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K–12 Technology Accessibility: The Message From State Governments

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Abstract

This study examined state education technology plans and technology accessibility statutes to attempt to answer the question—is K–12 instructional technology accessibility discussed in state-level technology accessibility statutes and education technology plans across the 50 United States? When a K–12 school district is planning the construction or acquisition of a new digital technology, are the legal requirements for making that digital environment accessible to people with disabilities part of the decision process? Just like built environments, digital environments can either be accessible or inaccessible to people with disabilities; the digital environment can either support or impede the inclusion of people with disabilities. At the federal level, statutes, regulations, and policy guidance make it clear that technology must be accessible to students with disabilities in K–12 schools. The message from the federal government is consistent. But what messages are state governments communicating, through statutes and policies, to K–12 educators about technology accessibility?

Keywords

K–12 education, state policy, educational technology, inclusive education, students with disabilities, web content accessibility guidelines, accessibility

When a K–12 school district is planning the construction of a new built environment, such as a new school building, the legal requirements for making that built environment accessible to people with disabilities are part of the design process. Ramps and wide doorways are included to make the environment accessible to people who use wheelchairs, braille signage is added to make the environment accessible to people who are blind, and fire alarms equipped with strobe lighting are installed to ensure the environment is accessible to people who are deaf. Even if the school district administrator in charge of the construction project is unaware of the Americans with Disabilities Act (ADA) requirements to make physical spaces accessible to people with disabilities, the architects and engineers will ensure that the building plans are compliant with the legal requirements—after all, if the plans are not compliant, the necessary construction permits will not be granted.

When a K–12 school district is planning the construction of a new digital learning environment, such as the adoption of a learning management system or a one-to-one computing initiative, are the legal requirements for making that digital environment accessible to people with disabilities part of the design and decision process? Just like built environments, digital environments can either be accessible or inaccessible to people with disabilities; the digital environment can either support or impede the inclusion of people with disabilities (Brown & Brown, 2006; Istenic Starcic & Bagon, 2014). And digital environments, just like built environments, are legally mandated to be accessible to people with disabilities (Brown & Brown, 2006; Krach & Jelenic, 2009; Lazar, Goldstein, & Taylor, 2015; Wentz, Jaeger, & Lazar, 2011; Wisdom et al., 2007).

The school district administrators who lead digital construction or procurement projects may not be aware of the needs of people with disabilities in digital spaces, the requirement to make digital spaces accessible to people with disabilities, or what digital spaces that are accessible to people with disabilities "look like" (Hashey & Stahl, 2014; Heaviside, Rowand, Hurst, McArthur, & National Center for Educational Statistics, 2000). Low levels of technology accessibility awareness have been reported in the fields of education and computing (Cragg, Carter, & Nikolova, 2013; Edyburn, 2008; Wisdom et al., 2007). Furthermore, there is evidence of inaccessible technology in K–12 education (Asuncion et al., 2010; Bray, Flowers, & Gibson, 2003; Bray, Flowers, Smith, & Algozzine, 2003; Fajardo-Flores, Losoya-Castrejon, &

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Velazquez-Vaca, 2007; Fichten, Asuncion, Barile, Ferraro, & Wolforth, 2009; Kamei-Hannan, 2008; Phipps & Kelly, 2013; Schaffhauser, 2013), a fact that might lead one to believe that some K–12 educators are unaware of technology accessibility.

If there are potential concerns about the levels of awareness of technology accessibility among K–12 educators, or practitioners in other fields, one might wonder what information about the topic is being passed along to practitioners. As will be discussed in the following section, at the federal level, statutes, regulations, and policy guidance make it clear that technology must be accessible to students with disabilities in K–12 schools (Brown & Brown, 2006; Krach & Jelenic, 2009; Lazar et al., 2015). But what messages are state governments communicating to K–12 educators about technology accessibility, through statutes and policies? That question prompted this research.

Literature Review

An examination of the literature provides some useful information about the message the federal government is sending about technology accessibility as well as a hint about the messages coming from state governments. This literature review will provide an examination of the message the federal government is sending to K–12 stakeholders about technology accessibility, the current status of technology accessibility in K–12, and state-level policies that could communicate a message about technology accessibility to K–12 stakeholders. Before jumping into the details, a brief definition of technology accessibility is offered.

Defining Technology Accessibility

At the most basic level, accessible built environments are usable by people with disabilities and the same can be said of accessible digital spaces. People with disabilities can use accessible technology, and inaccessible technology erects barriers for people with disabilities (Ellcessor, 2015; Lazar et al., 2015). At a deeper level, accessible technology affords people with disabilities access to the same functionality with substantially equivalent ease of use at the same time and in the same place as nondisabled people (Lazar et al., 2015). What characteristics make a digital space accessible to people with disabilities? What is the digital equivalent of a ramp or a wide doorway?

The web content accessibility guidelines (WCAG), which are arguably the most widely accepted and used consensus standard for accessible web content (Caldwell, Cooper, Reid, & Vanderheiden, 2008; Lazar et al., 2015; Pascual, Ribera, Granollers, & Coiduras, 2014), characterize accessible technology as meeting four overarching goals—accessible technology is perceivable, operable, understandable, and robust (Lazar et al., 2015; World Wide Web Consortium [W3C], 2016). Technology that is perceivable does not rely solely on a single mode of sensory output; pictures are described in words via "alternative text" and videos are captioned (Lazar et al., 2015; W3C, 2016). Technology that is operable does not rely solely on a single method of input; the technology allows navigation and input via alternative methods such as a keyboard or switch (Lazar et al., 2015; W3C, 2016). Technology that is understandable is easy to use; the interface is no more complex than it needs to be, and the interface is consistent and predictable (W3C, 2016). Finally, a technology that is robust is compatible (or interoperable) with current and future technologies if they are mainstream technologies or assistive technologies, specifically designed for people with disabilities (W3C, 2016). The WCAG model asserts that web interfaces that are perceivable, operable, understandable, and robust provide people with disabilities substantially equivalent ease of use at the same time and in the same place as nondisabled people (Lazar et al., 2015), and therefore, the technology is accessible to people with disabilities.

