
Changing Environments in Technology **1**

The role and importance of technology in the curriculum is a given educational reality. With this reality, the challenge facing educational leaders and technology coordinators is to tune into the future direction of education and better synchronize learning with modern, technological pedagogies and curriculum. One justification for this is that with information literacy and global awareness as part of our daily lives, it is important, if not crucial, for educational reform to become a priority, especially when connecting technology to learning. To meet these demands, administrators and technology coordinators, and curriculum leaders must understand the changing environments in technology and pay keen attention to innovative ways of leading schools. Sharing leadership—as well as sharing a vision of technology—is paramount if we are to meet the ever-increasing local and global demands placed on our schools. Understanding that this new reality is upon us, educators worldwide are coming to realize that learners of the 21st century are different and do require modern learning experiences.

TECHNOLOGY: A CATALYST FOR CHANGE

With technology emerging as a catalyst for real change, school leaders are becoming more fervent about school reform and how students learn. This fervency includes greater insight into the power of technology and how it allows teachers to present information in ways students will more readily understand (Peterson, 2011). At the same time, students are coming into the educational environment with new ideas and intentions for connecting thought, knowledge, and achievement to technology. These students live in a world where technology is how they communicate, socialize, and create. For them, technology makes academic growth exciting. For some ideas on how technology is changing knowledge, see Box 1.1.

BOX 1.1. TECHNOLOGY IS CHANGING KNOWLEDGE

Knowledge is

- hyperlinked;
- multidimensional;
- constructed; and
- held in graphic, audio, and video formats.

In addition, knowledge

- supports dynamic interactions with the user and
- incorporates powerful search engines.

Source: Dron (2005).

As excitement builds over new ways to use and experience technology in schools, educators at all levels are also directing their attention toward differentiated curriculum and evaluation strategies. This is best represented by the movement toward low-cost, portable devices for student use in all schools that assists teachers and students in redirecting learning on a global scale. Responding to this change, there are numerous examples of classroom teachers who are currently communicating and exchanging information worldwide with students via Web-based programs. In these environments, educators are no longer bound by classroom walls and are allowing students to work in multiple settings. As shown in Box 1.2, these virtual communities and learning spaces are exciting ways for students, teachers, and schools to collaborate on a variety of educational projects and relationships. From a school leader's perspective, technology, with its overflowing waves of information and media, appears to be making a difference on *how* teachers teach and *how* students learn. Examples include technology applications promoting investigative skills, making learning more exciting, providing opportunities to apply knowledge, as well as preparing students for an increasingly diverse world. In addition, digital formats and applications are revolutionizing student assessment by allowing teachers and students to instantaneously enter and access pre- and postassessment data. Information from these digital measures can be quickly graded and uploaded to various files for real-time analysis by both teachers and administrators. By and large, all of these changes and applications are providing a starting place for educators who want to channel energies toward technology-related schools and data-driven instruction.

BOX 1.2. TECHNOLOGY IS CHANGING SCHOOL COMMUNITIES

In using technology to go beyond classroom walls and build global communities, technology should satisfy the following concepts:

- *Negotiation:* School participants must agree on protocols for how the interactions will occur.

- *Relationships*: School participants need to establish the degree to which personal information will be shared. Some communities are about seeing how people in other parts of the world live, and so the relationship is closer. Some communities are purely about accessing the knowledge of another community, and so the relationship is more distant.
- *Commitment*: Detailed commitment to the work creates stronger communities.
- *Engagement*: Learners must have opportunities to interact with each other in meaningful ways and be committed to the process. This will encourage engagement in the community.

Source: “Characteristics of Virtual Learning Communities” (n.d.).

Technology is also a catalyst for change in that it can provide administrators with access to digitized up-to-the-minute performance information challenging leaders to reconceptualize the meaning of data and how it impacts instruction (Nidus & Saddler, 2011). It is through the use of data-driven instruction that school leaders can now readily analyze, chart, and graph every student, class, and school within a district—or multiple districts as needed. This is very helpful from an assessment, evaluation, and accountability perspective. In the confines of their offices, administrators can now instantly diagnose academic weaknesses and strengths in any school environment—as well as display, annotate, organize, import, capture, record, or share whatever information is provided with anyone across the world—in real time. Naturally, all of this uploaded information is encrypted allowing for data transactions that are private, secure, and safe. More importantly, with up-to-date instantaneous data results that are easy to read and understand, teachers have the resources they need to make data-driven changes. In particular, instructional action will hopefully lead to improved student achievement and create positive change.

EDUCATIONAL TECHNOLOGY AND INNOVATIONS IN LEARNING

The role of digital learning in schools is tremendously exciting and is sparking creative innovations with instructional methodologies. For example, teachers are now using forms of *flipped instruction* in their classrooms (Saltman, 2012). Flipped instruction is not a new concept and is occasionally referred to as *backwards classroom*, *reverse instruction*, or *reverse teaching*. Unlike a traditional classroom—where knowledge is conventionally delivered by a teacher—a teacher using a flipped instructional strategy might *first have students studying a topic on their own*, utilizing a variety of technological mediums. Using this approach, the teacher becomes more of a tutor, resource, or facilitator, thus “flipping” the instructional process. In addition to techniques such as flipped instruction, schools are focusing on different ways to use mobile devices and are implementing BYOD or BYOT (Bring Your Own Device/Technology) policies. In fact, mobile devices were recommended for use in schools by the U.S. Department of Education in the National Education Technology

Plan (NETP) as early as 2010 (Scholastic Administrator, 2012). Nonetheless, some educators remain justifiably wary of BYOD/BYOT because of the potential for misuse of mobile devices that can create a host of security concerns, including data protection and compliance with the Children’s Internet Protection Act (CIPA).

