

CHAPTER 2

LITERATURE REVIEW

Introduction

There seems to be some controversy whether students today are technologically prepared for the 21st Century Digital Age. “Available evidence shows that American adults and children have a poor understanding of the essential characteristics of technology, how it influences society, and how people can and do affect its development. Neither the educational system nor the policy-making apparatus in the United States has recognized the importance of technological literacy” (National Academy of Engineering, 2002, p. 1). Technologies are growing at a tremendous rate and U.S. citizens are not equipped to make well-considered decisions or to think critically about technology. In short, we are not “technologically literate” (National Academy of Engineering, 2002, p.1).

The North Central Regional Educational Laboratory (NCREL) reports that communities expect their graduates to be prepared to succeed in the Digital Age but that 21st Century skills are not well defined. These skills are not integrated in many state learning standards or measured on most state and local assessments. NCREL believes we are preparing students to succeed in yesterday’s world and that schools are obligated to keep up with rapid technology, research, and societal changes. Yesterday’s education is inadequate for today’s learners. “The sheer magnitude of human knowledge, world globalization, and the accelerating rate of change due to technology necessitates a shift in our children’s education – from plateaus of knowing to continuous cycles of learning”

(NCREL, 2003). NCREL categorizes skill clusters into digital-age literacy, inventive thinking, effective communication, and high productivity. Each skill cluster is broken down more into descriptive skill sets which offer assistance with identifying student achievement.

Roblyer and Edwards (as cited in Roblyer, 2000) states, “. . . the future of educational technology rests to a great degree on us (educators): how we view technology, how we respond to the challenge it presents, and how we see it helping us accomplish our own informed vision of what teaching and learning should be.”

Technology Growth

In America, between the academic school years of 1991-92 and 1996-97, inventories of computers grew 186% with an additional 1.2 million computers added in 1996-97 alone. In 1996-97 there were an estimated 6.3 million computers in virtually 100% of the nation's schools (Market Data Retrieval, 1997 as cited by U.S. Department of Education, 2002a). In 1998, 89% of schools had Internet connections (U.S. Department of Education, 1999 as cited by U.S. Department of Education, 2002a). However, technology alone does not make a difference; rather the key element is how it is used. The National Education Technology Plan 2004 (U.S. Department of Education, 2004), reports that today nearly every public school has access to the Internet, but the real issue lies in the lack of adequate training and lack of understanding of how computers can be used to improve learning.

A national survey (Gallup Poll, 1997) conducted on 744 students by the Gallup Organization in conjunction with CNN, USA Today, and the National Science

Foundation found that most students in grades 7 -12 feel comfortable with modern technology. Key findings of this survey included:

- 99% of teenagers have used a computer some time in their lives
- 82% think strong computer skills and an understanding of technology will be essential for their future success
- 80% imply they use a computer at least weekly
- 77% would prefer to conduct research for a school report by surfing the Internet, rather than using books and magazines
- 71% rate their computer confidence at a level of “6” or better on a scale from zero to ten, where ten is very confident and zero is not confident at all
- 67% have a computer at home
- Roughly two-thirds consider space exploration, new advances in computers and advances in medical research to be exciting subjects they’d like to learn more about at school
- 62% can usually figure out on their own how to operate a piece of electronic equipment or computer software rather than needing to ask for help
- 59% would prefer to live in a house filled with high-tech equipment and appliances when they are adults rather than a “simpler” house
- 58% would like to spend more time than they currently do using a computer
- 55% have had the opportunity to use the Internet
- 54% report that either they themselves or one of their siblings have the job of programming the VCR in their household, rather than a parent

Students also indicated a desire to develop better computer skills than what they were currently getting in school. Only one third of those surveyed thought their computer education was teaching them what they need to know by high school graduation.

