



## Making the Connection: Digital Skills and Access for 21st Century Learning

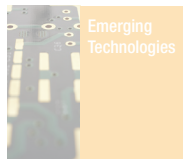
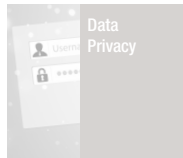
### Introduction

Literacy means the ability not only to read and write, but also to be fluent in a world of digital information. Digitally literate students have the knowledge and skills to access, evaluate, manipulate, design and develop information — and ultimately to learn from the digital environment. While educators have known for some time that students need these skills, it is only recently that state agencies have recognized their responsibility to ensure that students at all levels learn to comprehend and communicate digital information throughout their education. As a result, many states have begun the process of developing their own standards of digital literacy for students. In order to meet these standards, schools will need sufficient digital resources including high speed internet connectivity.

SREB's recent report *Unprepared and Unaware* indicates that many young adults with low skill levels will find their jobs changed significantly by technology advancements, and many will lose their jobs altogether. The report notes that “technological advancement in the workplace often creates more jobs than it eliminates,” but it cautions that these new positions generally require higher skills. One way to ensure that the workforce is well equipped for the jobs of the future is to make sure that today's learners are prepared with high levels of digital literacy from kindergarten through high school and beyond.

### Inside

What is Digital Literacy?	2
Digital Literacy Standards in SREB States	5
Connecting Students with the Bandwidth Needed to Learn in the Digital Era	6
<i>State Spotlight – Louisiana</i>	8
Recommendations	10
Resources	11



## What is Digital Literacy?

The American Library Association defines digital literacy as “the ability to use information and communication technologies to find, evaluate, create and communicate information, requiring both cognitive and technical skills.” It is contrasted with off-line, passive reading on a computer. Digital literacy includes active online reading using hyperlinks, videos, audio clips, images, interactive graphics, share buttons and interaction with comments. The process of finding digital content to meet specific needs requires skills to: query a search engine using keywords; navigate the results for usable responses; and assess sources, website bias and reliability. Digital literacy also includes the ability to create digital content, either individually or collaboratively, and to share and communicate through evolving technology tools.

SREB’s Education Technology Cooperative has identified student digital literacy as one of the top 10 technology issues currently facing educators and education policy makers. In material developed for the *10 Issues* initiative, the Educational Technology Cooperative defines student digital literacy as students having the fundamental skill sets they need from the early grades through college to be fully engaged in technology-mediated learning opportunities to develop lifelong fluencies for success in a digital world.

Students at each educational level need to navigate their learning experiences through a technological lens, both in school and out. Performing well in school requires more than media literacy and information literacy. Students in early grades should connect to the internet and local area networks and develop skills in working with various electronic and media devices, file types and data outputs. Students need the ability to troubleshoot errors and resolve problems with digital devices and electronic systems of various kinds. Digital literacy, however, does not stop with the ability to manipulate machines. Students also need to develop digital ethics and citizenship, wrapped with the responsibilities and consequences that come with leaving an electronic footprint that can be tracked and preserved indefinitely.

The International Society for Technology in Education has identified seven connected principles that describe the digital learner for the 21st century:

1. Empowered learner
2. Digital citizen
3. Knowledge constructor
4. Innovative designer
5. Computational thinker
6. Creative communicator
7. Global collaborator

ISTE indicates that an empowered learner leverages “technology to take an active role in choosing, achieving and demonstrating competency in their learning goals, informed by the learning sciences.” A digital citizen recognizes “the rights, responsibilities and opportunities of living, learning and working in an interconnected digital world, and they act and model in ways that are safe, legal and ethical.”

Each of the seven ISTE standards also comes with a set of indicators allowing users to know when the standard has been met. Both the empowered learner and digital citizen standards include indicators of what it means to be literate in a digital world.

## International Society for Technology in Education

### *Two Student Standards Related to Digital Literacy*

#### 1. Empowered Learner

- a. Students articulate and set personal learning goals, develop strategies leveraging technology to achieve them and reflect on the learning process itself to improve learning outcomes.
- b. Students build networks and customize their learning environments in ways that support the learning process.
- c. Students use technology to seek feedback that informs and improves their practice and to demonstrate their learning in a variety of ways.
- d. Students understand the fundamental concepts of technology operations, demonstrate the ability to choose, use and troubleshoot current technologies and are able to transfer their knowledge to explore emerging technologies.

