & Waterman, 1982; Pettigrew, 1979; Pondy & Mitroff, 1979; Smircich, 1983). It is the leader's beliefs, values, attitudes and behaviours which create the culture (Pettigrew, 1979; Schein, 1983; Schwartz & Davis, 1981; Sherwood, 1988). Litwin and Stringer (1968) stated that one of the major determinants of the culture of an organization was the leader's visionary outlook and strong persona. Sergiovanni (1984) more recently stated that "leadership acts are expressions of culture" (p. 106). He argued that leaders strive to make an organization cohesive and unified by developing standards,
philosophies, norms and values which define a way of life within the organization.

Learning about the procedures in an organization and how to function in the setting, whether this involves knowing the accepted dress code or understanding the way in which decisions are made, provides the employee with a sense of the organization's unique norms and his or her personal role within the organization. Organizational members incorporate these values, further deepening the sense of shared organizational identity. Wieland and Ullrich (1976) observed that to be most effective, an organizational ideology or culture should match employees' needs.

Culture has a recent history as an organizational variable in the literature; however, as noted by Nord and Tucker (1987), aspects of what is currently referred to as culture can be found in literature dating back several decades. A similar concept, organizational climate, has been the subject of more than a dozen reviews (e.g., Peterson, Cameron, Mets, Jones, & Ettington, 1986), and has often been used interchangeably with the concept of culture.

Allaire and Firsiovu (1984) report that the organizational climate research reflects views similar to those of the cognitive school of culture in anthropology. Climate, in their terms, is a "widely shared and enduring perception of the organization's attributes" (p. 203). Defining culture in anthropological terms, Benedict (1934), stated that culture is the foundational term through which the orderliness and patterning of much of our life experience is explained. In many respects, this definition fits organizational life as well. Climate research in this sense might be thought of as the precursor to culture research. Schneider (1987) stated that climate and culture are complementary topics. He defined climate as the way that the organization functions (what it rewards and supports), while culture refers to the assumptions and values at-
tributed to these rewarded and supported behaviours (the meaning behind what happens). While the two terms are not synonymous, previous climate research supports the current investigation of culture as an important variable in organizational change. In order to avoid confusion, the term "culture" rather than "climate" will be used when reporting all subsequent studies.

Culture is thought to be an ongoing and evolutionary process. Sergiovanni and Corbally (1984) list the components of an organization's culture: "customs and traditions, historical accounts be they mythical or actual, tacit understandings, habits, norms and expectations, common meanings associated with fixed objects and established rites, shared assumptions, and intersubjective meanings" (p. viii). The beliefs (i.e., basic assumptions about the world and how it works) and values (i.e., basic assumptions about the world and how it ought to work) held by both leader and employees define an organization's culture (Sathe, 1983). Sharing a common set of ideas, values, habits and traditions serves to separate organizational members from non-members. Schwartz and Davis (1981) emphasized that culture is as much a part of the organization as its structure. "Culture...is a pattern of beliefs and expectations shared by the organization's members...which produce norms and powerfully shape the behavior of individuals and groups in the organization" (p. 33).

The prevailing values and beliefs in an organization act as barriers to change. "Change always threatens a culture" (Deal & Kennedy, 1982, p. 157). Cultures can be strong (i.e., where everyone knows the organizational goals promoted by the leader and all are working to achieve them) or weak and fragmented (Peters & Waterman, 1982). Weak cultures are characterized by employees with little loyalty or vested interest in the organization. It has
been suggested that strong cultures adapt more readily to change (Peters & Waterman, 1982), although when activities are altered, even strong cultures are at risk. Strong cultures are characterized by well defined shared understandings (i.e., beliefs and values) and high employee involvement. Denison (1984) reported that a strong culture that encourages participation and involvement of employees is an important organizational asset. In a study of 34 large American firms he found that participation in decision making was thought to be an investment, one that takes time to pay off. He noted that implementation was improved when employees were involved in the decision making process, especially when the business environment was changing rapidly. According to House (1981), every organization has a unitary culture and internal value system which makes the organization unique. House suggests that the focus during innovation and implementation of change should be on participating groups, since success will be determined by participants' acceptance and usage of the innovation.

Finally, culture is a constant reminder to organizational members of the "way things are" in the organization. Jelinek, Smircich and Hirsch (1983) stated that "culture persists and is changed or maintained by virtue of its continual (re)creation through the interactions of organization members, their shared interpretations, and the significations they attach to what occurs" (p. 336). The process of questioning organizational values and beliefs serves to make the culture more responsive to change (Smircich, 1983). Sathe (1983) found that if organizational members can be gently persuaded by those in leadership positions to try new ways and they are pleased with the outcomes, the new beliefs and values may become a part of their internalized expectations and thus result in real change.
Pitt and Booth (1983) noted that "the prospects of achieving 'post-bureaucratic' change can only sensibly be evaluated by close inspection of cultural traditions...within specific organizational settings" (p. 205). The individual and group process of creating and utilizing organizational myths, or organizational culture, therefore, is a relatively unexplored, missing link in organizational analysis of the implementation of change. A fuller understanding of how organizational members interpret their workplace will lead to a more comprehensive knowledge of the process of organizational change.

The preceding discussion suggests that culture, by its very function, inhibits change. However, it is also recognized that certain types of cultures are more conducive to and capable of dealing with change than others. Culture influences the messages sent to organizational members and these determine whether members will be change-prone or change-resistant. An organization mandate promoted by the leader that actively encourages autonomy and innovation and awareness of environmental trends and discoveries will encourage organizational members to do likewise.

Allaire and Firsotru (1984) presented a conceptual framework for organizational culture based on a review of anthropological schools of thought and their influence on current organizational theories of culture. Two major systems were identified by Allaire and Firsotru; the sociocultural perspective and the ideational perspective. Research from the sociocultural perspective tends to focus on evolutionary and historic aspects of the organization and on the development of typologies to explain the wide variety of processes which occur. The sociocultural perspective treats the sociostructural and cultural systems as one. In the ideational perspective, the sociostructural and cultural systems are viewed as separate. While they interact in a complex, mutually supportive relationship under stable
conditions, they are subject to dysfunction when change is encountered. The current research focuses more on the ideational perspective; however, the sociocultural perspective will be presented briefly.

The sociocultural perspective merges ideational (meaning) aspects of an organization with the social system (the organizational structure and subsequent interactions of employees) of the organization. Culture, therefore, is thought to be a component of the social system which is manifested in behaviour. The following studies are classified as sociocultural in nature, due to the fact that culture is primarily interpreted through an assessment of behaviours rather than an assessment of meaning and values.

Pritchard and Karasick (1973) focused on supportiveness in organizational cultures and found that highly supportive cultures fostered high job satisfaction among managers. Managers with a high need for order were more satisfied in a highly structured culture whereas those with a high need for autonomy preferred a culture where individual discretion and low centralization was the norm. In another study, workers rating their organization’s culture as supportive also rated their superior as being more effective than did subordinates who described their culture as being less supportive and more bureaucratic (Friedlander & Greenberg, 1971).

According to the ideational perspective, culture is a less tangible construct, centred around beliefs, norms and values held by organization members rather than the structural/behavioural aspects of an organization. Ideational perspectives focus on individuals’ "theories of the world" and "shared meaning systems," wherein culture influences individuals' interpretations of their experiences and guides their actions. The cultural and social realms are distinct but interrelated. The ideational perspective also emphasizes the history of an organization and acknowledges the critical role
of the founder in creating the organizational culture. The leader, in this context, not only influences structure, but also symbols, beliefs, ideologies and myths (i.e., the cultural components of an organization) (Pettigrew, 1979).

Culture determines the character of an organization in many ways. Organizations have different atmospheres, different ways of doing things, different levels of energy, of individual freedom, of kinds of personality (Handy, 1976). Pondy and Mitroff (1979) have suggested that it is necessary to go beyond the organization/environment interaction stressed in contingency theories and investigate process variables which include "meaning" and other symbolic aspects of the organization. This perspective requires that the shared schemata of organizational members be analyzed, since organizational culture cannot be observed directly (Peterson et al., 1986). A culture's "shared understandings" include shared things, shared sayings, shared doings and shared feelings (Sathe, 1983). These shared understandings become a liability when they are not in keeping with organizational needs, its members and environment. Focusing on the cultural milieu within the organization will enhance our understanding of organizations and the response to change within the organization.

The ideational perspective is exemplified by Harrison's framework. Harrison (1972) proposed that ideological orientation determines the character of an organization. Handy (1976) expanded Harrison's model and used the term "culture" rather than "ideology." The fit between the leader and organizational members and the ability of those working in the organization to deal with the external environment are key elements in this framework. Beliefs, values and norms differ for each culture type. The first ideology, the power culture, is characterized by centralized leadership with a top-down decision making process, a stable environment and tight internal controls. This orga-
nization emphasizes competition both among employees and in relationships with other companies. Harrison's *role culture* emphasizes rigid roles and procedures and as a result this organization type resists change. Stability and reliability are valued and enforced by the leader in the role culture. With the emphasis on control through detailed procedure, it is not surprising that these two cultures do not readily adapt to change.

An organization with a *task culture* (Harrison, 1972), in contrast to those with power or role cultures, readily adjusts to the turbulent times of a complex, changing environment. Decentralized control promotes problem solving among lower levels in the organization. The task culture, with a flexible system of control and decision making which involves both the leader and employees, will readily adjust when demands are made by external environments and is most suited to coping with changes in the market or product (Handy, 1976).

Finally, Harrison's (1972) *person culture* is described as an organization having a minimum amount of structure and objectives based solely on individual needs and purposes. While many individuals espouse person culture values in their lives, the majority of organizations are to a large extent more structured and organized. Management hierarchies, for example, are unlikely in person-oriented cultures, since influence is shared among organizational members and the power-base is expert in nature. Individuals do what they are good at and are listened to when they have expertise in a specific area. This organization type cannot exist in many organizations because the individual is the central point or focus of person cultures (Handy, 1976), and organizational objectives typically supersede individual goals in an organization.
Moving beyond structural features toward ideational or meaning systems in organizations promotes a better identification of what is truly unique in organizations. Since two organizations with identical structures can have totally different cultures (Schein, 1985), the influence that culture has on organizational members should not be ignored. Culture, as determined by the leader, influences not only day to day activities but, to a large extent, any change that is planned or implemented within the organization.

Summary

To summarize, as illustrated in Figure 1, each of the four factors which has been discussed influences the process of change. Change originating in the environment will affect the organization. Monitoring the external environment provides data essential to the organization's long term planning. For example, a transition from a stable to an uncertain external environment will adversely affect the organization if it operates within a traditional bureaucratic structure. When the organizational structure matches the environment (e.g., uncertain environment and participatory structure), the organization is more capable of managing change.

The organizational structure influences the leader who, in turn, influences the response of organization followers. The leader's values and beliefs, embodied in the organization's culture, determine ways of thinking and acting for organizational members. Thus, leader attitudes and beliefs play a direct role in the creation and maintenance of an organization's culture. Finally, organizational culture is influenced by all of the previous factors. Uncovering the shared beliefs, values and traditions of the leader and followers will provide a better understanding of the organization.
Educational System

The educational system has undergone major change in recent years. With the introduction of the open concept teaching environment, team teaching, free schools (Herriott, 1987a), special education programs and computer technology, schools of the 1980s are in many ways different from their predecessors. Teachers, principals and administrators work in an environment of continuous change. The purpose of this section is to discuss the four factors--environment, structure, leadership and culture--as they relate to change in the educational system, using the model introduced at the beginning of this chapter. The final section will then focus on a specific change, the introduction of computer technology.

Educational Environment

The present environment of the school system is dynamic and uncertain, due in part to the many stakeholder groups taking an active role in educational matters. These stakeholders include the government, the community, the board and parents. Schools must accommodate the goals and objectives provided to them by the stakeholders. Given this uncertain environment, a decentralized organizational structure will respond to change most favourably (Miles & Snow, 1978; Pfeffer & Salancik, 1978).

Unfortunately, the school system as an institution typically functions in a centralized or bureaucratic manner. Even though the external environment is unstable and lends itself to innovation, school settings may be slow to embrace the opportunity presented for change.

Thus, the uncertainty found in the educational environment, with its many stakeholders and their demands, may impede a school's accommodation to change. In addition, as noted in the following section, this environmental uncertainty is not a good match for the somewhat traditional struc-
tures which characterize many school systems. This environment/structure clash is certain to influence the implementation of change.

Educational Structure

Schools have evolved into stable, bureaucratic institutions with a strong commitment to established procedures (Fullan, 1982). Standards imposed on the system maintain the bureaucratic structure. In the past, this bureaucratic structure functioned well, since the educational system was dealing with an environment that was relatively stable and unchanging. This scenario is no longer applicable.

One popular description of the present educational structure is that of a "loosely coupled system, in which technologies are uncertain, goals unclear, and the formal structures of which tend towards anarchy" (Tyler, 1985, p. 49). Loosely coupled systems foster independence and autonomy (Meyer, 1984; Meyer & Rowan, 1977; Sergiovanni & Corbally, 1984; Wilson & Corbett, 1983). This description is similar to Mintzberg's adhocracy (1979) which emphasizes teamwork and high employee autonomy.

However, loosely coupled systems may not accurately describe the majority of school settings. The current structure, in many respects, still appears to be more bureaucratic than organic. Thus, schools are governed by rules and regulations and top-down administration by the school board and government agencies (Morrish, 1976). Nevertheless, there are signs of deviation from the "traditional" notions of bureaucracy.

To the degree that teachers are professionals, the school system can be regarded as a professional bureaucracy. The extended training period prior to entry into the school system, the requirement of a university degree and regular in-service training for teaching staff describe a professional orientation. The application of a professional bureaucracy model to the educational sys-
tem is somewhat problematic, however. School personnel are subject to press-
sures from external sources: the government, the board, parents and students.
Benveniste (1987) suggested that professionals in roles where outside parties
influence their actions find their roles more limiting than professionals in
more autonomous roles. Thus, while teaching has moved in the direction of
increased professionalism, restraints in the educational system still curtail the
teacher's professionalism. The school, therefore, may function as a machine
or traditional bureaucracy, a professional bureaucracy or a loosely coupled sys-
tem such as an adhocracy.

Because the system leans toward bureaucratization, however, the pro-
cess of change and innovation in educational settings is often limited. Fullan
(1982) stated that the bureaucratic policies and procedures that initiated and
maintained a project through early phases were usually, in time, buried in
the realms of government bureaucracy and paperwork, while the key players
proceeded to a new project. He suggested that even when there was a definite
need for change in education, the development of sound programs often
lagged far behind. In addition, funding (and more importantly), support from
higher levels diminished over time. Berman and McLaughlin (1976), Delbecq
and Mills (1985) and Sutphin (1987) reported similar findings. Thus, the ex-
ternal environment demands change, yet the traditional bureaucratic struc-
ture stifles any long term solutions for implementing the change.

It would appear that an organizational structure like the adhocracy
would allow for greater experimentation and implementation of change.
Thus, schools which are organized to function as adhocracies would be more
open to innovation and change. Members of the school unit influence inno-
vation and change as well as day to day activities. It is proposed here that
within a single school unit, the primary determinant of the organizational structure is the leader, that is, the principal of the school.

Educational Leader

The principal interprets the school's history, articulates future direction, personifies the current values of the school and guides the change process. Schools are unique due to the principal's vision or ideal of where the school is heading and how to get there (Bridges, 1978; Darling-Hammond, Wise & Pease, 1983). Through informal staff interactions the leader has the opportunity to emphasize the importance of the change endeavour and its relevance to organizational goals (Corbett & D'Amico, 1986). Principal leadership, therefore, affects teacher acceptance of change and, in turn, contributes to successful implementation (Fullan & Pomfret, 1977; Waugh & Punch, 1987).

According to Darling-Hammond et al. (1983), one of the primary functions of the principal is to encourage and motivate teachers. The principal also defines follower expectations in that s/he is expected to lead and influence staff members. Others have suggested that the principal functions to seek information from the environment (e.g., the school board and community) and from teachers in the school. Using this information, the principal determines how the school operates and formulates the school's goals and objectives (e.g., Blumberg & Greenfield, 1980; Clark, Lotto, & McCarthy, 1980; Hallinger & Murphy, 1982; Miskel & Cosgrove, 1985; Sergiovanni, 1981).

The principal, therefore, is a central figure in the school setting. Many studies of effective schools stress the pivotal role of the principal as school leader (e.g., Berman & McLaughlin, 1978; Cuban, 1984; Fullan, 1981; Gross, Giacquinta & Bernstein, 1971; Owens & Steinhoff, 1976; Sarason, 1971; Wellisch, MacQueen, Carriere & Duck, 1978). In a review of the research on
elementary school principals (i.e., effective and ineffective principals), Leithwood & Montgomery (1982) concluded that effective principals encouraged staff participation in decision making, were able to define priorities for the school (mission statement), gain commitment from stakeholders (including administrators and community members) and effectively communicate to stakeholders the goals of the school. Their influence was clearly visible to all in the system. The principal's leadership style also influences the school environment. Iorio (1986) studied the small school setting (250-300 students), where the principal was the sole manager and teachers were considered to be professional employees. Iorio found that the principal's participatory management style encouraged active teacher involvement, enhanced communication and fostered a healthy, interactive environment.

Thus, the response to change at the individual school level is influenced largely by the values and beliefs of the principal. A principal whose personal attitudes and values encourage change promotes a school environment where individual initiative, risk taking and enthusiasm for change abounds. Fullan (1982) found that the change project with a supportive principal was more likely to be successful, as his/her support gave the project legitimacy and value. In addition, the creation of an environment wherein the majority of staff were considered key players in the change process encouraged individual efforts and the continuation of innovation implementation (Corbett & D'Amico, 1986).

Managing change is a reactive process, while initiating change is proactive. The principal, as leader, determines whether the response to change is proactive or reactive. In a study by Wolcott (1973), principals were more likely to manage change imposed from the outside rather than to lead change. The majority of principals were not actively involved in encouraging or ini-
tiating change. Fullan (1981) stated that the norm is for principals to show limited interest in proactive initiation of change. Indeed the educational structure pushes toward a reactive stance. While the burdens of a principal's managerial duties may affect the time available to become actively involved in a change process, principal commitment in some form is essential for the implementation of change (Corwin, 1975).

Hall, Hord and Griffin (1980) concluded that the degree of implementation of an innovation varied among schools according to the actions and concerns of the principals (cited in Fullan, 1981). Likewise, Owens and Steinhoff (1976), in a study of two matched urban schools, found that leader involvement in planning was the factor which made a significant difference in successful implementation of change. Sarason (1971) reported similar conclusions.

Delbecq and Mills (1985) found that successful innovation depended upon an organization's commitment of leadership, time and money. Fullan (1982) observed that many implemented programs failed when resources became limited (e.g., resources for equipment and support purposes) and when principal support diminished. Even when the principal supported the change, teachers were likely to be resistant to the innovation if it was not perceived as being beneficial. Daft (1983) proposed several strategies to manage resistance to change. The first involves matching the change to the goals and needs of the teachers; the second, soliciting teacher participation; the third, communicating openly with teachers on a continual basis and, finally, assigning an "idea champion" (Kennedy, 1985), either an individual or a committee of key players. It is important to note, however, that it takes more than just leadership commitment to effect change.
Another factor influencing the success of the principal in effecting change is followers' perceptions of the legitimacy of the principal's actions and motivations (Hollander, 1984). Personal involvement by the leader in program activities enhanced the status of the change program and emphasized its importance to employees. Furthermore, followers' perceptions of the principal's attitudes and values were likely to correspond to follower interest and commitment to a change. The involved leader, therefore, set a positive example for employees. In addition, effective principals actively sought information about their teachers' expectations for principal behaviour (McGeown, 1979-1980). They also sought information about their teachers' successes in the implementation of innovative programs (Gross et al., 1971).

A variety of research also indicates that the principal who is people-oriented and democratic, and who encourages and supports employees, will effectively bring about change. Seeking staff advice both early in the process of innovation and throughout the change period, and sharing decision making were found to be signs of effective leaders (Berman & McLaughlin, 1977; McGeown, 1979-80). Leader characteristics which facilitated change included a willingness to actively participate in and encourage change, positive communication about change, a supportive, concerned interactive style and an innovative, action orientation.

Thus, while the principal, as leader, has the potential to influence the change process, it is the overall set of organizational factors which will determine whether the change is actually carried out. One of the most important factors in this regard is the school culture which, as noted previously, is also influenced by the style of the leader.
Educational Culture

Leaders create the culture of the organization through their vision. Thus, their actions, words and beliefs are the cornerstone of the organizational culture. An effective leader "delegates the authority for conducting routine affairs and turns his attention to those matters that will establish the tenor and direction of his institution--what the school or school district will become, what it will seek to accomplish, what distinctive character it will assume" (Maxson & Sistrunk, 1973, p. 159). These latter aspects of leadership are centred around the principal's philosophies and values and describe the culture of the school. Because cultures are created and changed by the leader (Peters & Waterman, 1982), in each individual school setting, the principal, as leader, will create the culture of his/her school.

Culture can influence the implementation of an innovation in two ways. First, an organization can foster a culture with an orientation toward innovation. Thus, information regarding whether a school actively initiates change or implements change as a reaction to external demands sheds light on the prevailing character of the school and the attitude toward innovation that exists in the school. This orientation to change and the ensuing attitudes may be determined by factors related to organizational leadership and culture. On the other hand, each organization's specific cultural values may or may not fit the innovation being introduced, thereby influencing the likelihood of successful implementation.

In their study of the implementation of change in five school districts in Missouri, Parish and Krueger (1987) found that many of the successful schools included in the study used similar words to describe their organization. They concluded that these words embodied the school culture or view of the world. The words and phrases which were mentioned included:
"facilitating," "empowering," "enabling," "trust," "credibility,"
"reward/ recognition of quality," "sharing, caring family," "student/person
oriented," "our community supports us," and "we are professionals." It is of
interest to note that the schools varied in enrollment size and geographical
locale, yet the same expressions were used. Also observed in these schools
was a participative management structure, with consultation from interested
parties within both the school and the community, facilitative leadership
among professional staffs, a sharing/caring team and stable leadership with a
clear philosophy and the understanding that teachers are key. These factors
emphasize the importance of environment, organizational structure, leader-
ship and, especially, organizational culture in the implementation of school
change.

Any organizational change should take into consideration the indi-
vidual culture of the school. Romberg and Price (1981) concur that "any real
or radical change necessarily challenges the school's cultural traditions and
assumptions about work, new types of knowledge, and professionalism"
(cited in Knupfer, 1986, p. 25). Since the reaction to change is varied, it is ap-
propriate that each school experiencing the change be studied independently
(Knupfer, 1986). Assessing the school's culture may lend insight into the
school's procedures and activities.

Should an innovation not fit in with current employee values or the
organizational culture, the probability of successful implementation will be
low. House's (1981) cultural strategy framework considers the match between
the innovation and the existing school culture. This approach takes into con-
sideration the innovation's effect on employees and focuses less on the tech-
nical aspects of a change. Teachers' values, therefore, are relevant and need
to be considered (House, 1981). Daft and Becker (1978) found that educational
innovation in a school was a consequence of high aspirations among staff, goals specifically focused on innovation, professional teaching staff, proficient support staff and a decentralized organizational structure. These criteria led to a school culture where ideas were generated in abundance and where there was the capability to implement the proposals.