With new innovations and better security, online educational communities are springing up across the country (Dobler, 2012). According to Banchemo and Simon (2011), the state of Virginia authorized 13 online schools, with more to come. Not to be undone, Florida is requiring all public high school students to take at least one class online, partly to prepare them for college cybercourses. Idaho soon will require two. In Georgia, a new app lets high school students take full course loads on their mobile devices. Thirty states now let students take all of their courses online. According to the International Association for K–12 Online Learning, a trade group, an estimated 250,000 students nationwide are enrolled in full-time virtual educational experiences. A general search indicated that there are 18 virtual high schools in Canada and 247 virtual high schools throughout the United States. Whether there is a virtual or hybrid educational experience, technology is changing learning and the ways in which students learn. With all these changes occurring, future educators will need to consider questions such as, Are virtual schools and online learning making a difference, positively or negatively, in educating the youth that will lead in the future?

Along with new developments in technology, systemic planning is melding with up-to-date technological advancements to create digital-aided schools of the future. Moreover, systemic designs are redirecting educational technology away from its use as a mere tool toward its role in addressing the academic needs for a different generation of learners. The concentration of this approach makes implementation and regular use of technology even more student centered while providing a shared vision as well as awareness on how technology can advance learning. In this regard, Salpeter (2012) listed a variety of elements as to how schools can best prepare students to succeed in the first decades of the 21st century.

Elements of School Improvement

The following are the elements of school improvement:

- Schools need to expand their focus beyond “basic competency.”
- Students need to know how to use their knowledge and skills by thinking critically, applying knowledge to new situations, analyzing information, comprehending new ideas, communicating, collaborating, solving problems, and making decisions.
- Technology will continue to be the driving force in workplaces.
- Student experiences need to connect with authentic projects beyond the classroom.
- Content must prepare students to live and work in a 21st century world.
- Assessment includes moving beyond standardized testing as the sole measure of student learning.

This cocreative relationship between technology and innovations in learning is also reaching down to the basic concepts of the essential dispositions we

desire all of our learners in the K–12 system to attain. One expression of this comes from the National Common Core State Standards that are a state-led effort coordinated by the National Governors Association for Best Practices (NGA Center) and the Council of Chief State School Officers (CCSSO). The standards were developed in collaboration with teachers, school administrators, and experts to provide a clear and consistent framework that would prepare our children for college and the workforce. Of the standards currently developed, the English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects have the following as some of its core standards:

- Students employ technology thoughtfully to enhance their reading, writing, speaking, listening, and language use. They tailor their searches online to acquire useful information efficiently, and they integrate what they learn using technology with what they learn offline. They are also familiar with the strengths and limitation of various technological tools and mediums and can select and use those best suited to their communication goals.
- Students can integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words. Specifically in Grade 5, with some guidance and support from adults, students use technology, including the Internet, to produce and publish writing as well as to interact and collaborate with others and demonstrate sufficient command of keyboarding skills to type a minimum of two pages in a single sitting.
- New technologies have broadened and expanded the role that speaking and listening play in acquiring and sharing knowledge and have tightened their link to other forms of communication. The Internet has accelerated the speed at which connections between speaking, listening, reading, and writing can be made, requiring that students be ready to use these modalities nearly simultaneously. Technology itself is changing quickly, creating a new urgency for students to be adaptable in response to change.

Technologies and the Classroom

Every day across America, students are exploring and using a variety of technologies. Currently, K–12 students are accessing and sharing information via Web-based learning, smart boards, and mobile devices. Both mercurial and date sensitive, classroom technology continues to morph and change with the times. One day, classroom students are accessing the *cloud* as well as *skyping*, and the next day they are *moodling*. Moodle refers to a Course Management System (CMS), also known as a Learning Management System, used by educators to create effective online learning sites. Skyping is a Microsoft proprietary Voice over Internet Protocol (VOIP) and software application allowing educators and students to communicate with peers by voice, video, and instant messaging. Finally, cloud computing provides individuals with an efficient way to get applications up and running faster on the Internet, as well as improving manageability and allowing for less maintenance. This type of computing basically entrusts services with a user's data and software over a network. By collaborating in the cloud, students

have access to their work anywhere there is an internet. Thus, they do not have to work solely at school and can work wherever they have Internet access. The result is a major step toward individualizing instruction at all levels. With these types of technology applications in schools, many students are developing traits of high-tech experts simply by the way they approach their learning and the digital world around them (Cushman, 2012).