There are other models for defining technology accessibility (e.g., Adam & Kreps, 2006; Cooper, Sloan, Kelly, & Lewthwaite, 2012; Ellcessor, 2015; Lewthwaite & Swan, 2013; Jaeger, 2012), but, for the purpose of this research, the authors focused on the "physical accessibility" model offered by the WCAG because the relevant federal and state statutes and regulations are grounded in the physical accessibility model (Lazar et al., 2015). The following section will discuss the federal statutes as well as other messages about technology accessibility from the federal government.

The Message From the Federal Government

An examination of the message the federal government is sending to K–12 stakeholders about technology accessibility through federal statutes, regulations, and policy reveals a consistent message—K–12 schools are required to adopt technology accessibility. The message, however, can be difficult to locate if one does not know where to look. Three laws—the ADA, the Rehabilitation Act of 1973, and the Individuals with Disabilities Education Improvement Act (IDEA)—pertain to the use of accessible technology in K–12 education (Brown & Brown, 2006; Krach & Jelenic, 2009; Lazar et al., 2015; Wentz et al., 2011; Wisdom et al., 2007). Furthermore, the National Education Technology Plan (NETP), a policy document created and disseminated by the U.S. Department of Education (1996), has discussed technology accessibility in K–12 since 1996.

The ADA requires that people with disabilities have equal access to the programs, services, and activities offered by state and local governments (Title II) as well as by places of public accommodation (Title III; Lazar et al., 2015). As most are aware, public K–12 schools are, thus, covered under Title II of the ADA, as they are a subdivision of state and local governments. Private K–12 schools are, likewise, covered under Title III of the ADA.

The Rehabilitation Act of 1973 contains two sections that are pertinent to this discussion, Sections 504 and 508. Section 504 prohibits the federal government (and those who receive federal funding) from denying people with disabilities from participating in or benefiting from any activity or program or

discriminating against them based solely on their disability (Lazar et al., 2015). Section 508 pertains to the development, maintenance, procurement, and use of information technologies by the federal government. Section 508 requires that technology in the federal government is accessible to people with disabilities. The Section 508 regulations, which were updated in early 2017, provide specific guidance, including a technical standard, WCAG 2.0, for compliance with the statute (Lazar et al., 2015).

The Rehabilitation Act of 1973 and, subsequently, Section 504 are applicable to K–12 schools (public and private) that receive federal funding. The Section 508 technical standard is often the benchmark that is used to determine compliance with Section 504 when the activity or program in question involves technology. Therefore, to comply with the Rehabilitation Act of 1973, K–12 schools must ensure that the technologies that they develop, maintain, procure, or utilize are accessible to people with disabilities (Lazar et al., 2015), and schools would benefit from using the updated Section 508 regulations as a reliable and widely accepted benchmark for determining accessibility.

The impact of the IDEA on accessible technology in K–12 is unclear in the literature. Krach and Jelenic (2009), in discussing the IDEA, explained, "Section 650(l)(12), states that students with disabilities and/or their parents must be able to use any technology that is available to all other children" (p. 31). However, Brown and Brown (2006) commented, "IDEA does not mention accessible [technology], and there is no legal mandate that special education students have access to accessible [technology] per se" (p. 257). And Lazar, Goldstein, and Taylor (2015) disclosed, "the procedural structure of [IDEA] prevents it from being a tool with which to require that educational technology be accessible to all students" (p. 90). Although the IDEA mentions technology and people with disabilities' ability to use technology, it does not say the technology has to be accessible and the law does not provide any mechanism for enforcing technology accessibility in K–12. Therefore, K–12 stakeholders need to look at the two aforementioned laws, the ADA and the Rehabilitation Act of 1973, to understand their legal obligations pertaining to technology accessibility.

In addition to laws, policy from the executive branch of the federal government sends a message about technology accessibility in K–12 education. Prompted by complaints from disability rights advocates about the inaccessible technology being used in education (a topic that will be expanded upon in a subsequent section), the U.S. Department of Education and the U.S. Department of Justice issued a joint Dear Colleague Letter in 2010 (United States), a form of "significant policy guidance" (U.S. Department of Education 2011, p. 1), pointing out that the use of inaccessible technologies in education is illegal. Additional questions and concerns from education stakeholders and disability rights advocates motivated the Department of Education to issue additional guidance in the form of an official frequently asked questions document (U.S. Department of Education, 2011). The Dear Colleague Letter and the frequently asked questions document clearly articulated that (1) technologies used in any educational institution (e.g., K–12 and higher education) in the United States must be accessible to students with disabilities, (2) schools that do not educate students who are blind or otherwise disabled must still ensure that their technology is accessible, and (3) that technology accessibility mandates apply to all technologies used by schools (U.S. Department of Education, 2010, 2011).

Beyond the Dear Colleague letter and the frequently asked questions document, the Department of Education issues more general policy pertaining to the use of technology in education. The NETP is the department's primary piece of policy on the topic. The Department of Education first released an NETP in 1996 with the goal of developing and disseminating a strategy for maximizing the affordances of technology in the classroom (Wyzard, 2011). Subsequent plans have been released in 2000, 2004, 2010, and 2016 (U.S. Department of Education, 2016a; Wyzard, 2011). With the exception of the 2004 plan, all of the NETPs have mentioned, at least briefly, technology accessibility and the needs of technology users with disabilities. For example, the 1996 plan addressed the fact that graphical user interfaces on the web were, at the time, inaccessible to people who are blind (U.S. Department of Education, 1996). The 2010 NETP, in one section, articulated the Department of Education's commitment to accessibility and the requirements of Section 508, the reality that not all instructional technology is accessible to students with disabilities, and the department's wish to influence the broader education community in adopting technology accessibility (U.S. Department of Education, 2010). More than any of the previous plans, the 2016 NETP shines a light on the need for accessible technology. One of the recommendations in the plan states, "Education stakeholders should develop a born accessible standard of learning resource design to help educators select and evaluate learning resources for accessibility and equity of learning experience" (U.S. Department of Education, 2016a, p. 22). The plan goes on to define the term "born accessible" as the incorporation of accessibility into the entire design cycle, thereby creating technology that is accessible to people with disabilities "out of the box" (U.S. Department of Education, 2016a). As the NETPs have developed, technology accessibility has become a more noticeable piece of the message. Although present in the NETP, the message about technology accessibility is, at times, obscured by or conflated with other more prominent messages about students with disabilities such as recommendations to incorporate Universal Design for Learning into school culture and instructional design practices (National Federation of the Blind, 2010).

