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Leadership for Technology Integration: Computing the Reality

United States school districts continue to spend billions of dollars annually on various forms of technology equipment and services. Despite the widespread expectation that teachers routinely integrate technology into the curriculum to facilitate student achievement, there is substantial evidence that this is not occurring either in the manner or to the degree desirable. This study examined the extent to which computer-related technology is used in 12 school districts in North Louisiana from the perspectives of 214 site-based administrators in 149 schools. The findings suggest that technology integration remains problematic in that many teachers seem unwilling or unable to incorporate technology into the teaching and learning process. Furthermore, the data reveal that many school administrators consider themselves ill prepared to assume the role of technology leader. The implications of these and other findings for school improvement are discussed.

Aux États-Unis, les districts scolaires dépensent des milliards de dollars à chaque année pour acheter divers équipements et services technologiques. Malgré les attentes généralisées voulant que les enseignants intègrent la technologie dans leur programme d'études pour faciliter l'apprentissage par les étudiants, des informations probantes considérables indiquent que cette intégration ne se produit pas, ni de la façon, ni au degré, prévus. Cette recherche a porté sur la mesure dans laquelle 12 districts scolaires du nord de la Louisiane intègrent la technologie informatique. Les données ont été recueillies auprès de 214 administrateurs dans 149 écoles. Les résultats indiquent que l'intégration de la technologie continue à poser des problèmes car plusieurs enseignants semblent peu enclins à intégrer la technologie dans leurs cours, ou incapables de le faire. De plus, les données révèlent que les administrateurs scolaires n'ont pas l'impression d'être en mesure d'assumer le rôle de chef de file en matière de technologie. L'article termine en exposant les conséquences de ce genre de résultats sur l'amélioration des écoles.

Introduction

Little discord is evident today that technology integration should be an important component of the teaching and learning process in schools. This circumstance is clearly evidenced by the estimated $7 billion in technology-related expenditures that was projected to be made by school districts across the United States during the 2004-2005 academic year (Quality Education Data, 2004). Enduring debate tends to focus on such elemental points as the appro-

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priate nature and extent of technology use, the varying capacities of school systems to provide appropriate resources, and on teachers' ability and willingness to integrate technology successfully into the learning environment. Reaching the current plateau of prominence and widespread acceptance was attained through steady recognition that schools must carry the burden of both optimizing student learning and preparing today's youth for a technologically advanced workplace of the future. More than a decade ago the US Congress's Office of Technology Assessment was unequivocal in its assertion that incorporating technology into the instructional process was "one of the most important steps the nation can take to make the most of past and continuing investments in educational technology" (OTA, 1995). More recently the *No Child Left Behind Act* (2001) stipulated that by the end of 2006, states are to ensure that technology is integrated throughout the curriculum and that all students should be technologically literate by the end of grade 8.

Professional organizations, learned societies, and accrediting agencies currently espouse firm support for appropriate technology applications in schools and school systems. For example, the National Education Association (NEA), the International Society for Technology in Education (ISTE), the National Staff Development Council (NSDC), the Education Leadership Constituent Council (ELCC), and the National Council for Accreditation of Teacher Education (NCATE) routinely prescribe the meaningful application of technology in educational settings of all types. Such endorsements, as well as the proliferation of multiple forms of electronic technology for work and recreation, have clearly affected higher learning institutions across the nation. For example, most teacher preparation programs now routinely incorporate computer literacy and instructional technology integration in both initial and advanced programs of study. However, as further noted below, most states do not require technology courses in teacher preparation programs. Furthermore, providing preservice training does not ensure that practicing teachers will integrate technology into the teaching and learning process.

Not only does this provide preservice and practicing teachers with structured opportunities to develop technology literacy, but it also enables them to nurture these same skills in their pre-kindergarten-grade 12 students. To best facilitate this, McKenzie (1999) recommends that "every curriculum document should identify learning experiences and strategies which require the use of new technologies" (p. 3). It is not only necessary for teachers to be technology literate, but they should be accomplished in extending these skills to critique their instructional beliefs, to collaborate with others through computer networking, and to refine inquiry-based learning strategies. Additional positive consequences of the familiarity derived from proper training and regular instructional applications is a reduction in technology anxiety, an increase in user confidence, and the greater probability that teachers actually implement technology methods in their classes (Christensen, 2002). Unfortunately, as the study reported here signifies, the wide-scale integration of technology for instructional and learning purposes may continue to be problematic, and the supervisory leadership needed to address this circumstance may be deficient in many schools.