To be sure, mobile devices are fast becoming a way for teachers to deliver instruction. This is specifically true of iPads. Whether they are developing math skills, comprehension, or fluency, iPads are impacting the way teachers teach and the way students learn (Mulholland, 2011). If readers were to spend some time in a classroom using iPads, they would witness students accessing the cloud, being totally immersed in what they are doing, as well as being highly motivated to do more. Fingers fly with images scrolling across an electronic screen as students navigate a variety of apps and sources. Wrapped in interfaces, technology-loving kids are speaking into microphones, recording themselves, playing back voices and/or bringing up interesting photos. This technology-driven classroom is considered to be *mobile learning* and is occasionally referenced as *m-learning*. Certainly, this type of technology advancement has the capability of significantly reshaping the classroom learning experience (Caudill, 2007). Although time will tell, educators are using mobile learning or m-learning as an untethered and more informal approach to instruction. Some teachers even refer to m-learning as “just-in-time” technology because of its acquisition speed for students and because it is more “discovery” in nature. Covering the gamut of on-the-spot informational retrieval, m-learning, as well as the more common fixed-based electronic learning (*e-learning*), continue to revolutionize classrooms in schools today. What is especially exciting for educators is the speed and instant access to data. Just as importantly, high-speed handheld devices are designed to deliver extra feedback via apps and programs—and not extra work for teachers. By providing untapped opportunities for teachers, student performance can be uploaded, graphed, and screened as an assessment tool. Likewise, teachers and administrators can show parents how students are performing individually and are able to chart what is happening at the school or district level. Overall, a survey (Masie & Chan, 2011) conducted by the MASIE Center (described as “an international think tank dedicated to exploring the intersection of learning and technology”) found the following as the most used technologies in the classroom:

Technologies in Classrooms	
Technology	Percentage
Projector/Display	85%
Blackboard/Whiteboard	80%
Flipchart	78%
Movable furniture	68%
Speakerphone	59%
Microphone/Speakers	52%
Wireless	49%

Technologies in Classrooms	
Technology	Percentage
Video conferencing via webinar	47%
Flat screen	28%
High-def projector	28%
Video conferencing via IP/ISDN	25%
Fixed furniture	25%
Camera/Microphone to record class	23%
Dividable spaces	22%
Interactive whiteboard	22%
Video conferencing via desktop	20%
Document camera	19%
Multiple displays	19%
Audience response systems	13%
Tablet control for instructor	11%
Slide projector	10%
Tablet for every learner	6%
Gaming technology	4%

Another plus of mobile technology, especially for administrators and supervisors, is the ease in collecting data for program and staff evaluations. While walking from classroom to classroom, building-level supervisors can document, record, and upload data as needed. Thus, with handheld technology, school leaders are better able to capitalize on the interest, energy, and learning needed to better differentiate teaching and learning in individual classrooms. Not only is this useful in the classroom, but these technology advances are also allowing local classrooms to connect with a larger community. As a result, current advances in mobile technology are now providing educators and students everywhere, with a long-awaited window to school reform.

Caution is also essential when integrating technology into the classroom because some community members are expressing concerns over security. Fortunately, the issue of security is being addressed through a series of programs and applications. Systems such as Gaggle (www.gaggle.net) are becoming instrumental in allowing instructors to monitor students by making sure they do not wander on the Internet. Gaggle's control and filtering system gives administrators and teachers a way to protect students from sending and receiving inappropriate e-mail. Instructors can even place restrictions on student accounts controlling with whom they communicate. All student mail that is flagged by the filters is redirected to a Gaggle App account that will determine if it is allowed to go through or should be blocked. Along with improved security, it is crucial for school leaders to develop an acceptable-use policy that addresses mobile electronic devices.

When adapting an acceptable-use policy, school administrators need to make sure the policy addresses such areas as purpose, responsibility, theft or damage, inappropriate use as well as sanctions if policy is violated. Regardless of what type of policy is approved, mobile technology appears to be leaving a legacy of individualized learning, especially as it relates to working with both at-risk students as well as gifted and talented students. What really matters then is that handheld devices are a highly motivational learning tool for potentially increasing the “cool factor” for students. The old adage of “If you can’t reach them, you can’t teach them” seems to readily apply to today’s technology.

Key Elements Impacting School Change

With a variety of new innovations in technology appearing in classrooms, perhaps it is important to focus on some of the *key elements* impacting teaching and learning (Whitehead, Boschee, & Decker, 2013).

Time. Teachers and students in our schools today perceive *working, learning, and activities* as being interconnected. As a result, 21st century schools must implement curricula where working, learning, and activities converge allowing learning to occur at any time and any place.

Relationships. Students of this century are beginning to reestablish strong interconnections to community and linkages with other cultures via handheld mobile technology. This creates a somewhat fluid society vastly different from that of their parents. Today’s Tech-Age students are now learning and growing in communities that are becoming highly diverse in age, religion, culture, language, and location. Within these newly emerging digital communities, collaboration is surfacing as a primary expression of experience, and the working realities of life are becoming focused on being connected.

Technology. Students in schools today are living in a reality of reform and changing technologies. Moreover, these students are preparing and constantly waiting for the next level of advancement that will provide them with new ways of learning.

Learning Style. Digitally savvy students are now effectively using state-of-the-art technology. This does not mean individual students are spending time working alone, but are reinforcing learning through memberships in a network of social groups—even if those groups are thousands of miles away. As such, students want to solve real problems with hopes they can make a contribution to their school, city, and community. With information and knowledge acquisition expanding and changing, students also desire to formulate analytical skills that will help them succeed in our digitally transforming world.