An employee’s perception of the organizational culture may be partially influenced by the perceived degree of organizational structure. George and Bishop (1971) found that educational systems which were highly bureaucratic were perceived as having closed cultures. In schools rated as having a less bureaucratic, innovative culture, teachers displayed lower anxiety and felt that there was less structure than those working in the highly bureaucratic culture. In addition, teachers in the innovative atmosphere were more trusting and perceived the culture as being more open.

Halpin and Croft (1962) distinguished between closed and open school culture types. They described a continuum of six culture types which were determined by a school’s average score on eight subtests of the Organizational Climate Description Questionnaire (OCDQ). Questionnaire subscales were based on teacher and principal perceptions and included characteristics of teachers and the leader (i.e., the principal). Three culture types were thought to be open and three were closed. The closed culture types tended to have authoritarian principals who dictated rules, uncommitted teachers and few meetings and informal gatherings. In the open culture, principals used a democratic style which resulted in cooperative teacher/principal and teacher/teacher interactions as well as teachers who were interested in their work. Generally, the open culture was more conducive to the introduction of change.
In terms of culture typologies, however, school systems appear to match Harrison's (1972) power culture, at least when one considers the frequent school board and government interventions. Yet, the top-down decision making process and tight internal control system found in power cultures do not acknowledge the autonomous nature of individual schools. Perhaps schools are controlled by the school board with respect to funding and determination of policy and yet have autonomy with respect to school initiatives and policy implementation. Thus, at the subunit level of the individual school, organizational cultures may differ. Harrison (1987) stated that "most organizations are a mix of one or two dominant cultures and other, secondary ones" (p. 14). Thus, it is possible that due to environmental, structural and leadership variations, schools may differ in their culture orientations.

Individual Factors

Conditions optimal for change in the schools are those which encourage teachers, as professionals, to become involved in the change process to the extent that they desire. Conway (1976) conducted a study correlating teachers' level of participation and satisfaction with their school. Much previous research had suggested that more participation, rather than less, was the desirable alternative. Conway's research stressed that both present and desired levels of participation need to be equal in order to achieve satisfaction. In other words, teachers who participated as much as they desired were the most satisfied. Teachers who participated more than they desired were next most satisfied, while teachers who participated less than they wished were least satisfied. Conway concluded that overparticipation is not much better than underparticipation. This suggests that the amount of involvement alone is not
the key issue, but rather the fit between the actual and desired involvement level for each teacher.

Teachers may sometimes prefer not to become involved in decisions made in the school setting. Duke, Showers and Imber (1981) observed a decided lack of enthusiasm by teachers for participation and suggested several possible reasons which included the perception that they lacked the appropriate skills or knowledge, lack of interest in the decision area, lack of trust in the principal, and perceived costs outweighing the benefits. Some of the costs cited were increased time demands, loss of autonomy if decisions shifted from the individual to the group, and fear that colleagues may disapprove of an identification with the authority structure. Duke et al. found that 60% of the teachers felt that they had no real influence in the decision making process. Rather, the principal or other school personnel made all of the important decisions. They concluded that mere involvement did not necessarily mean influence, as there was a real feeling among teachers of a lack of influence.

Morrish (1976) stated that when implementing change "what really counts is his [the teacher's] estimate of the relative importance of the personal advantages and disadvantages of each change" (p. 51). The relationship between level of education, professionalism and innovation suggests that schools with highly educated, enthusiastic professional staff are more likely to foster an innovative atmosphere in their work environment and to seek teacher involvement when proposing and implementing change.

The higher the educational level of the individual teacher, the greater the degree of professionalism exhibited (Daft & Becker, 1978). Activities which constitute professionalism include participation in professional meetings and organizations, an internalized performance standard, autonomy,
and a desire for recognition from peers rather than from the formal hierarchy. Maxson and Sistrunk (1973) concluded that "the autonomy of each professional to try new things is perhaps the most important condition to be nurtured by educational leaders desirous of change" (p. 163). Daft and Becker (1978) found that more professional teachers (defined as having completed a Master's degree) had a greater tendency to initiate innovation than those with lesser degrees. Thus, in districts with highly professional teaching staffs, the teachers proposed 93% of the educational innovations. In districts with low teacher professionalism levels, on the other hand, only 53% of the innovations were proposed by teachers. Corwin (1975) conducted a study of innovativeness in 131 schools. Based on questionnaire responses elicited from a sample of school principals and new teachers, he also found that one of the key factors influential in increased innovation was the level of education of the teachers and principal.

Summary

To summarize, it is necessary to consider the complex interaction of four organizational factors in order to gain a more complete understanding of change in the educational setting. The environment includes stakeholders who are not only interested in the outcome of change endeavours but also provide support and funding for change projects. The government, the board, communities and parents all influence the educational organization and their concerns, to a large extent, must be considered. A series of professional bureaucracies (i.e., the schools) working within a school district foster individuality while maintaining continuity in the larger system. Unfortunately, the professional bureaucracy operates best in stable external environments. The instability found in the educational environment will be problematic for this organizational structure and change will be more difficult
to implement. Ideally, if the school were to operate as an adhocracy, change would be facilitated.

At the school or organization level, effective leadership can provide an atmosphere that is conducive to the implementation of change. The principal’s commitment to and support of change increases the likelihood of successful implementation. Additionally, his/her beliefs and ideals shape the school culture, another key factor determining the implementation of change. Finally, at the individual level, change is facilitated when teachers are involved in decision making to the extent that they desire.

The final section of this chapter discusses the influence of the four organizational variables on the implementation of computer technology in the school. The role played by teachers in the school is also discussed.

Implementation of Computer Technology in the School

The processes by which change is implemented or carried out in an organization is poorly understood. In 1971, Gross et al. pointed out that few studies had been conducted that focused specifically on the implementation of change. Over a decade later, similar statements were still being made (Maddux, 1984; Nord & Tucker, 1987). Implementation, according to Berman (1981), is the interaction between a technology and its setting. The implementation process focuses on the acceptance of and adaptation to an innovation. After the decision has been made to adopt an innovation, the organization begins the equally challenging task of introducing it into the workplace. Many experts agree that it is this implementation stage which determines whether the innovation will be successfully integrated into ongoing activities in the organization (Nord & Tucker, 1987).

While demands from the environment often provide the push to implement a change, the organizational structure, leadership and culture in-
ence the school's response to change. Implementation of change requires continual interaction among organizational goals, rules and procedures and members' values and beliefs (Berman & McLaughlin, 1978; Darling-Hammond et al., 1983; Mann, 1978). Thus, individual level factors also determine the ultimate success or failure of the implementation and several of these will be discussed in a later section.

In addition, the way in which an innovation is introduced to an organization will affect the long term success of the project. Top-down, bottom-up and shared responsibility for change are three strategies which may be utilized in any major change process (Beer, 1980). Top-down change occurs when a person high up in the organization makes the final decisions and decides how and when the changes will be implemented. Bottom-up change is the opposite, whereby employees or staff are involved intimately in the decision process and change outcomes (Koolhaas, 1982; Tucker, 1982). Shared responsibility for change promotes joint involvement of both upper management and employees in determining problems and solutions.

Top-down change is often linked to a bureaucratic organizational structure. Bottom-up change and shared responsibility for change fit into the organic framework, emphasizing employee cooperation across all organizational levels. Organizations that have involved employees in the decision making process have found that changes were successfully implemented (e.g., Hall, Goodale, Rabinowitz, & Morgan, 1978; Hilgendorf & Irving, 1976; Mumford & Banks, 1967; Taylor, 1982; Tucker, 1982). Fullan (1982) also stressed the importance of involving the "grass roots."

Mechanistic or traditional bureaucratic structures tend to react to change, while organic structures actively encourage and initiate change. Thus, the organic structure would be more likely to stimulate innovation.
Burns and Stalker's (1961) mechanistic/organic model has encouraged much debate and research about which one of these organizational structures is better for implementation (Gerwin, 1981; Normann, 1971). Zaltman, Duncan and Holbek (1973) proposed that those factors which facilitate the initial adoption of a change (i.e., low formalization, decentralization and high complexity or professionalism) work most effectively in an organic structure, while facilitators of the implementation process (e.g., high formalization, centralization and low complexity) are more commonly found in mechanistic structures.

On the other hand, Nord and Tucker (1987) suggested that organic organizations were more successful in implementing change. They found that flexibility (including open communication), concentration of power at an appropriate functional level, access to technical competence, technological readiness, and listening to staff views about the upcoming change contributed to successful implementation.

The purpose of the school as an educational institution has changed drastically in recent years (Herriott, 1987b). In the years when industrial work prevailed, the demands of the workplace (e.g., regulation and adherence to the norms and rules of the factory) were very precise so that quality products would be produced. Likewise, students were educated to function in this type of environment, and the school was a training forum for future employment. With the current movement away from industrial vocations (Toffler, 1971), the schools, their staff and students are facing shifting patterns in educational priorities. In the post-industrial period, schools must prepare students to function in more complex occupations and this requires teaching a variety of new skills. Chief among these is expertise with computers, which is considered an essential skill in many organizations (Schmidt, 1984). With the increase of information and automation available to the general public, new
strategies must be integrated into the current educational curriculum to prepare students for work in the future. Overall, there has been increasing implementation of computers in all schools, a fact which may be attributed to the influence of the educational environment.

Influence of Educational Environment

Organizational change rarely occurs without some dissatisfaction or pressure to alter the status quo. When an old procedure no longer meets the needs of an organization, or in response to a crisis or demands from external parties, new activities or behaviours not previously used are adopted (Beer, 1980; Daft & Becker, 1978; Groff, 1984). Knupfer (1986), in a discussion on the implementation of computer technology, noted that the "public school system's traditional reluctance to change complicates any accommodation to the rapid transformations caused by the introduction of microcomputers" (p. 12).

Nonetheless, as new needs and demands are created, environmental sources often provide the impetus for change, as found in the current government and parental pressure for computers in school settings. Due to the increasing prevalence of computers in society, these groups desire that newer and better technologies be available in the learning environment. Accessibility and usage are key issues for groups concerned that children receive the best possible educational experience. Information from these environmental sources (e.g., the government and parents), therefore, should be utilized by the organization (i.e., the school) to assist in predicting necessary future organizational changes (Margulies & Colflesh, 1982).

The introduction of computers into schools, the standardization of equipment, software selection and teacher training are being strongly encouraged by the Ontario government. The government is committed to the gradual introduction of computers into schools, a software-driven approach, and
evaluation efforts to monitor the success and progress of the innovations (Ministerial Thrusts, 1987). Evidence of this trend may be seen in the provision of funds for teacher training. The Grant Eligible Microcomputer Systems (GEMS) program has been established for the purchase of equipment, with the emphasis placed on development of "leading edge" educational software by both the Ministry and private sector. This government based funding system operates to provide relevant educational hardware and software to school systems in the province of Ontario. Yet, even with this apparent pressure from external sources, school boards continue to have difficulty implementing computer technology.

This difficulty may be due to the magnitude of change required for the introduction of computers into the educational system. According to Nord and Tucker (1987), routine technological innovation, that is, innovation which is similar to previous changes, may be readily implemented. Radical innovations are ones which are not familiar and are likely to result in more disruptions in the organization. They alter the status quo and result in changes in information, values, incentives, power and other elements in the organization. Because radical innovations such as computer technology introduce more uncertainty, they require more organizational change and the involvement of top management. The more radical an innovation is for a given school, the more resistance to its implementation and the greater need for support to ensure its success.

Support for an innovation from both external (e.g., board members, parents and community members) and internal parties (e.g., teachers) enhances the prospects for successful implementation. As noted by Berman (1981), Margulies and Colflesh (1982) and Meyer (1985), high levels of support from both computer users and external parties are necessary to introduce in-
novations successfully. Naron and Estes (1985) found that parents were generally enthusiastic about the progress made by school districts in implementing computer technology. However, some individuals (e.g., parents and/or teachers) may be concerned about potential negative impacts that may occur following the introduction of the technology. Opposition from any of these sources may result in implementation difficulties (Paul, 1977).

Parties in the external environment continue to push for implementation of computer technology in the schools. Implementation will be facilitated when supported by these environmental parties and by internal school personnel. Even so, swift change is seldom the norm in educational innovation (Wright, 1987). Although technological innovation usually begins outside of the school, acceptance of the technology depends largely upon organizational factors such as the structure, leader and school culture, which will be discussed in the following sections.

Influence of Educational Structure

The school system does not easily incorporate changes imposed by the external environment. Nonetheless, this unstable environment forces change within the school system. As Duttweiler (1983) observed, it seems imperative that as the external environment changes, what happens within the school must also change. Notar (1980) stated that the real barriers to successful change were likely to be bureaucratic, institutional and technical in nature. Likewise, Kearsley, Hunter and Seidel (1983) and Sheingold et al. (1983) found that computer implementation was particularly difficult because of the structural constraints found in educational institutions.

A structure, such as the professional bureaucracy or the adhocracy, which fosters participation has been widely cited as an important factor in the acceptance of innovations in school settings. Cuban (1984) found that using
the bottom-up approach when implementing computers allowed the individual school to determine its own agenda of activities, as well as monitoring and evaluation systems. The principal, staff and parents decided how district funds could best be used to fulfill the school's needs. Cuban stated that the "bottom-up strategy concentrates on generating among staff a shared vision of what the school might be, creating a team spirit, cultivating mutual trust, and building emotional bonds through collaborative decision making on school issues" (p. 139). Building on mutual interests, the principal and teachers can work together to bring about successful change. Nonetheless, while the collaborative approach does not always eliminate all underlying issues and resistance to change, perhaps the most important influence in ensuring teacher support is the leader.

Influence of the Principal

As previously discussed, principal values and beliefs largely determine the response to change. Principal approval and support of a technological innovation is essential for successful implementation (Fullan, 1982; Margulies & Colflesh, 1982; Sheingold et al., 1983; Wright, 1987). Principal initiative and support not only gives the change project legitimacy but also encourages teacher involvement. It is of interest to note that Dow and Whitehead (1980) found that principals generally lacked specific knowledge about the change process. This lack of knowledge and skill affected subsequent continuation of change. Therefore, if computer technology is to be implemented effectively, the principal, as leader of the school, needs to not only promote and encourage the use of computers but must also be knowledgeable about the technology.
Influence of Educational Culture

Despite a common link to their school district, it is clear that schools within a district vary in the extent to which computers are implemented. As argued here, one of the determinants of computer implementation is the specific culture within the school. The importance of culture becomes even more apparent when more specific indices of computer utilization are employed. In other words, how computers are used in classrooms tends to reflect the values, beliefs, and attitudes of the teachers and the principal toward technology and innovation in the learning process.

The simplest and most frequently expressed indices are the number of computers and the amount of time spent using computers. Naron and Estes (1985), in a study of the impact of technology in education, found that the number of students actively involved with computers varied across districts, as did the amount of student time spent working on computers. More complex and less frequently used indices tap the extent of integration of computers into the classroom curriculum. More specifically, the ways in which the computers are being used to promote learning may be differentiated according to levels of sophistication and expertise.

Decisions made at the school level have the most significant impact for the acceptance and utilization of computer technology (Steier, 1986). Sheingold et al. (1983), in a case study of three schools using microcomputers, concluded that each school's goals, needs and ways of operating were influential in the successful implementation of computer technology. Naron and Estes (1985) found considerable variance among schools in different districts. They observed computers in both lab settings and classrooms, variations in levels of teacher interest and enthusiasm, different scheduling patterns, and wide variations in the extent of computer usage. It seems evident that the
unique aspects of each school, (i.e., the principal and school culture) are largely responsible for how computers are implemented.

Influence of Factors at Individual Level

The real resistance to change may not be resistance to the technology itself, but resistance to new perspectives about learning, teaching and the overall educational process which the technology represents. Herriott (1987a) stated that few changes have occurred in the schools: "teachers are continuing to teach as they themselves were taught, schools are still being organized as they always were and growing ever more larger in the process" (p. 8).

Common (1987) expressed similar concern about the lack of teacher change. Katz (1980) pointed out that teachers "have a 'tenacious hold' on the status quo and tend to become its defenders" (p. 83). Indeed, change of any sort is difficult when teachers are reluctant to incorporate the change into their teaching repertoires.

The implementation of computer technology in the school and classrooms has direct relevance for teachers and their routines. Wright (1987) concluded that teachers often regard microtechnology as another demand on their time, another topic in which to become expert. Some teachers will continue to be resistant to the implementation of computer technology (Wright, 1987), and while they may go through the motions required they will not become actively involved in the change process. In addition, these teachers may regard other teachers' involvement as self promotion even when that may not be the case. Acknowledging that all teachers may not initially be equally enthusiastic is important. Achieving long-term commitment to technology will not be accomplished by a simple mandate to implement it.

Specifically, teachers encountering change may feel that their professional territory is being invaded, since in their classroom they are in charge
(Common, 1987). Additionally, there may be some fear that computers are likely to eradicate the present professional teacher role and may result in substantial change in the way schools conduct their business (Tucker, 1983). According to Hannafin, Dalton and Hooper (1987), there is no doubt that computer technology could potentially replace some teaching functions. As in business settings, the computer can do many of the repetitious, tedious, non-teaching tasks that teachers are required to perform. However, as noted by Hannafin et al. (1987), the benefit of technology is that it can free teachers to concentrate on what they do best, teaching children. The authors concluded that rather than asking teachers overburdened with many other duties to use computers, as is the case in most school systems, it would be better to "infuse computers into normal routines, capitalize on the unique aspects of computers to motivate and support instruction, and use them to reduce or eliminate the boring, non-creative chores of teaching" (p. 13). To the extent that computers are perceived as additional work, they will not be fully implemented (Hannafin et al., 1987).

Moreover, as long as teachers are not adequately prepared and trained to use computers, the equipment will not be fully utilized (Meyer, 1985). Steier (1986) acknowledged that computers will place increased demands on teachers. He pointed out that "the teacher's role will gradually begin to change from a disseminator of knowledge to a facilitator of learning" (p. 15) as in-service and training programs prepare teachers to utilize computers in their classrooms. Similarly, Sheingold et al. (1983) found that roles changed when some teachers became computer experts and student interest increased. Nonetheless, the vast majority of teachers have not mastered the basics of computer technology and must learn new skills to ensure that computers are functional in their classrooms, not only teaching computer literacy but in-
tegrating the computer into the daily classroom environment (Wright, 1987). Without technical competence acquired through teacher in-service programs, teachers will be frustrated and waste time and energy attempting to learn by trial and error (Sutphin, 1987).

To assist employees in coping with the implementation of computers, many organizations have offered support through training programs. Naron and Estes (1985) found that most school districts had implemented a professional growth program of some kind for their teaching staff, with courses focusing on technology and related subjects. Training techniques ranged from short workshops to full-fledged courses on a wide range of computer topics. The content most often included programming, word processing, operation techniques, hardware and software information and applications for the classroom. A hands-on approach was the most frequently chosen training method. While some districts demanded teacher participation, others selected participants who were then expected to go back to their schools and train their colleagues. Sheingold, Kane and Endreweit (1983) reported similar findings.

It is clear that the importance of teachers and their role in the implementation of change cannot be overlooked. Their involvement is essential for change to become integrated into the school environment. The implementation of change necessitates adequate preparation (i.e., acquisition of skill and knowledge) as well as active teacher participation in the planning stages and beyond.

Conclusions

The extent to which future events cannot be predicted, or environmental uncertainty, has been the dimension of the environment most frequently researched. Organic (i.e., decentralized and less formalized) structures readily
adjust to uncertain or unstable environments. Bureaucratic structures, on the other hand, function best in stable environments. The environment, therefore, influences organizational structure. Mintzberg's (1979) structural typologies include the traditional bureaucracy, the professional bureaucracy and the adhocracy. While the traditional bureaucracy and the professional bureaucracy both operate best in a stable environment, the adhocracy is able to tolerate uncertainty. The adhocracy, then, responds more favourably to change in the environment.

Within the context of organizational structure and leadership, many factors act to influence the change process. The method of implementation (e.g., top-down vs. bottom-up strategies) and decision making styles (e.g., employee involvement or lack of involvement) are two of these factors. Top-down implementation strategies tend to be associated with authoritarian leadership styles, while bottom-up strategies are associated with participatory leadership styles.

At the individual level, the extent to which employees are satisfied with their involvement in decision making, whether highly involved or not involved at all, will influence the implementation of a change. Thus, it is proposed that one of the primary ways in which leaders can promote change is to develop an organizational culture which is characterized by employee participation and feelings of accomplishment.

The application of this model to change in the educational system suggests that the present educational system operates in an unstable environment. The structures of the individual schools, however, may vary. In general, if schools are defined as strategic business units, they would be expected to function as bureaucracies. However, schools appear to have several alternate structures: traditional bureaucracies, professional bureaucracies or ad-
hocracies. These structures vary in their responsiveness to change, with the adhocracy being the most responsive and the traditional bureaucracy the least. Within a school district, then, those schools which are not traditional bureaucracies can be expected to adapt more successfully to an unstable environment.

A critical factor in school change is the principal. His/her behaviours, attitudes and ideas influence teacher perceptions. Thus, the principal/teacher relationship will actively influence any change introduced in the school. Finally, the principal, as leader, determines her/his school's culture and vision of the future.

Studies of organizational culture suggest that culture is a major determinant of the implementation of change. In terms of the school setting, the school's culture determines how performance is controlled and how decisions will be made in the school. Specifically, it determines how willing teachers are to embrace computers in their classrooms and how they are used.

It has been proposed that the environment, organizational structure, leadership and organizational culture are the four primary factors to be considered when investigating the implementation of organizational change. Thus, in order to fully study organizational change, all four interrelated influences must be investigated. There has been little research to date investigating the introduction of computers in elementary school settings in terms of the influence of these four factors. The purpose of this study is to investigate the influence of these factors on computer usage and acceptance in the elementary school setting. Figure 3 provides a graphic representation of the proposed model, showing the interrelationships among the environment, organizational structure, leadership and organizational culture and their
Figure 3. MODEL OF THE IMPLEMENTATION OF COMPUTER TECHNOLOGY IN SCHOOLS
influence on the implementation of computer technology. In addition, several factors which have been reported to influence the implementation process (i.e., teacher involvement in decision making and adequacy of training) will be investigated.

The environment (i.e., the school board) is thought to be either unstable or stable. If the environment is unstable and computers are valued (i.e., perceived as necessary and essential), the school orientation toward change is high. Schools with a professional bureaucratic structure or an adhocracy structure combined with a participatory leadership style and task culture readily adapt to change. It is suggested, therefore, that when a match is found between the board level and the school's organizational factors (i.e., culture, structure and leadership style), teachers are involved in decision making and adequately trained, much computer implementation will result. If no match is found between the board level and school organizational factors and teachers are not involved in decision or adequately trained, even though the orientation toward change is high, it is thought that little computer implementation will result.