Advocates for technology accessibility wish that the federal statutes, regulations, and policies were more explicit (Burke, Clapper, & Mcrave, 2016), but the mandates do require the use of accessible technology in K–12 schools, and the policy does send a message that the executive branch of the federal government expects technology accessibility to happen (Lazar et al., 2015; U.S. Department of Education,

2010, 2011). Because the mandates and the message are somewhat buried, district administrators may be unaware of the requirement and may unintentionally leave their school district in a vulnerable position by not ensuring that the technology used in their schools is accessible to people with disabilities (First & Hart, 2002).

Lawsuits filed under the Rehabilitation Act of 1973 and the ADA, such as the *Nightingale v. Seattle School District* (2014), are an example of one such vulnerability. In *Nightingale*, a mother who is blind and the National Federation of the Blind sued the school district for disability-based discrimination, citing the inaccessibility of the district's website and math software. The lawsuit resulted in a consent decree requiring the district to follow detailed time lines and steps to meet the identified accessibility standards and to ensure that people with disabilities had equal access to the district's technology programs and services.

The Status of Technology Accessibility in K–12

The message from the federal government about technology accessibility is over a decade and a half old and has been communicated in statutes, regulations, and policy. Unfortunately, however, technology accessibility, as an innovation, has not yet fully diffused in K–12, as evidenced by (1) the plethora of inaccessible technologies present in K–12 classrooms (Asuncion et al., 2010; Bray et al., 2003; Fajardo-Flores et al., 2007; Fichten et al., 2009; Kamei-Hannan, 2008; Phipps & Kelly, 2013; Schaffhauser, 2013) and (2) the grave concerns expressed by disability rights organizations about inaccessible instructional technologies used in K–12 classrooms (National Federation of the Blind, 2015; *Nightingale v. Seattle School District*, 2014; Riccobono et al., 2015; Riccobono & Rosenblum, 2016).

Discussions of inaccessible instructional technologies in the literature have focused on Internet-based technologies, which are common in both e-learning and traditional face-to-face learning environments. Examples of inaccessible technologies that can be found in K–12 classrooms and are likely to pose barriers for students with disabilities include learning/content management systems (Fajardo-Flores et al., 2007), school websites (Bray, Flowers, & Gibson, 2003; Bray, Flowers, Smith, & Algozzine, 2003; Krach & Jelenic, 2009; Opitz, Savenye, & Rowland, 2003), computer-adapted testing (Kamei-Hannan, 2008), and other e-learning resources (Asuncion et al., 2010; Fichten et al., 2009; Phipps & Kelly, 2013). Studies examining the accessibility of K–12 websites found that 74.3% of 120 school district websites contained accessibility barriers (Bray, Flowers, & Gibson, 2003) and 57.4% of 244 elementary school websites contained accessibility barriers (Bray, Flowers, Smith, et al., 2003). Samuels (2016) reported that extensive accessibility assessments conducted between 2014 and 2016 discovered that 500 K–12 websites—including state departments of education, public schools, charter schools, virtual schools, and schools for the deaf and blind—contained accessibility barriers.

The large-scale assessment of K–12 website accessibility, which Samuels (2016) discussed, resulted in hundreds of complaints filed with the U.S. Department of Education's office of civil rights, which were submitted by one disability rights advocate from Michigan. The advocate from Michigan has not been alone in her concerns about inaccessible technology in K–12 education. Disability rights advocates from across the country have expressed concerns about many inaccessible technologies found in K–12 education including e-books (National Federation of the Blind, 2015; Riccobono & Rosenblum, 2016), Common Core State Standard assessments (Riccobono et al., 2015), math software (*Nightingale v. Seattle School District,* 2014), Google applications for education (Riccobono & Rosenblum, 2016), and Google Chromebooks (Riccobono & Rosenblum, 2016).

If technology accessibility, as an innovation, was fully diffused, inaccessible technologies would not exist in U.S. education and disability rights advocates would not have a reason to file complaints with the federal government. Evidence from academia, disability rights advocates, and the federal government suggests that the diffusion of technology accessibility in K–12 has been slow. This sluggishness leaves one to wonder whether K–12 educators are receiving and understanding the messages that the federal government has been sending for many years about technology accessibility. Perhaps those messages from the federal government are not making it to K–12 educators? The path from the federal government to the individual district-level educator is long and often circuitous.

In the United States, the federal government does not have autonomy over public education. On the contrary, education is often viewed, in this country, as a matter of local concern with some advocating that states should have autonomy over regulating public education (Elmore, 1983). To the dismay of some and to the delight of others, the system of governance that our founding fathers built for us creates a tension between federal and state governments, particularly around the matter of public education (Elmore, 1983). The federal government often leverages federal funding to make its voice heard in public education, as is the case with issues pertaining to students with disabilities such as technology accessibility (Elmore, 1983; Lazar et al., 2015). But states have more control over regulating public education than the federal government. So one begins to wonder, what, if any, messages are state governments sending about technology accessibility, particularly in education? Perhaps messages from state governments are more likely to reach district-level educators and thus influence the adoption of technology accessibility in K–12 education.

State-Level Policies Pertaining to Technology Accessibility

State governments have a variety of mechanisms for communicating messages to various stakeholders including statutes, regulations, and policy. Following the lead of the federal government, some states have enacted technology accessibility statutes (Brown & Brown, 2006; Hill, 2012; Lazar et al., 2015) and developed state education technology plans (Wilhelm, 2014). States could communicate messages about technology

accessibility to educators through both state technology accessibility statutes and state education technology plans.

According to the literature, 18 states have enacted state technology accessibility statutes (Lazar et al., 2015). Furthermore, many of the states that do not have a technology accessibility statute have a policy that requires accessible technology (Brown & Brown, 2006; Lazar et al., 2015). Similar to federal statutes, state technology accessibility statutes rarely explicitly mention K–12 education (Brown & Brown, 2006); therefore, deduction is required on the part of the reader to understand that the state statute also applies to K–12. In Kentucky, however, the state technology accessibility statute does explicitly require the use of accessible technology in K–12 schools (Lazar et al., 2015; Noble, 2005). It is unclear from the literature whether any other state technology accessibility statutes address K–12 as explicitly as Kentucky.