#### 2. Digital Citizen

- a. Students cultivate and manage their digital identity and reputation and are aware of the permanence of their actions in the digital world.
- b. Students engage in positive, safe, legal and ethical behavior when using technology, including social interactions online or when using networked devices.
- c. Students demonstrate an understanding of and respect for the rights and obligations of using and sharing intellectual property.
- d. Students manage their personal data to maintain digital privacy and security and are aware of data-collection technology used to track their navigation online.

Other organizations, such as the International Federation of Library Associations, use different terminology to frame digital literacy concepts. The IFLA, in its 2006 Guidelines on Information Literacy for Lifelong Learning, refers to the concepts of digital literacy in two separate definitions: computer literacy and media literacy.

## International Federation of Library Associations

### *Definitions of Digital Literacy*

#### Computer Literacy

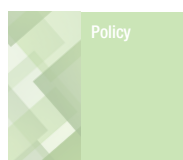
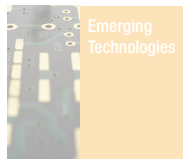
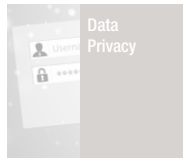
The knowledge and skills necessary to understand information and communication technologies (ICTs), including the hardware, the software, systems, networks (both local area networks and the Internet), and all of the other components of computer and telecommunications systems.

#### Media Literacy

The knowledge and skills necessary to understand all of the mediums and formats in which data, information and knowledge are created, stored, communicated, and presented, i.e., print newspapers and journals, magazines, radio, television broadcasts, cable, CD-ROM, DVD, mobile telephones, PDF text formats, and JPEG format for photos and graphics.

Common Sense Education recommends teaching digital citizenship at the elementary level by addressing online safety and how the online world connects to the real world. As students get to middle grades and high school, their digital citizenship lessons should consist of managing data privacy, recognizing ethical dilemmas and understanding their digital footprint.

Further, the Partnership for 21st Century Learning defines digital learners in its framework as those who can access and evaluate information; use and manage information; analyze media; create media



products; and apply technology effectively. The information, media and technology skills sections build upon other elements to help connect “the process of 21st century teaching and learning.”

The American Academy of Pediatrics also acknowledges the need for digital citizenship and awareness in the adolescent years. It indicates that “Many teens need to be reminded that a platform’s privacy settings do not make things actually ‘private’ and that images, thoughts, and behaviors teens share online will instantly become a part of their digital footprint indefinitely.”

Key education and technology associations have not been the only groups to define digital literacy. State legislatures have also done so. Among SREB states, legislatures have defined many technology-related terms, often using different terminology to express similar concepts. (See Table 1.)

**TABLE 1: SREB States with Definitions of Student Digital Literacy, 2019**

State	Definition of Student Digital Literacy (may include definitions within computer science, technology or media)
Alabama	Digital literacy: the ability to use information and communication technologies to find, evaluate, create, and communicate information that requires both cognitive and technical skills.
Delaware	Technological literacy: the ability to use, manage, understand, and assess technology.
Kentucky	Technology literacy: the ability of students to responsibly use appropriate technology to communicate, solve problems, and access, manage, integrate, evaluate, and create information to improve learning in all subject areas and to acquire lifelong knowledge and skills in the 21st century.
Louisiana	Digital literacy: the ability to use technology to find, evaluate, create, and communicate information. Along with a working knowledge of computer software and hardware, students will benefit from an understanding of a wide range of applications (e.g., word processing, presentations, web-based resources). With software applications becoming so mainstream, it is vital to be fluent in their use when entering the work force.
Maryland	Digital literacy: the ability to find, evaluate, use, share, and create content using information technologies and the Internet.
Mississippi	Digital literacy: the ability of students to use a range of technology and online tools in order to analyze, evaluate and communicate in an always-connected world. Just as important is the ability to understand and use this information from multiple sources and source types (i.e. online textbooks, video, web). The key to digital literacy is a student’s ability to find and evaluate information and media and use that knowledge to complete tasks.
Oklahoma	Computer Literacy: the general use of computers and programs, such as productivity software. Examples include performing an internet search and creating a digital presentation. Ed Technology: the ability to apply computer literacy to school subjects. For example, students can use a web-based application to collaboratively create, edit, and store an essay online. Digital Citizenship: the appropriate and responsible use of technology, such as choosing an appropriate password and keeping it secure. Information Technology (often overlaps with computer science): focuses on industrial application of computer science, such as installing software rather than creating it.
Texas	Technology-literate student: one who has mastered the Technology Applications of the Texas Essentials Skills (Assessment) — TEKS — for grades K-8
Virginia	Computer science: Builds upon the concepts of computer literacy, educational technology, digital citizenship, and information technology. <ul style="list-style-type: none"> <li>Computer literacy: refers to the general use of computers and programs, such as productivity software. Examples include performing an Internet search and creating a digital presentation.</li> </ul>