In 1999 the Milken Family Foundation conducted its second annual survey (Solomon & Widerhorn, 2000) of district technology coordinators. Previously, assessments were believed to have been tied more to equipment measures than technology planning and advancement. The purpose of this survey was to obtain accurate and up-to-date school technology data by state. According to the survey, student-to-computer ratio was the most common summary statistic on the status of school technology. Survey results indicated a significant drop in student-to-computer ratio, 36.3 to one in 1997-98 as compared to 18.5 to one in 1998-99. Results indicated an increase in the percentage of schools using a local area network (LAN), 60.6% to 64%, and also an increase in schools connected to the Internet via a LAN, 51.9% to 67.9%. One trend resulting from the survey was that technology use in schools is increasing more due to Internet-related uses than to changes unrelated to the Internet such as curriculum or pedagogy. Another trend was that technology is becoming more engrossed in our schools as indicated by the decline in the student-to-computer ratio. A troubling result of the survey indicated the excitement for learning technology may be declining and that expectations for technology use may be leveling off.

Another survey (Newberry, 2001) managed by the International Technology Education Association's Technology for All Americans Project (ITEA-TfAAP) in cooperation with the ITEA Council for State Supervisors for the 2000-2001 school year

was conducted to determine the status of technology education in the U.S. Forty-seven out of fifty states responded. Of those surveyed, 57.7% indicated that technology education is in the state framework. Fourteen states (27%) reported that technology education is required in their state, 11.5% indicated local control of technology education, and 3.8% were waiting on pending legislation or in the process of writing standards.

Zhao and Alexander (2002) noted, “With the advancement of the Internet and Web technologies from static information delivery to dynamic, interactive, data-driven applications, U.S. companies have been integrating such technologies into their corporate computer information systems to maintain a competitive edge” (p. 175). Zhao and Alexander (2002) conducted a survey of Fortune 500 corporations to determine what technology skills business students need upon graduation now and toward 2005. Their research results indicated an increase from 11 skills needed just five years ago, to 28 skills strongly recommended today. These skills include:

- Hardware: using keyboard, microcomputer, and mouse
- Operating system: using Windows
- Productivity skills: using word processor, spreadsheet, presentation, and database; with Microsoft office as the “strongly recommended” productivity application suite
- Telecommunications: using email, Internet/Web, intranet, wireless/mobile Web applications, Web-conferencing, searching/ downloading/managing/posting information

- Information systems: budgeting, general ledger, cash management, data mining, sales analysis, sales forecasting, decision support system, human resource management, systems analysis and design, and systems implementation..

In recent years, there has been an enormous growth in the areas of online courses and virtual schools, customizing instruction to the meet the needs of individual students. According to the Education Week Research Center (as cited in Fox, 2005), 22 states have established state virtual schools and 16 states have at least one cyber charter school (Technology Counts, 2005). During the 2003-04 school year, the Florida Virtual High School became the state's 73rd school district. This is the largest state-sponsored online high school and gets state funding through per-pupil costs, just like other districts (Technology Counts, 2005). Market Data Retrieval (as cited in Fox, 2005), a research firm that tracks educational technology use and provides evidence of the ongoing integration of technology into schools, found that 25 percent of public schools provide distance-learning programs for students.

Assessments can now be taken online, providing students, teachers, and parents with instant feedback. Technology has provided a huge improvement in the areas of tracking progress, identifying needs, and effectively designing and managing instructional programs (U.S. Department of Education, 2004). Technology has dramatically changed the world outside our schools and is now changing the learning and teaching environment within them.

Need for Change

Rod Paige, U.S. Secretary of Education states, “Education is the only business still debating the usefulness of technology. Schools remain unchanged for the most part, despite numerous reforms and increased investments in computers and networks.” (U.S. Department of Education, 2004, p. 22)

Friesen (2003) notes that not long ago, an educated person was someone who could read and write where information was delivered at a manageable pace. This is no longer true. With the onset of the Internet, an explosion of easily accessible information has created a challenge. Bill Gates (as cited in Zhao & Alexander, 2002) stresses that “in a changing world education is the best preparation for being able to adapt; as the economy shifts, people who are appropriately educated will tend to do best.”

Excerpted from *Learning for the 21st Century: A Report and Mile Guide for 21st Century Skills* (Partnership for 21st Century Skills, 2003), Peter Senge, a senior lecturer at Massachusetts Institute of Technology (MIT), stated,

A simple question to ask is, ‘How has the world of a child changed in the last 150 years?’ And the answer is, ‘It’s hard to imagine any way in which it hasn’t changed.’ Children know more about what’s going on in the world today than their teachers, often because of the media environment they grow up in. They’re immersed in a media environment of all kinds of stuff that was unheard of 150 years ago, and yet if you look at school today versus 100 years ago, they are more similar than dissimilar (p. 6).