The Status of Technology Integration

Most US school districts and schools have had technology plans in place for at least several years, and they usually incorporate such things as computer hardware and software acquisition, networking capabilities, technical support, professional development, and acceptable use policies (Kleiman, 2000). However, despite the proliferation of well-intended technology plans and policies and the acquisition of various forms of electronic equipment, problems with fully integrating technology into the curriculum are apparent. Indications are that much of the expensive technology in schools is underused as many teachers decline opportunities to apply technology for instructional purposes or simply feel that they cannot afford the time to refine the requisite computer skills (Cuban, 2002; Rother, 2004). Citing considerable research-based evidence, Creighton (2003) charged that "technology in our schools exists at a minimal or basic level, at best" (p. 2). Two years later, this premise was echoed by Gura and Percy (2005), who reported that they were disheartened by this continuing reality.

> It seems unbelievable. On the one hand, humankind has developed a new set of power tools of the mind, digital technologies that aid immeasurably in the tasks of gathering, analyzing, and processing information, and communicating the results of these activities. On the other hand, teachers, the people to whom our society entrusts the development of young minds, the very guardians of the ideal of education, have largely avoided adopting those tools. (p. 1)

At the turn of the millennium, Kleiman (2000) claimed that visions of technology integration in education were not being realized, not because they were poorly formulated, but because they were inadequately resourced to the point where teachers could not and would not use technology effectively. He cited research projects that had revealed how teachers tended to move through five stages of "instructional evolution" for using technology: from entry, adoption, and adaptation through to appropriation and invention. The concern was—and may well continue to be—that few teachers move beyond the initial stages of technology use and consequently fall well short of realizing its full potential to support teaching and learning. In fact a particular concern is that teachers who do regularly use computers in their classrooms restrict their use to that of a remedial tool for the drill and practice of basic skills (Becker, 2001; Creighton, 2003; Cuban 2002; Hofer, Chamberlin, & Scot, 2004). The literature addressing technology use in schools particularly recognizes this circumstance as evident in the minority schools-poorer districts side of the so-called digital divide. Predominantly white and wealthier schools and districts are more likely to use technology for focused Internet research, multimedia presentations, and the creation of Web sites (Creighton, 2003; Fulton & Sibley, 2003; Wiburg, 2003).

For some, the key to bridging the digital divide between technologically active and technologically inactive schools lies in professional development designed to expand teachers' comfort levels with the use of technology. According to Deason and Olivárez (2005), current research strongly indicates a fundamental need "to maintain consistent, relevant, and engaging professional development that gets teachers interested in using computers in the classroom" (p. 25). They recommend that school districts place the greatest emphasis not on the technology itself, but rather on the teachers who are expected

to master its use and to integrate it meaningfully into the curriculum. The large quantities of underused computer equipment in schools may be at least to some extent a consequence of teachers' misconception that it is difficult to master, will rob them of valuable time, and will actually harm students by exposing them to inappropriate information and materials (Gura & Percy, 2005).

Leadership for Technology Integration

There is substantial and growing evidence that a school's culture, mission, and goals; instructional practices; and accountability mechanisms can have dramatic effects on its success. There is also increasing recognition that formal leadership plays a pivotal, albeit largely indirect, role in student achievement (Fullan, 2005; Leithwood, Seashore Louis, Anderson, & Walstrom, 2004; Peterson & Cosner, 2005). No longer, though, are the administrators expected to be the only school leaders. The more effective leaders of the postmodern era are those who do not rely on the legitimacy of their position, but rather use mechanisms of high participant involvement (Lambert 2003; Speck, 1999; Wohlstetter, Smyer, & Mohrman, 1994). The growing expectation is that schools should exhibit attributes of the so-called professional learning community where leadership is highly participatory and where common purpose, authentically collaborative practices, and reciprocal trust are prevailing organization attributes (Friend & Cook, 2000; Leonard & Leonard, 2005; Lovely, 2005). The literature in educational administration has become replete with such evolving organizational and cultural conceptions. Consistent emphasis is placed on the necessity of school leaders inviting and actively promoting high-density involvement, not only in administrative or school-wide decisions, but also to engage routinely in professional interaction that addresses the everyday worklife of teachers. Such empowerment of teachers promotes the development of schools as communities of learning.