If the environment is stable and computers are not valued (i.e., perceived as important but not essential), the school orientation toward change is low. A school with a traditional bureaucratic structure combined with an authoritarian leader and a power or a role culture does not typically adapt well to change. Nonetheless, when a match is found between the board level and the school's organizational factors (i.e., culture, structure and leadership style), teachers are involved in decision making and adequately trained, even though the school orientation toward change is low, much computer implementation will result. If no match is found between the board level and school organizational factors, teachers are not involved in decision making or
adequately trained, it is thought that little computer implementation will result.

The present study is an empirical investigation of individual schools within one school district designed to assess the variations in the implementation of computer technology and the factors which contribute to these differences. Within a school district, environmental contingencies are, to some degree, similar. Organizational structures and principal leadership styles, attitudes, beliefs and perceptions, on the other hand, may differ markedly. School cultures may also be unique. Finally, at the individual level, teacher attitudes and experiences may vary and influence the implementation process. Therefore, differences in these factors may be the key to understanding the variation between schools implementing similar innovations.

School systems at present operate in an unstable environment. This unstable or dynamic environment is thought to promote a push toward change. In this study environment is assumed to be constant across individual schools in the school district. While many stakeholders make up the environment and influence individual schools, in this study only the school board or administrative level will be investigated.

Structurally, schools are expected to operate as traditional bureaucracies, professional bureaucracies or adhocracies. Leadership styles of principals are expected to be authoritarian or participatory. Schools with bureaucratic structures and principals with authoritarian leadership styles are not expected to encourage a school orientation toward change. Organizations with looser structures such as the professional bureaucracy or the adhocracy (Mintzberg, 1979), with participatory leadership, on the other hand, will encourage a potential orientation toward change in the school.
Finally, it is expected that school settings will most likely function as either power, role or task cultures (Harrison, 1972). Alternative organizational culture types may also occur (e.g., person cultures, [Harrison, 1972]) thereby increasing the number of possible culture types.

Taking into consideration all three factors results in three-way combinations or clusters. These clusters of organizational structure, leadership style and organizational culture will be used to categorize individual schools. The proposed model of change emphasizes the influence of all four major variables in the change process. While the organizational structure, leadership style and organizational culture of each individual school are expected to influence change, the structure, leadership style and organizational culture at the board or administrative level must also be considered. This administrative level will determine to a large extent financial allocations, acquisitions and policy. Therefore, the investigation of the values and preferences held by personnel at this level is critical in the analysis of change. Finally, factors specific to teachers in the schools will be investigated. Teachers, as end users of the computer technology, will be in a position to determine the day to day use of computers. Therefore, their attitudes and commitment will influence the implementation process.

Goals of the Study

The first two predictions were formulated based upon the theoretical discussion outlined in this chapter. Predictions three and four were based on previous research findings in the organizational literature, while predictions five through seven were based upon previous research findings specific to individual factors.

**Prediction 1:** Schools with a task culture, a participatory principal and an organizational structure conducive to change will have high use of com-
puters if computers are valued at both the school and school board levels. Schools with a power or role culture, an authoritarian principal and a bureaucratic structure will have lower use of computers.

**Prediction 2:** Teachers in schools with a task culture, a participatory principal and an organizational structure conducive to change will have positive attitudes toward computers (i.e., high computer acceptance scores) if computers are valued at both the school and school board levels. Teachers in schools with a power or role culture, an authoritarian principal and a bureaucratic structure will have lower computer acceptance scores.

**Prediction 3:** Schools which have a principal with long tenure in his/her leadership position (i.e., where a strong culture has evolved) will have higher computer usage and acceptance scores.

**Prediction 4:** Schools where the average teacher tenure is of long duration (i.e., school culture is well known) will have higher computer usage and acceptance scores.

**Prediction 5:** Teachers who are involved in decision making regarding computers to the extent that they desire will have higher computer usage and acceptance scores.

**Prediction 6:** Teachers who feel that they have received adequate computer training/expertise will have higher computer usage and acceptance scores.

**Prediction 7:** Teachers who have a positive attitude toward computers will have higher computer usage and acceptance scores.
CHAPTER II

Method

Design

The general purpose of the present study was to develop a model of the implementation of computers in the educational setting. Because the research was conducted in a field setting, several restrictions on research design were imposed. First, field settings are concerned with problems and solutions of an immediate nature; thus, the demands of a research project cannot interfere with the basic purpose of the organization (Fiedler, 1978). Second, from inception to completion of the research study, the researcher must negotiate with the host organization for access to participants, research time, scheduling etc. (Schatzman & Strauss, 1973). Finally, research in the natural environment makes it difficult if not impossible to control variables. The researcher must deal with a messy and complex environment. "In the field, the environment is less amenable to control" (Fielder, 1978, p. xi). In the current study, procedural activities have been fully documented in an effort to increase confidence in the findings.

Recently, there has been some movement toward field research. Scientists, in increasing numbers, are becoming disillusioned with "experimental" research findings. After many years of scientific research there is little to show in terms of our ability to predict and control beyond the artificial environment of the laboratory (Renner, 1988b). Moving away from this artificial environment, field/action research aims to contribute both to the goals of social science/academic research and to the practical concerns of those in the field settings (Clark, 1972).

It is the motivations and beliefs of individuals in organizations that are of interest to the field researcher. These individuals initiate choices, decide
upon the issues and make the decisions in their organization (Renner, 1988a).
The current study was exploratory in nature and focused on individuals in a
school system. Specifically, principals' and teachers' perceptions of organiza-
tional factors unique to their school and the influence of these and other en-
vironmental factors on the school's implementation of computer technology
were investigated.

Measures

Self-report data in the form of questionnaires and interviews measured
participant perceptions. This dual approach served several purposes. In par-
ticular, questionnaire measures were utilized for analyses focusing on the in-
dividual teacher as the unit of analysis. It was anticipated that the question-
naire measures might not provide reliable and valid data for school analyzes;
therefore, interviews were also incorporated into the research design.
Interviews allowed the researcher to probe details of the functioning of each
school more fully than was possible with the questionnaire. Also, in the in-
terview process it was possible to focus on what was actually happening
rather than the ideal, which typically influences questionnaire responses.
Moreover, the interview was suited to eliciting the "rich data" for under-
standing organizational culture (Schein, 1985) which is not possible to obtain
in questionnaires.

Investigations of organizational culture have most often relied on an
open-ended approach to data collection and interpretation. Interview proce-
dures have been used more often than questionnaire instruments (Bate, 1984;
Deal & Kennedy, 1982; Marshall, 1982; Pettigrew, 1979; Rossman, Corbett &
Firestone, 1988; Schein, 1985; Wilkins, 1983). The analysis of organizational
culture "focuses attention of the expressive, nonrational qualities...it legiti-
mates attention to the subjective, interpretive aspects of organizational life"
(Smircich, 1983, p. 355). Morey and Luthans (1985) suggest that qualitative and quantitative methods need not be polar opposites. They go on to state that qualitative approaches can be just as "nomothetic" as can quantitative methods. Pennings & Gresov (1986) suggest that the current difficulty and challenge confronting research is that "a variety of methodological approaches will be required, both nomothetic and idiographic" (p. 332). Using a structured but nondirective approach—such as an interview—adds richness and meaning to the data which are collected and analyzed (Morey & Luthans, 1985). Smith and Peterson (1988) would concur in that "students of organizational culture have usually relied upon methods derived from anthropology which are more qualitative and more sensitive to nuances of meaning" (p. 101). Thus, cultural analyses often rely on anecdotes and symbolic stories to reveal underlying cultural norms and values of the participants which are then used by the researcher to compile a composite portrait of an organization's culture.

Leadership style and organizational culture were measured through teacher interviews (Appendix E). Using a structured interview format, respondents were asked to respond to five questions. The first two focused on school culture and leadership style in their school—1) "What tips would you give a new teacher to fill them in on what this school is like?" and 2) How would you describe the atmosphere in your school?" The last three questions dealt with issues pertaining to computers in the school—1) "Do you use computers and have day to day practices changed?"; 2) "How valued are computers?"; and 3) "What would you like to see changed in the computer implementation process?" Interviews varied in length, depending upon the individual being interviewed, from approximately twenty minutes to over one hour. Teacher responses were recorded by the researcher. Responses were
coded, by school, based upon criteria differentiating culture types and leadership styles (see results section for details).

Questionnaire data was used to determine consensus among teacher responses for both leadership style and organizational culture, as well as for confirmation/collaboration of interview data. Harrison's (1972) Diagnosing Organization Ideology Questionnaire (Appendix A) was used as a measure of organizational culture. The questionnaire is based primarily on Harrison's conceptual framework which identifies four distinct culture types or ideologies. The questionnaire has 15 sections, each including 4 statements. Each statement relates to one of the cultural forms identified by Harrison (i.e., power, role, task, and person orientations). All respondents were asked to rank order items according to their perception of the dominant view in their organization.

While Harrison's culture types have a relatively strong following in the theoretical literature, there has been little use of the questionnaire as a tool to explore organizational culture. Prior to use, the questionnaire was modified to enhance its face validity for the educational population. For example, "principal" replaced "boss," "school" replaced "organization," and all references to male gender were changed to s/he statements. In addition, while the original questionnaire asked respondents to respond to questions in terms of the dominant view in the organization (i.e., actual) and again according to the individual's attitudes and beliefs (i.e., ideal), in this study respondents were only asked to respond to the dominant view in their school. Time constraints imposed by the school board required the elimination of the second rating.

In an exploratory study using the Harrison questionnaire, Hebden (1986) reported that the questionnaire findings were supported through ex-
tensive interviews with the participants. New employees in several organizations were given the Harrison questionnaire at several times and Hebden found the questionnaire to be reflective of their perceptions of the organizational culture. As the new employees learned about their company, their perceptions about the existing organizational culture were modified. Hebden concluded that the Harrison model reflected the cultural situations found in the various companies studied and stated that the general utility of the model was apparent in his study of the developmental process of organizational culture. The findings from this study, although far from conclusive, suggested that the questionnaire may be a useful tool in measuring organizational culture.

An adapted version of Blake and Mouton’s (1964) Leadership Styles Questionnaire was used as a measure of leadership style (Appendix B). The original questionnaire was shortened and modified to better address the educational sample (e.g., principal vs. leader). Principals were asked to rank five items from most to least descriptive or typical of themselves. Teachers were asked to use the questionnaire to describe their principal’s leadership style. The Leadership Styles Questionnaire measures two dimensions: concern for production and concern for people. The two dimensions are interdependent, that is, a shift in one is accompanied by a change in the character of both. While Blake and Mouton’s theory has been challenged by some theorists and researchers in the literature, others contend that the theory enhances our understanding of leadership style.

To determine organizational structure, a questionnaire focusing on six dimensions was constructed and then validated by the following procedure. The six dimensions included hierarchy of authority, goals and budgets, activities, environment, rules and procedures and decision making. These six di-
Dimensions are key components of organizational structure (Daft, 1983). Sets of three statements were constructed by the present researcher to describe each organizational structure (i.e., the traditional bureaucracy, the professional bureaucracy and the adhocracy) on each of six dimensions, resulting in a questionnaire with eighteen statements.

Statements were validated using a sample of 51 business students (22 Masters of Business Administration students and 29 fourth year undergraduate students). The students were asked to identify the statement that described each of the three structure types for the six dimensions. For each dimension, the students were asked to indicate which statement identified a traditional bureaucratic structure, which statement the professional bureaucracy and finally, which statement represented the adhocracy. Results showed that the students were able to discriminate among statements describing each of the three structures for the large majority of the eighteen statements. The percentage of students correctly choosing the appropriate structure for each statement ranged from 47% agreement to 88% agreement. Only two statements did not discriminate, having only 47% and 53% agreement. These two statements were revised. Participants in the present study were asked to indicate which statement in each group of three most closely described their school (Appendix D, Question 4). Choices for each dimension were tallied to identify which organizational structure was thought to operate in each school.

Computer acceptance was measured using items from the Survey of Attitudes about Working with Computers (SAC) (Appendix C). This scale is a Likert-type instrument constructed by Gressard and Loyd (1985) presenting positive and negative statements of attitudes toward computers and the use of computers. In validation studies using elementary, middle and secondary
school teachers, Gressard and Loyd (1985) reported coefficient alpha reliabilities of .89, .89, .89 and .95 for the Computer Anxiety, Computer Confidence, Computer Liking, and the Total Scale, respectively. Convergent validity was measured by correlating the SAC with selected responses chosen to complete the following sentence ("I think that learning about and working with computers is (would be) ______"). The three SAC subscales were significantly related to the six selected response words. In this study, responses to questions were coded and an overall score was determined for each respondent.

Computer usage was measured through questions constructed by the researcher (Appendix D, questions 6, 7 and 8). The questions asked participants about weekly use of computers, daily use of the computer and integration of computers into the classroom. Teachers and vice-principals were asked to respond on 5-point scales specific to each question.

Involvement in decision making was measured through questions constructed by the researcher (Appendix D, questions 2 and 3). The questions asked teachers and vice-principals to identify their actual and preferred involvement in decision making relevant to computers on 5-point scales. To assess the goodness of fit, participant responses to the questions were compared (i.e., the difference between scores on the two scales was calculated).

To measure training, teachers and vice-principals were asked to respond to the question, "I have received adequate training to prepare me for computer implementation" on a 5-point scale ranging from strongly disagree to strongly agree (Appendix D, question 14). Teachers responded to the four computer expertise questions (i.e., setting up computers, keyboarding skills, familiarity with software in teacher's educational area and organizing computer use in the classroom) on 5-point scales ranging from no expertise to expert (Appendix D, question 15).
Finally, to measure satisfaction with computer implementation in the school, teachers and vice-principals were asked to respond to the question, "In general, how satisfied are you with the computer implementation that has occurred in your school?" on a 5-point scale ranging from not at all satisfied to very much satisfied (Appendix D, question 1).

Procedure

This research study was approved by the Administrative Council of a school board located in a city of 200,000 in Southwestern Ontario. Following this approval, three superintendents presented the proposal to a meeting of the thirty-four elementary school principals. Principals were asked to volunteer to participate in the study. Nineteen principals agreed to participate.

In the majority of the schools participating in the study, principals called a special staff meeting or asked the researcher to attend an upcoming staff meeting, at which the researcher made a short presentation to those teachers present on the particular day. In two of the schools, principals mentioned the study to their staff and left it up to interested teachers to attend the presentation and in one school, the principal solicited teacher volunteers in the absence of the researcher. In the majority of the schools, the researcher left an additional two or three questionnaires with the principal so that any teachers not present at the meeting would be able to participate if they chose to do so. Teachers were assured that their participation would not influence their workplace activities or evaluations and that questionnaires would be maintained by file number only. A total of 267 questionnaires were distributed.

Principals were asked to complete the Diagnosing Organization Ideology Questionnaire (Appendix A), the Leadership Styles Questionnaire (Appendix B), the SAC (Appendix C), and the Principal Questionnaire
(Appendix F). The teacher participant package required approximately fifty minutes to complete and included the Diagnosing Organization Ideology Questionnaire, the Leadership Styles Questionnaire, the SAC, and the Teacher/Staff Computer Usage Questionnaire (Appendix D). Teachers were asked to return the completed package of questionnaires in a sealed envelope to a designated teacher or secretary in their school. Details about each school's computer system (i.e., hardware, software and physical set up) were also collected (Appendix H).

Follow up contacts were made in each of the participating schools to encourage teachers to return their questionnaires. When the questionnaires were distributed, teachers were asked to complete them during the following week. Approximately two weeks after questionnaires were distributed, reminder notices were put in teachers' mailboxes (See Appendix I). Finally, in all but a few of the schools, principals made a final request over the school's public announcement system asking that teachers return their questionnaires. Questionnaires were distributed during the month of December in nine of the schools. In the remaining ten schools, at the request of the principals, questionnaires were distributed in January.

Finally, individual structured interviews (Appendix E) were conducted with respondents who indicated a willingness to participate. The researcher, once again with the permission of each principal, went into the schools and asked individual teachers if they would agree to a short interview. Teachers had been asked to indicate on the consent form if they would be willing to be interviewed. Approximately 95% of the teachers who were approached agreed to participate in the follow-up interview. The majority of interviews were conducted during teachers' preparation time, before school in the morning, at lunchtime or after school finished for the day. Interviews varied
somewhat in length but on average lasted about forty minutes. In addition, the majority of principals (n=15) were interviewed.

A sample of superintendents, staff members and trustees was also interviewed (Appendix G). The Superintendent of Special Services requested superintendent and trustee volunteers on behalf of the researcher. Four superintendents and the Director of Education were interviewed. Five trustees also volunteered to participate. Two board staff personnel who were knowledgeable about computers in this school board were asked to participate. Interviews ran one half hour to one hour in length.

All participants were informed that their responses would be confidential and that overall results of the study would be made available to interested participants. Individual questionnaires and schools were coded numerically to maintain confidentiality.

Data Analysis

Coding. The Harrison Culture Questionnaire was scored using the following two tables to tabulate individual and group profiles. The first table was used to determine each individual's sum of ranks for each of the four culture types (scores range from 15 to 60 for each culture type). For each of the 15 sections, (a) corresponds to power culture, (b) to role culture, (c) to task culture, and (d) to person culture. As an example, scores for a participant's response to section 1 where (b) is equal to 1, (d) is equal to 2, (c) is equal to 3, and (a) is equal to 4 are shown in the following table. A score of 15 means that the particular culture is totally dominant, the person having ranked that culture type as Most Typical (1) for every statement. A score of 60 would indicate that the culture type was very atypical, wherein the person would have ranked the culture type as Least Typical (4) for all 15 statements.
Individual Scoring

<table>
<thead>
<tr>
<th>Existing</th>
<th>a. Power</th>
<th>b. Role</th>
<th>c. Task</th>
<th>d. Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q. 1</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>2</td>
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<td>Q. 2</td>
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<td>Q. 3</td>
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<td>etc.</td>
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Then, for each participant the culture type with the lowest score was identified. Each individual’s perception of his or her school’s culture type was recorded (using a tally system) using the following table. Finally, the culture type with the highest numerical total in this second table of group scores was used as the culture type for the school.

Group Scores

<table>
<thead>
<tr>
<th>Existing</th>
<th>a. Power</th>
<th>b. Role</th>
<th>c. Task</th>
<th>d. Person</th>
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<td>School</td>
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<td>Ideology</td>
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The Leadership Styles Questionnaire was scored using the following table. Each individual’s ranking of the five leadership styles (principal’s personal ranking and teacher’s perception of principal’s leadership style) was recorded across the table. Sums of columns were calculated, resulting in totals for each of the five leadership styles.
The five leadership styles were classified a priori in the following manner. Bureaucratic styles included the 1,1 style and the 9,1 style, the middle of the road style was the 5,5 style and participatory styles included the 1,9 style and the 9,9 style. The lowest total score among the five leadership styles was the perceived principal leadership style for the school and this style was classified as bureaucratic, middle of the road or participatory according to the criteria specified above.

Organizational structure was scored in the following manner. Each teacher's choice of structure type (i.e., the traditional bureaucracy, the professional bureaucracy or the adhocracy) for the six dimensions of organizational structure was recorded on the following table. For example, teacher #1 may have responded as follows: Dimension 1, professional bureaucracy; Dimension 2, traditional bureaucracy; Dimension 3, traditional bureaucracy; Dimension 4, adhocracy; Dimension 5, traditional bureaucracy; Dimension 6, traditional bureaucracy. These six scores were recorded as shown in the following table. A score of 1 indicated the traditional bureaucracy (TB), a 2 the professional bureaucracy (PB), and a 3 the adhocracy (Ad).
### Six Dimensions of Organizational Structure

<table>
<thead>
<tr>
<th>Teacher Response</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
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<tr>
<td>Q. 1</td>
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Then, group totals for each structure type were determined based on the number of times each structure type had been chosen for each of the six dimensions. As shown in the following table, the total from each column should be equal to the number of teacher participants. For example, if twenty teachers participated, the scores for Dimension 1 might be TB equal to 15, PB equal to 2, Ad equal to 3.

Finally, adding across each row determined the total score for each organizational structure type. The organizational structure with the highest score of the three was used as the perceived organizational structure for the school.

### Six Dimensions of Organizational Structure

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<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>Group Total</th>
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<tbody>
<tr>
<td>TB</td>
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<td>PB</td>
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The Survey of Attitudes about Working with Computers scale (SAC) was scored in the following manner. For all statements, a four-point scale was used, ranging from strongly agree to strongly disagree, with strongly agree equal to 4 and strongly disagree equal to 1. Negative statements were scored in the opposite direction. A total score was derived from the sum of the four
subscales. A high score indicated high acceptance, that is, a lower degree of computer anxiety and a more positive attitude toward learning about or using computers.

Superintendent, trustee and board personnel interview protocols and open-ended questions from principal questionnaires were coded using the grounded theory method of content analysis (Glaser, 1978; Glaser & Strauss, 1967). This method is an inductive, qualitative analysis wherein elements (e.g., sentences or complete thoughts found in the data) are compared and conceptualized in terms of commonalities. Thus, descriptive themes or categories are formed based upon the interview responses.

Summary of Analyses. Descriptive statistics were used to summarize demographic data (e.g., participant sex, education level, number of years using computers). A detailed descriptive summary of the sample is found in Appendix K (Tables K1-K4). Schools were classified into groups based upon leadership style and culture type and the stated expectations were tested using multivariate analyses of variance (MANOVA) and univariate analyses of variance (ANOVA). MANOVAs were performed to ensure that spurious findings were not obtained as a result of conducting large numbers of ANOVAs. Post hoc analyses using the Tukey test were used to compare all group means. Finally, t tests were employed to test for differences among groups at the individual level of analysis. Quantitative analyses were conducted using SPSS-X (1988) and SAS programs. Alpha was set at .05 for all analyses unless otherwise indicated.
CHAPTER III

Results and Discussion

Group Analyses

The first section will focus on group or school-level analyses. Results pertaining to the four organizational factors will be summarized, followed by results specific to Predictions 1 through 4. Several post hoc analyses were conducted and will be reported.

External Environment

The external environment is assumed to be a key factor influencing the implementation of computer technology at the school level. To determine what kind of environment existed for the schools in this school board, a summative description of the organizational structure, leadership style and organizational culture at the board/administrative level is presented. Interviews were conducted by the researcher with school board superintendents, trustees and board staff members (n=12). An open-ended question format was used. The interview data were categorized using Glaser's (1978) grounded theory methodology.

Overall, respondents more often addressed areas needing improvement rather than indicating satisfaction with the change process. Top level administrators expressed uncertainty and some frustration centered around the innovation process. The overall impression from the interview findings was that a bureaucratic milieu fostered a "slow-to-change" attitude at the board level; this could have the effect of slowing down the implementation of computers. The board appeared to function primarily as a traditional bureaucracy (Mintzberg, 1979). The board was described as historically being slow to adopt change and embrace new ideas, a theme common to Mintzberg's (1979) "traditional bureaucracy."
A cautious culture relative to computer implementation also prevailed at the board level. There was no clearly defined long-range plan for computer implementation; moreover, respondents indicated that the board tended to proceed one step at a time, apparently operating under the philosophy that change was a slow and gradual process. Board members indicated that the computer program was not operating optimally, yet they were uncertain as to details of what was or was not working presently. Respondents did not feel that their board was as advanced in terms of computers as were boards in other geographic locations. In addition, the board did not promote exploration or evaluation to learn about teachers’ experiences using computers. Furthermore, teacher input was limited in that they were seldom involved in planning and strategy formulation.