State education technology plans generally endeavor to provide guidance for the integration of technology in K–12 education throughout the state (Wilhelm, 2014). Some states, like Virginia, have had education technology plans in place continuously since the 1980s (Wilhelm, 2014). For many years, federal programs, such as Enhancing Education through Technology, served as an incentive for states to develop and maintain education technology plans (Wilhelm, 2014). State education technology plans have a variety of stated goals and visions. The plans cover topics such as using technology to boost student learning, supporting teachers' integration of technology in the classroom, equal access to technology, distance learning, and data-driven decision-making (Maryland State Department of Education, 2007; Virginia Department of Education, 2010).

A Gap in the Literature

The literature appears to focus more on the message that the federal government is sending about technology accessibility and less so on the message that state governments are sending. Some information is available in the literature about state technology accessibility statutes, but the literature that the authors found seemed to focus primarily on how many states had such statutes, only providing detailed information about a few exemplar state statutes. A similar pattern seems to emerge from the literature about education technology plans. Scholars have offered analysis and description of the various NETPs (Kenefick & Werner, 2012; Roumell & Salajan, 2016), but the information about the state-level plans is sparser. More in-depth information about the messages that state governments are dispatching about technology accessibility in K–12 is needed. The authors endeavored to provide some of the needed information by investigating the messages about technology accessibility in K–12 that are disseminated by state governments through state technology accessibility statutes and education technology plans.

Research Questions

This research focused on state-level guidance pertaining to technology accessibility in K–12. Specifically, this research examined the contents of state technology accessibility statutes and state education technology plans. The overarching research question, which guided this project, was—is K–12 instructional technology accessibility discussed in state-level technology accessibility statutes and education technology plans across the 50 United States? The research is further guided by the following sub questions:

1. How many states have a technology accessibility statute, an education technology plan, or both?
2. How many state technology accessibility statutes explicitly mention K–12 education?
3. How many state education technology plans explicitly mention technology accessibility, Section 508 of the Rehabilitation Act of 1973, or disability?
4. Is there an association between the existence of a state technology accessibility statute and the mention of accessibility in the state education technology plan?
5. Is there an association between the mention of K–12 in the state technology accessibility statute and the mention of technology accessibility in the education technology plan?
6. Is there an association between the year the education technology plan was published and the mention of technology accessibility in the plan?
7. Is there an association between the mention of disability and the mention of technology accessibility in the education technology plan?

Method

This study followed a content analysis approach. Content analysis is "a research technique for making replicable and valid inferences from texts (or other meaningful matter) to the contexts of their use" (Krippendorff, 2004, p. 18). Quantitative content analysis, a methodology that is well suited for the analysis of text, was appropriate for this study because the population that this study endeavored to investigate was a corpus of text documents (i.e., state statutes and policies) and the research questions focused on quantity and association (Krippendorff, 2004; Punch & Oancea, 2014).

This study utilized the variety of content analysis promoted by Krippendorff (2004), which assumes that content is brought to the text by the research and is impacted by the context within which the researcher has chosen to examine the text. Since the research questions dictated a quantitative approach, this content analysis made use of an a priori coding scheme, which the researcher brought to the data (Neuendorf, 2002). Therefore, the coding process was deductive in nature (Krippendorff, 2004; Punch & Oancea, 2014).

Context, Analytical Constructs, and Operationalization

Krippendorff (2004) insists that content analysis occurs within a researcher-defined context, as the context facilitates the researcher's understanding of the text and analysis of the data.

Since the context is such a critical aspect of content analysis, Krippendorff implores researchers to make the context of their content analysis explicit.

This content analysis was conducted within a national context comprised of three current realities in the worlds of both policy and education. First, at the federal level, stakeholders eagerly awaited the overdue update to the Section 508 regulations for years; the final rule of the updated Section 508 regulations was published in January 2017, as work on this article was concluding (U.S. Access Board, 2017). Second, the U.S. Department of Education's (2016a) NETP places more emphasis on technology accessibility than previous plans noting, "[l]earning experiences enabled by technology should be accessible for all learners, including those with special needs" (p. 18). Finally, for many years, the field of education has seen the increased use of instructional technology in K–12 classrooms to the point where technology is commonplace in schools today (Bowser & Zabala, 2012; Brown & Brown, 2006). For example, the 2016 K–12 Horizon report predicted a growth in the adoption of online learning, robotics, and virtual reality technologies in the next 1–5 years (Adams Becker, Freeman, Giesinger Hall, Cummins, & Yuhnke, 2016). With a focus on technology and accessibility within the spheres of both education and policy, the authors were interested in the extent to which the issue of K–12 instructional technology accessibility was being discussed at the state level in statutes and policies.

In addition to articulating the context in which the content analysis took place, Krippendorff (2004) highlights that scholars need to develop an analytical construct, which is a cognitive tool for understanding the population, the population's interaction with the researcher-defined context, and for making inferences about the sample and the population.

The analytical construct that the authors used for this study is comprised of several nesting boxes (see the figure in Appendix A). The largest box represents the national context, the medium box represents the state, and the two smaller boxes represent each of the policy documents, which comprised the sample for this study. The national context box highlights the three realities that are currently visible in the worlds of both education and policy, which were discussed above. The realities include the update to the Section 508 regulations, the 2016 NETP, and the increased use of instructional technology in K–12. The federal Section 508 regulations are shown to have a strong influence on the state technology accessibility statutes and a potential influence on the state education technology plans. The NETP and the increased use of instructional technology in K–12 are shown to have influence on the state education technology plan but not the state technology accessibility statute.

The medium box represents the state and contains the two small boxes, which represent the state technology accessibility statute and the state education technology plan, respectively. A two-way arrow is drawn between the two small boxes indicating a possible association. Question marks under each of the boxes indicate the uncertainty that these documents exist in every state. The state technology accessibility box features the main aspect of the document in which this study is interested—does the statute explicitly mention K–12. The state education technology box, likewise, features the main aspect of the document in which the study is interested—does the plan explicitly mention technology accessibility?

