Disability Access and E-Government

An Empirical Analysis of State Practices

Nadia Rubaii-Barrett
Binghamton University, New York

Lois Recascino Wise
Indiana University, Bloomington

Despite a body of federal and state laws and policies promoting access to e-government for individuals with disabilities, wide variation exists across the states in the level of Web site accessibility. This study seeks to identify factors accounting for why some states are more responsive than other states to the needs of people with disabilities in their use of e-government. Drawing on demographic, political, administrative, and economic arguments, the authors account for a substantial share of the variation among states using a model based on measures of need, partisan control of government, fiscal capacity, and state spending. The single most important variable in the model is the strength of a state’s own technical assistance policy; the way a policy is formulated in terms of clarity of objectives and enforcement capacity is significant. The authors’ findings have clear implications for policy formulation and implementation, and they suggest several avenues for future research.

Keywords: e-government; digital divide; accessibility; disability; comparative state analysis; information; communication technologies

Technology continually changes the way government does business, but the extent to which changes in information technology (IT) translate into advances in the level of democracy and social equity in society remains an open question. A substantial body of research examines the relationship between digital government and democracy (Carrizales, 2004). On one hand, e-government may contribute to citizen empowerment and political participation by making the portals of government more readily available (Edmiston, 2003; Kraemer, Kim, & Perry, 1994; Lee-Kelley & James, 2003; Milward & Snyder, 1996; Moon, 2001; National Research Council, 2002; P. Norris, 2001; U.S. Department of Justice, 2003). Alternatively, IT may merely reinforce the status quo, perhaps increasing the amount of access for those already engaged but not significantly expanding the share of the population that is empowered (Chadwick, 2003; Davis, 1999; Margolis & Resnick, 2000; McNeal, Tolbert, Mossberger, & Dotterweich, 2003). As the volume of government information provided and business conducted on the Internet expands, the possibility that digital government excludes specific groups becomes more concerning, and for those excluded the costs become higher (Holden, Norris, & Fletcher, 2002). Thus, the question of whether a proactive concern for avoiding virtual barriers is keeping pace with the proliferation of e-government needs to be continually asked (Baker & Panagopoulos, 2004; Sobie, 2003; Stanley & Weare, 2004). In this context, e-government is integrally linked to the growing concern for the way diversity is valued and recognized by government organizations (Becker, 2004; Chavan & Stein, 2001; Sobie, 2003).

Our focus is on whether and how state governments accommodate the needs of members of diverse groups in their access to digital information and services. State governments are critical providers of services that citizens access on the Internet (Steyaert, 2004; U.S. Department of Commerce, 2002). We are interested in learning whether states recognize as disadvantaged and respond to the needs of a particular group that is prominently identified in the diversity literature but less frequently discussed in terms of the digital divide, namely, those with disabilities. Unlike other disadvantaged groups, technological solutions, rather than expanding public access points, are critical to enabling those with disabilities to engage in e-government.

Although many governments have taken steps to expand the number of public computers linked to the Internet, West (2004a) concluded that “little is being
done to address the needs of special populations such as the disabled” (p. 21). Others reported that between 22% and 37% of government Web sites have accessibility features (Jaeger, 2004a). This performance shortfall runs counter to high expectations for technology as a vehicle for individuals to gain full advantage of digital government services (Becker, 2004; Patterson, 2002; Woolfson, 2004).

Despite the promulgation of legislation promoting accessibility and prohibiting discrimination, as well as a growing body of guidelines and advanced resources for facilitating the usability and accessibility of Web sites and Web portals, our findings illustrate that states generally do not recognize the needs of those with disabilities in their Web site designs. We see little evidence of a concerted effort to embrace diversity issues related to access and usability for those with disabilities. In the majority of states, only a small portion of e-government portals can be characterized as friendly toward persons with disabilities.