**TABLE 1: SREB States with Definitions of Student Digital Literacy, 2019** (continued)

<p>Virginia (continued)</p>	<ul style="list-style-type: none"> <li>• Educational technology: applies computer literacy to school subjects. For example, students in an English class can use a web-based application to collaboratively create, edit, and store an essay online.</li> <li>• Digital citizenship: refers to the appropriate and responsible use of technology, such as choosing an appropriate password and keeping it secure.</li> <li>• Information technology: often overlaps with computer science but is mainly focused on industrial applications of computer science, such as installing software rather than creating it. Information technology professionals often have a background in computer science.</li> <li>• Digital literacy: implies the progressive development of technical knowledge and skills, intellectual skills for thinking about and using information, and skills needed for working responsibly and productively both individually and within groups. Digital literacy is not an end in itself but lays the foundation for deep and continuous learning. It focuses on using technology to learn rather than learning about technology.</li> </ul>
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## Digital Literacy Standards in SREB States

In state legislation and documentation in SREB states, some digital literacy standards or reference to standards can be found under computer science or technology standards. Some states have yet to develop or are in the process of developing standards that will include digital literacy.

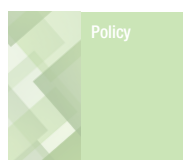
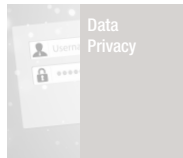
**TABLE 2: SREB Region States with Digital Literacy Standards by Grade Band**

SREB State	Elementary Standards	Middle Grades Standards	High School Standards
Alabama	X	X	X
Arkansas	X	X	
Delaware	X		
Florida			
Georgia			
Kentucky	X	X	X
Louisiana			
Maryland	G	G	G
Mississippi			
North Carolina	A	A	A
Oklahoma	X	X	X
South Carolina	X	X	X
Tennessee	X	X	
Texas	X	X	X
Virginia	X	X	X
West Virginia	X	X	X

X — State has implemented explicit digital literacy standards.

G — State has implemented general standards, not necessarily by grade level.

A — State has adopted standards that have not yet gone into effect.



As more state policymakers begin to weigh in on student digital literacy and digital citizenship in K-12 classrooms, it is just as important to consider those same efforts in the postsecondary world. A recent study from Stanford University determined that many students do not know how to assess the credibility of the information they read online. This lack of skills in judgment related to digital content among students is particularly troublesome; as these students become adults and need to make informed decisions based on materials they find on the Internet, they need these skills finely developed.

Digital literacy is not an end in itself but lays the foundation for deep and continuous learning. It focuses on using technology to learn rather than learning about technology.

Digital literacy is necessary as the U.S. and global workforce becomes more digitized and automated. Digital citizenship is simply one component of the overarching concept of digital literacy. In addition to knowing how to use digital tools, students must understand how to evaluate sources, draw conclusions and develop new levels of creativity. Students must be taught how to expand their knowledge of the tools they are currently using. Additionally, as new forms of technology and digital communication are introduced, students should be made aware of these emerging technologies as they progress through grade levels and enter postsecondary education and the workforce.

## Connecting Students with the Bandwidth Needed to Learn in the Digital Era

The US Department of Education report, *A Description of US Adults Who Are Not Digitally Literate*, indicates that a little over 40% of US adults without a high school education “are not digitally literate, compared to 17% of adults who have a high school diploma but no college degree, and 5% of adults who have a college degree.” In order to correct the disparity of equity of access and to close the digital divide, states must improve internet access particularly among older, less educated, and less affluent populations, as well as in rural parts of the country. For students to have access to the resources needed to become digitally literate, high-speed internet connectivity is a necessity. While internet connectivity is spreading rapidly across SREB region states, some areas do not yet have the required amount of bandwidth to support high-speed services or student digital learning. Digital literacy and appropriate bandwidth go hand-in-hand. Students who live and learn in areas that have access to greater connectivity have a better opportunity to become digitally literate than those in areas without it.

Expanding reliable, affordable bandwidth helps to ensure that educators and their students gain maximum benefit from current and emerging technologies. Internet connectivity, or lack thereof, is a major determining factor in how fully teachers integrate technology into learning, which affects how students can learn in increasingly digital environments.