In a world where student lives have changed dramatically, schools must also change to meet the demands of the ever-changing digital society. In today's society, students "connect with their friends via email, instant messaging and chat rooms online; search the Web to explore their interests; express themselves fluently using new media; learn with educational software; play video and computer games in virtual realities; manipulate digital photos; go behind the scenes on DVDs; channel surf on television; and chat on and take photographs with cell phones" (Partnership for 21st Century Skills, p. 7).

With the increasing growth of technology in both the workplace and the community, the Partnership for 21st Century Skills (2003) suggests that Americans "need to be better educated to fill new jobs and more flexible to respond to the changing knowledge and skill requirements of existing jobs...Lifelong skills development must become one of the central pillars of the new economy" (p. 6). Murray (2003) states, "The 1990 Department of Labor report of the Secretary's Commission on Achieving Necessary Skills (SCANS) identifies information and technology as two of the five competencies essential for employment" (p.15).

Phillip J. Bond, U.S. Under Secretary of Commerce for Technology, in an address delivered at the U.S. Chamber of Commerce 2002 conference, *Before Technology in Education and Training* (Partnership for 21st Century Skills, 2003) stated:

During the past decade, our nation came to the widespread realization that technology was the driving force in the economy, and increasingly important to most of our human endeavors. All around us we see the

information technology revolution in progress . . . in communications, business and commerce, how we educate and train our people, and how we manage our personal lives.

The Partnership for 21st Century Skills (2003) suggests that education is the key to preparing students for learning in today's complex, digital society. Learning will be more meaningful and more effective if public education can focus on closing the gap between how students live and how they learn. They also suggest that a critical component in adapting education will be a deeper understanding of how people learn. The Partnership for 21st Century Skills (2003) reported research findings of a 2000 report of the National Research Council entitled, *How People Learn: Brain, Mind, Experience, and School*. The key research findings are listed below.

1. Students come to class with preconceptions about how the world works. If teachers do not use this prior knowledge to build new understanding, students may fail to grasp the new concepts and information they are taught, or they may learn them for purposes of a test but revert to their preconceptions outside of the classroom.
2. To develop competence in an area of inquiry, students must have a deep foundation of knowledge, understand facts and ideas in the context of a conceptual framework, and organize knowledge so they can retrieve and apply it.
3. A metacognitive approach to instruction, in which students are taught to think deliberately about how they are learning, can help students

take control of their own learning, monitor their own progress and improve their achievement (p. 7).

Lemke (2003) states, “Today, given the realities of globalization, knowledge work, and accelerating social change, it’s obvious that what students learn, as well as how and when they learn it, are changing” (p. 7). Lemke (2003) suggests that to be genuinely equipped for success in today’s digital age, “all students need evolving skill sets that reflect this reality” (p. 7).

With the increased popularity of online learning, technology skills become even more important and educators are raising the bar on student expectations. Without a solid foundation of technical skills, students may have a difficult time being successful in e-learning environments. Sheffield (as cited in Osika & Sharp, 2002) notes that many college faculty assume students coming out of high school have the technology skills needed for college. Hopp, Camin, and Wignall (as cited in Osika & Sharp, 2002) disagree and state, “Unfortunately, ... many students do not have the technical competence required to operate successfully in a Web-based learning environment.” Osika and Sharp (2002) conducted a study at a medium-sized public university and reported that even though technology may be introduced to students at an early age, it does not necessarily mean they possess the technically competent skills required to be successful in an e-learning environment.

According to the National Research Council, (Zhao & Alexander, 2002) technology skills are closely tied to hardware and software applications, thus technology skills for graduates are expected to change at the same rate that technology changes. “The

sheer magnitude of human knowledge, globalization, and the accelerating rate of change due to technology necessitate a shift in our children's education from plateaus of knowing to continuous cycles of learning" (Lemke 2003, p. 9).