To further aid the authors in (1) understanding the text of the sample and (2) making inferences, definitions of the four critical concepts of this inquiry—technology accessibility, state technology accessibility statute, K–12 education, and state education technology plan—were operationalized. The authors defined technology accessibility as meeting a technical or performance standard, which results in mainstream digital technology that provides everyone (with or without a disability) substantially equivalent ease of use at the same time and in the same place (Lazar et al., 2015). Technology accessibility, for the purpose of this study, is not (1) an assistive technology, a specialized device specifically designed for people with disabilities, nor (2) the transformation of inaccessible analog materials (e.g., print books) into alternative formats (e.g., Braille, large print, accessible electronic formats) for people with print disabilities. A technology accessibility statute was defined as a statute promulgated by a state legislature requiring the state government (and potentially other entities) to ensure that the technologies it procures and develops are accessible to people with disabilities. A technology accessibility statute, according to this definition, is not (1) a statute pertaining to nondigital technologies nor (2) a statute pertaining to assistive technology. Moving to the education sphere, the authors defined K–12 education as public schools serving students between the ages of 3 and 22 that receive some form of federal funding. Finally, education technology plans were defined as statewide plans developed by the state department of education pertaining to the procurement, adoption, and use of technology in K–12 schools for the purpose of instruction, learning, professional development, assessment, or communication.

Sampling

The population of interest in this study is state statutes and policies pertaining to K–12 instructional technology and technology accessibility. To be considered part of the population for this study, documents had to meet four criteria. The document must (1) have emerged from 1 of the 50 U.S. states; (2) discuss either the requirement that state governments procure, develop, and maintain accessible technology (as operationalized above) or the implementation of instructional technology in K–12 schools; (3) either be a state statute or a strategic plan, developed by the state department of education, pertaining to the integration of instructional technology in K–12 education; and (4) be a type of document that is common across states (i.e., existing in at least 1/3 of the 50 states). The two types of documents that meet the four criteria are state-level technology accessibility statutes and state education technology plans. This study endeavored to take a census of the entire

population; that is to say, the study examined all of the state technology accessibility statutes and state education technology plans that could be found. Documents were collected using the primary source retrieval protocol, which is outlined in Appendix B. The authors attempted to collect primary sources from all 50 states; however, not all states had a technology accessibility statute and not all states had an education technology plan.

Data Collection and Analysis

In quantitative content analysis, before collecting any data, the researcher must have first determined how the data were going to be unitized (i.e., what chunks of data were going to be examined). According to Krippendorff (2004), researchers must have identified three different types of units, which were then used throughout the study. The three units are sampling units, coding units, and context units.

The sampling unit is the unit that the researchers have decided shall be included in the study (Krippendorff, 2004). As outlined in the Sampling subsection, this study examined state technology accessibility statutes and state education technology plans. Consequently, the sampling unit for this study was the primary source document in its entirety; the sampling unit did not include resources referenced by the primary source document.

Coding units typically reside within the bounds of the sampling unit. Coding units demarcate the chunk of the sampling unit that will be coded or categorized (Krippendorff, 2004). For the purpose of this study, the coding unit was defined as a phrase. The authors developed a coding scheme a priori and then used the scheme to categorize relevant phrases throughout each document in the sample, and the coding scheme can be found in Appendix C. Finally, a context unit is the chunk of text that contains the coding unit in addition to any syntactical information that is necessary to interpret the meaning of the coding unit (Krippendorff, 2004). The context unit allows the researcher to incorporate the context, which Krippendorff (2004) insists is critical, into the coding process. The context unit that was utilized in this study was the paragraph within which the coding unit was found.

Once the data were collected, they were analyzed using one of two techniques, depending on the question. Data analysis for straightforward descriptive questions, such as how many states have technology accessibility statutes, was purely an exercise in counting. Questions of association, however, were answered using Fisher's exact test, a method for analyzing contingency tables when the sample size is small (Field, 2014).

Results

Of the 50 states examined, 38% ($n = 19$) were found to have technology accessibility statutes. Of the 19 technology accessibility statutes that were found, 47% ($n = 9$) mentioned education in general and 10.5% ($n = 2$; Kentucky & Arkansas) of statutes explicitly mentioned K–12. Of the 50 states examined, 54% ($n = 27$) were found to have education technology plans. Of the 27 education technology plans that were found, 56% ($n = 15$) mention students with disabilities, 37% ($n = 10$) explicitly mention technology accessibility, and 15% ($n = 4$) mention Section 508 of the Rehabilitation Act of 1973. Of the 50 states examined, 18% ($n = 9$) were found to have both a technology accessibility statute and an education technology plan. In the 9 states that have both a technology accessibility statute and an education technology plan, none of the states' education technology plans referenced their technology accessibility statute. Appendix D offers a tabular breakdown by state of some of the descriptive data, and Appendix E offers a graphical presentation of the states that had a technology accessibility statute, an education technology plan, or both.

The analysis of several contingency tables produced p values that were not significant; therefore, the null hypotheses (there is no association) could not be rejected. First, no association was found between the existence of a state technology accessibility statute and the mention of accessibility in the state education technology plan (Research Question 4). Second, no association was found between the mention of K–12 in the state technology accessibility statute and the mention of technology accessibility in the education technology plan (Research Question 5). Third, no association was found between the year the education technology plan was published and the mention of technology accessibility in the plan (Research Question 6). Finally, no association was found between the mention of disability and the mention of technology accessibility in the education technology plan (Research Question 7).

Analysis of two contingency tables revealed significant p values, and therefore the null hypothesis was rejected. An analysis of the association between the U.S. Department of Education (2016b) region in which a state resides and the mention of technology accessibility in the state's education technology plan was found to be significant ($p = .039$, Fisher's exact test) with a strong association ($V = .76$). The significant Fisher's exact test result appears to be located in Department of Education Region 6, which had adjusted standardized residuals exceeding 1.96. No other cells in the contingency table produced residuals of that magnitude. Additionally, an analysis of the association between the mention of Section 508 and the general mention of technology accessibility in state education technology plans was found to be significant ($p = .012$, Fisher's exact test) with a moderate association ($V = .54$). Not surprisingly, 100% ($n = 4$) of the education technology plans that mention Section 508 also discuss technology accessibility more generally. However, only 60% ($n = 6$) of the state education technology plans that mention technology accessibility reference Section 508.

Discussion

The finding of 19 state technology accessibility statutes extended what had been published in the literature previously;

Lazar, Goldstein, and Taylor (2015) cited 18 technology accessibility statutes. A comparison between the two data sets reveals three differences. First, Connecticut was included in Lazar and colleagues' list but was excluded from this study because the statute dealt strictly with the accessibility of health records. Second, the Illinois statute was not included in Lazar and colleagues' list, and, finally, the Texas statute did not appear in the previously published list.