A report by Education Super Highway indicates that states and school districts should consider three main things when determining the bandwidth and connection speeds necessary for student learning:

1. Individual classroom technology use (bandwidth of 100Kbps per student and one wireless access point per 1.5 classrooms)
2. Daily 1:1 technology use (bandwidth of 1Mbps per student and 1.2 wireless access points per classroom)
3. Video, virtual reality and other rich media use (bandwidth exceeding 1Mbps per student)



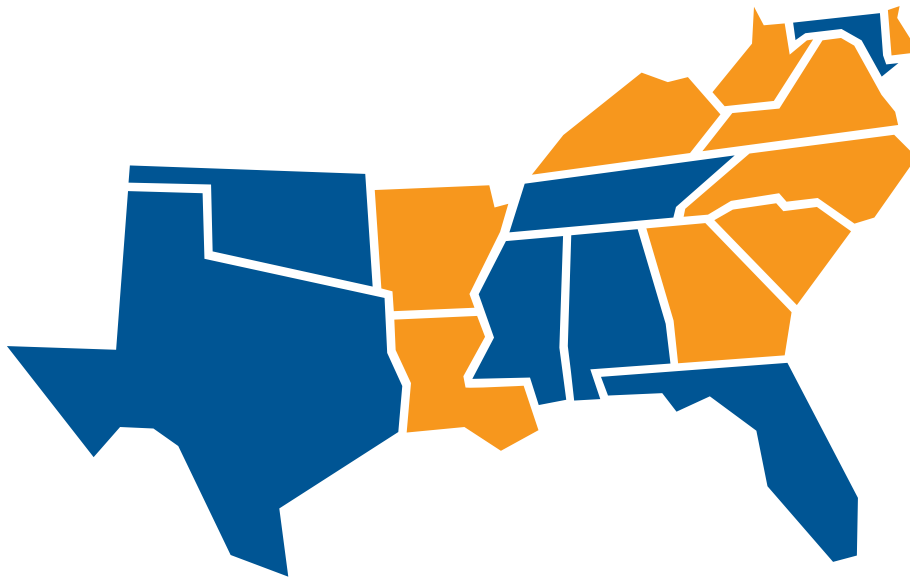
While only four million students had access to high-speed internet in 2013, nearly 45 million had high-speed access in 2018. The 2018 State of the States report by ESH indicates that schools across the nation have made great strides to get students connected. Over 96 percent of students have access to the broadband services that make digital learning possible.

According to the Consortium for School Networking’s 2018-19 Annual Infrastructure Survey Report, 69% of “respondents report they are *very confident* in their network’s ability to support one or more devices per student as compared to the prior year’s 58%.” Further, “ninety-two percent of districts are meeting the FCC short-term goal of 100 Mbps per 1,000 students for all their schools. Even more impressive, this year over a third (35%) of districts achieved the FCC long-term goal (1 Gbps per 1,000 students) for all schools – up nearly 100% from last year.”

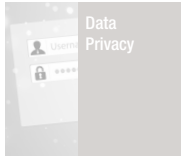
Having access and taking advantage of online and distance education will help prepare a workforce that is ready for jobs requiring more than basic skill levels. SREB’s *Unprepared and Unaware* report indicates that “the technological expansion throughout the U.S. job market means that working-age adults with lower levels of educational attainment will be increasingly likely to be unemployed.” Greater access to education through comprehensive broadband networks and improved digital literacy skills can help break this trend.

The cost of connectivity continues to be a barrier for some states and districts. While more states and districts have been able to negotiate lower costs of internet connectivity and wide area networks (WANs), nearly a quarter of respondents on the CoSN survey indicate paying more than \$5/mbps.

**FIGURE 1: States where 100% of districts have access to internet speeds of at least 100/kbps, in gold**



Source: Education Superhighway 2018 State of the States Report



## State Spotlight — Louisiana

The US Department of Education, Office of Educational Technology recommended in the *2017 National Education Technology Plan Update* that state and local education agencies develop plans to upgrade the infrastructure necessary for wired and wireless access as demands for broadband access increase.

In 2017, a task force in Louisiana was charged with figuring out how to make the state a leader in public school internet access and other aspects of education technology. In Louisiana, over 20,000 students lack the appropriate access to the bandwidth needed for digital learning. In early 2019, Louisiana released its *Statewide Educational Technology Plan* developed specifically to address “the expansion of technology rich environments.” The plan discussed how to increase access to high-speed internet for all 700,000 students.