Hall (2001) states that "Education is the thread that binds us through time to what we have learned and what we have achieved, and provides a system for future learning and development" (p. 99). Hall suggests that educated people are the heart of a civilized society and while education provides a societal foundation, technology should be an engine for social change. According to Hall, technology has changed the way we communicate, travel, learn, socialize, and interact within our natural and manmade environments. Hall (2001) states, "The technologies we have available for use, our perception of those technologies, and how we choose to utilize them are determinants of the shape our world takes" (p. 99).

The U.S. Department of Education (2004) suggests that "change is in the air". With *No Child Left Behind* as an exception, these changes are being powered by "the new realities of the digital marketplace, the rapid development of [virtual] schools, and the enthusiasm of an amazing generation of students weaned on the marvels of technology who are literally forcing our schools to adapt and change in ways never before imagined" (p. 10). The *No Child Left Behind Act* presents strong goals to our education environment. The U.S. Department of Education (2004) compares this Act to the 1960's mission to place a man on the moon. This means that with the increased use of new technologies and the inspiring capabilities of today's students, the next decade could bring about the greatest leap forward in the history of educational achievement.

Technology Literacy

What is Technology Literacy?

According to Eisenberg and Johnson (2002), there seems to be a general consensus among the public and educators that students need to be “computer literate.” However, these authors raise some interesting questions on the meaning of computer literacy: “Can a student who operates a computer well enough to play a game, send e-mail or surf the Web be considered computer literate? Will a student who uses computers in school only for running tutorials or an integrated learning system have the skills necessary to survive in our society? Will the ability to do basic word processing be sufficient for students entering the workplace or post-secondary education?” Their answer was, “clearly not.”

Rose and Dugger (2002), define technology literacy as “one’s ability to use, manage, assess, and understand technology.” According to Lemke (2003), “The No Child Left Behind legislation establishes technology literacy as a core foundation for learning, calling for academic excellence in the context of modern technologies” (p. 7).

The U.S. Department of Education (as cited in Hall, 2001) defines technological literacy as “computer skills and the ability to use computers and other technology to improve learning, productivity, and performance” (p. 100). Hall suggests that a definition of technological literacy should have a broader focus in order to provide a solid technological foundation. Hunter (as cited in Hall 2001) defines technological literacy as:

...an appreciation of the scientific method as a powerful way of knowing;
the ability to distinguish technology from science but also to see the

connections; and an understanding that the world we live in is increasingly technological, not only in regard to products, but in the whole organization of modern life (p. 101).

Hall (2001) implies that "...society is advancing faster than its understanding of technologies that have allowed it to achieve these new heights." (p. 102). Because of continuous changes in technology, it is our responsibility to provide all students with a basic knowledge of what technology is, how it can be used, and how it will affect their future lives (Hall, 2001).

Russell (2003a) suggests that "...learning about technology includes cognitive knowledge acquisition, skill development, and affective/analytical capacity-building" (p. 28).

Benefits of Technological Literacy

Much would be gained for individuals and for a society as a whole by raising the level of technology literate citizens. According to the National Academy of Engineering (2002), benefits would include improved decision making, increasing citizen participation, supporting a modern workforce, narrowing the digital divide, and enhancing social well-being.

Technology Trends

Federal Government Initiatives

In 1996 President Clinton announced the Technology Literacy Challenge Fund (TLCF) which was the single largest investment devoted exclusively to increasing the effective use of technology in elementary and secondary education. In the first year of

operation, the TLCF grant provided \$200 million to encourage local communities, companies, universities, and others to work together toward fully integrating technology into the curriculum and improving teaching and learning (U.S. Department of Education, 2002a).

In 2002 President George W. Bush signed into law the *No Child Left Behind Act* (NCLB) of 2001. This legislation “provides increased flexibility and local control to States and School districts, emphasizes strong accountability for results, offers expanded options for parents of disadvantaged children, and supports teaching methods that have a solid scientific research foundation” (U.S. Department of Education, 2002b). The reauthorized Elementary and Secondary Education Act (ESEA) established an Educational Technology Program (Enhancing Education through Technology) which consolidates the Technology Literacy Challenge Fund (TLCF) Program and the Technology Innovative Challenge Grant Program into a single state formula grant program. Its goal is to improve student academic achievement through the use of technology in schools. It is also designed to help every student traverse the digital divide by making sure every student is technologically literate by the end of eighth grade, and to support the successful integration of technology in teacher preparation and curriculum development (U.S. Department of Education, 2002b). The education technology director, in most states, has the ultimate responsibility for ensuring that their students meet this goal.