It is worth noting that though the majority of states do not have technology accessibility statutes, many states have policies or other forms of guidance pertaining to technology accessibility. Tennessee, for example, has a house joint resolution, which was signed by the governor in February 2016, pertaining to technology accessibility (Tenn. H. J. Res. 57, 109th Cong.). These forms of policy did not meet the criteria for inclusion in the sample of this study, but they could be considered part of the state government's message about technology accessibility.

It was not surprising to find that only 2 of the 19 technology accessibility statutes specifically mentioned K–12; Brown and Brown (2006) asserted that state technology accessibility statutes rarely mention K–12 education. The literature pointed to the Kentucky statute as one instance where K–12 is mentioned (Lazar et al., 2015; Noble, 2005), a fact that the findings from this study confirm. The Kentucky statute states, "State-assisted organization' means a college, university, . . . school system, or other entity supported in whole or in part by state funds" (Ky. Rev. Stat. Ann. § 61.980 (10) et seq). This definition of state-assisted organizations articulates that the statute applies to K–12 schools in Kentucky, as well as other governmental entities. This study's finding that the Arkansas statute explicitly mentions K–12 was unanticipated; the authors had not found any indication in the literature that any state technology accessibility statute other than Kentucky discussed K–12 explicitly.

The discovery of 27 state education technology plans in this study falls within the range of existing information. Wilhelm (2014) cited 19 states as having education technology plans and the State Educational Technology Directors Association (2012) cited 33 states. The difference in findings between the three data sets is likely due to the policy cycle at the state level and some shift in practice. As Wilhelm (2014) articulated, some states reported that they no longer develop and maintain an education technology plan because they do not find it useful. Furthermore, some states let their existing policies lapse before subsequent policies are published, thus leaving a couple year gap between policies. If data happened to be collected during a handful of states' gap years, the results would be different from data collected during nongap years.

The content of state education technology plans has not been widely discussed in the literature, and the authors were unable to find any discussion in the literature pertaining to technology accessibility in education technology plans. Therefore, the finding that 10 state education technology plans explicitly address technology accessibility is a useful addition to the knowledgebase. Delaware's education technology plan, for example, in describing plans to negotiate a state technology contract, emphasizes the importance of technology accessibility, urging that "provisions for full accessibility for the benefit of all students and educators with disabilities" (Task Force on State Education Technology, 2016, p. 33) be included in the contract. The contract language strategy, which was included in the Delaware education technology plan, aligns with recommendations that have been made in the literature (Lazar et al., 2015).

The authors were surprised to find no association between the mention of disability and technology accessibility in the state education technology plans. This finding may be due, in part, to the fact that some education technology plans discuss student diversity in very broad terms, thus making it impossible to know what groups of students the plan is referencing, a conjecture that is supported by the literature. Scholars have argued that the common practice of referring to various minority groups using a single term (e.g., "diverse" or "diversity") strips away the identity and interests of the individual groups, particularly those with disabilities (Ball, Monaco, Schmeling, Schartz, & Blanck, 2005; Davis, 2011; Olkin, 2002; Swartz, 2009). Furthermore, the lack of clarity that results from this practice can pose challenges in research (Harrison & Klein, 2007). In addition to the lack of clarity related to student diversity in some of the education technology plans, the size of the sample may have impacted this finding, given that only 10 education technology plans explicitly mentioned technology accessibility.

The discovery of an association between the mention of Section 508 of the Rehabilitation Act of 1973 and the mention of technology accessibility in the education technology plan was far from surprising. However, it was interesting to find that most of the education technology plans that mentioned technology accessibility did not reference Section 508. Although the authors noticed, during data collection, that other statutes and regulations were mentioned in some education technology plans, data were not systematically collected pertaining to statutes and regulations beyond those associated with Section 508 of the Rehabilitation Act of 1973. Consequently, it is impossible to know whether the treatment of Section 508 is similar or different from the treatment of other relevant statutes and regulations in the contents of education technology plans. It could be that education technology plans tend not to reference statutes or regulations of any nature or it could be that the lack of reference to federal technology accessibility statutes and regulations in some education technology plans is an oversight. One cannot know from the findings of this study.

It was intriguing to discover an association between the region of the United States (as defined by the U.S. Department of Education) in which a state resides and the discussion of technology accessibility in the education technology plans. Department of Education Region 6 (i.e., Arkansas, Louisiana, New Mexico, Oklahoma, Texas) appeared to be the location of the significant association. Of the three states in Region 6 that had education technology plans, all of them explicitly

mentioned technology accessibility. It is unclear from this study what caused the association in Region 6. One could conjecture that perhaps some training or other learning opportunity was available to educational leaders in Region 6, and therefore technology accessibility made it into their state education technology plans. One could also conjecture that one state's education technology plan, which mentioned technology accessibility, served as a model for the other states in the region. Future research is needed to better understand the relationship between these two variables.

Limitations

The key limitations of this study relate to the sample. The research question that drove this study—is K–12 instructional technology accessibility discussed in state-level technology accessibility statutes and education technology plans across the 50 states—necessitated an examination of two types of state policy documents, technology accessibility statutes and education technology plans. However, as mentioned above, some states have technology accessibility policies in a format other than a statute, and states could have communicated messages about K–12 technology accessibility in those policy documents or through other available communication channels. Therefore, it is possible that some states' messages about K–12 technology accessibility were not captured by this study. Future research that takes a broader look at the policy documents and communication channels through which state governments may be communicating messages about K–12 technology accessibility would bolster the findings of this study. For example, future research could examine additional policy documents such as state regulations, resolutions from state legislatures (e.g., Tenn. H. J. Res. 57, 109th Cong.), and other forms of policy guidance from the state department of education. Furthermore, it is possible that the protocol used to identify primary source policy documents did not uncover all of the existing and relevant state policy documents. Future research that incorporates rigorous legal research methodologies may uncover additional state technology accessibility statutes.

Recommendations

Several recommendations can be gleaned from the results of this study as well as the information available in the literature for both district- and state-level educators. To facilitate the continued inclusion of students with disabilities in K–12 education, it is important that educators at all levels familiarize themselves with the construct of technology accessibility. Resources available from Web Accessibility In Mind (webaim.org) as well as the recently published *Digital Accessibility Toolkit* (cosn.org/accessibility) from the Consortium of School Networking and the Center on Technology and Disability are great places to start.