The following section will explore in greater detail board level respondents’ perceptions of the current status of computer implementation in the schools (See Appendix G for interview protocol). Three key themes emerged from the interview data (Table 5) which were used to summarize the environment at the board level. (1) Change was thought to be a slow and gradual process; (2) computers were a low priority; and (3) computer technology needed to be promoted in the schools.

*Change is a slow and gradual process.* Change was thought by board members to be an ongoing feature of the educational system. Computers were thought to have evolved far more quickly than other programs with respondents pointing out that change is typically implemented slowly and problems are therefore inevitable. This board started in the computer track slowly and has been successful in meeting its initial objectives. Several respondents stated that they had no knowledge of current long range plans regarding
Table 5

Themes based on Superintendent, Staff and Trustee Interviews

<table>
<thead>
<tr>
<th>Themes</th>
<th>Number of Respondents Mentioning Theme (n=12)</th>
<th>Number of Times Mentioned</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Change is a slow and gradual process</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Implementation is a slow process</td>
<td>9</td>
<td>21</td>
</tr>
<tr>
<td>Long range plans don't exist</td>
<td>7</td>
<td>16</td>
</tr>
<tr>
<td>Too many Ministry regulations/requirements</td>
<td>9</td>
<td>15</td>
</tr>
<tr>
<td>Decisions made at the top</td>
<td>6</td>
<td>11</td>
</tr>
<tr>
<td><strong>Computers are a low priority</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computers a low priority</td>
<td>9</td>
<td>16</td>
</tr>
<tr>
<td>Computers a medium priority</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Computers a high priority</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Adequate funding given for computers</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Need more computer funding</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Accessibility is important</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td><strong>Computer technology needs to be promoted</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sell to schools and teachers</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>Involve more in process</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>Encourage/support implementers</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>Teacher expertise is lacking</td>
<td>9</td>
<td>19</td>
</tr>
<tr>
<td>Provide teacher training/follow up</td>
<td>9</td>
<td>21</td>
</tr>
<tr>
<td>Need to allow time to learn</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Computers should be a tool for teachers</td>
<td>7</td>
<td>9</td>
</tr>
</tbody>
</table>
computer implementation, which suggests that computer issues were not perceived to warrant immediate concern or action.

The constant stream of regulations and requirements at the Ministry level was mentioned by many respondents. Comments included "finances are driven by the Ministry," "Ministry regulations cause difficulties," "there are some problems getting Ministry monies distributed," and "programs and packages are determined at the Provincial level." In addition, it appeared that decisions about computer finances, acquisitions and inventories were by and large made at the board level. This top-down decision making style was evident in comments such as "superintendents ask principals for input but make the decisions for computer acquisitions and placements," "principals are asked for computer inventories but are not involved in discussions about long term plans for buying, training, computer usage, etc." and "program people decide what software to buy."

Computers are a low priority. Respondents indicated that student accessibility to computers was a primary concern. Nonetheless, respondents stated that computers were actually only a mid to low priority. Emphasizing the need for computer technology in the schools, respondents declared "computer skills will take children into the information age" and "computers are like books and should be accessible to children." On the other hand, there was a perceived lack of urgency evident in statements such as "the board hasn't jumped on the band wagon yet" and "computers are not at/near the top of the priority list." Computers were indeed present in the schools; this presence may have been perceived as sufficient. At the school level, therefore, computers may be perceived as important yet not necessary or essential in the classroom, and use of the technology may, in turn, be moderate at best.
With the majority of decisions being made at the board level, schools are left with little room for individual initiative. This lack of participation may be problematic at the school level where a top-down decision making strategy may impede computer implementation. It is difficult to build commitment and enthusiasm for a change project when "ownership" is not felt by those who are implementing the change (Margulies & Colflesh, 1982; Meyer, 1985). Also, school personnel may not make computers a priority if they feel other board-oriented demands on their time are more pressing. Finally, there was no consensus at the board level concerning the adequacy of funding for computers.

**Computer technology needs to be promoted.** There was a general perception among board level respondents that teachers must be sold on computers and that teacher interest was low. Statements included "we must create interest and sell the idea that teachers can't do without computers," "the same 20% show up over and over for workshops" and "you can't force/impose computers on people." It was thought that computers would be best used as a teaching "tool" and that as teacher acceptance and familiarity increased, so would computer usage.

Principal and teacher commitment and involvement were thought to be critical components for successful implementation of computers in the schools. An awareness of the importance of involvement was present, although teacher involvement was not actually practiced. "We must get the teachers/elementary personnel involved" and "the principal must get involved, it's a top-down process" were a few comments emphasizing the importance of the principals' and teachers' involvement. As stated previously, it was apparent that involvement at the grass roots or school level was limited and, therefore, comments emphasizing increased teacher involvement
may have been somewhat idealistic rather than realistic. The majority of school board respondents mentioned teachers' lack of computer expertise and the need for additional training. Comments included "need more than the odd workshop," "teacher acceptance and familiarity will bring about change," and "ad hoc training is typical." Finally, respondents indicated that computers should be viewed as a tool to enhance teaching in the classroom.

From a systems perspective, the environment influences organizational members regardless of their level of awareness of the environmental factors. However, from an individual behavioural perspective, the way in which they interpret the environment has a direct impact on the decisions made and courses of action taken. The goal of the next section is to explore the extent to which teachers' perceptions of the environment matched those of the board. To the degree that these match then it may be argued that the individual's behaviour may be influenced by the environment (i.e., the board).

Teacher Perceptions

Structured interviews were conducted with a number of teachers who had previously completed the questionnaire. Eighty-one of 151 teachers participated in interviews conducted by the researcher. Teachers were asked "Are computers valued by the board?" The general consensus among teachers was that the board was not truly supportive and committed to the implementation of computers in the schools. Teachers' responses indicated that they thought the environment (i.e., the school board) was an influential factor at the school level. Interestingly, the concerns of school board respondents were found to be quite similar to those indicated by teachers. The consensus among board and school level respondents suggested that teachers
were cognizant of board policy and practice regarding computers in the schools.

Teachers did not perceive the board to value computers highly. Table 6 presents teacher perceptions of the extent to which computers were valued by their board. A large number of responses indicated that teachers felt that the board was not committed to long-term change involving computer technology. Statements reflecting this lack of long-term planning for computer implementation included "every five years a new subject becomes the focus" and "computers are not a high priority/not a must." While many respondents perceived that the board was providing the financial resources necessary to acquire and distribute a limited number of computers in the schools, there were a similar number of responses suggesting that funding was insufficient. Likewise, this uncertainty about the adequacy of funding was observed at the board level.

Indeed, interview responses emphasized that while respondents felt encouraged that funding was being made available, money alone was not perceived as sufficient. A feeling that there was not adequate direction and planning was evident in comments such as "the board is not interested and not ready" and "there is little direction." In addition, as was evident at the board level, teachers perceived that computers were somewhat of a trend to be followed because of the current emphasis on technology in society. Comments included "it's all public relations...computers sound forward thinking" and "they're saying the right things." Even the implementation process was criticized. Teachers stated that "we're not moving fast enough," "bit by bit implementation is no good" and "we're in the dark ages." Indeed, while computers were arriving at the schools, it was obvious that both
Table 6

**Teacher Perceptions of School Board's Commitment to Computer Technology**

<table>
<thead>
<tr>
<th>Theme</th>
<th>Number of Times Mentioned in Teacher Interviews (n=81)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Board not committed to long term change</td>
<td>27</td>
</tr>
<tr>
<td>Funding is provided</td>
<td>22</td>
</tr>
<tr>
<td>Insufficient funding</td>
<td>21</td>
</tr>
<tr>
<td>Computers are only a short term &quot;trend&quot;</td>
<td>19</td>
</tr>
<tr>
<td>Students need access to computers</td>
<td>5</td>
</tr>
<tr>
<td>Lack of equipment</td>
<td></td>
</tr>
<tr>
<td>hardware</td>
<td>13</td>
</tr>
<tr>
<td>software</td>
<td>20</td>
</tr>
<tr>
<td>printers</td>
<td>9</td>
</tr>
<tr>
<td>Teachers require additional formal training</td>
<td>31</td>
</tr>
<tr>
<td>Lack of time to implement computers</td>
<td>22</td>
</tr>
</tbody>
</table>

**Note.** Numbers for each theme may reflect multiple responses from some teachers.
teachers and administrators had concerns about the direction of the implementation process.

When given the opportunity to examine why computers were not used to a greater extent, teachers emphasized several key issues. The first was the lack of adequate equipment, including hardware, software and printers. It is interesting to note that respondents' perceptions of the sufficiency of equipment differed from school to school, even though the actual numbers of computers across schools were similar. Computers were allocated according to student population and most schools had from 13 to 17 computers (Appendix H). When teachers were asked whether there were sufficient computers in their school, the mean scores (based on school averages) ranged from 1.5 (i.e., mid-point between strongly disagree and disagree) to 3.3 (i.e., between I am undecided and agree) on the five-point scale. While these scores strongly reflect the perceived necessity of additional equipment in all of the schools, individual teachers' perceptions were varied. Some respondents indicated that they were very dissatisfied, while others were generally content with the numbers of computers in their school. This diversity of views suggests that respondents who participated in the study were not only those who were avidly interested in computers in the school.

Finally, teachers emphasized the necessity of formal, in-depth computer training. Comments emphasizing the need for training included "staff are not overly comfortable with computers," "teachers don't value computers" and "staff have varied expertise." Concerns about the time required to effectively utilize computers stressed that "there's too little time." Thus, teachers' perceptions were found to match those at the board level, which supports the conclusion that environmental factors were influential in determining computer usage and acceptance at the school level.
Summary. The bureaucratically-oriented board level was thought to have influenced individual schools operating under its direction. Bureaucratic structures and cultures do not facilitate/enable change; they do not promote an environment responsive to innovative ideas. Thus, the overall low computer usage scores at the school level were thought to be a function of the board's general reluctance to adopt change. This reluctance went beyond a lack of expressed interest to more tangible issues such as lack of adequate funding for school expenditures related to computers and necessary supplies and a lack of training available to teachers on an ongoing basis. The frequent failure of educational innovation has been linked to the administrative level neglecting to follow through with necessary support. As noted by Fullan (1982), for implementation to succeed, ongoing support from the top level of the organization is essential. Initial provision of equipment and funds does not assure that a program will be implemented.

Moreover, as emphasized by Wright (1987), swift change is seldom the norm. The board's belief that change was a slow and gradual process may be a result of several factors. First, a lack of funding precluded the acquisition of large quantities of computer hardware and software. Second, while it was noted that training was essential, the board had yet to implement a mandatory training program for teachers. A voluntary plan brought in those who were currently committed or interested, but had failed to entice those teachers whose interest was moderate or low.

Research suggests that without continued involvement, monies, training and commitment, even the most beneficial program is likely to falter (Delbecq & Mills, 1985; Fullan, 1982). Germaine to the issue of computer implementation, it appears that this board level perception of computers as being "important" but not yet "necessary" and "essential" may have invoked
similar uncommitted attitudes at the school level. Thus, organizational factors at the board level may have set the stage for less than optimal use of computer equipment in the schools. The next section outlines the procedures used to classify schools according to structural, leadership style and culture type variations at the school level.

Organizational Structure

It was hypothesized that schools could operate as one of three organizational structures: traditional bureaucracies, professional bureaucracies or adhocracies. Teacher responses, based on a six-part question developed by the researcher (See Appendix D, Question 4), indicated that thirteen of the eighteen schools in the study were perceived by respondents to be professional bureaucracies. Four of the remaining five schools were perceived as adhocracies. It was not possible to identify the structure type for one school (School 5) since teacher scores were split between the professional bureaucracy and the adhocracy. Table 7 presents teacher responses for each school.

Only two of the three organizational structure types were found in this study. Several t tests (Table 8) were conducted to compare those schools with a professional bureaucratic structure and those identified by teachers as being adhocracies. Dependent variables included training, expertise and teacher tenure. Two significant differences were found. It was observed that respondents from adhocracies had significantly more tenure in their school than did respondents in the professional bureaucracies (M = 6.5 vs. M = 3.2; p < .01). One explanation of this finding is that the adhocracy, with an emphasis on teacher autonomy and participation, is a desirable setting for teaching. Therefore, low teacher turnover in the adhocracy schools could result in higher teacher tenure. Differences were also found between scores
Table 7  
Organizational Structure Type by School: Teacher Responses

<table>
<thead>
<tr>
<th>School</th>
<th>n</th>
<th>Traditional Bureaucracy</th>
<th>Professional Bureaucracy</th>
<th>Adhocracy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>5</td>
<td>17</td>
<td>37</td>
<td>47*</td>
</tr>
<tr>
<td>2</td>
<td>13</td>
<td>13</td>
<td>61*</td>
<td>26</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>22</td>
<td>56*</td>
<td>22</td>
</tr>
<tr>
<td>4</td>
<td>17</td>
<td>8</td>
<td>50*</td>
<td>42</td>
</tr>
<tr>
<td>5</td>
<td>8</td>
<td>21</td>
<td>40*</td>
<td>40*</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
<td>17</td>
<td>37</td>
<td>47*</td>
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<td>7</td>
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<td>14</td>
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<td>44*</td>
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<td>8</td>
<td>63*</td>
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<td>10</td>
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<td>13</td>
<td>33</td>
<td>54*</td>
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<tr>
<td>11</td>
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<td>10</td>
<td>57*</td>
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<td>12</td>
<td>7</td>
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<td>43*</td>
<td>33</td>
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<td>14</td>
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<td>15</td>
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<td>29</td>
<td>42*</td>
<td>29</td>
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<tr>
<td>16</td>
<td>9</td>
<td>24</td>
<td>50*</td>
<td>26</td>
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<tr>
<td>17</td>
<td>7</td>
<td>17</td>
<td>55*</td>
<td>29</td>
</tr>
<tr>
<td>18</td>
<td>10</td>
<td>25</td>
<td>45*</td>
<td>30</td>
</tr>
<tr>
<td>19</td>
<td>9</td>
<td>17</td>
<td>57*</td>
<td>26</td>
</tr>
</tbody>
</table>

Note. * indicates school structure type.  
Data is presented using percentages for structure types by school and numbers have been rounded to the nearest percent.
Table 8

Differences for Training, Expertise and Teacher Tenure Variables for Professional Bureaucracy and Adhocracy Structure Types

<table>
<thead>
<tr>
<th>Variable</th>
<th>Professional Bureaucracy (n=13)</th>
<th>Adhocracy (n=4)</th>
<th>( t )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( \bar{X} )</td>
<td>SD</td>
<td>( \bar{X} )</td>
</tr>
<tr>
<td>Adequacy of training</td>
<td>2.72</td>
<td>0.62</td>
<td>2.28</td>
</tr>
<tr>
<td>Expertise</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Setting up computers</td>
<td>2.64</td>
<td>0.37</td>
<td>2.60</td>
</tr>
<tr>
<td>- Keyboarding</td>
<td>2.94</td>
<td>0.44</td>
<td>2.85</td>
</tr>
<tr>
<td>- Software in educ'al area</td>
<td>2.70</td>
<td>0.26</td>
<td>2.34</td>
</tr>
<tr>
<td>- Use in classroom</td>
<td>2.73</td>
<td>0.36</td>
<td>2.08</td>
</tr>
<tr>
<td>Teacher Tenure</td>
<td>3.21</td>
<td>1.04</td>
<td>6.50</td>
</tr>
</tbody>
</table>

* \( p < .001 \).
measuring teacher expertise organizing computer use in the classroom \((M = 2.1 \text{ vs. } M = 2.7; p < .01)\). Those schools identified as professional bureaucracies indicated more expertise organizing computer use in the classroom than did adhocracies. These findings suggest the possibility that teachers in the professional bureaucracy schools, with less tenure than teachers in the adhocracies, may have gained experience using computers from an alternate source (e.g., teacher's college courses). No significant differences were observed between mean scores on the SAC scale or for the computer usage variables. The next section outlines the classification procedure used to identify leadership styles based on the interview data.

**Leadership Styles**

Leadership style was assessed through the use of open-ended questions during teacher interviews. Respondents were asked to respond to a hypothetical question concerning the arrival of a new teacher at their school; what would they offer as useful advice/help to assist the teacher in getting to know the school? (See Appendix E, Question 1).

All statements specifically pertaining to leadership style were separated from the interview data and each statement was coded by the researcher, based upon leadership themes which were observed, using Glaser's (1978) grounded theory of content analysis. The five themes found in the data were: 1) decision making style of principal (comments ranging from decision made by principal to team decision making); 2) authoritarianism (presence or absence of this personality trait); 3) emphasis on communication (poor vs. good communication); 4) degree of supportiveness (poor vs. good support from leader); and 5) primary orientation (key focus or emphasis by principal). Responses indicated that several differing leadership styles were evident in the data. These styles are outlined below.
Evidence of an authoritarian leadership style was found in the following examples: "volunteer or you may be 'jobbed' into doing something you don't like," "the principal is not respectful, not tolerant of individual differences," "administration will pull out big gun if necessary," "principal must be in charge to feel important," "rules are enforced," "even vice-principal doesn't have any power" and "principal does not give teachers credit for professionalism."

Bureaucratic leadership style comments included "in decisions affecting staff, administration asks for opinions and majority vote," "input is solicited but principal ultimately decides" and "final decisions up to principal but teacher co-operation increases when teachers participate in decision making."

Team-oriented leadership style comments included "principal demands no more of staff than she demands of herself," "decisions are always a joint effort," "work toward common goals" and "are willing as team to share ideas and materials." Comments exemplifying good support from the team-oriented principal included "principal stands up for staff" and "principal willing to intervene and deal with problems." Comments reflecting the professional orientation which existed included "teachers are the experts," "principal delegates and trusts teachers to carry out responsibilities and doesn't check up" and "principal recognizes the fact that staff are strong."

These three leadership styles will be discussed in greater detail in a later section wherein leadership style responses were grouped by culture type. The next section outlines the procedures used to categorize interview data by culture type.
Organizational Culture

To quantify the teacher interview data pertaining to organizational culture (which included leadership style statements), statements were coded and interpreted using specific criteria determined for each of Harrison's four culture types. It was necessary to develop criteria relevant to schools due to a lack of criteria available in the literature. Five teachers and one principal from a different school system in another city, all of whom could be considered "experts" in the field (average tenure was twenty years), were recruited and asked to develop the criteria to be used in coding the interview data. The key dimensions of Harrison's (1972) four culture types were described to these individuals and they were asked to think about how a school with each of the four cultures would operate. Then, for each of the four cultures, they were asked to provide descriptive statements for the following five categories: the leader, the staff, how the school is run, the school atmosphere and what the school "looks" like (i.e., physically). These categories were chosen as representative of Harrison's key dimensions of culture.

Responses were grouped according to similar themes and a profile of key aspects which differentiated one school culture type from the others was compiled. The organizational culture profiles for the elementary school setting were quite specific. The names used by Harrison to identify the cultures did not differentiate one school culture type from another in a meaningful way. Alternative names which were more explanatory in nature (e.g., participatory rather than task) were substituted to describe school cultures. Therefore, results from this study will be discussed using authoritarian, bureaucratic and participatory cultures in place of Harrison's (1972) terminology of power, role and task cultures.
The culture profiles were used by the two coders as criteria for coding interview data according to culture type (See Appendix J for organizational culture profiles). The two coders independently rated the interview statements, and responses not pertaining to school culture were also identified. Each statement was assessed as a match if the coding was identical or as a nonmatch if it was not. The percentage of agreement was calculated by dividing the number of matches (n = 560) by the total number of statements coded (N = 844). Thus, across the eighteen schools inter-rater agreement of 66% was obtained.

The next step in the classification process involved moving beyond statements to a synthesis or identification of the culture type for each of the eighteen schools. The two coders separately evaluated each school based on general guidelines (See Appendix J) and then met to discuss their classifications of the schools. Inter-rater agreement for school culture type was 78% with the two coders agreeing on culture type for fourteen of the eighteen schools.

Authoritarian culture schools were classified without difficulty by both coders. Differentiation between the bureaucratic and participatory culture schools was a little more difficult, in that bureaucratic culture schools often included some participatory-like features. Nonetheless, coder decisions resulted in the following classifications: four authoritarian, four bureaucratic and six participatory culture schools.

Four other schools were not included in subsequent group analyses of culture since inter-rater agreement on the prevalent culture type operating in the four schools could not be obtained. Of these four schools it was felt by the coders that two of the schools had two cultures operating simultaneously and
the other two schools did not have well enough defined cultures to determine the type.

**Leadership Style by Culture Type**

Finally, leadership statements were categorized based upon culture type (i.e., authoritarian, bureaucratic or participatory). The question of whether leadership style differed among culture groups led to the categorization of leadership themes by culture type (Table 9).

Not surprisingly, schools which had been categorized as having an authoritarian culture also had principals who favoured an authoritarian style of leadership. As illustrated in Table 9, leaders in the authoritarian cultures were perceived by teachers to be the decision makers (17 responses). Limited teacher input in decision making (3 responses) and team decision making (0 responses) were not perceived to occur with any frequency in the authoritarian culture schools. Leaders in authoritarian cultures were described as being "very much in charge," the "decision maker" and the "power." It is noteworthy to observe the absence of responses suggesting team decision making, a team approach, a good administration, a professional orientation and a focus on programs in the authoritarian culture schools. Statements reflecting the poor communication patterns in authoritarian culture schools (10 responses) included "internal communication is the pits," "we don't know what's going on," "get permission" and "it's hard to get straight answers." The comments reflecting poor support from leader (7 responses) were not much higher in number than those found in the bureaucratic schools but more frequent than responses of a similar nature in participatory culture schools.

Teacher interview data portrayed bureaucratic culture principals as involving teachers in decision making to a limited extent but often reserving the final decision for themselves. An authoritarian personality was evident
Table 9

Leadership Style by Culture Type: Teacher Interview Responses (n=81)

<table>
<thead>
<tr>
<th>Category</th>
<th>Authoritarian</th>
<th>Bureaucratic</th>
<th>Participatory</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Decision Making Style of Principal</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decisions made by principal</td>
<td>17</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Limited input by teachers</td>
<td>3</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>Team decision making</td>
<td>0</td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td><strong>Authoritarianism</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Authoritarian personality</td>
<td>20</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Lack of authoritarian personality</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td><strong>Emphasis on Communication</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor communication</td>
<td>10</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Good communication</td>
<td>1</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td><strong>Degree of Supportiveness</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor support from leader</td>
<td>7</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Good support from leader</td>
<td>4</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td><strong>Primary Orientation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional orientation</td>
<td>0</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>Focus on programs</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Team approach</td>
<td>0</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Good administration</td>
<td>0</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

*Note.* Numbers for each category may reflect multiple responses from some teachers.
in bureaucratic culture school leaders (10 responses) with comments including "the principal is the boss, always remember this" and "if you make waves, principal will have you moved." Yet, there were a few comments (3 responses) indicating that the principal was not totally authoritarian. These included "there isn't someone watching over your shoulder here" and "the principal doesn't rule through intimidation" which suggest that bureaucratic principals differ from authoritarian style principals.