Due to the *No Child Left Behind* (NCLB) emphasis on strong accountability for results, technology standards are becoming more important to help define clear guidelines

for assessment and accountability. Prestebak (2001) notes that everything around us is controlled by standards, from holes in notebook paper to educational programs. Standards make things work and ensure quality, help set goals and win support from administrators, and provide a measurement gauge for student/teacher performance.

Standards

Ansell and Park (2003) state that the rapid growth of school technology has caused many states to write and/or adopt technology standards. These standards offer guidelines for teaching and using educational technology more effectively. Forty states have drawn up technology standards for teachers, 32 states have technology standards for administrators, and 48 states including the District of Columbia have technology standards for students (Technology Counts, 2005). Although most states have technology standards, they are not currently testing students on those standards. Presently, only three states New York, North Carolina, and Utah test student's mastery of technology standards (Fox, 2005).

According to Thomas and Knezek (1999), the standards movement in education attempts to offer a national consensus on what students should know in content subjects. They suggest that "...educators have not adequately addressed the use of technology as a tool for applying content knowledge in authentic context, for solving problems and making decisions, for exchanging information, and for communicating ideas. Knowing is not sufficient in itself—rather, students must apply knowledge to construct new understandings, to solve problems, to make decisions, to develop products, and to communicate" (p. 1). Bybee (2000) believes our society today is extremely dependent on

technology and therefore crucial that students achieve technological literacy. “The power of standards lies in their capacity to change fundamental components of the education system” (Bybee 2000 p. 26).

International Technology Education Association’s (ITEA) *Standards for Technological Literacy: Content for the Study of Technology (STL)* offers a vision of what students should know and be able to do to be technology literate. These content standards result from a multi-year collaborative process involving thousands of individuals from both within and outside the profession. The standards do not try to define curriculum, but rather describe what the focus of technology should be (ITEA, 2000). Martin (2002) addresses a key concern, if the content standards are to bring about significant and meaningful change, then implementation strategies also need to exist in the form of assessment, program development, and professional development.

ITEA’s *Advancing Excellence in Technological Literacy: Student Assessment, Professional Development, and Program Standards (AETL)* is a companion document to STL which offers standards and guidelines for student assessment, professional development of teachers, and the program infrastructure related to the study of technology in grades K-12. “AETL (student assessment, professional development, and program standards), along with STL (content), provides guidance for improving student learning and offers direction for the future study of technology” (ITEA, 2003).

ITEA conducted a survey of a randomly selected group of ITEA members to get views from the field. Of the respondents, 75% were teachers, 13% department chairs who were also teachers at one time, and 12% were state supervisors. Russell (2003b) reported

that almost 93% of survey respondents indicated that standards for technological literacy were important for the following reasons:

- 1) Helps to validate the profession.
- 2) Gives direction to the curriculum.
- 3) Facilitates movement toward more standardization of technology education across the country.
- 4) Provides for a better understanding of expectations and goals.
- 5) Identifies the essential content that students need to learn.
- 6) Provides a vision for technological literacy. (p. 29)

Responses to some open-ended questions also provided some interesting comments: 1) “We live in a technological society, and the curricula should be appropriate to society’s needs.” 2) “The standards provide a level of unity between schools, states, and grades.” 3) “The standards give our discipline validity and national unity.” 4) “The standards are important because they put the research and justification to the activities and content that is delivered in the classroom.” (p. 30)

Technology standards in many states previously focused on computer skills but are now beginning to focus more on identifying technology skills that students need for the school and the workplace (Burke, 2001). In many states, technology standards are based on the National Educational Technology Standards for Students (NETS-S) developed by the International Society for Technology in Education (ISTE) and published in 1998. According to Roblyer (2000), ISTE is the largest educational technology organization in the world, connecting classroom teachers and national

policymakers. Technology skills are viewed by state and federal governments as critical to student learning. Thus, standards could develop into a separate set of required skills, as they are in North Carolina, or integrated into other statewide skills, as they are in Florida (Roblyer, 2000).