There is also an expectation that school administrators should be visionaries, effective problem-solvers, consensus builders, and role models of appropriate practice. This expectation exists for technology integration as much as it does for the other facets of school leadership; moreover, it is clearly reflected in relevant national standards (e.g., TSSA/ISTE-NETS-A, ELCC standards) and most state standards for school administrators. In addition, most of the literature on leadership and technology either explicitly or implicitly places the ultimate responsibility for the use of educational technology in the purview of the principal (Anderson & Dexter, 2005). In reporting their analysis of data gathered from principals, teachers, and technology coordinators working in 1,150 schools nationwide, Anderson and Dexter reached the following elemental conclusion: "The study confirmed that technology leadership played a very central, pivotal role in technology-related outcomes, and the findings also revealed considerable diversity in technology leadership and organizational support systems" (p. 73). Anderson and Dexter asserted that there are multiple mitigating factors—such as school and district infrastructure, resources, and demographics—that affect the overall quality of technology leadership in schools. Nonetheless, they were emphatic that the most important determinant of successful technology integration was the capacity of school administrators both to advocate and to model the appropriate orientations and practices. This

supposition is supported by Creighton (2003), who challenges principals to alter existing leadership practices that do little to transform schools as necessary to address the evolving challenges of the 21st century either in terms of operational reforms in general or technology integration in particular. The challenge for current school leaders is to lead and to follow, as well as to know when the one or the other is more appropriate in creating and sustaining a community of technology learners. The study reported here was intended to determine the extent to which this circumstance may be evident in today's schools. Although certainly not necessarily representative of other locales, we considered that learning more about conditions in one selected region might serve to initiate additional discourse and perhaps prompt additional studies in the field.

Method

The focus of this research was on fundamental aspects of technology integration for instructional purposes in North Louisiana schools. A survey that we developed was self-administered by principals and assistant principals in a dozen school districts. In addition to basic demographic information, the instrument was designed to elicit information about aspects of technology planning and access in respondent schools, as well as perceived teacher technology orientations and skills. After receiving permission to proceed from the district superintendents, we distributed questionnaire packets to school site administrators in all public schools in the designated region. The packets contained a covering letter outlining the purpose of the study, a postage-paid return envelope, and the survey instrument with completion instructions. Fifteen of the survey items required a dichotomous *yes* or *no* response, two were open-response questions, and the remaining six requested demographic information. Each survey was coded for identification purposes, and a reminder letter was mailed to invited participants who did not return the survey within two weeks. A survey packet was mailed to the principal of each of the 251 schools in the dozen districts; in addition, assistant principal surveys were sent to those 155 schools with at least one designated assistant principal. The combined completed survey return rate was 52.7% (214 of 406) with respondents being spread over 149 of the 251 (59.4%) surveyed schools. A plurality of participating schools (49%) was at the primary/elementary level, 14% were of junior high/middle school configuration, 13% were high schools, another 13% were junior high-senior high combinations, and the remaining 12% were all-grade (PK-12) configurations (total exceeds 100% due to rounding). As Table 1 also summarizes, student enrollment sizes ranged from <300 to >1,200 with the largest proportion, 49%, reporting enrollments between 300 and 600 and 4% with enrollments of >1,200. Slightly more than half (51%) were situated in rural communities, and 29% were located in urban neighborhoods and 20% in suburban communities. Administrators' experience ranged from fewer than three years (26%) to 3-10 years (49%) to more than 20 years (6%). Overall the sex of principals was evenly split, but two thirds of assistant principals were female.

Results

Eight of the 15 yes-no response survey items addressed aspects of technology planning and access whereas the remaining seven concerned faculty technol-

ogy orientations and skills. The data were analyzed in the context of ascertaining school principals' and assistant-principals' perceptions about specific aspects of technology integration in North Louisiana public schools. The underlying premise was that the school administrators were in advantageous positions to be knowledgeable about circumstances in their schools and would be willing to reflect and share their insights. As Table 2 summarizes, almost all (96%) the 214 school-based administrators indicated that effective technology integration was an important school goal. Eighty-eight percent reported that their school had a technology integration plan whereas four fifths (81%) reported that their school had been involved in designing a district-wide technology plan. Approximately one third of the respondents overall reported that their teachers tended to complain about the lack of access to computer hardware (36%) and computer software (30%). Many of the principals and assistant principals concurred in the perceived concerns of their teachers. Only half (50%) the combined principals and assistant principals indicated that their school district provided adequate funding for the acquisition and maintenance of computers and related technology. This perception was further evidenced in the responses to one of the open-ended questions that asked "What particular concerns do you have about the effective use of technology in your school?" Numerous respondents complained of not having enough computer hardware and software and that what they did have was often inadequate, outdated, or in need of repair. Furthermore, they complained of insufficient opportunities for professional development in areas of technology integration for the purposes of students' learning. One rural all-grade school principal reported that even though his school was relatively well-equipped, they were nonetheless encountering problems with effective technology use:

> We have a great deal of technology available! We have multimedia projectors for every classroom and will have smartboards by the end of the year. Upkeep, maintenance and technical assistance are my biggest concern.

Approximately three quarters (76%) of the administrators felt that their schools had adequate access to the Internet but some principals and assistant

Table 1
Characteristics of Participating Schools, Communities,
and Administrators (*N*=214)

School Type	Primary/ Elem.	Middle/ Jr. High	High School	Junior/ High School	All-Grade
(%)	46.8	14.0	12.6	13.1	11.7
Community Type	Rural	Urban	Suburban		
(%)	50.9	29.0	20.1		
Enrollment Size	<300	300-600	601-900	901-1200	>1,200
(%)	18.3	49.3	23.0	5.2	4.2
Administration Experience	<3 yrs.	3-10 yrs.	11-20 yrs.	>20 yrs.	
(%)	26.2	48.6	19.2	6.1	

Table 2
School Administrators' Perspectives on Technology Planning
and Access (*N*=214)

Survey Question	Principals n=112 Yes (%)	Asst. Principals n=102 Yes (%)	Admin. Combined N=214 Yes (%)
1. Is effective technology integration considered to be an important goal at your school?	97	94	96
2. Does your school have a site plan that includes technology planning?	91	86	88
3. Has your school been involved the creation or updating of a district-wide technology plan?	80	83	81
4. Do teachers in your school complain that they do not have sufficient access to technology hardware (computers and related equipment)?	32	40	36
5. Do teachers in your school complain that they do not have access to appropriate computer software (such as the latest versions of Microsoft Word)?	27	33	30
6. Do you feel that your school has adequate connectivity to the Internet?	79	72	76
7. Do you feel that your school district provides adequate funding to your school for the acquisition and maintenance of computers and related technology?	47	55	50
8. Do you believe that smaller rural schools and school districts encounter more problems with integrating technology for student achievement than do larger urban and suburban schools and school districts?	71	68	70

principals bemoaned a lack of connectivity to the World Wide Web and said that when it was available, many teachers failed to take advantage of it for instructional purposes. As this suburban combined middle school-high school assistant principal put it,

> More teachers need to take advantage of Internet resources, Powerpoint [sic] presentations of lessons, and digital photography to integrate "real world" items into their lessons.

Problems were perceived as more pronounced in particular types of settings. Seventy percent of the administrators considered that smaller rural schools and school districts encountered more problems with integrating technology for student achievement than did their larger school and school district counterparts. The principal of this relatively large rural PK- 4 school stated her concern succinctly.

> Funding and access to a variety of technology is often limited at the school level in rural areas. Finding time for staff development of teachers is also a concern.

Still, technology and facility shortcomings were not solely the domain of rural schools as the principal of one urban magnet school noted that her school was "a very old facility and the electrical power needs to be upgraded" so that "teachers can learn to integrate."

Table 3 summarizes the principals' and assistant principals' responses to survey questions that dealt with aspects of technology orientations and skills. Almost all (97%) felt that technology integration was important for effective teaching and learning in their schools. However, the principal of one combined middle school-high school seemed to doubt this supposition in stating:

> Technology is only a small part of the teaching process. My best teachers use very little technology.

In another case, a rural elementary school assistant principal noted that her principal also "does not consider technology a priority."