The task force also developed a *Technology Footprint Snapshot* report for each district that details the average student-to-device ratio, the average bandwidth per student and educational and informational staff available.

### Louisiana Statewide Educational Technology Plan Goals

	2019- 2020 GOALS	2020-2021 GOALS
<b>DEVICES</b>	Student to device ratio of 2:1	Student to device ratio of 1:1
<b>INTERNET ACCESS</b>	<ul style="list-style-type: none"> <li>• Small School System</li> <li>• Medium School System</li> <li>• Large School System</li> </ul>	<ul style="list-style-type: none"> <li>• At least 1.5 Mbps per user (Min. 100 Mbps/ system)</li> <li>• At least 1.0 Gbps per 1,000 users</li> <li>• At least 0.7 Gbps per 1,000 users</li> </ul>
<b>NETWORK CONNECTIVITY</b>	At least 10 Gbps per 1,000 users	At least 4.3 Mbps per user (Min. 300 Mbps/ System) At least 3.0 Gbps per 1,000 users At least 2.0 Gbps per 1,000 users

Small School System = Fewer than 1,000 students  
Medium School System = 1,000 to 10,000 students  
Large School System = more than 10,000 students

### Louisiana District Level Technology Footprint Report (Example)



	DISTRICT	STATE
AVERAGE STUDENT TO DEVICE RATIO	1:1	1.3:1

#### PERCENT OF DEVICES BY TYPE:

TABLET	0%	4%
LAPTOP	4%	20%
CHROMEBOOK	71%	46%
DESKTOP	25%	29%



	DISTRICT	STATE
AVERAGE BANDWIDTH PER STUDENT	0.259 MBPS	0.7 MBPS



	DISTRICT	STATE
EDUCATIONAL TECHNOLOGY STAFF	12	AVERAGE 2.8 PER DISTRICT
INFORMATION TECHNOLOGY STAFF	38	AVERAGE 6.8 PER DISTRICT

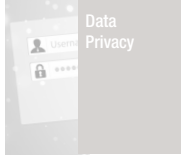


While much progress has been made toward greater broadband access in all SREB states, the efforts to reach rural districts continues. Many students in rural areas do not have internet access, except through a cell phone. Students in low-income or impoverished areas may not have devices or internet access to continue learning outside of the classroom, and getting to a public library or a business with free Wi-Fi may not be an option.

To alleviate this lack of access, several SREB states have begun to provide Wi-Fi on school buses to help students with long commutes. Some schools provide wireless hotspots that students can take home with them to provide internet access. Other options that have been introduced include providing devices with cached information for completing homework that can be automatically uploaded to school servers when the student returns to campus. States that have achieved their goals for broadband access in schools should continue to work on equity and access for students in rural areas.

**TABLE 3: Broadband and 2019 Legislative Action**

State	Included by Governor in State of the State Address	Legislative action introduced or in progress	Legislative action enacted
Alabama	X		HB-400, Broadband Services SB-90, Broadband Internet Accessibility
Arkansas	X		SB-150, Telecommunications Regulatory Reform Act
Georgia	X	HB-22, Provisions for Broadband Service HB-184, Wireless Broadband in Public Rights of Way	SB-2, Public Utility Provisions
Louisiana			SB-349, Technology Strategy Task Force (2018)
Mississippi			
North Carolina	X	HB-381, School Construction and Broadband Investment Act HB-431, Broadband Expansion SB-627, Broadband Infrastructure Grants SB-645, Broadband Expansion HB-398, Growing Rural Economies	NC-91, Broadband Taskforce SB-310, Rural Broadband Services
Texas			HB-1960, Governor’s Broadband Development Council
Virginia	X		HB-2141, Local Broadband Service Districts HB-640, Comprehensive Plan for Broadband Infrastructure
West Virginia			SB-3, Small Wireless Facilities Deployment Act



## Recommendations

States without digital literacy standards should adopt standards that incorporate computer literacy, media literacy and digital citizenship. These should go beyond outdated computer science initiatives and be officially included in all grade level pathways. With the changes expected in the U.S. and global workforce, digital literacy is critical to lifelong success as students begin navigating the world through a digital lens in adulthood.

As digital literacy standards are increasingly integrated into classroom learning and workforce environments, states and districts should continue developing standards around broadband access for educational attainment. Without the proper levels of bandwidth and connectivity, students will find it difficult to learn and educators will find it difficult to teach. In SREB region states, policymakers should continue to consider legislation that will make broadband affordable for districts and accessible for students at every stage of learning and in every region of their states.

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## Resources

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