The National Education Technology Standards for Students (NETS-S) are divided into six broad categories: 1) basic operations and concepts; 2) social, ethical, and human issues; 3) technology productivity tools; 4) technology communication tools; 5) technology research tools; and 6) technology problem-solving and decision-making tools. Standards in each category are to be introduced, reinforced, and mastered by students. A key element of the NETS Project is the creation of a set of profiles describing technology-literate students at major progress points in their pre-college education. “These profiles reflect the underlying assumption that all students should have the opportunity to develop technology skills that support learning, personal productivity, decision making, and daily life. These profiles and associated standards provide a framework for preparing students to be lifelong learners who make informed decisions about the role of technology in their lives” (NETS-S, 2000).

According to NETS (2003), “. . . 49 of the 51 states have adopted, adapted, aligned with, or otherwise referenced at least one set of standards in their state technology plans, certification, licensure, curriculum plans, assessment plans, or other official state documents.”

North Central Regional Education Laboratory (NCREL) and the Metiri Group also released a set of standards known as the enGauge 21st Century Skills. These

standards were developed to assist in the teaching of technology and content to K-12 students. The standards include four skill clusters: digital-age literacy, inventive thinking, effective communication, and high productivity.

Other Educational Programs and Initiatives

New educational programs and initiatives are arising around the nation. The Technology Across the Curriculum (TAC) initiative at George Mason University in Virginia focuses on graduating students who “are fluent in technology” (Boettcher, 2000, p. 42).

The Information Technology Literacy Program at Georgetown College in Kentucky was instituted in the fall of 1999 and requires new students to demonstrate basic proficiencies in the use of information-technology resources as a graduation requirement (Rafaill & Peach, 2001).

Certifications

In addition to preparing high school students for college, competition in the business world is global and information-based. As a result, knowledge of computers is vital for anyone wishing to succeed in the work force. Those looking for employment in Europe can prove their proficiency of basic computer skills by showing employers a “computer driving license” (Csapo, 2002). The European/International Computer Driving License (ECDL/ICDL) is an internationally recognized computer literacy training and certification program. Because of its success in Europe, the ICDL is now offered in the United States. The ECDL/ICDL has nearly 2 million registered participants and more than 1 million participants already certified. Certification has become an important

measurement for employers in validating the knowledge and skills of employees. “A certification of an individual’s technology skills that is acceptable and recognizable worldwide would benefit all involved” (Csapo, 2002).

A new certification program on the horizon is the Internet and Computing Core Certification (IC³). This is the “world’s first validated, standards-based training and certification program for basic computing and Internet knowledge and skills” (Certiport, 2001). This certification requires three exams covering three different areas: computing fundamentals, key applications, and living online. The computing fundamental exam includes computer hardware, software, and operating system issues. The key applications exam covers common program functions, word processing functions, and spreadsheet functions. The living online exam covers networks and the Internet, electronic mail, using the Internet, and the impact of computing and the Internet on society. The IC³ certification has received an American Council on Education (ACE) credit recommendation for college education in general education or computing literacy. Students can transfer credit to more than 1800 accredited, degree-granting colleges, universities, and other education-related organizations that are members of ACE (Certiport, 2001). The exams for this certification were “created under the supervision of professional psychometricians and test developers with experience in the certification industry. This expertise ensures that the program fulfills all of the computer industry’s highest standards for test development, integrity, and validity” (Certiport, 2001). The International Society for Technology in Education (ISTE) has joined forces with

Certiport to construct the new 2005 version of the IC³ exams. IC³ aligns with the National Education Technology Standards for Students (Certiport Certification, 2005).

Technology Assessment

Russell (2003a) identifies assessment as "...a critical sub-component of teaching. It demonstrates learning. It provides reinforcement and feedback. It is essential to a student's awareness of where he or she stands in relation to understanding a certain content area or mastering a given skill." (p. 27). Russell goes on to state that "assessment is a quality process providing timely, valid, reliable information....Assessment is not just a solitary act that follows instruction, but should, in fact, drive instruction" (p. 27).