In spite of the wide recognition of the value of technology integration, a large proportion of the study's participants felt that technological applications

Table 3
School Administrators' Perspectives on Technology Orientations
and Skills (*N*=214)

Survey Question	Principals n=112 Yes (%)	Asst. Principals n=02 Yes (%)	Admin. Combined N=214 Yes (%)
1. Do you consider technology integration to be important for effective teaching and learning?	97	97	97
2. Overall, do you feel that your teachers have sufficient training in the use of computer technology for effective teaching and learning purposes?	47	53	50
3. Overall, do you feel that teachers in your school have sufficient understanding of how to effectively integrate technology for the purposes of student learning?	42	46	44
4. Do the teachers at your school regularly discuss matters pertaining to the effective use of technology in the teaching and learning process?	70	59	65
5. At present, do you feel that you are adequately qualified to provide the necessary leadership for effective technology integration at your school?	61	52	56
6. Do you feel that you are adequately familiar with various technologies that could be integrated into your school's curriculum?	60	54	57
7. Do you feel that you need to know more about how you can be an effective instructional leader in integrating technology into the teaching and learning process?	84	90	87

were not adequately evident in classrooms as a consequence of insufficient teacher preparation and understanding. Although many respondents noted that technology integration was occurring regularly in their schools' classes, others were concerned that the opposite was prevalent in their schools. Exactly half (50%) reported that they felt their teachers lacked training in the use of computer technology for effective instructional purposes. Furthermore, an even greater proportion (56%) felt that their teachers did not adequately understand the principles of technology integration and that some were "still hesitant to let go of traditional methods of instruction." Other comments of concern ranged from "teachers do not have appropriate training to provide effective instruction for students" to "teachers are not using technology as part of instruction" and "teachers need to be more aggressive in the use of computers."

On a number of occasions the respondents saw a gap between technology training and routinized applications in the classroom setting. One principal observed that "teachers need more time to practice using the computer skills and technology that they learn in training sessions," and another noted that "teachers must be comfortable with technology or it will gather dust." The pressure of time limitations was noted often by the respondents. A few administrators drew a direct connection between time constraints and prevailing concerns about standardized testing. The assistant principal in one suburban K-5 school felt that although teachers might possess technology equipment, they "feel they do not have adequate time to integrate technology and provide academic instruction to meet the needs of high-stakes testing." Her thoughts were echoed by the principal in another suburban elementary school who considered teachers to be "overwhelmed with meeting standards for testing and technology is put on the back burner." Nonetheless, about two thirds (65%) considered that their school's faculty regularly discussed matters pertaining to the effective use of technology in support of student achievement.

Many of the school administrators had serious concerns about their own capacity to supervise technology use in their schools. Only a slight majority (56%) felt that they were "adequately qualified to provide the necessary leadership for effective technology integration" in their school. Slightly more (57%) reported that they were "adequately familiar with various technologies that could be integrated" into their school's curriculum. In open-ended responses, the principals and assistant principals wrote of the need to become more familiar with methods of instructional technology, to have more accessible and concise information on emerging technology, and to have "more time out of the administration office and inside the classrooms." They repeatedly cited their need for technology training, workshops, and continued education. Indeed, in their responses to the second open-ended question "What do you need to allow you to be a better supervisor of instructional technology in your school?" the need for additional administrator professional development in the supervision of technology was the most commonly cited. Further evidence of the demand for technology supervision training was evident in the yes-no portion of the survey questionnaire. Eighty-seven percent (186 of the 214) of the school-based administrators indicated that they needed to know more about

being effective instructional leaders in integrating technology into the teaching and learning process.

Discussion and Conclusions

The survey data gathered from the 214 school-based administrators contained some important revelations about technology integration for teaching and learning purposes in their 149 North Louisiana schools. There was widespread recognition that technology had attained a vaunted place in the education environment and that most schools and school districts had taken the initiative to develop long-term technology integration plans. According to the participating principals and assistant principals, however, a large proportion of teachers remained either unprepared or disinclined to incorporate computer and other electronic technology into their instructional repertoire. This may not be entirely surprising considering that only 15 states require preservice teachers to complete technology courses, and only nine states require them to demonstrate competence by passing a technology test. Louisiana is not included in either group (Park & Staresina, 2004). Even with appropriate teacher technology-use preparation and dispositions, the administrators were concerned about technology resourcing. Half the respondents considered that technology continued to be inadequately funded in their districts. Consequently, they reported, there were recurring problems with computer and software currency, equipment maintenance, and teacher training. Problems were considered as more serious in smaller, rural schools and school districts, primarily as a consequence of inadequate district support and persisting problems with insufficient Internet connectivity.