In addition to learning about technology accessibility, district-level educators could take three additional actions. First, it is essential for district-level educators to familiarize themselves with the legal requirements pertaining to technology accessibility, to ensure that their districts are meeting their obligations under the law and are not vulnerable to lawsuits alleging disability discrimination. Second, a crucial step that school districts can take to increase the accessibility of their instructional technology is to incorporate technology accessibility concerns into procurement and development processes (see Lazar et al., 2015, for a detailed discussion of the topic). Finally, it would be of tremendous benefit to the field for districts that have already incorporated technology accessibility into their school culture and organizational processes to share their experiences with the broader field, so that others may learn from them.

Educators who work at state departments of education or other entities that serve an entire state could support district educators and students with disabilities by amplifying the message about technology accessibility that the federal government has been sending for over a decade. Two steps that state-level educators could take to amplify the message are to (1) ensure that discussions of technology accessibility are included in the state education technology plan or other strategic plans related to instructional technology integration and (2) develop or curate resources and professional learning opportunities about technology accessibility for educators across the state.

Conclusion

The message about technology accessibility in K–12 from the federal government is consistent, but the message is not always as conspicuous as disability advocates would like it to be. Furthermore, this study indicates that the messages communicated by state governments about technology accessibility in K–12 are varied. In some states, such as Kentucky and Arkansas, the message is clear and relatively visible. In many other states, this study was unable to find a message about K–12 technology accessibility within the documents that were examined.

Technology accessibility will remain a critical component of inclusive education, as the integration of technology in K–12 classrooms continues to increase over the next decade and students with disabilities continue to be included in general education courses. The more plentiful and prominent that messages about the importance of technology accessibility are, the more likely it is that K–12 educators will hear and understand the message. Increasing educators' awareness about technology accessibility is an important step toward increasing the adoption of technology accessibility in K–12 and decreasing the barriers faced by students with disabilities. Federal and state officials can help raise awareness by elevating messages about the importance of technology accessibility through their many communication channels including statutes and policy documents.

Appendix A

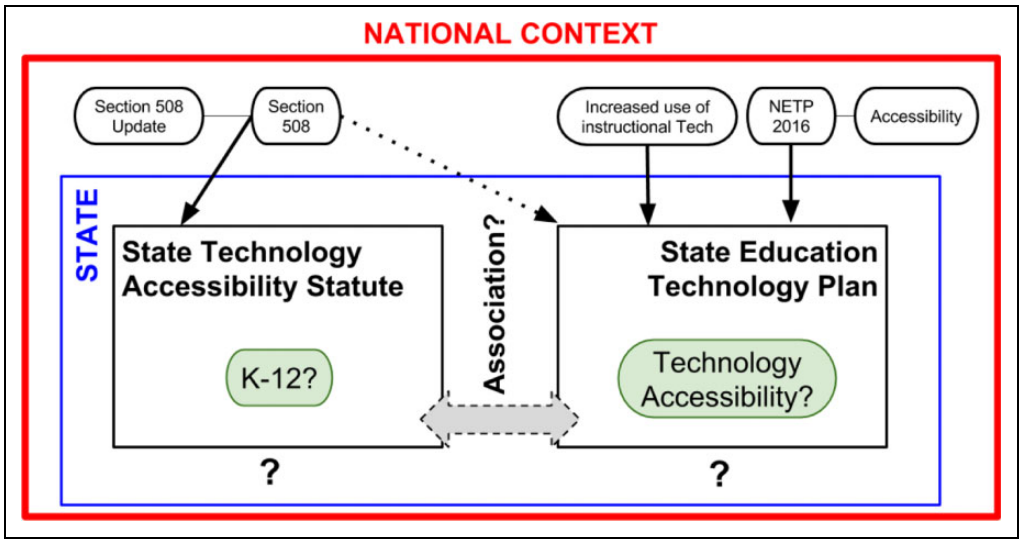

Figure A1. Analytical construct

Appendix B

Primary Source Retrieval Protocol

Primary sources to be used in this study for data collection and analysis will be retrieved using the following protocols.

State technology accessibility statutes

(1) The researcher will attempt to acquire statute reference numbers from the literature in the field.

(2) The researcher will follow the steps below for states whose statute is not referenced in the literature:
   (a) Search existing state legislative databases and listings (e.g., National Council of State Legislatures and Section508.gov) for statute reference numbers.
   (b) Contact local agencies and organizations that are knowledgeable about the topic. Specifically, the state's Protection and Advocacy Center, ADA Technical Assistance Program, and Council on Developmental Disabilities.
   (c) Look at the table of contents for the state statutes on the state government's website to see whether the statute can be located.

(3) If the statute has still not been located, the researcher will indicate that the statute was not found.

State education technology plans

(1) The researcher will attempt to acquire reference information for the state's education technology plan from the State Education Policy Center (http://sepc.setda.org) and U.S. Department of Education (http://www2.ed.gov/programs/edtech/techstateplan.html).

(2) The researcher will search each state's department of education website to attempt to locate the education technology plan.

(3) The researcher will contact the department of education to attempt to acquire reference information for the state's education technology plan.

(4) If the researcher finds a state education technology plan that appears to be out-of-date based on the years published in the document, the researcher will contact the state's department of education to confirm that the plan is the most current plan available.

(5) If the state's education technology plan has still not been located, the researcher will indicate that the policy was not found.

Appendix C

Coding Scheme

Does the state have an education technology plan? (0, 1)
Does the state have a technology accessibility statute? (0, 1)
In which Department of Education region does the state reside? (0–10)
State education technology plan

- Technology Accessibility (0, 1)
- Section 508 statute or regulation (0, 1)
- State technology accessibility statute (if applicable; 0, 1)
- Disability (0, 1)

State technology accessibility statute

- Section 508 statute or regulation (0, 1)
- Education (K–12 or education in general; 0, 1)

Appendix D

Table D1. Tabulating State Technology Accessibility Statutes and Education Technology Plans.