The State Educational Technology Directors Association (SETDA) Technology Literacy Assessment (TLA) Work Group have been working to offer documentation and a solid base allowing states to work from a common definition when assessing technology literacy and allowing policy makers to understand what states are assessing when they measure technology literacy. The TLA Work Group presents assessment diversity utilizing various evaluation components or models to ensure appropriate verification during the process. The assessment requirements and expectations for each state or school will determine the depth of assessment (SETDA, 2003).

SETDA has developed a Common Data Elements (CDE) Work Group whose objective is to identify a set of common data elements on education technology to support student learning. These elements will assist states in reporting progress on NCLB, will provide a base for national comparisons, and provide public policy guidance to state leaders regarding educational technology needs (SETDA, 2003).

With a grant funded by the U.S. Department of Education, in October 2001 SETDA outsourced the development of a set of common data elements to the Metiri Group. Group discussions focused on how educational technology data is presently being gathered and conclusions revealed that much of the data is redundant. The group also identified problems with the existing data collection instruments – “different survey questions, lack of well-defined terminology and survey instruments, and even misleading or inconsistent data analysis” (SETDA, 2003). A framework for assessment of education technology was established in the fall of 2002 based on a set of key questions aligned to indicators and data elements. A matrix was then developed that aligned data elements to the NCLB goals and purposes. The framework was evaluated by a select group of state technology directors and experts at the National Leadership Institute (NLI). Once this framework is completed and the instrumentation is developed, SETDA will develop a toolkit for all states to use and will suggest that the U.S. Department of Education carefully choose key elements from the framework to use in the federal performance report required of states participating in NCLB. In addition, SETDA suggests that the U.S. Department of Education provide support for states to use the framework (SETDA, 2003). Deb Sutton (SETDA, 2003) from the Missouri Department of Elementary & Secondary Education and a SETDA member comments on her experience of attending training at the NLI:

My experience working with the Common Data Elements (CDE) Work Group was not only informative, but also very timely. Like other states, Missouri surveys its public schools annually. We are in the process of

revising and updating our 2003 Census of Technology to reflect the new state technology plan and No Child Left Behind Act of 2001 (NCLB) requirements. I came back from the NLI with a clearer idea about the data we should be collecting now and with a glimpse of what might be expected down the road. I appreciated the opportunity to learn what other states are doing in terms of education technology data collection and analysis. I am excited about states having input into national data collection policy and procedures. I look forward to the development of a product that clarifies and defines core ed tech data elements for national and state use and which provides insight into and guidance on how to collect classroom-level data that truly evaluate the impact of technology on instructional practices and student learning.

According to the Partnership for 21st Century Skills (2003), standardized tests are here to stay. Therefore in order to improve student achievement, the nation needs to focus on assessment. As noted by many observers, “What gets measured gets taught.” According to President George W. Bush, “Accountability doesn’t cause failure; it identifies failure. And only by acknowledging poor performance can we ever help schools to achieve. You can’t solve a problem unless you first diagnose the problem” (Partnership for 21st Century Skills 2003, p. 16).

To date, there has been no common assessment measures used statewide and/or nationally, however this could be changing in the new future. ISTE, ICDL, and Vantage Learning have teamed together to develop and implement a scalable, national assessment

tool for middle school students. This assessment was designed to meet the requirements of NCLB in addition to more universal technology literacy assessment needs. The assessment aligns with the NETS for students and will be nationally available for the 2005-06 school year (ISTE, 2004).

ISTE and Microsoft have upgraded a NETS online technology assessment to evaluate the technology literacy of middle school students (Felix, 2005). This free online toolkit consists of 12 assessments covering a wide range of applications and aligns with the NETS performance indicators. Each assessment contains five to 10 activities measuring technology skills related to a project or problem.

Russell (2003a) indicates that assessment is a critical component of effective teaching and learning. It provides student awareness of what knowledge and skills are important, and help teachers, supervisors, and administrators recognize areas needing extra attention or an alternative teaching method. Assessments can identify the need for curricular modifications and can document benefits for those needing verification of effectiveness.