Flexibility. Students participating in the global shift to mobile technology can no longer depend on the stable and unchanging reality of school buildings and classrooms; therefore, they desire a curriculum open to a diverse range of options and educational choices. This is especially true with learning opportunities and knowledge acquisition expanding so rapidly. A result of these transformative

changes—school leaders, curriculum designers, and technology coordinators are taking note. Not surprisingly, these educators are now looking for flexibility in allowing students to learn in multiple settings—public and private schools, home schooling, travel, community groups, as well as cloud computing groups.

On a daily basis, educators across the country are seeing an increase in innovative instructional strategies and curriculum changes. Progressive teachers now desire to step into learning environments that were unimaginable only a decade or two ago. With more changes on the horizon, administrators, teachers, and technology coordinators are readying for systemwide school reform. In support of this finding, more evidence is demonstrating that up-to-date technology, if used wisely, can have the following positive effects on students:

- Interesting and engaging websites provide students opportunities to explore the world and access unlimited informational resources.
- Communicating through the Internet enables students to keep in touch with friends and family and to form online communities with others who share their interests.
- New innovations and applications are enhancing instructional assessment practices and student academic performance.
- Advances in media literacy and digital fluency are allowing students to create, design, and invent in much more affordable ways.

Integration of up-to-date transformative technology will be critical for future school success. In addition, it will be crucial for schools to engage students in addressing real-world problems, issues, and questions that matter (Devine, 2012). When focusing on school reform, the reality is that developments in educational technology are changing societal and career needs as well as challenging the very nature of schools.

Technology and Pedagogy

What is extraordinary is the capability of technology in augmenting educational reform in terms of pedagogies. To prove this point, a model emerging from research in the areas of leadership and technology shows that technology is becoming a force for student growth and achievement (Lytle, 2012). Subsequently, this alters the philosophies that many teachers hold about the nature of instruction. One of the realities found in the literature—from a philosophical level—is how many educators continue to depend on the foundational pedagogies of Piaget, Bruner, and Vygotsky, for example. The struggle is that some pedagogies are based on a nontechnological educational space. This creates a unique philosophical conflict between how learning is conceived and how learning happens when technology is added to the equation. What is required, perhaps, are modern technological pedagogies that are consistent with the technological educational space we now inhabit. A key for transformation is to research and discover how future educators will be able to learn to adapt to tomorrow's pedagogical challenges and opportunities.

School Technology Realities

A careful look around the country, as well as around the globe, reveals that communities are embracing educational change mostly due to the characteristics (see Box 1.3) of the change agents—school administrators. Just as important, schools are making strides in solidifying research-based reforms. In keeping with this trend, visionary school leaders are now refocusing district and state efforts on how technology can best enhance students' academic and social needs, especially through cloud computing (Damani, 2011/2012). What is even more interesting is that with all these changes, students are matriculating into upper grades with more technical skills as well as a greater desire to learn.

BOX 1.3. TOP CHARACTERISTICS OF CHANGE AGENTS

- Trustworthy
- Resilient
- Manages conflict
- Coaches
- Facilitator
- Excellent communicator
- Emotionally intelligent
- Tolerant
- Service minded
- Active learner

Furthermore, these reforms are generating greater interest on the part of parents, teachers, and students as to the real-world relevancy of educational technology.

All of these changes are causing school administrators and technology coordinators to rethink how schools approach teaching and learning. Given the circumstances, perhaps we have reached a tipping point in how schools address reform, especially on how school administrators, technology coordinators, curriculum leaders, board members, trustees, and teachers are reassessing the ways technology can impact instructional delivery. In keeping with this perspective, educational leaders are now compelled to ask some penetrating questions:

- How can technology best be integrated into educational programs?
- Will educationally related technological approaches have the impact we expect?
- Is redirecting our technological program worth the effort?
- Are there technological advances on the horizon that will render our current use obsolete in the not-too-distant future?
- Where can we go to get the best advice about meeting our technological needs?

Student Achievement and Technology

Using technology to improve student achievement is becoming a major part of school success, but this has not always been the case. An emphasis on

higher levels of student achievement has largely been associated with federal and state legislation, regulations, and recommended standards such as the Elementary and Secondary Education Act (ESEA), No Child Left Behind Act (NCLB), Race to the Top, Response to Intervention (RTI), and Common Core State Standards. Results have not necessarily met expectations. In attempting to better understand the connection of technology with student achievement, the Milken Exchange on Education Technology (an independent economic think tank whose mission is to improve the lives and economic conditions of people in the United States and around the world) conducted a meta-analysis of 700 empirical research studies. This research showed that students who had access to

- computer-assisted instruction, or
- integrated learning systems technology, or
- software that teaches higher-order thinking, or
- collaborative networked technologies, or
- design and programming technologies