Undoubtedly, sufficient resourcing—as well as teachers' understanding, skills, and orientations—are important factors in the successful integration of technology for student learning. Empirical studies and other research have repeatedly demonstrated that many of today's classrooms remain characterized by outmoded equipment or relatively current technology that remains underused to the point of serving principally as electronic game stations, as an access to e-mail, or as a mere pretense to computer use (Creighton, 2003; Cuban 2002; Hofer et al., 2004). Such a show of technology use has been likened to "putting lipstick on a bulldog" (Creighton, pp. xi-xii; Moss Kanter, 2001, p. 72). As the metaphor suggests, a classroom that is equipped with computers that are rarely or ineffectively used is similar to trying to transform a bulldog by applying a little make-up. In spite of the disguise, the animal still looks and behaves like a bulldog, and the same may be said for the attempt to make the classroom appear to be a technologically advanced learning environment.

An equally disconcerting revelation arising from this study is the large proportion of the school administrators who feel that they are unprepared to supervise teaching and learning technology in their schools. Forty-three percent of the combined principals and assistant principals reported that they were not sufficiently familiar with various technologies, and 44% indicated that they did not consider themselves qualified to lead technology integration in their schools. Furthermore, of the administrator respondents, 87% indicated that they needed to learn more about being effective technology leaders. This is a resounding admission that technology supervision preparation and professional development for administrators in the 149 schools of the 12 surveyed

school districts has been seriously deficient. This is particularly surprising as only two states, Georgia and Florida, require prospective school administrators to complete a course in computer technology (Park & Staresina, 2004). As is repeatedly stated in the germane research literature and by relevant agencies and organizations, it is highly unlikely that schools will appropriately use and optimally incorporate the various forms of instructional technology if understanding and expectations do not emanate from the formal positions of school leadership (Anderson & Dexter, 2005; Creighton, 2003; Hesbol, 2004). As with other organizations, strong and visionary leadership in schools is "crucial in implementing successful technology programs" (Miranda, Russell, & O'-Connor, 2004, p. 5).

The implications of these findings are largely self-evident and may not be confined to the geographical parameters of North Louisiana. Many of today's schools, teachers, and administrators are known to use various forms of information technology effectively to enhance student learning and to prepare these students in the application of tools and skills needed to pursue personal and educational development throughout their lives and careers. As this research clearly indicates, however, many others may be doing substantially less, and the consequences may not be fully apparent for some time. This judgment has been attained elsewhere in the literature (see, e.g., Clifford, Friesen, & Lock, 2004; Rother, 2004; Gura & Percy, 2005). Electronic technology is quite evidently here for the long term; it will not go away, and it will continue to evolve and to transform the world. Public schools need to be at the forefront of technological use because it is there that the emerging generation must have the opportunities to access fully its potentialities for learning. To be harbingers of instructional technology integration requires that both teachers and administrators be knowledgeable of its forms and comfortable with its applications. Beyond that, they must also assume ultimate responsibility for its planning and implementation (Picciano, 2002). As this study strongly shows, these circumstances remain largely unrealized in many North Louisiana schools.

The importance of effective school leadership is widely recognized and virtually unassailable even as its nature transforms toward the shared opportunity and collective responsibility orientations of the professional learning community. Nonetheless, it is on the principals and assistant principals as the formal leaders of schools—many of the latter of whom are destined to assume the roles of the former—that emphasis needs to be more rigorously applied. Only when they are fully appreciative of the forms and complexities of instructional technology, and only when they can skillfully assess the nature and extent of its applications in the school and classroom setting, can they be expected to be truly effective technology advocates and competent technology supervisors. The vast majority of the school administrator participants in this study clearly indicated that they needed to be better prepared to fulfill their roles as technology supervisors. Accomplishing this objective will not only require ongoing professional development for practicing school administrators, but also an appropriate emphasis on educational leadership programs. Unfortunately, most colleges and universities have been inclined to address the school leader as technology supervisor only in passing and have failed to provide "education related to the importance of creating a school environment

conducive to maximizing the use of technology in the curriculum" (Creighton, 2003, p. 3). Making the most of the opportunities that appropriate technology use can provide schools—in terms of administrative applications, but especially in the facilitation of quality instruction and learning—requires a dedication of purpose that can be achieved only through the expectation and the support of the entire school community. However, quality technology integration in schools is likely to be determined largely through the caliber of the leadership directed to sustain it. This e-leadership must be informed, visionary, and committed (the term *e-leadership* in this instance refers to the provision of electronic or technology leadership functions in the school setting): an aspirant combination of attributes that as this study suggests, may continue to remain largely absent or essentially illusory. For many schools, this may be the continuing computed reality of technology integration.

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