The team leader was clearly linked to the participatory culture school. The principal in the participatory culture, according to teachers, functioned as a team player in a group of professionals working together in the school environment. Decisions affecting school staff were typically made jointly by the principal and teachers. Team decision making was a frequent response (15 responses), while in authoritarian and bureaucratic culture schools this comment was never made by respondents. Teacher responses based on a team-oriented approach included "decisions are made by consensus; we trust and support each other" and "the principal is part of the team; people pull together." In addition, many respondents indicated that input by teachers in decision making was the norm (12 responses). Very few participants (4 responses) indicated that decisions were made solely by the principal. Principals were perceived by a large majority of teachers to favour a participatory leadership style. An emphasis on constantly striving and working toward common goals was mentioned, as was the importance of good communication among all staff in the school. Teachers referred to the dominant goals or prevailing philosophy in the schools with comments about the focus of the school being the child, the positive learning environment and commitment to joint ideals for creating an environment conducive to learning.
It is interesting to note that not one participant mentioned authoritarian personality as being descriptive of their participatory culture leader, while ten such responses were noted in the bureaucratic culture schools and twenty in the authoritarian culture schools. Other differences which separated the participatory culture principals from the other two culture groups included a team approach, a feeling that there was good support from the leader and a professional orientation in the participatory culture schools. Also unique to the participatory schools was a focus on many positive interactions/feelings both between principal and teachers and in teacher/teacher contacts. Thus, teacher comments lend support to the idea of different leadership styles being associated with the various culture types (e.g., an authoritarian leadership style with the authoritarian culture).

In summary, few differences in organizational structures suggested that this variable did not differentiate well among the schools studied. Structure was not used for classification purposes. On the other hand, several distinct organizational culture and principal leadership style types were observed. It was concluded that it was possible to identify differences among the schools on these classification variables. Since two of the factors were strongly associated with each other (i.e., leadership style and organizational culture) and the third factor (i.e., organizational structure) had little variance, only one dimension, organizational culture, was used for classification purposes. Three culture types (i.e., authoritarian, bureaucratic and participatory) became the primary independent variables in the study. The dependent variables which were studied were computer usage (i.e., daily and weekly use of computers and integration of computers in the classroom) and computer acceptance (i.e., attitude toward computers in the school).
Specific Prediction Tests

Comparison of Culture Types

It was expected that the participatory (team) culture schools would have the highest computer usage scores (Prediction 1), as well as the highest computer acceptance scores (Prediction 2). The model presented in Figure 3 also suggests that the perceived value of computers at the school and the board level will moderate computer usage. Initially though, findings will be reported without taking into consideration the perceived value of computers at the board level. The environmental influence on computer usage and acceptance will be discussed in a later section.

High correlations between items assessing daily and weekly use of computers suggested that they were measuring the same thing. Thus, in all further analyses in this section, usage variables included daily use of computers and the integration of computers, while the acceptance variable was measured using the SAC scale. Predictions of differences included (1) higher scores on daily use of computers, (2) higher integration of computers in the classroom, and (3) a more positive attitude toward computers in participatory culture schools.

A MANOVA failed to indicate a significant effect due to culture type ($F(2,11) = 0.85$, n.s). Thus, Predictions 1 and 2 were not supported. No differences were found among the three culture types for computer usage and acceptance variables. The lack of findings may have been influenced by the school board (i.e., external environment). Findings suggest that the culture was very strong and forceful at the board level which may have resulted in school level variations not being as important. Moreover, at the board level, computer use did not appear to be a high priority and this attitude may have also curtailed school-based initiatives. A second explanation may be that
variations among teacher responses in the schools functioned to average out differences across schools, resulting in schools being more similar than different.

Influence of Principal Tenure

Does the length of time a principal has been in a school setting influence the way that the implementation process is perceived by teachers? Previous research has suggested that leader tenure strengthens an organization's culture, with members becoming more cognizant of the leader's beliefs and values over time. Next, differences related to principal tenure in the school were explored. It was expected that principal tenure would influence computer acceptance and usage; thus, long principal tenure would result in higher teacher computer acceptance and usage (Prediction 3). Schools were divided into three groups: Group 1--new position (1 to 2 years); Group 2--established (3 to 5 years) and finally, Group 3--long term (6 to 19 years).

Table 10 presents the analysis of variance summary for the dependent variables by principal tenure groups. A MANOVA indicated significant group differences for the computer usage and acceptance variables ($F(2, 15) = 7.83, p < .01$). The individual ANOVAs and tests for comparisons of group means indicated that significant differences between principals new to the position (Group 1) and those in established positions (Group 2) were found on the following variables: integration of computers in the classroom ($F(2,15) = 7.02, p < .01$) and daily use of computers ($F(2,15) = 7.83, p < .01$).

It appeared that the length of time a principal had been in his/her school did influence computer usage, although not in the expected direction. Schools with a long tenured principal did not have the highest computer usage and acceptance scores. Thus, Prediction 3 was not supported. Findings suggested that teachers in schools with newer principals used computers more than in the other groups. Specifically, schools with newcomer princi-
Table 10

**Mean Scores for Usage and Acceptance Variables: Tests for Between-Group Differences**

<table>
<thead>
<tr>
<th>Usage and Acceptance Variables</th>
<th>Principal Tenure Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1-2 years (n=5) (a)</td>
</tr>
<tr>
<td>Integration of computers (ab)</td>
<td>3.49</td>
</tr>
<tr>
<td>Daily use of computers (ab)</td>
<td>2.75</td>
</tr>
<tr>
<td>SAC Score</td>
<td>52.33</td>
</tr>
</tbody>
</table>

**Note.** The letters refer to significant differences between group means (ab = new to positions [1-2 years] and established principals [3-5 years]).

* p < .001.
pals reported significantly higher daily use of computers and more integration of computers in their classrooms. These new principals were experienced computer users with the majority (75%) having five or more years experience using computers. Also, their motivation may have been a result of their moving to a new school environment with the added opportunity to initiate new ideas and strategies.

Principal interest in the innovation process has been reported as a key factor in successful implementation (Fullan, 1982; Margulies & Colflesh, 1982; Wright, 1987). Four of the five principals in the new to the position group indicated a strong interest in and commitment to computer use in the classroom (data obtained from interview and questionnaire responses), with three of the five schools using computers primarily in the classroom. Therefore, high principal interest in computers in the classroom may have influenced higher usage in the newcomer group.

Influence of Teacher Tenure

Teachers with tenure have had the opportunity to learn a great deal about how their school and the overall system operates. This knowledge should provide a solid understanding of how innovation is implemented. Individual teacher scores were averaged to produce school scores which were then categorized to investigate any group differences. The three groups included: Group 1--new to the school (less than 3 years); Group 2--established (3 but less than 5 years) and Group 3--long term (5 years or more). It was expected that as teacher tenure in their school increased, computer acceptance and usage would also increase (Prediction 4). A MANOVA failed to indicate a significant effect for the computer usage and acceptance variables (F (2,15) = 1.30, n.s.). Thus, Prediction 4 was not supported. The variability in teacher scores, once again, may have functioned to average out any group differences.
It is also possible that teacher tenure may not be an important variable determining computer usage and acceptance.

In sum, no significant differences were found for the computer usage or acceptance variables based on culture types or teacher tenure groupings. Principal tenure was the only variable which was associated with higher computer usage. The strong culture at the board level was thought to have been a factor influencing these findings. The next section synthesizes findings specific to each of the three culture types.

Summary Profiles of Culture Types

The profiles which follow are not based on any one particular school; rather, they are a composite drawn from all the data from each culture type. Bureaucratic culture schools were found to have the highest computer usage scores (although not significantly different from the other groups). A summary profile of the bureaucratic culture schools revealed a strong commitment to computers in the classroom by principals. This interest may have prompted principals to encourage teachers to make use of the technology to the best of their ability, even though, on average, teacher expertise scores in this group were low. Low expertise suggests a need for training, without which teachers are likely to experience frustration and dissatisfaction in their trial and error attempts to use the equipment (Fullan, 1988). While computers were thought to be available and teachers indicated some expertise with educational software, teachers agreed that there was a lack of computer equipment in the schools.

Overall, teachers in the bureaucratic culture schools indicated low satisfaction with the implementation process. The limited involvement in decision making for issues concerning computers expressed by participants in this group may also be a reflection of their awareness that decisions are made at
the administrative level and thus the likelihood of increased involvement is unlikely. Although dissatisfaction was expressed, teachers appeared to be using computers. Their stated need for increased involvement, training and computer hardware and software, may have been brought about by a heightened awareness of the basic requirements needed to successfully implement computers in the classroom, following a period where teachers have been using the technology. Teachers' scores on the SAC were highest (i.e., more positive attitudes toward computers) in the bureaucratic schools, although not significantly different from the other culture groups.

Authoritarian culture school teachers responded in a way which might be interpreted as a desire to preserve the status quo. While teacher expertise scores were quite high, their usage of computers did not appear to be influenced by this knowledge. They considered themselves to be more thoroughly trained (i.e., they had the highest mean score) than did teachers in the other groups. It is possible that they had not tested their computer expertise to any extent or that they overestimated their ability. Moreover, the match between actual and preferred involvement in decision making with respect to computers was good which suggests that teachers were involved in decision making as much as desired. Principals' interest in computers in the authoritarian culture schools focused on computers as an important trend as opposed to a necessary component of the teaching environment.

The discrepancy between use of computers and adequacy of training in the authoritarian culture schools is most interesting. The high level of satisfaction with the implementation of computers in their schools and the high scores for the adequacy of computer training and the computer expertise variables suggest that teachers may be content with the present situation, which, however, does not appear to include extensive use of computers.
There was less agreement among scores in the participatory culture schools. Differences among the six schools may have moderated the overall group scores. Ratings of both high and low satisfaction with the implementation process were observed among the six schools as were high and low ratings for adequacy of computer equipment and the availability of equipment. Even the extent of involvement in decision making about computers differed among schools in this group. Additionally, participatory culture principals did not agree on the benefits of computers—half the participatory principals expressed moderate interest in computers in the schools while the other half indicated that computers were very important. The participatory culture schools had the least internal consistency of the three culture groups. This inconsistency may have been a function of the lack of fit with the school board level's culture and leadership style.

Post hoc Analyses—Involvement in Decision Making, Training and Satisfaction Variables

Analyses of variance were conducted to explore several additional groups of dependent variables including: involvement in decision making (i.e., current and preferred involvement), training (i.e., adequacy of training and levels of expertise) and satisfaction with the implementation process. Culture type and principal tenure were the independent variables.

Tables 11 and 12 present the ANOVA tests by culture types. Significant differences among the three culture groups were found for only one of the training variables, teacher expertise with software in their educational area (F (2,11) = 6.28, p < .05). Comparisons of group means indicated significant differences between the bureaucratic culture schools (M = 3.0) and the participatory culture schools (M = 2.6). ANOVAs were conducted for both involvement variables and while no significant differences were found, current
Table 11

Mean Scores for Training Variables: Tests for Between-Group Differences

<table>
<thead>
<tr>
<th>Training Variables</th>
<th>Authoritarian (a)</th>
<th>Bureaucracy (b)</th>
<th>Participatory (c)</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adequacy of training</td>
<td>2.92</td>
<td>2.40</td>
<td>2.63</td>
<td>0.63</td>
</tr>
<tr>
<td>Expertise with software (bc)</td>
<td>2.66</td>
<td>3.01</td>
<td>2.57</td>
<td>6.28*</td>
</tr>
<tr>
<td>Expertise using computers in classroom</td>
<td>2.74</td>
<td>2.88</td>
<td>2.46</td>
<td>1.51</td>
</tr>
<tr>
<td>Expertise setting up computers</td>
<td>2.86</td>
<td>2.67</td>
<td>2.54</td>
<td>0.84</td>
</tr>
<tr>
<td>Expertise in keyboarding</td>
<td>3.08</td>
<td>2.84</td>
<td>2.96</td>
<td>0.28</td>
</tr>
</tbody>
</table>

Note. The letters refer to significant differences between group means (bc = bureaucracy and participatory).
* p < .05.
Table 12

Mean Scores for Involvement and Satisfaction with Implementation Variables:

Tests for Between-Group Differences

<table>
<thead>
<tr>
<th>Involvement Variables</th>
<th>Authoritarian (a)</th>
<th>Culture Group Bureaucracy (b)</th>
<th>Participatory (c)</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Involvement (ab)</td>
<td>2.43</td>
<td>1.82</td>
<td>2.11</td>
<td>3.53*</td>
</tr>
<tr>
<td>Preferred Involvement</td>
<td>3.22</td>
<td>3.09</td>
<td>2.95</td>
<td>0.57</td>
</tr>
<tr>
<td>Satisfaction with Implementation</td>
<td>3.46</td>
<td>2.96</td>
<td>3.07</td>
<td>0.69</td>
</tr>
</tbody>
</table>

**Note.** The letters refer to marginal differences between group means (ab = authoritarian and bureaucracy).

* *p < .10.*
involvement in decision making approached significance ($F (2,11) = 3.53, p < .10$). Finally, an ANOVA was performed for the satisfaction with implementation variable. No significant differences were found ($F (2,11) = 0.69, n.s.$).

Further analyses were also performed using principal tenure as the independent variable with training, involvement and satisfaction being the dependent variables. A series of one-way ANOVAs were performed and the results of the ANOVA tests are reported in Tables 13 and 14. No significant differences between groups were observed for the involvement variables or the variable measuring satisfaction with computer implementation. Two of the five training variables were significant: teacher expertise with software in their educational area ($F (2,15) = 5.04, p < .05$) and teacher expertise using computers in the classroom ($F (2,15) = 3.75, p < .05$). Comparisons of group means for teacher expertise with software indicated significant differences between Group 2 (Established principals—3 to 5 years [$M = 2.4$]) and Group 3 (Long term principals—6 years or more [$M = 3.1$]). Similarly, the mean score ($M = 3.1$) for Group 3 was significantly higher than the score for Group 2 ($M = 2.4$) for the variable measuring teacher expertise using computers in the classroom.

Teachers' perceptions of their level of expertise specific to software in their educational area and use of computers in the classroom were found to be higher in schools where the principal had long tenure. This finding is interesting in that actual use of computers was found to be higher in schools where principals had very little tenure rather than in schools where teachers indicated high levels of expertise. This discrepancy suggests that computer usage may depend on variables other than or in addition to training and expertise. In summary, few significant differences were found in the aforementioned school-level analyses.
Table 13

Mean Scores for Involvement and Satisfaction with Implementation Variables:

Tests for Between-Group Differences

<table>
<thead>
<tr>
<th>Involvement and Satisfaction Variables</th>
<th>Principal Tenure Groups</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1-2 years (n=5) (a)</td>
<td>3-5 years (n=10) (b)</td>
<td>6-19 years (n=3) (c)</td>
<td>F</td>
</tr>
<tr>
<td>Current Involvement</td>
<td>2.00</td>
<td>2.06</td>
<td>2.35</td>
<td>0.64</td>
</tr>
<tr>
<td>Preferred Involvement</td>
<td>3.10</td>
<td>2.98</td>
<td>3.06</td>
<td>0.14</td>
</tr>
<tr>
<td>Satisfaction with Implementation</td>
<td>3.00</td>
<td>3.24</td>
<td>3.05</td>
<td>0.35</td>
</tr>
</tbody>
</table>
Table 14

Mean Scores for Training Variables: Tests for Between-Group Differences

<table>
<thead>
<tr>
<th>Training Variables</th>
<th>Principal Tenure Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1-2 years (n=5) (a)</td>
</tr>
<tr>
<td>Adequacy of training</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.49</td>
</tr>
<tr>
<td>Expertise with software (bc)</td>
<td>2.85</td>
</tr>
<tr>
<td></td>
<td>2.42</td>
</tr>
<tr>
<td>Expertise using computers in classroom (bc)</td>
<td>2.65</td>
</tr>
<tr>
<td></td>
<td>2.43</td>
</tr>
<tr>
<td>Expertise setting up computers</td>
<td>2.66</td>
</tr>
<tr>
<td></td>
<td>2.60</td>
</tr>
<tr>
<td>Expertise in keyboarding</td>
<td>2.93</td>
</tr>
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<td></td>
<td>2.88</td>
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<td></td>
<td>3.18</td>
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<td></td>
<td>F</td>
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<td></td>
<td>2.77</td>
</tr>
<tr>
<td></td>
<td>3.05</td>
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<td>0.52</td>
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<td></td>
<td>0.23</td>
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<tr>
<td></td>
<td>5.04*</td>
</tr>
<tr>
<td></td>
<td>3.75*</td>
</tr>
</tbody>
</table>

Note. The letters refer to significant differences between group means (bc = bureaucracy and participatory).

* p < .05.
Group Analyses Discussion

It had been expected that participatory culture schools would have higher computer usage and acceptance scores than the authoritarian or bureaucratic culture schools. Based on data at the individual school level, this expectation was not supported. Schools, grouped by culture types, were found to be quite homogeneous, with teachers in all the schools reporting low computer use scores.

Based on the bureaucratic environment operating at the board level and the difficulties that bureaucracies encounter when faced with change, it would be expected that computer implementation would be limited. Given that both board and school level personnel believed that change was a slow, gradual and often difficult process, it was not surprising to find that computer usage scores were generally quite low in all the participant schools. School means of teacher usage scores were calculated. Teachers rated computer usage variables on five-point scales. Daily use of computers scores ranged from 1.7 to 3.1 in the eighteen schools. Use-of-computers-per-week scores ranged from 1.7 to 3.7, while scores for the integration of computers into the classroom ranged from 2.0 to 4.0. Grand mean scores based on averaged school means were calculated for the three usage variables. These scores were also low: a score of 3.0 for the integration of computers, 2.4 for the daily use of computers and 2.6 for the weekly use of computers. It is possible that the lack of commitment at the board level had filtered down to the school level, resulting in low usage scores across all schools.

It appeared that this school board was operating as a traditional bureaucracy, in terms of leadership style and culture type (See Figure 3), wherein computers were an important but not an essential element. The proposed model suggests that a match between board and school level organizational
factors will lead to more successful implementation. Thus, the bureaucratic
culture schools coincide with the culture (i.e., values and beliefs) at the ad-
ministrative level. Indeed, the bureaucratic culture schools did report the
highest computer usage and computer acceptance scores. Interestingly, all bu-
reaucratic culture principals expressed strong interest in computers in the
schools. Their interest may have been somewhat driven by a willingness to
follow the board's recommendations and requirements for the introduction
of computers in their schools.

Both authoritarian and participatory culture groups are poorly matched
to the bureaucratic environment operating at the school board level. It may
be that having dissimilar cultures led to implementation problems at the
school level. For example, a bureaucratic board would likely provide schools
with detailed computer implementation procedures. While this mandate
might be accepted by bureaucratic culture schools, participatory culture
schools may prefer to formulate their own implementation strategies based
on teacher and school needs.

Interpretation of the participatory culture schools was difficult due to a
lack of agreement within this group. Although it was expected that they
would be amenable to innovation, it is possible that messages sent down
from the bureaucratic board may have been misunderstood due to different
cultural values and beliefs at the two levels. Limited participation in partici-
patory schools may also have led to low levels of interest in and ownership of
the project. Participatory cultures are not typically forced to comply with
change; rather, they generate and promote enthusiasm at the grass roots level
(Harrison, 1972). Thus, the mismatch of culture type may have led to a feel-
ing of discontentment at the school level, wherein computers were another
requirement mandated from the board level.
Authoritarian culture schools may have been reacting to computers in their schools with feigned enthusiasm. Teachers' perceived satisfaction with computer implementation and training was not linked to high computer use as might be expected. The fact that evaluation of computer use was virtually nonexistent by either the board, the principals or other teachers, may have provided the opportunity for teachers in the authoritarian culture schools to say that everything was fine without having to substantiate their words with actual use of computers.

While small sample size suggests that caution must be taken in interpreting these findings, it may be that the culture match between the organizational levels may have influenced the computer usage and acceptance scores. Future research based on larger samples is recommended.

Individual Analyses

The following sections are based upon analyses of individual rather than school data. Two variables were used to measure computer usage—daily use of computers and the integration of computers into the classroom. Computer acceptance was measured using scores from the SAC scale. In addition to tests of the predictions regarding teacher involvement in decision making, the influence of training and teachers' attitudes toward computers, several post hoc analyses were performed. These findings are discussed, summarizing issues at the individual level. Group totals are reported for each analysis since variations in the degrees of freedom occurred as a result of missing data.

Teacher Perception of Leadership Style and School Culture

Reviewing data at the individual level resulted in some interesting observations. Teacher questionnaire responses to Blake and Mouton's leadership style and Harrison's ideology are documented in Tables 15 and 16. As
Table 15

Teacher Responses to Blake and Mouton's Leadership Style Questionnaire

<table>
<thead>
<tr>
<th>School</th>
<th>Leadership Styles (N=151*)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Impoverished Management</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
</tr>
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<td>3</td>
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<td>18</td>
<td>3</td>
</tr>
<tr>
<td>19</td>
<td>4</td>
</tr>
</tbody>
</table>

Note. * missing observations = 16.
### Table 16

**Teacher Responses to Harrison's Ideology Questionnaire**

<table>
<thead>
<tr>
<th>School</th>
<th>Power</th>
<th>P/R</th>
<th>Role</th>
<th>R/T</th>
<th>Task</th>
<th>T/P</th>
<th>Person</th>
<th>Variance</th>
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<td>4</td>
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<td>.70</td>
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<td>2</td>
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<td>.83</td>
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<td>3</td>
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<td>1</td>
<td>6</td>
<td>4</td>
<td>3.24</td>
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<td>8</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>4</td>
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<tr>
<td>9</td>
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<td>.92</td>
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<td>11</td>
<td>2</td>
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<td>6</td>
<td>.65</td>
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<tr>
<td>12</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>3</td>
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<td>14</td>
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<td>1.58</td>
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</tr>
<tr>
<td>15</td>
<td>1</td>
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<td>.70</td>
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<td>16</td>
<td>1</td>
<td>6</td>
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<td>1</td>
<td>2.61</td>
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<td>17</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>1.28</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>2.25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>3</td>
<td>1</td>
<td>5</td>
<td>.94</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note.** *missing observations = 6.*

P/R—Power/Role Combination.
R/T—Role/Task Combination.
T/P—Task/Person Combination.
illustrated in the two tables, teacher responses were quite diverse and no one leadership style or culture type could be identified for the majority of schools. High variability among teacher responses was observed for both questionnaires. What does this variability tell us about this sample?

Previous literature suggests that cultures can be strong or weak (Peters & Waterman, 1982). Strong cultures are typically driven by leaders who are capable of clearly articulating their vision to organizational members, the result of which is agreement among members regarding organizational values and beliefs. Leaders in weak cultures, on the other hand, do not provide their members with well-defined visions of the organization. An inconsistent or non-existent message from the leader will not only result in uncertainty among employees but also hinders the organization's adaptability to change (Peters & Waterman, 1982).