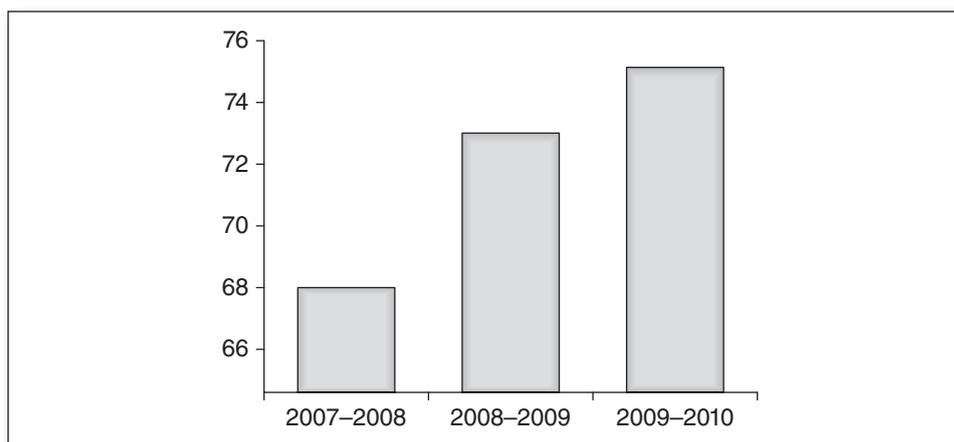
showed positive gains in achievement on researcher-constructed tests, standardized tests, and national tests. In contrast, Toch (2012) reviewed the outcome of NCLB and found that NCLB's effect on student achievement was mixed, at best. The National Assessment of Educational Progress (NAEP), a rigorous snapshot of student performance nationally, reported that the number of fourth graders scoring proficient or advanced in math increased 11% during the NCLB era (from 2003 to 2011), which is good news. At the same time, this compares to an increase of 23% in the pre-NCLB era (1990 to 2003). The same is true for eighth graders in math—"those scoring proficient or above increased 9% in the NCLB era compared to 17% in the pre-NCLB period" (p. 67).

Regardless of state or federal outcomes, there is a renewed vision of education across the country. Researchers are finding pockets of increased student achievement, even in frontier states such as Montana. One such school is the Hellgate Elementary School District in Missoula, Montana. Hellgate is uniquely named after an adjacent historical canyon and located on the outskirts of Missoula. It is made up of primary Grades P–2, intermediate Grades 3–5, and middle school Grades 6–8. In total, there are over 1,200 students in the district. Student population is 87% Caucasian, 5% Native American, 4% Asian American, 2% Hispanic, 1% African American, and 1% Native Hawaiian. Over 40% of students qualify for free or reduced-price lunch.

According to Superintendent Douglas Reisig, Hellgate Elementary School District failed to meet Adequate Yearly Progress (AYP) mandated by NCLB. Administrators, concerned for the progress and success of students, knew that it was time for a change. After extensive research, the school district selected McGraw-Hill's Direct Instruction reading and math programs, which are fully aligned with RTI, for the entire district's strategic and intensive intervention students. To assist with program implementation, the district engaged with Educational Resources, Inc., a professional staff development company, to aid in the implementation of curriculum and instructional revision.

Along with curriculum changes, classroom teachers integrated technology such as Web-based instruction, Classroom Performance Systems (clickers), and iPads to enhance instruction. With the implementation of direct instruction and improvement of classroom technology, Hellgate has seen improvement in reading and math scores on the annual Criterion Reference Test (CRT). For example, CRT scores for third-grade students at primary levels increased over 10% from 2007 to 2009. In 2010, the district achieved a significant milestone, meeting AYP for the first time in two years. Moreover, the implementation of direct instruction along with technology applications has had a direct impact on economically disadvantaged students, which make up nearly half of the district's student population. Before implementing direct instruction, only 61% of economically disadvantaged students were meeting the standard in math. For the 2010/2011 school year, 84% of these students met projected goals to meet the standard. This marks a vast 23% improvement in math scores in just four years (Kelly, 2011).

Hellgate Elementary School Grade 3 Criterion Reference Test Math Proficiency



Source: Kelly (2011).

Much of Hellgate Elementary School's success is attributed to quality teachers, program changes, as well as changes in the implementation of educational technology. Students have reacted to the program with enthusiasm, noting it is predictable and fun to use. Teachers are pleased and have described the new curriculum and technology as rewarding, especially when they hear previously reluctant students exclaiming, "I love math." To be sure, the success of this Montana school in the area of curriculum revision and technology integration is being replicated across the country, revealing that individual school districts can, and are, moving into the future.

Impact of Technology on Schools

Along with focusing on student achievement, educational leaders must realize the overall impact of technology on schools. This is especially the case due to educators having a sense of greater ownership as well as having their work on permanent display for the world to see. Naturally, these changes

continue to be vastly significant. Keeping with this perspective of a culture of change, educators worldwide are finding that advancements in technology can potentially impact schools in at least 10 major areas (Whitehead, Boschee, & Decker, 2013). Impact areas include the following:

1. **Increased student writing.** Simply measuring the amount that students are using technology applications to write reveals one positive impact of technology. Students are writing more compositions and doing so more often. Many teachers now find that students are producing three times the amount of written documents than they did before word processors were made available to them. Teachers who carefully watch students find that it often appears to be easier for their pupils to use a keyboard and screen than a pen or pencil to write. The direct result is that students are writing more often and with seemingly greater ease. This trend is likely to become even more pronounced with quality voice recognition programs and other technological applications.
2. **Higher quality student writing.** Analysis of student writing by numerous researchers has shown that word processing related program helps students become more effective writers. This is not surprising to anyone who uses digital media to any degree.
3. **Enhanced cooperative learning.** Teachers using mobile technology are finding that this format greatly enhances and supports cooperative learning strategies. When collaborative learning is linked with technology, it is known to have a strong positive influence on student achievement.
4. **Enhanced integration of curriculum.** Instructors having access to cloud computing as well as mobile devices are finding technological applications are making it easier to integrate social studies, literature, math, and science into a more coordinated series of learning experiences for students. A practical example of this is when students use applications to create content-integrated presentations using material from several disciplines. In addition, maps, graphs, tables, and illustrations from a variety of subject areas can be easily shared or incorporated into student projects and visual presentations.
5. **Greater range of learning applications.** Teachers are finding the use of technology helps accommodate different ways students learn. This is best evidenced by research noting certain cognitive skills are strengthened, sometimes substantially, by the use of computers and the Net (Carr, 2011).
6. **Increased applications of cross-age tutoring.** Students using mobile technology now have easy access to information across grade levels. As a result, teachers are finding that older students can work with younger students on cooperative or tutorial projects anytime, anywhere.
7. **Increased teacher communication.** Instructors using mobile technology are finding it easy to communicate with colleagues. Today's technological advances create greater possibility for exchanging information and sharing on local, state, national, as well as global levels.

8. **Greater parent communication.** New technology innovations are proving to be a promising link between home and school. Parents anywhere and at any time can readily receive updated reports on student performance, homework assignments, as well as school activities.
9. **Enhanced community relations.** Bringing the school and community together provides another compelling reason for implementing technology into schools. In many school districts, community residents and local business members often participate in campus training and professional development programs using school technology. As a result, adult education classes are on the rise. In addition, students and teachers across the country are helping civic groups as well as small businesses become more attuned to the latest up-to-date technological advances.
10. **Enhanced global learners.** Never before have educators and students been able to develop a better understanding of other cultures and people than is possible today. Many schools are now using technology applications to access information from all parts of the globe. As one considers this phenomenon, it becomes increasingly evident that technology in schools is paving the way for students, teachers, and citizens to enter into a community of global learners.

FOCUSING ON SOCIAL MEDIA AND ETHICAL ISSUES

Social media and e-mentoring help to define various generations such as Generation Y, Millennials, Net Generation, and iGeneration. For example, Rosen (2011) referred to the iGeneration as the group who heavily used digital technologies (iPhone, iPod, iPad, Wii, and iTunes). Interestingly enough, regardless of the label, social networking technology uniquely offers new generations an opportunity to interact with an expansive universe of team members, family, and friends (Richardson, 2011).

Drawbacks

There are, however, some drawbacks to using social networking websites according to Gross and Acquisti (2005). The four areas where social networking can cause individuals personal and professional drawbacks are the following:

1. It must be understood that when making postings on these types of websites, individuals are making public statements and not *private* postings.
2. When posting a statement or story, it is important to note the posting is (and remains) a digital footprint and that it is accessible to the rest of the world. To remove a statement or story, one needs to go through the website policy process for removing information.
3. The Internet is an open unlimited international community in which millions of people have access. Thus, personal responsibility is a critical aspect of being safe on the Internet.

4. There is another point of view to consider: the privacy of others. Privacy is a complicated matter in American law. It evokes everything from the right to family planning through Fourth Amendment search and seizure, to torts, or civil rights (Hodge, 2006). School leaders and staff need to be aware that if they post an alleged fact about someone that proves incorrect, the message writer may be liable for damages under either the defamation or libel. Moreover, if they post photographs or information about someone that can be construed to be an “invasion of their privacy” or “false light,” or “misappropriation of likeness,” they may also be liable for a tort under the broad rubric of “privacy.”

As noted in *The Principal: Leadership for a Global Society* by Whitehead, Boschee, and Decker (2013), social networks are a great innovation allowing users to express their humanity and an opportunity to create new communities. The freedom of the Internet, however, does not suggest individuals can act with impunity. Since we live in a society in which expression is judged in legal policy and even personal ways, it is important to remember the consequences of that expression no matter how ephemeral or fun in the moment it might seem to be. What matters most for educators, however, is to be fully aware and realize that anything posted about them or anyone else, given caching technologies, might prove to be a liability to an ongoing sense of identity over the longer course of history. Behind every device, behind every new program, and behind every technology is a law, a social norm, or a business practice that warrants thoughtful consideration.

Social Ramifications of Cyberbullying

In our newly developing digital world, the age-old problem of bullying is taking on a whole new agenda that is hidden behind digital screens and cell phones. The term *cyberbullying* is harassment over the Internet or via other technologies. Teasing, name calling, and threats thrive on social media networks as well as text messaging on cell phones and in e-mails. According to Lenhart, Madden, Purcell, and Zickuhr (2011), a research study sponsored by the Pew Research Center titled *Teens, Kindness and Cruelty on Social Network Sites* reported that 9 out of 10 teens say they have witnessed cruelty by their peers on social networks. The survey of 800 children between the ages of 12 to 17 found cyberbullying cuts across all ages and backgrounds. Some 15% of teen social media users who were participants in the Pew Research Center sponsored research indicated that they have experienced such harassment themselves (Guess, 2011).