State	Has an Education Technology Plan	Education Technology Plan Mentions Technology Accessibility	Has a Technology Accessibility Statute	Technology Accessibility Statute Mentions K–12
Alabama				
Alaska				
Arizona	✓		✓ Ariz. Rev. Stat. Ann. § 41-3532	
Arkansas	✓	✓	✓ Ark. Code Ann. § 25-26-202 et seq.	✓
California	✓		✓ Cal. Gov't Code § 11135(d)(2)	
Colorado			✓ Colo. Rev. Stat. Ann. § 24-85-102 et seq.	
Connecticut	✓		[a]	
Delaware	✓	✓		
Florida			✓ Fla. Stat. Ann. § 282.601 et seq.	
Georgia	✓		[a]	
Hawaii				
Idaho			✓ Idaho Code Ann. § 67-6701 et seq.	
Illinois			✓ Information Technology Accessibility Act, 30 Illinois Compiled Statutes 587/1	
Indiana			✓ Ind. Code Ann. § 4-13.1-1-3 et seq.	
Iowa				
Kansas			[a]	
Kentucky	✓		✓ Ky. Rev. Stat. Ann. § 61.980 et seq.	✓
Louisiana			✓ La. Rev. Stat. Ann. § 39:302	
Maine	✓			
Maryland	✓	✓	✓ Md. Code Ann., State Fin. & Proc. § 3A-311	
Massachusetts			[a]	
Michigan	✓			
Minnesota			✓ Minn. Stat. Ann. § 16E.03 et seq.	
Mississippi				
Missouri	✓		✓ Mo. Ann. Stat. § 191.863	
Montana			✓ Mont. Code Ann. § 18-5-602 et seq.	
Nebraska			✓ Neb. Rev. Stat. § 73-205	
Nevada	✓			
New Hampshire				
New Jersey	✓	✓		
New Mexico	✓	✓		
New York	✓			
North Carolina	✓	✓	[a]	
North Dakota	✓	✓		
Ohio	✓			
Oklahoma	[a]		✓ Okla. Stat. Ann. tit. 62, § 34.28 et seq.	
Oregon				
Pennsylvania				
Rhode Island				
South Carolina	✓			
South Dakota				
Tennessee			[a]	
Texas	✓	✓	✓ TX Local Govt T. 10, Subt. B, Ch. 2054, Subch. A, Gen. Prov.	
Utah	✓	✓		
Vermont	✓			
Virginia	✓	✓	✓ Va. Code Ann. § 2.2-3500 et seq.	
Washington	✓			
West Virginia	✓		✓ W. Va. Code Ann. § 18-10N-3 et seq.	
Wisconsin	✓			
Wyoming	✓			
Total	27	10	19	2

[a]*Connecticut*: Conn. Gen. Stat. Ann. § 19a-25d(b)(2) pertains to the accessibility of health records (Lazar et. al., 2015); *Georgia*: The state has a government web accessibility initiative, which has received national recognition (Georgian Technology Authority, 2016); *Kansas*: The state has a web accessibility policy (Kansas, 2000); *Maine*: The current education technology plan is from 2001; the state is in the process of developing a new plan (M. Muir, personal communication, September 27, 2016); *Massachusetts*: The state has a technology accessibility policy that applies to the executive branch of the state government (Massachusetts, 2016); *Michigan*: As of the time of this writing, the current education technology plan is from 2010; however, an updated plan is expected in 2017 (A. Mapes, personal communication, October 26, 2016); *North Carolina*: Section 168A-7 of The North Carolina Persons with Disabilities Protection Act, references the Internet (N.C. Gen. Stat. § 168A-7); *Oklahoma*: The state is working on a "Digital Learning Technology Plan," but the plan is not yet available (K. Bernhardt, personal communication, October 10, 2016); *Tennessee*: The state has a "house joint resolution" pertaining to technology accessibility, TN HJR 57 Equal Rights To Technology and Information Access, which was signed by the governor in 2016 (Tenn. H. J. Res. 57, 109th Cong.); *Vermont:* The state is working on updating its current education technology plan (P. Drescher, personal communication, October 5, 2016).

Appendix E

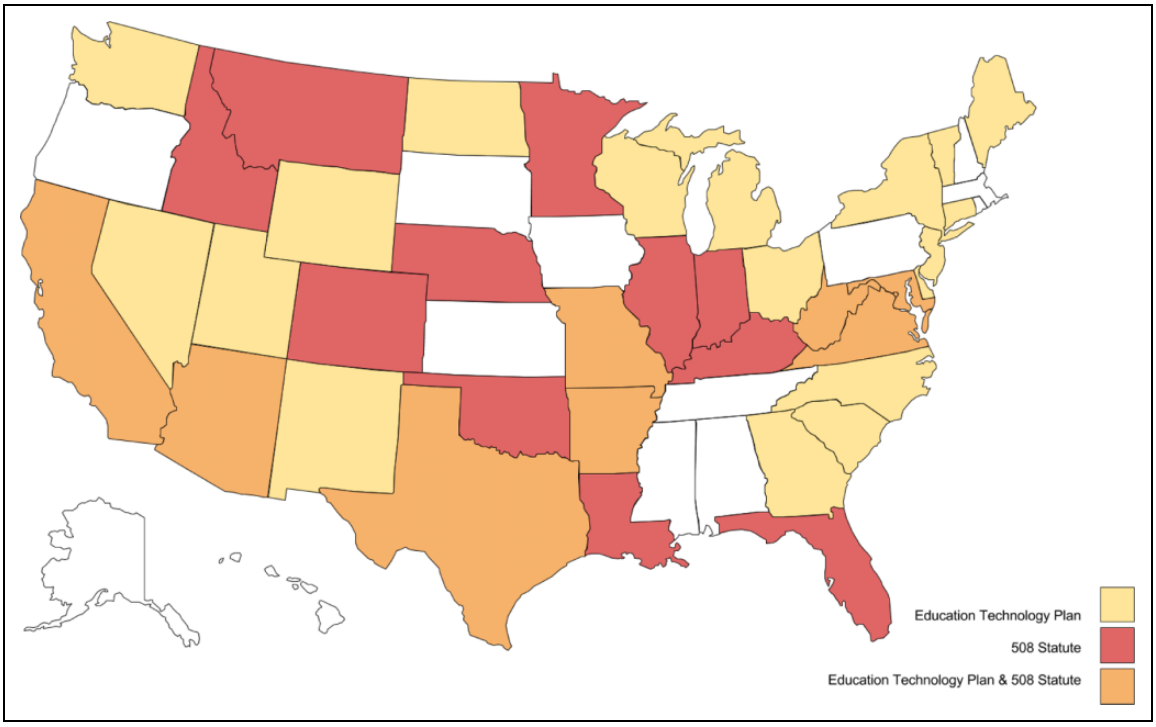

Figure E1. A U.S. map of technology accessibility statutes and education technology plans.

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