The lack of consensus (i.e., high variability among teachers in a school) suggests that the majority of schools in this study had weak cultures. Perhaps, principals were not placing an emphasis on transmitting values and beliefs to their staff. At the board level, it was also thought that leaders were not widely circulating their visions to the school level. The bureaucratic culture which was evident at the board level was certainly not found in large numbers at the school level. Thus, it appeared that not only was there poor transmission of culture information from the board level to the school level, but that weak cultures were prevalent at the school level. Finally, weak cultures are not accepting of innovation or change (Peters & Waterman, 1982). The low computer usage scores observed across all schools in this study reaffirms the likelihood of weak cultures operating in the schools.
Influence of Teacher Involvement in Decision Making

Previous research has suggested that the implementation of change is facilitated when participants are involved to the extent which they desire (Bryman, 1986). The match between preferred and current involvement in decision making in this study was measured using two questions (Appendix D, Questions 2 and 3). Scores on the five-point scale measuring the extent of current involvement were subtracted from scores on the preferred involvement five-point scale to calculate the difference score for each teacher in the school. Responses were categorized into two groups: Good match—where difference scores indicated either a match or more involvement than desired and Poor Match—where difference scores indicated less involvement than would be preferred. The mean scores for the "more involvement than was desired" group were more similar to the "match between actual and ideal" group and were included in Group 1.

Table 17 presents the results of two-tailed t tests of differences for the involvement groups for the usage and acceptance variables (Prediction 5). Significant group differences were found for the weekly use of computers variable (Good Match \( M = 2.94 \) vs. Poor Match \( M = 2.40, p < .05 \)). No other usage or acceptance variables were found to be significant. These findings are consistent with research indicating that a match between actual and desired amount of involvement may lead to more successful implementation (Abdel-Halim, 1983).

Influence of Training

Previous research has suggested that training is a key factor in computer implementation (Meyer, 1985; Naron & Estes, 1985; Sheingold, Kane & Endreweit, 1983; Sutphin, 1987; Wright, 1987). It was expected, therefore, that training would be associated with higher computer usage and acceptance.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Good Match (n=54)</th>
<th>Poor Match (n=95)</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integration of computers</td>
<td>3.09</td>
<td>2.93</td>
<td>1.30</td>
</tr>
<tr>
<td>Weekly use of computers</td>
<td>2.94</td>
<td>2.40</td>
<td>1.27</td>
</tr>
<tr>
<td>SAC</td>
<td>50.76</td>
<td>51.38</td>
<td>0.42</td>
</tr>
</tbody>
</table>

Note: SAC refers to Survey of Attitudes about Working with Computers scale.
* p < .05.
(Prediction 6). Respondents were separated into two training groups to examine any differences in attitudes toward and usage of computers as a result of training. Those classified as Group 1 respondents felt that they had not received adequate training (i.e., Low Training--teacher scores of 1 or 2 on the five-point scale), while Group 2 agreed that they had received adequate training (i.e., High Training--teacher scores of 4 or 5 on the five-point scale). Scores of 3 on the five-point scale, which were "I am undecided" responses were not used in the analysis. Weekly use of computers and integration of computers were the two usage variables studied and computer acceptance was measured by the SAC score.

Table 18 presents the results of t tests of differences for the two training groups for the usage and acceptance variables. Findings were consistent with previous research. Respondents in the high training group (Group 2) used computers more often on a weekly basis ($M = 2.92$ vs. $M = 2.37$, $p < .05$). Teachers in this group had also attempted to integrate computers into their classrooms (High Training $M = 3.35$ vs. Low Training $M = 2.77$, $p < .05$). The groups differed significantly in their scores on the SAC scale, with those teachers who indicated that they had received adequate training having more positive attitudes toward computers (High Training $M = 54.19$ vs. Low Training $M = 49.04$, $p < .01$). It is noteworthy that the inadequate training group was comprised of many more respondents than the adequate training group. The fact that the majority of teachers indicated that they had not received adequate training may be interpreted in a couple of ways. While it is possible that teachers desire more training, it is also possible that although they feel that they are not adequately trained, they may not care to receive more training.
Table 18

Differences for Usage and Acceptance Variables for Training Groups

<table>
<thead>
<tr>
<th>Variable</th>
<th>Low Training Group 1 (n=75)</th>
<th>High Training Group 2 (n=37)</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>Integration of computers</td>
<td>2.77</td>
<td>1.21</td>
<td>3.35</td>
</tr>
<tr>
<td>Weekly use of computers</td>
<td>2.37</td>
<td>1.32</td>
<td>2.92</td>
</tr>
<tr>
<td>SAC</td>
<td>49.04</td>
<td>7.44</td>
<td>54.19</td>
</tr>
</tbody>
</table>

Note. SAC refers to Survey of Attitudes about Working with Computers scale.

* p < .05. ** p < .001.
Influence of Teachers' Attitudes toward Computers

Differences in computer usage and acceptance as a result of individuals' attitudes toward computers were examined. Computers have been found to change roles and influence teachers' activities (Hannafin et al., 1987; Steier, 1986; Tucker, 1983; Wright, 1987) and therefore, it was expected that teachers' attitudes toward computers would influence their computer acceptance and usage (Prediction 7). Groups were determined by dividing the respondents into two groups using the median score of 53.0 on the SAC as the cutoff score. Eleven scores falling on the median were eliminated from the analysis.

Scores below the median were labelled Negative Attitudes (Group 1), and scores above the median were labelled Positive Attitudes (Group 2). Table 19 presents the results of t tests of differences for the two SAC groups for the usage variables.

Differences were found for the two usage questions: weekly use of computers ($M = 2.01$ vs. $M = 3.25$, p < .01) and integration of computers into the classroom ($M = 2.41$ vs. $M = 3.63$, p < .01). For both variables, higher scores were observed for respondents with a positive attitude toward computers (i.e., Group 2).

While it is not clear whether positive attitudes led to increased expertise, or vice versa, it was apparent that high scores on the SAC were associated with greater expertise. Consistent with findings in the next section, current involvement in decision making was higher for teachers with more positive attitudes, as was the perception that computers were as productive as traditional teaching methods.
Table 19

Differences for Usage Variables for SAC Groups

<table>
<thead>
<tr>
<th>Variable</th>
<th>Negative Attitudes</th>
<th>Positive Attitudes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group 1 (n=68)</td>
<td>Group 2 (n=65)</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Integration of computers</td>
<td>2.41</td>
<td>1.18</td>
</tr>
<tr>
<td>Weekly use of computers</td>
<td>2.01</td>
<td>1.11</td>
</tr>
</tbody>
</table>

Note. SAC refers to Survey of Attitudes about Working with Computers scale.

* p < .0001.
Post hoc Analyses—Training, Attitudes toward Computers and Location of Computers

Training. Table 20 presents the results of two-tailed t tests for the training groups for differences in expertise, involvement in decision making, satisfaction with computer implementation and equipment. Many significant differences were found. As would be expected, those respondents who felt that they had received adequate training (High Training) indicated that they had greater expertise than the Low Training respondents for all four expertise variables: setting up the equipment (High Training $M = 3.43$ vs. Low Training $M = 2.18$, $p < .01$), keyboarding (High Training $M = 3.78$ vs. Low Training $M = 2.53$, $p < .01$), software in their educational area (High Training $M = 3.27$ vs. Low Training $M = 2.24$, $p < .01$) and use of computers in their classroom (High Training $M = 3.41$ vs. Low Training $M = 2.18$, $p < .01$).

In addition, those with training indicated more current involvement in decisions about computers than those respondents with less training ($M = 2.54$ vs. $M = 1.69$, $p < .01$). Preferred levels of involvement indicated a desire for more involvement for both groups (Group 2 $M = 3.38$; Group 1 $M = 2.81$). Difference scores were calculated from these involvement scores. There was a smaller difference gap between actual and desired involvement for Group 2 (0.84) than for Group 1, suggesting that respondents in Group 2 were already quite involved in decision making and would prefer even more involvement. The larger difference score (1.12) for Group 1 is a result of a lower mean score for current involvement and a preference similar to Group 2 respondents for increased involvement in decision making. It is important for future research efforts to investigate whether positive attitudes toward computers cause increased involvement in decision making or whether increased involvement in decision making leads to positive attitudes.
Table 20

Differences for Expertise, Involvement, Satisfaction and Equipment Variables for Training Groups

<table>
<thead>
<tr>
<th>Variable</th>
<th>Low Training Group 1 (n=74)</th>
<th>High Training Group 2 (n=37)</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>Expertise</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Setting up comps.</td>
<td>2.18</td>
<td>1.10</td>
<td>3.43</td>
</tr>
<tr>
<td>Keyboarding</td>
<td>2.53</td>
<td>1.06</td>
<td>3.78</td>
</tr>
<tr>
<td>Software in educational area</td>
<td>2.24</td>
<td>1.03</td>
<td>3.27</td>
</tr>
<tr>
<td>Use in classroom</td>
<td>2.18</td>
<td>1.00</td>
<td>3.41</td>
</tr>
<tr>
<td>Involvement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Involvement in decisions now</td>
<td>1.69</td>
<td>.88</td>
<td>2.54</td>
</tr>
<tr>
<td>Preferred involvement</td>
<td>2.81</td>
<td>.99</td>
<td>3.38</td>
</tr>
<tr>
<td>Satisfaction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Satis. with implementation</td>
<td>2.91</td>
<td>1.22</td>
<td>3.49</td>
</tr>
<tr>
<td>Equipment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Productivity</td>
<td>3.31</td>
<td>.96</td>
<td>3.64</td>
</tr>
<tr>
<td>Adequate equipment</td>
<td>2.40</td>
<td>1.07</td>
<td>2.97</td>
</tr>
<tr>
<td>Equipment works well</td>
<td>3.60</td>
<td>.89</td>
<td>3.78</td>
</tr>
<tr>
<td>Quality software available</td>
<td>2.66</td>
<td>1.08</td>
<td>3.03</td>
</tr>
</tbody>
</table>

* p < .05. ** p < .01. *** p < .0001.
Finally, respondents in the adequate training group (Group 2) felt that there was sufficient equipment in their schools ($M = 2.97$ vs. $M = 2.40$, $p < .01$) and they were generally more satisfied with computer implementation ($M = 3.49$ vs. $M = 2.91$, $p < .05$) than were Low Training respondents. It is interesting that teachers in the adequate training group indicated that sufficient equipment was available, while teachers with less training did not. The required amount of equipment prior to computers being regarded as useful may, therefore, be somewhat dependent on training. It appeared that teachers who felt that they had received adequate training were willing to use the equipment which was available to them. Once again, the numbers of computers were quite similar across schools.

The four expertise variables provided confirmatory evidence that the adequacy of training was linked with the acquisition of computer skills. Nonetheless, scores for the adequate training group indicated only limited expertise using computers, while teachers in the inadequate training group indicated little computer expertise. Interesting differences between groups were observed for the involvement variables. The mean score for the inadequate training group was indicative of very infrequent involvement and teachers indicated that their preference would be for moderate amounts of involvement. The adequate training group, on the other hand, appeared to express higher involvement levels relative to the inadequate training group, with current involvement being occasional to moderate in frequency, while the preference was for a great deal of involvement. Therefore, training was thought to be an important factor in determining extent of teacher involvement in decision making.

**Attitudes toward Computers.** Table 21 presents the results of two-tailed $t$ tests of differences for the two attitude groups based on SAC scores
Table 21

**Differences for Expertise, Involvement, Satisfaction and Equipment Variables for SAC Groups**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Negative Attitudes Group 1 (n=68)</th>
<th>Positive Attitudes Group 2 (n=65)</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td><strong>Expertise</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Setting up comps</td>
<td>2.18</td>
<td>.95</td>
<td>3.20</td>
</tr>
<tr>
<td>Keyboarding</td>
<td>2.53</td>
<td>1.01</td>
<td>3.48</td>
</tr>
<tr>
<td>Software in educal area</td>
<td>2.25</td>
<td>1.01</td>
<td>3.09</td>
</tr>
<tr>
<td>Use in classroom</td>
<td>2.18</td>
<td>.95</td>
<td>3.12</td>
</tr>
<tr>
<td><strong>Involvement</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Involvement in decisions now</td>
<td>1.82</td>
<td>.99</td>
<td>2.34</td>
</tr>
<tr>
<td>Preferred involvement</td>
<td>2.81</td>
<td>.94</td>
<td>3.31</td>
</tr>
<tr>
<td><strong>Satisfaction</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Satis. with implementation</td>
<td>3.16</td>
<td>1.23</td>
<td>3.32</td>
</tr>
<tr>
<td><strong>Equipment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Productivity</td>
<td>3.15</td>
<td>1.03</td>
<td>3.64</td>
</tr>
<tr>
<td>Adequate equipment</td>
<td>2.75</td>
<td>1.11</td>
<td>2.49</td>
</tr>
<tr>
<td>Equipment works well</td>
<td>3.63</td>
<td>.93</td>
<td>3.75</td>
</tr>
<tr>
<td>Quality software available</td>
<td>2.97</td>
<td>1.06</td>
<td>2.70</td>
</tr>
</tbody>
</table>

**Note.** SAC refers to Survey of Attitudes about Working with Computers scale.

* p < .01  ** p < .0001.
(i.e., Negative Attitude--Group 1 and Positive Attitude--Group 2) using the four groups of dependent variables mentioned above. The two groups varied in many respects. Differences were found for all of the expertise questions: setting up computers [Negative Attitude $M = 2.18$ vs. Positive Attitude $M = 3.20$], keyboarding [Negative Attitude $M = 2.53$ vs. Positive Attitude $M = 3.48$], use of educational software [Negative Attitude $M = 2.25$ vs. Positive Attitude $M = 3.09$] and use of computers in the classroom [Negative Attitude $M = 2.18$ vs. Positive Attitude $M = 3.12$]. Group 2 participants were also more likely to feel that time spent by students using computers was as productive as traditional instruction methods (Negative Attitude $M = 3.15$ vs. Positive Attitude $M = 3.64$). Thus, a positive attitude toward computers was related to computer knowledge and use.

In addition, Positive Attitude respondents were currently more involved in decisions about computers ($M = 2.34$ vs. $M = 1.82$) than were respondents in the Negative Attitude group. Mean scores indicated that teachers in both groups would prefer additional involvement in decision making (Positive Attitude $M = 3.31$; Negative Attitude $M = 2.81$). Difference scores based on the actual/desired involvement in decision making questions were similar for the two groups (Group 1 = 0.99; Group 2 = 0.97). As was found in the training section above, teacher involvement in decision making and expertise variables, once again, proved to be important factors influencing positive attitudes.

**Location of computers.** The issue of the classroom vs. the laboratory setting as the most appropriate set up for computers was identified by respondents at both the school and board level. This interest led the researcher to investigate computer usage based on the location of the equipment. Several $t$ tests were conducted to investigate the influence of a com-
puter laboratory in the school setting, as opposed to computers primarily in the classroom, on computer usage and acceptance variables. Teachers were separated into two groups: Group 1--no lab in the school (n = 62); Group 2--lab in the school (n = 87). Table 22 presents the findings.

Significant differences were found for the two usage variables. Integration of computers in the classroom mean scores were significantly higher for those schools without labs than with labs (Without Lab $M = 3.32$ vs. With Lab $M = 2.75, p < .01$). It is possible that teachers were more likely to integrate computers into their daily curriculum because the computers were easily accessible as a function of computers being located in their classroom. The two groups also differed in weekly use of computers. Again, those schools without labs had higher weekly use scores (Without Lab $M = 2.95$ vs. With Lab $M = 2.32, p = < .01$) suggesting that the classroom environment may lend itself to higher computer usage. While these scores would not be considered high on a five-point scale, in this study, where most scores were lower, they were relatively elevated.

Evidence suggests that computer laboratories minimize the need for all teachers to be trained in computer use since the computer lab setting is most often run by a knowledgeable "expert" teacher or staff member (Knupfer, 1986). Teachers may not be left on their own for any length of time with the computers. In addition, teachers do not need to gain expertise in managing the computer on a daily basis, if the equipment is not located in their classroom. Computers in the classroom (as an alternative to a lab rather than in addition to a lab in the school) may increase teacher awareness of the benefits and the limitations associated with the new technology. The apparent heightened awareness of the need for training, support, hardware, software,
Table 22

Differences for Usage and Acceptance Variables for Computer Laboratory Groups

<table>
<thead>
<tr>
<th>Variable</th>
<th>No Lab (Classroom)</th>
<th></th>
<th>Computer Lab</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group 1 (n=62)</td>
<td>Group 2 (n=88)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Integration of computers</td>
<td>3.32</td>
<td>1.27</td>
<td>2.75</td>
<td>1.29</td>
</tr>
<tr>
<td>Weekly use of computers</td>
<td>2.95</td>
<td>1.56</td>
<td>2.32</td>
<td>1.18</td>
</tr>
<tr>
<td>SAC</td>
<td>52.70</td>
<td>7.50</td>
<td>50.15</td>
<td>8.72</td>
</tr>
</tbody>
</table>

Note. SAC refers to Survey of Attitudes about Working with Computers scale.
* p < .10.  ** p < .01.
etcetera found among teachers who utilized computers in their classrooms may be a result of their regular use of computers.

Differences approaching significance were found for scores on the SAC scale (Without Lab $M = 52.70$ vs. With Lab $M = 50.15$, $p < .10$). Teachers' attitudes toward computers were slightly more positive in the classroom group. **Interrelationships between Variables**

This section of analyses explores the relationships among the various teacher and usage factors to determine patterns of computer usage. Correlational analyses were performed on the data to explore the pattern of association between the dependent variables and those variables which have been identified in previous literature as influencing computer use and acceptance (i.e., training, involvement in decision making, satisfaction with the implementation process and equipment issues). The correlation matrix is presented in Table 23.

Computer usage scores were significantly related to teachers' current involvement in decision making regarding computers. Positive correlations indicated that as teacher involvement increased their use of computers also increased. Integration of computers into the classroom was also correlated with current involvement in decision making.

When teachers reported how involved in decision making they would like to be, several significant relationships were found among the usage variables. A desire for increased involvement was related both to integration of computers in the classroom ($r = .35$, $p < .01$) and to higher use of computers ($r = .24$, $p < .01$).

Training and the four expertise variables were positively correlated to the integration of computers in the classroom and to the use of computers in the school. Positive correlations suggest that as expertise in setting up
Table 23

Correlations between usage and acceptance variables and outcome variables

<table>
<thead>
<tr>
<th>Outcome Variables</th>
<th>Use per week</th>
<th>Integration of computers</th>
<th>SAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adequacy of training</td>
<td>.24***</td>
<td>.24***</td>
<td>.36****</td>
</tr>
<tr>
<td>Teacher expertise:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Setting up computers</td>
<td>.25***</td>
<td>.37****</td>
<td>.52****</td>
</tr>
<tr>
<td>Keyboarding</td>
<td>.32****</td>
<td>.35****</td>
<td>.51****</td>
</tr>
<tr>
<td>Using educational software in area</td>
<td>.38****</td>
<td>.53****</td>
<td>.51****</td>
</tr>
<tr>
<td>Using computers in the classroom</td>
<td>.33****</td>
<td>.46****</td>
<td>.57****</td>
</tr>
<tr>
<td>Involvement in decisions about computers</td>
<td>.33****</td>
<td>.36****</td>
<td>.31****</td>
</tr>
<tr>
<td>Preferred involvement in decisions about computers</td>
<td>.24**</td>
<td>.35****</td>
<td>.38****</td>
</tr>
<tr>
<td>Satisfaction with computers</td>
<td>.07</td>
<td>.05</td>
<td>.12</td>
</tr>
<tr>
<td>Adequate equipment</td>
<td>-.14*</td>
<td>-.13</td>
<td>-.11</td>
</tr>
<tr>
<td>Quality software available</td>
<td>-.09</td>
<td>.03</td>
<td>-.07</td>
</tr>
</tbody>
</table>

Note. SAC refers to Survey of Attitudes about Working with Computers scale.
* p < .05.  ** p < .01.  *** p < .001.  **** p < .0001.
computers, keyboarding, use of software and use of computers in the classroom increased so did the use of computers and the integration of computers in the classroom. Thus, elevated computer usage was primarily associated with teacher expertise (especially expertise with educational software and use of computers in the classroom), current involvement in decision making by teachers and perceptions that adequate training had been received.

Finally, analyses were conducted to obtain the correlations between the computer acceptance variable (SAC) and the outcome variables (Table 23). Significant positive correlations were found between the SAC scores and both current and preferred involvement in decision making, training and the four expertise variables. Those teachers who indicated that they were currently more involved in decision making also reported higher SAC scores. Likewise, as the preferred amount of involvement in decision making increased, so did computer acceptance scores. In addition, training was positively correlated to the SAC scale score.

Two of the outcome variables, training/teacher expertise and involvement in decision making, were associated with computer usage and acceptance. High correlations were consistently observed. Thus, it was concluded that these variables were important factors influencing computer usage.

Regression Analyses

The final set of analyses will explore those variables most likely to predict computer usage. Stepwise multiple regression analyses (SAS program) were performed on the data to explore assumptions from the reported literature (as reviewed in Chapter 1) investigating those variables which predict computer usage (i.e., high weekly use of computers and integration of
computers in the classroom) and positive attitudes toward computers (i.e., high scores on the SAC). Predictor variables included satisfaction with computer implementation, current involvement in decision making about computers, preferred involvement in decision making, adequacy of training, expertise in setting up computers, keyboarding skills, familiarity with software in teacher's educational area, familiarity with organizing computer use in the classroom, years teaching, years using the computer and teacher year of birth. Table 24 presents the findings for all stepwise regression analyses.

**Prediction of Computer Use and Acceptance**

**Integration of Computers in the Classroom.** A stepwise regression analysis was performed to determine which variables best predicted the integration of computers in the classroom. Two variables emerged as the best predictors: teacher expertise with software in their educational area and current involvement in decision making \( R^2 = .23, F (2, 119) = 17.48, p < .01 \).

**Weekly Use of Computers.** A second stepwise regression analysis was performed to determine which variables best predicted weekly use of computers. The best predictors were teacher expertise with software in their educational area, teacher age and current involvement in decision making \( R^2 = .21, F (3,117) = 10.58, p < .01 \).

**Positive Attitudes (SAC Scale).** Finally, a stepwise regression analysis was performed to determine the variables which best predicted positive attitudes toward computers. The best predictors were teacher expertise with computer use in the classroom, teacher age and number of years using computers \( R^2 = .37, F (3,116) = 22.99, p < .01 \).

Expertise with software in the teacher's educational area was a good predictor of both integration of computers and weekly use of computers.
Table 24

**Stepwise Regression Analysis: Integration of Computers in Classroom**

<table>
<thead>
<tr>
<th>Variables Entered</th>
<th>Beta</th>
<th>$R^2$</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expertise - software</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>in educational area</td>
<td>.47</td>
<td>.21</td>
<td>31.43***</td>
</tr>
<tr>
<td>Involvement in decisions</td>
<td>.17</td>
<td>.23</td>
<td>3.01*</td>
</tr>
</tbody>
</table>

*Note.* $n = 122$, $df = (2,119)$

**Stepwise Regression Analysis: Weekly Use of Computers**

<table>
<thead>
<tr>
<th>Variables Entered</th>
<th>Beta</th>
<th>$R^2$</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expertise - software</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>in educational area</td>
<td>.40</td>
<td>.14</td>
<td>18.90***</td>
</tr>
<tr>
<td>Year born</td>
<td>-.23</td>
<td>.19</td>
<td>7.34***</td>
</tr>
<tr>
<td>Involvement in decisions</td>
<td>.21</td>
<td>.21</td>
<td>3.83**</td>
</tr>
</tbody>
</table>

*Note.* $n = 121$, $df = (3,117)$

**Stepwise Regression Analysis: SAC Scale**

<table>
<thead>
<tr>
<th>Variables Entered</th>
<th>Beta</th>
<th>$R^2$</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expertise - use of</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>computers in class</td>
<td>3.61</td>
<td>.30</td>
<td>50.96***</td>
</tr>
<tr>
<td>Year born</td>
<td>1.49</td>
<td>.35</td>
<td>8.81***</td>
</tr>
<tr>
<td>Years using computers</td>
<td>.56</td>
<td>.37</td>
<td>4.13**</td>
</tr>
</tbody>
</table>

*Note.* $n = 120$, $df = (3,116)$

Beta weights for variables are those based on final model presented. SAC refers to Survey of Attitudes about Working with Computers scale.