As part of creating a sense of responsibility, schools are paying closer attention to the cyberbullying experiences that students are having (Guess, 2011). With this in mind, it is important for educational leaders worldwide to not only address the cyberbully issue but to also have counselors available to assist targeted students. Having a plan as well as an authentic problem-based solving approach to help and assist victims of cyberbullying can be just as important as catching the culprit. Students engaged in authentic problem-based learning are encouraged to apply their knowledge to questions they have about why things happen in their world, and thus, are better able to discuss social ramifications often associated with specific issues—such as cyberbullying. Pew Research has identified some

areas of interest for school leaders that involve negative impacts of cyberbullying. A substantial number of teens report specific negative outcomes from experiences on social network sites. For example, 41% of teenagers who use social media say they have experienced at least one of the following negative outcomes:

- 25% of social media teenagers have had an experience on a social network site that resulted in a face-to-face argument or confrontation with someone.
- 22% have had an experience that ended their friendship with someone.
- 13% have had an experience that caused a problem with their parents.
- 13% have felt nervous about going to school the next day.
- 8% have gotten into a physical fight with someone else because of something that happened on a social network site.
- 6% have gotten into trouble at school because of an experience on a social network site.

Understanding that technology is constantly evolving, lawmakers are racing to keep up with policies and punishments for cyberbullying. As schools and administrators struggle to keep up with the changes, they must stay on top of this issue for the safety of students who are trying to become young adults in an environment that is constantly changing (Whitehead, Boschee, & Decker, 2013).

SCHOOL TECHNOLOGY GOALS

Fundamental to the process of planning educational technology is how schools/districts assess needs, develop goals and strategies, and pursue implementation to improve student learning. As discussed in Chapter 2, a key standard for school jurisdictions to consider is the provision of four clear and practical technological goals that will expand the boundaries of traditional schooling and help children reach new levels of learning development. The goals are the following:

- School administrators should coordinate school-based services and resources in order to heighten access to interactive technology for students in their schools.
- Guidelines to enhance communication and technological awareness within communities need to be developed. Improved public awareness of what technology is available often leads to a greater understanding of how technology can benefit students and citizens. Community appreciation also leads to the creation of shared vision and mission statements, joint technology committees, appropriate financing programs, infrastructure development, professional development, maintenance and service arrangements, favorable program evaluation and, finally, successful public relations programs. Education leaders must expand traditional school boundaries to involve the community in planning, financing, implementing, and evaluating technology.
- School leaders would be wise to share school success stories with their communities. Data obtained from student assessments can add substantial

credibility to the positive things happening in schools when effectively presented to the public. This information can be easily retrieved and presented in our digital world.

- Data from student assessments can provide school administrators and teachers with a valuable mechanism to ensure that student performance meets or exceeds Common Core State Standards. In addition, statewide data retrieval systems for student performance are helpful to school leaders in determining aggregate achievement levels for all schools. Likewise, an accompanying item analysis of standardized test questions can provide administrators and teachers with a means of making a sound appraisal of strengths and weaknesses in the school or district curriculum.

As can be seen, it is with the development of clear public information programs that state legislators and citizens will best understand how technology is impacting student achievement. As community support increases, school leaders are better able to provide the administrative support necessary to accommodate the needs of teachers and students. As a result, high-impact school leaders are critical to turnaround success, and pockets of success can be found around the country (Stein, 2012). Community support also helps break down classroom walls by making positive activities in schools more visible and educators more accessible to parents via technology. In retrospect then, there appears to be little doubt about leading-edge technology holding the promise for many positive changes occurring in American education. A few of these positive outcomes will be focusing on exploratory learning, the empowering of teachers, and equipping school leaders with advanced technological resources needed to manage schools. In reality, the task of illuminating the role of technology in our nation's classrooms is complex, but a very important one.

STRATEGIES FOR SUCCESS

To be successful in our increasingly technological world, it is evident that all educators and learners must be skilled in the use of technology. This is especially important because research on raising student achievement consistently revealed that an effective teacher is the most vital factor in a student's success (Routman, 2012). As a result, to bring about change and establish equity in our schools, factors such as proper professional development programs, technical support, and time for learning must be provided simultaneously as well as the strategies displayed in Box 1.4.

BOX 1.4. SUCCESSFUL SCHOOL TECHNOLOGY STRATEGIES

- Community involvement in planning and implementing the use of technology in schools should be a high priority for school leaders.
- Developing quality technological leadership and planning for effective technology use within the jurisdiction must receive considerable attention.

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- Finances for technology and other forms of school technology should become a line item in the general budget of all school districts.
- Emphasis should be placed on incorporating handheld mobile technology into all classrooms.
- Professional development involving technology should be made highly practical by encouraging teachers to teach other teachers.
- Planning and implementation phases for new technology should include assessment and evaluation standards.
- A well-planned public relations program should be a priority of every school district.

By incorporating diverse ideas and strategies into a collective vision, school leaders and technology coordinators can—and will—improve the overall nature of education. Furthermore, there is no question that in our rapidly changing world, the economic vitality of our communities will depend more on students being able to turn information into usable knowledge (Goudvis & Harvey, 2012). Just as important, individual students will be better able to build knowledge, solve problems, and share successes with the larger community.