* $p < .10$. ** $p < .05$. *** $p < .001$. **** $p < .0001$. 
Teachers' expertise related to an educational area or topic was the most significant predictor of computer usage. This finding suggests that training may be most effective if specifically centered around subject areas (e.g., geography, English). The importance of subject-centered training may be relevant to other boards currently implementing computers in their schools. Involvement in decision making was also a good predictor of higher usage. An interesting connection was found between older teachers and higher computer use. One explanation of this finding is that older teachers, knowledgeable about routines and curriculum, may have more time and energy to use the computer equipment on a regular basis.

Teacher expertise in using computers in the classroom was found to be a predictor of positive attitudes toward computers (i.e., high SAC scores). In addition, teacher age and the number of years using computers were significant predictors. These results suggest some connection between the endorsement of knowledge in the use of computers, younger teachers and prior use of computers and a tendency to have positive attitudes toward computers. It may have been that this group of younger teachers had been exposed to computers in their teachers' college courses. Consistent with findings from previous sections, expertise and involvement variables were found to be good indicators of high computer usage and positive teacher attitudes.

Revised Model

The model of computer implementation proposed in Figure 3 was not found to accurately represent computer usage and acceptance based on results from this sample. Figure 4 presents a revised model of computer implementation wherein the factors found to be important in this study are highlighted. Findings suggested that, in general, organizational factors did not have as much influence on computer implementation as was expected. Specifically,
Figure 4. REVISED MODEL OF THE IMPLEMENTATION OF COMPUTER TECHNOLOGY IN SCHOOLS
organizational structure, leadership style and organizational culture were not found to directly influence the use of computers in the schools. The external environment (i.e., the school board) appeared to be somewhat more influential, as were individual factors such as teacher involvement in decision making, training and attitudes toward computers. Factors at the individual level were found to be good predictors of high computer use and positive attitudes toward computers. These factors support the "professional" status of elementary school teachers in schools functioning as professional bureaucracies.
CHAPTER IV

Conclusions

The purpose of the present study was to investigate the implementation of computer technology in an elementary school system as influenced by organization and individual level factors. At the organization level, the environment, organizational structure, leadership style and organizational culture were investigated. At the individual level, teacher involvement in decision making and adequacy of training as well as several other indicators were explored. While many school systems have the technology in the schools, few are effectively utilizing this resource (Knupfer, 1986; Naron & Estes, 1985; Sheingold, Kane & Endreweit, 1983; Steier, 1986; Tucker, 1983; Wright, 1987). Indices of implementation included usage and acceptance of computers in the schools. The current study attempted to integrate several levels of analysis (i.e., individual, organization and environment) as well as disciplinary orientations (i.e., organizational psychology and organization theory). The researcher felt that this strategy would lead to a more comprehensive understanding of organizational functioning. This chapter presents a summary of the key findings from the present study followed by a consideration of the limitations of the study, and finally, implications for application and future research.

A sequential model for the implementation of computer technology was proposed in the introductory chapter. While prior research has supported the importance of the four organizational variables in the change process, the current research findings did not concur with the model. Findings suggested that the environment may have influenced the use of computers in the schools but support was not found to link leadership style and organizational culture to the change process. Indeed, school level factors did not
prove to be useful in predicting high use of computers. No differences in computer use were found among the authoritarian, bureaucratic or participatory culture schools. Individual factors were found to be important predictors of computer use. Thus, findings from this study did not support the proposed model of implementation.

One explanation is that the environment may be influencing the implementation process in a more direct manner than proposed by the model. The overall low use of computers by teachers in all schools, augmented by teacher and board members' comments, suggests that organizational factors at the administrative level may have limited the use of computers in the schools. Since low computer usage scores were found across the sample, further investigation in a school system where usage is presently higher may provide interesting comparisons. In addition, the bureaucratic structure and culture found at the board level in the current study would not provide an atmosphere which was conducive to change. Specific to computer implementation, the board did not appear to have focused on long-term plans to guide the implementation process. At least, the respondents were not aware of a computer plan. Finally, funding, support and expertise in the form of ongoing training, computer co-ordinators etcetera did not appear to be a high priority.

A message of limited interest in computer implementation and usage at the board level appeared to have been conveyed to principals and teachers at the school level. Findings indicated that at both the board and school level there was agreement that progress was inevitably slow and that the process of computer implementation would continue to be fraught with difficulties. These attitudes may have limited enthusiastic growth and expansion in the use of computers at an individual school and teacher level. Furthermore,
computers appeared to be perceived as only one of many important demands on teachers' time. Finally, a lack of continued interest at the board level appeared to have diffused initiatives at the school level. Indeed, schools were apparently responding to mixed signals from the top; although computer use was verbally promoted, many necessities (e.g., additional training) did not appear to be high priorities budget-wise.

According to Schein (1990), cultures can be either strong or weak. Weak cultures have little or no shared history, frequent turnover of members and are not prone to innovation or change. Findings suggested that schools in this study were more likely to have weak rather than strong cultures, whereas a strong culture was evident at the board level. This strong culture with the low-to-moderate commitment to computer implementation may have functioned to limit the use of computers at the school level. Also, strong and cohesive school cultures who are interested in computers in the school may have higher use of computers. Few schools fitting this description were found in the current sample.

Alternatively, it is possible that leadership style and organizational culture are simply not critical factors in this particular change process. Further research is required to explore this possibility.

Principal tenure was found to be a factor influencing computer usage. Specifically, schools with new principals showed higher computer usage. It was not clear whether this was due to a higher interest in computers, the challenge of being in a new position/school or an alternative explanation. Further study of new tenure principals may provide insight into the implementation process.

It is also possible that factors unique to the individual may be central to the implementation process. Consistent with previous research and expecta-
tions, several variables were found to be associated with higher computer usage scores. The most important of these was teacher expertise with software in his/her educational area. Another training variable, teacher knowledge of computer use in the classroom, was also found to be a good predictor of high computer use. Like many previous researchers (Naron & Estes, 1985; Meyer, 1985), these findings emphasize the need for specialized knowledge and skill to better prepare staff to use computers in their classrooms.

A second variable found to be associated with high computer usage and acceptance was teacher involvement in critical computer decisions. Furthermore, it was observed that when teachers were involved to the extent they desired, usage scores increased. It may be that it does not matter whether teachers are highly involved in decisions or not, but rather that they are involved to the extent that they desire. This finding suggests that perhaps the question to ask teachers may be "How involved do you want to be in decisions about computers?" Given that decision makers would be willing to share responsibility for decision making, allowing teachers the autonomy to choose the extent of their involvement may be the most appropriate strategy. Moreover, involvement in decision making may be associated with the "professional" nature of teachers. Professionalism is, therefore, another factor which should be investigated in future research. Findings at the individual level of analysis suggest that the provision of extensive training and increased involvement in decision making may be an effective way to ensure successful implementation—in other words, high use of computers in the schools.

Limitations of the Study

Several limitations in the present study warrant consideration in interpretation of the results. Well-defined procedures or empirically con-
structured test instruments to identify an organization's culture are not abundant in the literature. Researchers have acknowledged the difficulties in tapping the beliefs and values unique to an organization (Pitt & Booth, 1983; Schein, 1985). Continued exploration of these variables using alternative methodologies as well as more extensive validation of existing measures is required. In the current study, data from structured interviews was used to aggregate individual data into groups. Although the summing of individuals' scores into a group score is a common procedure, the resulting group scores may not have accurately reflected the organization. While care was taken to ensure that criteria utilized to differentiate group membership was clear and specific, further replication and verification are required.

In this exploratory study many variables were investigated in order to assess the influence at several levels (i.e., environment, organization and individual levels). While it is suspected that the three levels influence each other, conclusions from this study do not indicate the relative importance of variables at each level. Further research investigating the linkages among the three levels is necessary. The difficulties associated with the assessment of organizational variables will continue to challenge researchers in the years ahead.

Second, participants in this study were volunteers. As a result, the possibility of self-selection bias in the sample must be addressed. School superintendents advised all principals in this board of the research study and encouraged principals to volunteer to participate. While approximately two-thirds of the elementary schools chose to participate, those principals who refused may have been afraid of the possible negative reflection on their school if computer use was not a priority. Upon entry to the school, it is also possible that teachers who were not as interested in computer use may have selected
themselves out as participants. Some teachers may have been reluctant to complete the questionnaire because of the sensitive topic areas (i.e., an assessment of their principal's leadership style and evaluation of their school). These same individuals who opted not to participate were not recruited for the interview. Therefore, their input was not available for use in the identification of the school culture. Total participation of all teachers in each school would have led to increased certainty of the school cultures. Moreover, a random sampling of both administrative personnel and teachers would have been desirable, although in a field setting, such a requirement would be difficult to impose.

Third, the self-report measures used in the present study did not control for defensiveness or self-presentation bias. Although the researcher assured confidentiality, all participants may not have been convinced. The potential effects of bias and defensiveness through the use of self-report measures may be examined in future research with the use of behavioural indices such as participant observation.

Fourth, the present study findings could also be influenced by small sample size which averaged three to four schools per group. Small group size limits not only interpretation of the findings but also generalizability to other settings. Future research with larger samples would increase confidence that differences which were observed were meaningful. Furthermore, comparison studies of school boards which have different culture types at the board level would be most informative. It would be interesting, for example, to compare a participatory culture school board to the present sample. It is possible that the participatory culture school board may foster a push to change which may speed up the change process at the school level.
Implications for Application and Future Research

The increasingly turbulent world (i.e., increasing changes in the external environment) in which organizations must function creates the need for organizations to view change as an opportunity rather than a threat. In traditional bureaucratic organizations, where stability and predictability are valued, change evokes resistance and uncertainty. The educational system has met with increasing change in recent years and research suggesting that innovation is difficult for such institutions prompted the current study. An investigation of the implementation of computer technology in school settings was conducted in an effort to consider the influence of organizational factors both within the schools and those which influence from the outside (i.e., the school board level).

The findings from this study are consistent with literature concluding that numerous critical conditions must be present for change to occur (Berman & McLaughlin, 1979; Dow & Whitehead, 1980; Fullan, 1982; Fullan, 1988). At the board level, positive attitudes and support, in addition to, financial aid, training and planning, are requirements of the implementation process (Fullan, Miles & Anderson, 1988). The findings from the present study suggest that this board was not making the implementation of computers a high priority which was thought to have curtailed innovation in the schools. Active and ongoing support was not evident, even though many respondents commented on the benefits to be realized when such support and training was emphasized. A gradual implementation process appeared to be the strategic choice at the board level which suggests that extensive teacher training and increases in computer equipment will also be gradual. In summary, the bureaucratic culture evident at the board level was thought to be a factor which limited extensive use of computers at the school level.
Several factors at the individual level were found to be important. A desire by many respondents for increased involvement in decision making regarding computer implementation was noted. Also, those teachers who were involved to the extent that they desired indicated higher computer usage. This information may be useful to other boards and schools introducing computers into the school environment. In addition, teacher interest and knowledge in this sample appeared to vary, which suggests that more extensive training programs are necessary. Tailor-made instruction/coaching specific to each school and staff members may further enhance the practical applications of computers; prompting teachers to "buy into" the change and invest the time and energy to develop computer skills and expertise.

Computers in the "classroom" vs. the "laboratory" setting was discussed by many respondents in this sample. Findings suggested that while teachers were more satisfied when computers were in the lab, high computer usage was not associated with the lab environment. The classroom environment, on the other hand, appeared to promote higher usage; if the necessary equipment, software and training was provided. Thus, if higher computer use is the desired outcome, it appears that, for this sample, the classroom environment may be the better alternative.

Further exploration of the relationship between factors at the board level and those at the school level is perhaps the most worthwhile direction for future research. Because of extensive control and decision making at the board level, school members may benefit from a better understanding of how and why decisions are made at the board level. Optimally, principals and teachers would be included in board decision making processes relevant to their schools.
In addition, research investigating school boards with a participatory culture type would provide interesting comparative data and perhaps a more comprehensive understanding of the influence of organizational factors in the implementation of change. Furthermore, it will be the ongoing challenge for future researchers to continue to refine methodologies to be used in investigations of organizational factors in the work environment.
References


Meyer, J. H. (1985, October). *What classroom teachers would love to tell administrators about computers or how to successfully introduce computers into your school district's curriculum.* Paper presented at the Annual
Conference of the Educational Computing Consortium of Ohio, Columbus, OH. (ERIC Document Reproduction Service No. ED 266 772).


APPENDIX C

SURVEY OF ATTITUDES ABOUT WORKING WITH COMPUTERS
SURVEY OF ATTITUDES ABOUT WORKING WITH COMPUTERS

The purpose of this survey is to gather information concerning your attitudes about working with computers. All responses will be kept confidential.

Below are a series of statements. There are no correct answers to these statements. They have been set up in a way which permits you to indicate the extent to which you agree or disagree with the ideas expressed. Place a check mark in the parentheses under the label which is closest to your agreement or disagreement with each statement. If you are not currently using computers in your teaching, answer the statements according to how you think you would feel.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Slightly Agree</th>
<th>Slightly Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Using computers in the classroom does not scare me at all.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>2. I use computers many ways in my teaching.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>3. Working on a computer in my classroom makes me very nervous.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>4. Learning about computers is a waste of time.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>5. I think working with computers in the classroom is enjoyable and stimulating.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>6. Learning about computers is worthwhile.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>7. I'll need a firm mastery of computers for teaching in future years.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>8. I have little use for computers in my classroom.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>9. I can't think of any way to use computers in my classroom.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>10. Using a computer in my classroom on a regular basis is very difficult.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
</tbody>
</table>
11. Knowing how to work with computers increases my teaching expertise.  
12. I get a sinking feeling when I use computers in my classroom.  
13. I use computers in my classroom as little as possible.  
14. Anything that a computer can be used for in the classroom, I can do just as well some other way.  
15. I feel comfortable using computers in my classroom.  
16. I have a lot of self-confidence when it comes to working with computers.
APPENDIX D

TEACHER COMPUTER USAGE QUESTIONNAIRE
Dear Participant,

For the past several years I have been interested in studying computer usage in organizations. How does computer usage differ in organizations? What factors influence high or low usage? In a previous study which I conducted in business organizations, I observed that employee's attitudes and ideas, to a large extent, influenced computer usage.

I am currently a graduate student at the University of Windsor working on my doctoral dissertation. My research focuses on the influence of organizational factors (i.e., organizational culture, organizational structure and leadership) on the implementation of computers in school settings. Because of the primary role of vice-principals/teachers using computers in classrooms and schools, your input is especially valuable to me. With the endorsement of the Research Review Committee and the Administrative Council of the Windsor Board of Education, your school has been selected to participate in this research study. Results from the study will be useful in implementing computers in your school board and others.

I am requesting approximately 45 minutes of your time to complete the questionnaires. The enclosed material includes an Informed Consent Form and a questionnaire package. Please read and sign the Informed Consent Form. Then complete each questionnaire in the order in which it appears. Please complete ALL questions. Since your name will NOT be required on any of the questionnaires, your responses will be kept strictly confidential.

Because you are one of a few vice-principals chosen to participate in this study, your involvement is very important and highly valued. I greatly appreciate your time and effort. If you have any questions, do call me at 254-7617. Thank you very much.

Sincerely,

Mary Ann Schmidt, M. A.
Informed Consent Form

I have read the enclosed letter and understand the nature of this study and my participation in it.

I understand that the information that I provide will be analyzed and reported in group form only. My name will not be attached to any of the questionnaires. Files will be maintained by Code Number only. No information from my individual questionnaires will be accessible to anyone in my workplace or anywhere else, nor will my participation influence any workplace activities or evaluations.

Signature: __________________________

Date: __________________________

Two self-addressed envelopes have been enclosed: one for the Consent Form and one for the Questionnaire. You may return them to either the designated teacher in your school, your school office, or mail them directly to me.

Check below if you would like to receive a copy of the results.

_____ Yes, I would like to receive a copy of the results.

Finally, please indicate below if you would be willing to participate in a brief (one-half hour) follow-up interview.

_____ I would be willing to participate in a follow-up interview.

_____ I would not be willing to participate in a follow-up interview.
Code Number _____

**Demographic Information**

Name of School ____________________________

Position _______________________

Grade(s) Taught ____________________________

Year born ______

Female _____  Male _____

Last degree completed _________________

Number of years teaching ______

Number of years at this school ______

Number of years using computers in a school setting ______

List the computer courses that you have taken _______________________

Do you own a home computer? _____
Computers in the School

The purpose of this survey is to gather information concerning the implementation and use of computers in your school. All responses will be kept confidential.

1. In general, how satisfied are you with the computer implementation that has occurred in your school?

1  2  3  4  5
Not at all Somewhat Neither Somewhat Very much
satisfied unsatisfied unsatisfied satisfied satisfied
nor satisfied

2. How involved are you now in decision making related to computers?

1  2  3  4  5
Not at all Involved occasionally Involved most involved all
involved involved a moderate amount of the time of the time

3. How involved would you like to be in decision making related to computers?

1  2  3  4  5
Not at all Involved occasionally Involved most involved all
involved involved a moderate amount of the time of the time
4. Six groups of statements (1 through 6) are listed below. Read through the three statements (a, b and c) from the first group and choose the ONE statement that you feel best describes your school. Continue for groups two through six, choosing the ONE statement in each group that best describes your school. Place a check mark on the space beside the statement that you choose.

1)  ___ a. Teachers are supervised closely by the principal.
     ___ b. Teachers' professional standards to a large extent determine their actions.
     ___ c. Teachers have a great deal of individual discretion and autonomy.

2)  ___ a. The school board determines goals and budgets for this school.
     ___ b. Goals and budgets are determined by the principal with teacher input into the decision.
     ___ c. Principals and teachers work together to define appropriate goals and budgets for this school.

3)  ___ a. Teachers' activities are routine and unchanging from day to day.
     ___ b. Teachers have personal autonomy over day to day teaching activities.
     ___ c. Teams of teachers work together to initiate new teaching activities.

4)  ___ a. The current educational environment is relatively stable and unchanging.
     ___ b. The current educational environment is somewhat stable but subject to increasing change.
     ___ c. Ongoing change is typical in the current educational environment.
5)  a. Extensive rules and procedures define teachers' roles in the school.
    b. Teachers' roles are guided by professional standards of conduct.
    c. Teachers' roles are primarily determined through individual discretion.

6)  a. Important decisions that affect the school are made primarily by the principal.
    b. Important decisions that affect the school are made by the principal only after consultation with teachers.
    c. Important decisions that affect the school are always made jointly by the principal and teachers.

5. To what extent are computers in your school available for your use?

1 2 3 4 5
Not accessible Somewhat accessible Very accessible.

6. Have you attempted to integrate computers in your classroom?

1 2 3 4 5
No, not at all To a limited extent Yes, a great deal

7. On how many occasions each week do you use computers?

1 2 3 4 5
Not at all Once or twice a week Three to five times Five to ten times Ten times or more
8. How long on average do you or your students use the computer during a typical school day?

1 2 3 4 5
Few minutes 5 minutes to one half hour One half hour to one hour All morning or afternoon The entire day

9. Time spent by students using the computer is as productive as time under instruction by traditional methods.

1 2 3 4 5
Strongly disagree Disagree I am undecided Agree Strongly agree

10. There is enough equipment (hardware, software, and peripherals) in our school at the present time.

1 2 3 4 5
Strongly disagree Disagree I am undecided Agree Strongly agree

11. The equipment is working well.

1 2 3 4 5
Strongly disagree Disagree I am undecided Agree Strongly agree
12. There is enough quality software to meet my teaching needs.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly disagree</td>
<td>Disagree</td>
<td>I am undecided</td>
<td>Agree</td>
<td>Strongly agree</td>
</tr>
</tbody>
</table>

13. Please evaluate the following software formats.

<table>
<thead>
<tr>
<th>Learning Format</th>
<th>Available? (Yes/No)</th>
<th>Currently Use? (Yes/No)</th>
<th>Relevant to Curriculum (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Games</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drills/Practice</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Simulations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Problem Solving</td>
<td></td>
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<td></td>
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<td>Story Writing</td>
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<tr>
<td>Word Processing</td>
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<tr>
<td>Programming</td>
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</tr>
<tr>
<td>Data Base</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

14. I have received adequate training to prepare me for computer implementation.

<table>
<thead>
<tr>
<th></th>
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<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly disagree</td>
<td>Disagree</td>
<td>I am undecided</td>
<td>Agree</td>
<td>Strongly agree</td>
</tr>
</tbody>
</table>
15. Please describe your expertise in each of these areas using the following scale. For each statement below circle the appropriate number.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>No expertise</td>
<td>Some expertise</td>
<td>Expert</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

How to set up computers
Familiarity with keyboard features
Familiarity with software for your educational area
How to organize computer use in the classroom

16. How would you describe your school's orientation to change?

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very resistant to change</td>
<td>Somewhat resistant to change</td>
<td>Neutral</td>
<td>Somewhat open to change</td>
<td>Very open to change</td>
</tr>
</tbody>
</table>
APPENDIX E

TEACHER/VICE-PRINCIPAL STRUCTURED INTERVIEW PROTOCOL
Teacher/Vice-Principal Structured Interview Protocol

1. Suppose that a new teacher was starting to work in this school. What tips would you give him/her to help them "get on board"/"fill them in on what the school is like?"
   - how to fit in
   - how do you know what is going on in the school?
   - how are you informed about special events etc
   - specific stories/history
   - descriptions of what goes on/organization of school
   - what is an average day like?
   - how do things get done/decisions & planning
   - how decisions are made/involvement
   - does your principal share information from meetings etc?
   - activities or patterns that are common
   - how problems are handled
   - rules and their enforcement

2. If you were telling a friend what it was really like to work here, how would you describe the atmosphere in your school? (norms, beliefs about the nature of the work, how it should be done, employee involvement in work)

3. Do you use computers? If so, have day to day practices changed because of computers in the school? in what way?

4. How valued are computers (by school, by board)?

5. Is there anything that you would like to see changed (any suggestions) concerning computer implementation and usage in your school (ideal scenario for computer implementation)?
APPENDIX F

PRINCIPAL QUESTIONNAIRE
Dear Principal,

For the past several years I have been interested in studying computer usage in organizations. How does computer usage differ in organizations? What factors influence high or low usage? In a previous study which I conducted in business organizations, I observed that employee’s attitudes and ideas, to a large extent, influenced computer usage.

I am currently a graduate student at the University of Windsor working on my doctoral dissertation. My research focuses on the influence of organizational factors (i.e., organizational culture, organizational structure and leadership) on the implementation of computers in school settings. Because of your primary role as principal, your input is especially valuable to me. Thank you for your cooperation and interest in this research study. Results from the study will be useful in implementing computers in your school board and others.

I am requesting approximately 45 minutes of your time to complete the questionnaires. The enclosed material includes an Informed Consent Form and a questionnaire package. Please read and sign the Informed Consent Form. Then complete each questionnaire in the order in which it appears. Please complete ALL questions. Since your name will NOT be required on any of the questionnaires, your responses will be kept strictly confidential.

Because you are one of a few principals chosen to participate in this study, your involvement is very important and highly valued. I greatly appreciate your time and effort. If you have any questions, do call me at 254-7617. Thank you very much.

Sincerely,

Mary Ann Schmidt, M. A.
Informed Consent Form

I have read the enclosed letter and understand the nature of this study and my participation in it.

I understand that the information that I provide will be analyzed and reported in group form only. My name will not be attached to any of the questionnaires. Files will be maintained by Code Number only. No information from my individual questionnaires will be accessible to anyone in my workplace or anywhere else, nor will my participation influence any workplace activities or evaluations.

Signature: ________________________________

Date: ________________________________

Two self-addressed envelopes have been enclosed: one for the Consent Form and one for the Questionnaire. You may return them to either the designated teacher in your school, your school office, or mail them directly to me.

Check below if you would like to receive a copy of the results.

____ Yes, I would like to receive a copy of the results.

Finally, please indicate below if you would be willing to participate in a brief (one-half hour) follow-up interview.

____ I would be willing to participate in a follow-up interview.

____ I would not be willing to participate in a follow-up interview.
Demographic Information

Name of School ______________________

Female ___ Male ___

Year born ____________

Last degree completed ________________

Number of years as principal at this school ______

Number of years using computers in the school setting ______

List the computer courses that you have taken ______________________

Do you own a home computer? _____
Computers in the School

The purpose of this survey is to gather information concerning the implementation and use of computers in your school. All responses will be kept confidential.

1. Six groups of statements (1 through 6) are listed below. Read through the three statements (a, b and c) from the first group and choose the ONE statement that you feel best describes your school. Continue for groups two through six, choosing the ONE statement in each group that best describes your school. Place a check mark on the space beside the statement that you choose.

1)   ____ a. Teachers are supervised closely by the principal.
  ____ b. Teachers' professional standards to a large extent determine their actions.
  ____ c. Teachers have a great deal of individual discretion and autonomy.

2)   ____ a. The school board determines goals and budgets for this school.
  ____ b. Goals and budgets are determined by the principal with teacher input into the decision.
  ____ c. Principals and teachers work together to define appropriate goals and budgets for this school.

3)   ____ a. Teachers' activities are routine and unchanging from day to day.
  ____ b. Teachers have personal autonomy over day to day teaching activities.
  ____ c. Teams of teachers work together to initiate new teaching activities.
4)  a. The current educational environment is relatively stable and unchanging.
    b. The current educational environment is somewhat stable but subject to increasing change.
    c. Ongoing change is typical in the current educational environment.

5)  a. Extensive rules and procedures define teachers' roles in the school.
    b. Teachers' roles are guided by professional standards of conduct.
    c. Teachers' roles are primarily determined through individual discretion.

6)  a. Important decisions that affect the school are made primarily by the principal.
    b. Important decisions that affect the school are made by the principal only after consultation with teachers.
    c. Important decisions that affect the school are always made jointly by the principal and teachers.

2. Please describe your personal expertise in each of the following areas using the scale below. For each statement circle the appropriate number.

    1  2  3  4  5
    No expertise Some expertise Expert

How to set up computers
Familiarity with keyboard features
Familiarity with educational software
How to organize computer use in the classroom
3. Think about the majority of teachers in your school. How would you describe their level of interest in computers?

1 __________ 2 __________ 3 __________ 4 __________ 5
No Interest Very little Some Quite a bit Very high
at all interest interest of interest interest

4. Think about the majority of teachers in your school. How would you describe the extent of their computer use?

1 __________ 2 __________ 3 __________ 4 __________ 5
No usage Infrequent Occasional Frequent Very frequent
at all usage usage usage usage

5. How important do you believe it is for every teacher to use computers in his or her classroom? Why or why not?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

6. Given the equipment you currently have available in your school, describe how it might be most effectively used.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

7. What resources (i.e., hardware and software) do you feel are most urgently needed? (prioritize).

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
APPENDIX G

SUPERINTENDENT/STAFF/TRUSTEE INTERVIEW
Interview for Superintendents/Board Staff/ Trustees

1. Relative to what you would consider to be the ideal, what is the current situation in each of the following areas?
   a) financial allocation for computers in the schools
   b) support from specialists available to the schools
   c) computer training for school staff
   d) community/parent involvement in computer issues

2. What is the Board doing to facilitate the implementation of computers in the schools?

3. Who makes decisions on computer issues for the schools?

4. How much/often are principals, teachers etc. included in decision making concerning computer issues? In which cases, if any, are they not involved?

5. Who holds the resources for computer purposes? How are resources for computer purposes allocated/ distributed?

6. With respect to other priorities, where does the implementation of computers in the school rate in importance?
APPENDIX H

HARDWARE AND SOFTWARE IN THE SCHOOLS
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<th>School</th>
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</table>
APPENDIX I

REMINDER NOTICES
RESEARCH STUDY ON ORGANIZATIONAL FACTORS AND COMPUTER

USAGE IN ELEMENTARY SCHOOLS

In December you received a questionnaire on organizational factors and computer usage. As representatives of your school, your input is very important to me. Now that the New Year has arrived and the Christmas rush is over, if you have not yet completed the questionnaire, I would appreciate it if you could do so in the next week. If you have misplaced your questionnaire, extras can be found in your school office, or give me a call at 254-7617.

Thank you very much. Your participation will make my research project successful.

Mary Ann Schmidt
Graduate Student
University of Windsor

RESEARCH STUDY ON ORGANIZATIONAL FACTORS AND COMPUTER

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Mary Ann Schmidt
Graduate Student
University of Windsor
RESEARCH STUDY ON ORGANIZATIONAL FACTORS AND COMPUTER USAGE IN

ELEMENTARY SCHOOLS

Several weeks ago you received a questionnaire on organizational factors and computer usage. As representatives of your school, your input is very important to me. If you have already returned your questionnaire, please accept my sincere thanks. I realize the time demands on people like yourself. If you have not yet completed the questionnaire, I would appreciate it if you could do so in the next week. If you have misplaced your questionnaire, extras can be found in your school office, or give me a call at 254-7617.

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University of Windsor

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RESEARCH STUDY ON ORGANIZATIONAL FACTORS AND COMPUTER USAGE IN

ELEMENTARY SCHOOLS

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Mary Ann Schmidt
Graduate Student
University of Windsor
APPENDIX J

ORGANIZATIONAL CULTURE PROFILES--EXPERT TEACHERS
Decision Rules:

1. Attempt to code every statement.
2. If a statement does not pertain to culture, leave the coding area blank.
3. If unable to identify which culture is appropriate for a statement, place a ? in the coding area.

After all statements for all schools have been coded:

1) Choose the culture that best fits each individual school taking into consideration all the statements for each school.

**Power** -- principal is primary influencer, staff toe the line, principal makes the majority of decisions and assumes responsibility

**Role** -- many rules and regulations and communication venues evident, principal and staff follow set schedule, some staff involvement in decision making but buck stops at the principal

**Task** -- a team orientation evident in principal/staff interactions, principal delegates and shares responsibility to a greater extent than in role or power culture schools, emphasis on student as primary area of concern

**Person** -- much individuality and autonomy among staff, individual emphasized and school/team aspect de-emphasized, experts/professionals working individually at task

Begin by asking: Is this school primarily driven according to elements found in a power culture?
If more emphasis is on power statements than other culture statements...then choose power culture
If not primarily power culture: Is this school primarily driven according to elements found in a role culture?
If some power statements, yet staff are asked for their input and somewhat involved...then role culture
If not primarily a role culture due to an emphasis on teamwork and consultation: Is this school primarily driven according to elements found in a task culture?
If focus is on teamwork and student orientation...then task culture
If not primarily a task culture: Is this school primarily driven according to elements found in a person culture?
If statements emphasize individual orientation...person culture

2) If secondary culture is very strong for any school, also identify this secondary culture.
Power Culture

Descriptors of Leader
- principal keeps on top of everything and everyone
- principal is always right, will be critical if his/her way is not followed
- principal tells staff what s/he expects, assigns duties
- puts pressure on individuals, demanding, unapproachable
- confident, independent
- likes to be in charge, authoritarian, dictates
- aware of all aspects of the programs

Descriptions of Staff
- "on edge" -- am I doing the right thing and what principal wants?
- staff may form small groups to discuss their uneasiness and problems within school
- staff feels that all materials/plans must be in on time -- an excuse would never do for tardiness
- staff have very little say, don't question principal's direction
- staff are obedient, follow the leader, always trying to please
- fearful, pressed, "under the gun", "stressed-out"
- always looking over their shoulder, who do you trust?

Descriptions of how the school is run
- specific discipline program set up and followed
- little leeway for change/expansion -- always feel that you have to check with the boss
- rules and regulations may be posted
- very structured, very controlled, very rigid, very regimented
- all decisions made by principal, s/he sets rules
- all communication/permission comes from the office
- discipline is usually firm and there are no exceptions

Atmosphere
- threatening, tense, staff members resentful, "paternalistic"
- afraid to make a mistake, apprehensive

What the school "looks" like
- doors of classrooms etc. closed
- everything is in its place, neat classrooms, orderliness and quiet
Role Culture

Descriptions of Leader
- goes by the rules, consistent, rigid, little flexibility
- difficult to approach with a new idea, not willing to step out on a limb and try something different
- change would come from what the leader sees happening in other schools rather than showing initiative
- response to issues is "I'm the principal and you're the teacher"...DO YOUR JOB!

Descriptions of Staff
- make sure kids are aware of rules and they follow the rules
- a bit rigid/inflexible
- staff may feel very secure in their specific roles
- stale ideas/lack of creativity
- staff question other staff stepping out of assigned roles

Descriptions of how the school is run
- kept on a schedule that is closely followed
- probably a detention system in place
- strict but fair in the sense that rules are set and pupils know them
- centralized authority
- teachers participate in decision making to a limited extent
- rules are posted and pupils are frequently reminded of them
- each staff member deals with discipline within their "role" and then it is the responsibility of the principal

Atmosphere
- teachers know what is expected
- stable and secure, comfortable, non-threatening
- "don't upset the apple cart"

What the school "looks" like
- lots of announcements and memos
- supplies easily accessible
Task Culture

Descriptions of Leader
- approachable, friendly, supportive, encouraging
- delegates responsibility and trusts others to carry it out
- relies on experts in school for ideas
- decentralized authority
- displays confidence in staff, allows staff to do the job
- team approach, willing to work with staff
- encourages professional growth
- influences as a "team" member, provides information/resources
- change is a cooperative endeavour

Descriptions of Staff
- great variety of ideas -- discuss issues, brainstorm ideas
- friendly atmosphere
- working as teams on specific tasks
- staff decide on the rules and teams, will set group goals
- staff are considered to be the experts
- productive, task-oriented, organized and structured
- staff show initiative for change or new ideas, will discuss change
- staff support each other

Descriptions of how the school is run
- team of staff experts keep other staff informed
- sharing of program activities/seatwork among staff
- many things going on with various activities being led by different staff members
- decisions made in a cooperative group base (e.g., at staff meetings)
- staff collectively deal with the discipline and decision making issues whenever possible
- communication is 2-way
- staff treat each other as professionals

Atmosphere
- a feeling of working together, accomplishment, needing each other
- sense of achievement and progress, good team spirit, co-operative
- individual needs and opinions valued

What the school "looks" like
- open, welcoming, accepting
Person Culture

Descriptions of Leader
- no communication between staff, principal has to talk to each person separately to find out what's going on
- leaves it up to teachers to handle things, principal doesn't make decisions
- allows individuals to "sink" or "swim" as long as it does not significantly affect the overall efficiency of the organization
- "private", not interested in generating "team" spirit
- responsive to individual needs, helpful, enthusiastic

Descriptions of Staff
- no consistency among staff, everybody does their own thing
- staff could feel like they're in this situation all by themselves without anyone else to help them, may lack direction
- staff will do their own thing even though it may be opposed to good of the organization, have difficulty working with a team

Descriptions of how the school is run
- school doesn't run as a unit because rules vary from one teacher to the next
- each teacher makes their own decisions regarding personal classroom needs, each room is like an isolated school unto itself
- communication is specific and occurs only when necessary
- decisions are typically made by individual staff
- staff tend to be individualistic and will work with a team only when their objectives are similar

Atmosphere
- complicated, no continuity or consistency found throughout school
- everyone says or does something different, expectations are not specified
- atmosphere of independence and self-reliance
- lots of room for personal growth
- personal needs are met and are important

What the school "looks" like
- varied styles due to individuals involved (i.e., very organized to very disorganized)
- warm, friendly, inviting
APPENDIX K

DESCRIPTION OF THE SAMPLE
Description of the Sample

Questionnaires were distributed in nineteen elementary schools. All questionnaires from one school were incomplete and this school (School 13) was subsequently eliminated from the sample\(^1\). Table 1 summarizes the return rate for each of the eighteen participating schools as well as the percentage of teachers/vice-principals who responded in each school. Overall, 258 questionnaires were distributed. The final questionnaire sample consisted of 169 respondents resulting in a return rate of 66 percent. Fifteen of the eighteen individual schools had a return rate greater than 50 percent. The other three schools had lower return rates of 42%, 45% and 46 percent. The percentage of staff who volunteered to participate across all eighteen schools was 48 percent. In four of the participating schools less than 40% of the staff members volunteered to participate in the study. In the remaining fourteen schools more than 40% of staff members volunteered to participate.

Table 2 summarizes the demographic variables for the teacher and vice-principal sample. Eleven percent of the respondents (n=18) were principals, 6% (n=10) were vice-principals, 83% (n=140) were teachers and .6% (n=1) did not specify their position. Teachers from all grade levels (i.e., primary, junior and intermediate [n=78]) and combination grades (i.e., grades 1 & 2, etc. [n=52]) were represented. Twenty one participants (14%) did not specify the grade level which they taught. Sixty four percent of the participants were female, 29% were male and 8% did not indicate gender. In terms of educational level, 87 or 58% of respondents held university bachelor degrees and 35 or 23% held graduate degrees. Only three individuals or 2% stated that they did not hold a degree. The average number of years teaching for respondents was

\(^1\) See End Note.
Table 1

Return Rate for Questionnaire Respondents (Teachers and Principals) in the Schools

<table>
<thead>
<tr>
<th>School</th>
<th>Return rate of individuals who expressed interest in participating at time of distribution</th>
<th>Staff totals and percentage of staff who participated in study</th>
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</thead>
<tbody>
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<td>7 out of 14, 50%</td>
<td>17, 41%</td>
</tr>
<tr>
<td>2</td>
<td>14 out of 23, 61%</td>
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</tr>
<tr>
<td>3</td>
<td>5 out of 12, 42%</td>
<td>20, 25%</td>
</tr>
<tr>
<td>4</td>
<td>19 out of 27, 70%</td>
<td>27, 70%</td>
</tr>
<tr>
<td>5</td>
<td>10 out of 12, 83%</td>
<td>18, 56%</td>
</tr>
<tr>
<td>6</td>
<td>8 out of 10, 80%</td>
<td>19, 42%</td>
</tr>
<tr>
<td>7</td>
<td>13 out of 18, 72%</td>
<td>21, 62%</td>
</tr>
<tr>
<td>8</td>
<td>10 out of 16, 63%</td>
<td>16, 63%</td>
</tr>
<tr>
<td>9</td>
<td>5 out of 8, 63%</td>
<td>17, 29%</td>
</tr>
<tr>
<td>10</td>
<td>5 out of 11, 45%</td>
<td>22, 23%</td>
</tr>
<tr>
<td>11</td>
<td>13 out of 15, 87%</td>
<td>17, 76%</td>
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<tr>
<td>12</td>
<td>10 out of 12, 83%</td>
<td>17, 59%</td>
</tr>
<tr>
<td>14</td>
<td>5 out of 7, 71%</td>
<td>12, 42%</td>
</tr>
<tr>
<td>15</td>
<td>6 out of 13, 46%</td>
<td>14, 43%</td>
</tr>
<tr>
<td>16</td>
<td>10 out of 13, 77%</td>
<td>26, 38%</td>
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<tr>
<td>17</td>
<td>8 out of 11, 73%</td>
<td>20, 40%</td>
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<tr>
<td>18</td>
<td>11 out of 19, 58%</td>
<td>19, 58%</td>
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<tr>
<td>19</td>
<td>10 out of 17, 59%</td>
<td>18, 56%</td>
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Totals: 169 out of 258, 66% 350 48%
### Table 2

**Demographic Variables for Teachers/Vice-Principal**

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<td><strong>Position</strong></td>
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<td>Vice-Principal</td>
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<tr>
<td>Teacher</td>
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</tr>
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<td><strong>Grade Taught</strong></td>
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<td></td>
</tr>
<tr>
<td>Primary (Grades K, 1, 2)</td>
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<td>21.9</td>
</tr>
<tr>
<td>Junior (Grades 3, 4, 5)</td>
<td>19</td>
<td>12.6</td>
</tr>
<tr>
<td>Intermediate (Grades 6, 7, 8)</td>
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<td>17.2</td>
</tr>
<tr>
<td>Other/Combination Grades</td>
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<td>13.9</td>
</tr>
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<td><strong>Age</strong></td>
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</tr>
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<td>.7</td>
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<td>24</td>
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<tr>
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<td>3.3</td>
</tr>
<tr>
<td>No answer</td>
<td>23</td>
<td>15.2</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
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</tr>
<tr>
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<td>96</td>
<td>63.6</td>
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<tr>
<td>Male</td>
<td>43</td>
<td>28.5</td>
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<td>7.9</td>
</tr>
<tr>
<td><strong>Degree</strong></td>
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<td>BA/BSc/BEd</td>
<td>87</td>
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</tr>
<tr>
<td><strong>Years Teaching</strong></td>
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<tr>
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<td>7-19</td>
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<td>20-29</td>
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Table 2 (continued)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
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<tr>
<td><strong>Years at School</strong></td>
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</tr>
<tr>
<td>1-2</td>
<td>64</td>
<td>42.4</td>
</tr>
<tr>
<td>3-5</td>
<td>42</td>
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<td>6-10</td>
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<td>10.6</td>
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<tr>
<td>11-22</td>
<td>13</td>
<td>8.6</td>
</tr>
<tr>
<td>No answer</td>
<td>16</td>
<td>10.6</td>
</tr>
<tr>
<td><strong>Years using Computers</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-2</td>
<td>34</td>
<td>22.5</td>
</tr>
<tr>
<td>3-5</td>
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</tr>
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<td>6 or more</td>
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<td>21.9</td>
</tr>
<tr>
<td>No answer</td>
<td>16</td>
<td>10.6</td>
</tr>
<tr>
<td><strong>Computer Courses Taken</strong></td>
<td></td>
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<tr>
<td>Yes</td>
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<td>25.8</td>
</tr>
<tr>
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<td>63.6</td>
</tr>
<tr>
<td>No answer</td>
<td>16</td>
<td>10.6</td>
</tr>
<tr>
<td><strong>Computer at Home</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>33</td>
<td>21.9</td>
</tr>
<tr>
<td>No</td>
<td>107</td>
<td>70.9</td>
</tr>
<tr>
<td>No answer</td>
<td>11</td>
<td>7.3</td>
</tr>
</tbody>
</table>
19 years, while the average number of years at their current school was 4 years. Respondents, on average, had used computers in their school setting for 4 years with individual school means ranging from 2.5 to 5.4 years. The large majority (64%, \( n=96 \)) indicated that they had not taken computer courses, while 71% (\( n=107 \)) reported not having a computer at home.

Table 3 summarizes the demographic variables for the principals. Eighty three percent (\( n=15 \)) were male and 17% (\( n=3 \)) were female. One third (33%, \( n=6 \)) held university bachelor degrees while 61% (\( n=11 \)) had graduate degrees. The average number of years at their school was 5 years. Principals indicated that they had used computers in the school setting for an average of 5 years. Again, the majority (\( n=12 \)) or 67% had not taken computer courses and (\( n=12 \)) or 67% did not have a computer at home.

Table 4 summarizes the interview sample. A total of 93 interviews were conducted; 87% (\( n=81 \)) with teachers, vice-principals and principals in the 18 schools, 5% (\( n=5 \)) with superintendents, 5% (\( n=5 \)) with trustees and 2% (\( n=2 \)) with board staff personnel.
Table 3

Demographic Variables for Principal Group

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency (n=18)</th>
<th>Percent</th>
</tr>
</thead>
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<td></td>
<td></td>
</tr>
<tr>
<td>Over sixty</td>
<td>1</td>
<td>5.6</td>
</tr>
<tr>
<td>Fifty to fifty nine</td>
<td>6</td>
<td>33.4</td>
</tr>
<tr>
<td>Forty to forty nine</td>
<td>8</td>
<td>44.5</td>
</tr>
<tr>
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<td>1</td>
<td>5.6</td>
</tr>
<tr>
<td>No answer</td>
<td>2</td>
<td>11.1</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
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<td>3</td>
<td>16.7</td>
</tr>
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<td>BA/BSc/BEd</td>
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</tr>
<tr>
<td>Years at Current School</td>
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<td></td>
</tr>
<tr>
<td>1-2</td>
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<td>6-10</td>
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<td>11 or more</td>
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<td>11.1</td>
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<tr>
<td>Years using the Computer</td>
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<tr>
<td>0</td>
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<td>5.6</td>
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<td>Yes</td>
<td>4</td>
<td>22.2</td>
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<td>No</td>
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<td>27.8</td>
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<td>School</td>
<td>Frequency (n=93)</td>
<td>Percent</td>
</tr>
<tr>
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</table>
End Note. School 13 was dropped from the study following administration of the questionnaire package to the teachers and principal. Teachers in the school elected to complete only the computer portion of the questionnaire, omitting the culture and leadership questionnaires. In a discussion with the principal the researcher requested to contact the teachers to discuss this omission but the principal decided that further discussion was not appropriate. He indicated that perhaps the teachers were protecting him in some way, even though he indicated that he had told them that this was not necessary. It was suspected that his upcoming retirement may have influenced the teachers’ decision. Thus, due to the fact that all of the questionnaires were incomplete, the entire school was subsequently dropped from the study.
Vita Auctoris

Mary Ann L. Schmidt was born on December 8, 1958 to Leonard and Helen Schmidt in Walkerton, Ontario. She earned an Honours B. A. in Psychology from the University of Waterloo (St. Jerome's College) in 1980. Pursuing graduate studies at the University of Windsor in Applied Social Psychology, she completed the requirements for the Masters degree in 1984 and was accepted into the Ph.D. program.