State and National Levels of Awareness

State and national organizations are moving forward in their continued support of school technology. Furthermore, it is crucial that educational leaders and organizations at all levels develop a coordinated plan directed at helping schools best use new advances in technology.

TECHNOLOGY THOUGHT

Review your district's technology plan to ensure that it is developing well-rounded, adept, intuitive, and culturally aware students.

In an effort to improve the situation, school administrators are spearheading movements to develop community frameworks to include influential noneducators into the brainstorming and implementation process before bringing technologies into their districts. As will be described in Chapter 3, these efforts have been especially beneficial in formulating professional learning communities (PLCs) as a way to address a multitude of issues including reading and writing academic problems.

Along with PLCs, an ever-expanding state and national focus includes the formation of National Common Core State Standards. These standards are dramatically helping to redefine a basic education as per readiness for college and careers (Rothman, 2012). Moreover, Common Core Standards are addressing as well as clarifying the complexity of today's hi-tech educational landscape. In addition to Common Core State Standards, the Council for the Accreditation of Educator Preparation (CAEP) continues to be highly involved as well. For example, CAEP requires schools of education to meet verifiable

technology standards for program accreditation. This accreditation body recognizes the importance of advanced technology in schools and supports this stance by stating that technology needs to move from the periphery to the center of teacher education. In addition, organizations such as the National Association of Elementary School Principals (NAESP), National Association of Secondary School Principals (NASSP), and American Association of School Administrators (AASA) are collaborating to review and endorse highly successful educational technology practices. To make this happen, these organizations are now assisting school technology coordinators with ideas and strategies to help address the issue of equity and cultural diversity on a global level. This is extremely important.

Fostering a Global Link

As society grows both culturally and globally, educators remain concerned as to how the United States is measuring up academically. Tony Wagner (2008), in *The Global Achievement Gap*, relates how transformations in leadership represent enormous challenges for future educational leaders. He lists a primary challenge as being the ability of educators to prepare students for both analytic and creative thinking. For this reason, Wagner focuses on the development of a global achievement gap. Basically, this gap reflects the distance between what our best public schools are teaching and testing as opposed to what all students need to know in the world today. With an alarming fear of other countries having more success academically, the achievement gap has profound implications not just for work, but also for citizenship and lifelong learning.

To meet these challenges and address any gaps in achievement, schools are using advances in technology to become globally interconnected. This means school leaders are becoming global leaders as well. A global leader is an individual who is aware of universal challenges, world cultures, and the connection between them and the rest of the world. It is crucial for our school leaders to understand how other countries develop curriculum, conduct professional development, and handle school-related issues. It is equally imperative for schools to develop a global perspective through integrated online communities, mobile technology, and other communication sources to gather information about other countries and cultures. Therefore, by rearranging priorities and developing an effective use of technology, every new 21st century learner will have an opportunity to learn from a global audience (Blair, 2012). By and large, an increasing number of school leaders are realizing the potential of technology as a powerful resource for enhancing learning on a global scale. Through advanced technology, it is now possible to share information and classroom projects with educators and schools all over the world. As part of that culture of conversation, school leaders will be better able to formulate a broader perspective of world challenges. Moreover, in the process of encouraging staff and students to become global citizens, teachers can become more interested in using advances in technology to explore civic responsibilities and equity issues, cultural awareness, and the environment. The need for vibrant educational leadership on a global level is here and apparent. Knowing what problems might arise from a worldly perspective and how to deal with complex issues is the reward. Likewise, knowing that this

generation of students is more cognizant of world affairs than previous generations will help lead us to an age of global transparency.

FUTURE CHALLENGES

As educators give further thought to the impact of technology in our present world, it becomes readily apparent that we must carefully merge new technology advances and applications into our educational institutions. The potential for creating schools and school districts of high quality is only possible through the timely application of existing knowledge. In order to benefit from conceptually new ways of learning, it is important that a comprehensive blueprint be adopted and followed. It is recommended that school administrators, technology coordinators, and community leaders carefully consider and adhere to suggestions from the chapters that follow as they explore ways to integrate technology into our schools. What is at stake is *how* students learn, and this may have the greatest impact on our future as a global society.

REFLECTIVE ACTIVITIES

1. List and analyze the outcomes expected from innovative applications of educational technology.
2. Explain how your school district technology purchases are meeting students' needs. If they are not meeting students' needs, list the shortcomings (e.g., equipment inadequacies, lack of qualified personnel, or infrastructural limitations).
3. Identify other forms of technology available that could improve learning opportunities for students in your school district.
4. Reflect on the type of students you see in your school district today. Compare and contrast their relationship with learning and technology.
5. Consider how instructional strategies in your school have changed as a result of technology being implemented into your curriculum.
6. Analyze the positive and negative aspects of technology use in your school district.
7. Decide how much access community members should have to your school's technologies.
8. Provide a rationale for why school-community communication via e-mail, text messaging, Facebook, Twitter, and other applications should or should not be promoted.
9. Identify what organizations exist in your school district and state for the coordinated implementation of educational technology.
10. If applicable, describe how your school is using technology to align with the Common Core State Standards.