This article extends current research by focusing on state government, rather than on the federal or local government sectors (Brudney & Selden, 1995; Jaeger, 2004a, 2004b; D. F. Norris & Moon, 2005), by contributing a needed empirical study (D. F. Norris & Moon, 2005; West, 2004a) of the diversity-related effects of digital government and by providing a comparative study of all 50 states. Many of the state government–based studies to date have been descriptive in nature (West, 2004b) or have been limited to case studies of individual states (Potter, 2002) and thus have not provided insight into factors that might explain variations in state performance on e-government accessibility. Finally, our study expands upon research on the exclusionary effects of the so-called digital divide, which has mainly examined the socioeconomic aspects of disadvantage, and it contributes to the growing body of work on diversity-related hindrances.

**Expanding the Construct of the Digital Divide**

An underlying assumption of our work is that it is appropriate to apply the construct of the digital divide broadly to a wide range of social groups and to consider the implications of access in the context of the needs of those population segments. Baker and Panagopoulos (2004) expanded the definition of digital divide to include issues related to access to technologies, available content, and awareness and utility. Virtual barriers create a “democratic divide” (Mossberger, Tolbert, & Stansbury, 2003) for persons with disabilities.

Some think governments in the United States have been relatively less concerned about the social effects of computer technology than governments in other countries and have responded in an ad hoc way to problems that have arisen from the way computer-related innovations were implemented, including concerns for exclusion (Gordon & Cuddehe, 2005; Kraemer et al., 1994). An evaluation conducted by the Commonwealth of Massachusetts cited the ad hoc growth of digital government as presenting potential users with “an impenetrable jungle of individual agency sites” (Massachusetts Information Technology Division, 2005). Complex Web portals that test individuals’ abilities, skills, knowledge, and stamina not only turn away potential users but also increase operating costs for state agencies forced to maintain duplicative services and points of access.

Limited accessibility to digital government for segments of the population becomes increasingly important as governments move from more basic levels of e-government activity, such as information posting, to more sophisticated applications (Brown & Brudney, 2004, p. 106; Carvin, Hill, & Smothers, 2004). Advanced applications related to citizen engagement and empowerment place different demands on the operational and technical arenas of e-government management. Constraints and concerns in the technical environment need to be proactively considered for e-government to realize its full potential (Brown & Brudney, 2004, p. 104). Accessibility can be viewed as an ethical imperative for IT in contemporary society (Mason, 1986).


These access-based solutions do not address the more fundamental problems that limit accessibility (Mauldin
and Ford, 2000) for individuals with disabilities. The virtual barriers they face are not eliminated by merely putting more computers and Internet connections in public places (Becker, 2004). For government Web sites to be more fully used by people with disabilities, particular user requirements need to be reflected in the construction and design of government Web pages. Barriers to accessibility of e-government are, in many cases, embedded in the Web sites themselves. Web designers tend to construct for the typical user who can see the text on the screen, distinguish among colors, maneuver the mouse, type on the keyboard, and read and comprehend the information written in English (Berliss, Krauss, & Staddard, 1996). Individuals with disabilities may not meet these expectations. Failure to consider issues of diversity and accessibility as a component of Web design may result in e-government systems that disadvantage this population.

**Issues of E-Government Accessibility for Individuals With Disabilities**

About 52 million Americans have disabilities, and the share of the population is growing as the general public ages (Loiacono & McCoy, 2004). On average, slightly less than 10% of a state’s working-age (16–64 years), noninstitutionalized population has a sensory, physical, mental, or self-care disability. The share of a state’s population with one or more disabilities ranges from 7.5% in New Jersey to 15% in West Virginia (U.S. Census Bureau, 2004b).

Subsets of the population with disabilities have different levels of Internet and computer usage. Overall, individuals with multiple disabilities are less likely than others to use computers and Internet services, but not all disabilities are associated with lower levels of computer usage. In fact, individuals with hearing impairments appear to be almost as likely as those without disabilities to use these technologies. Among 25- to 60-year-olds, only 30% of individuals with multiple disabilities reported use of the Internet, compared to 40% of those with difficulty walking or leaving home, roughly 50% of individuals with blindness or severe vision impairment or with difficulty typing, 55% of individuals with hearing impairments, and 63% of those with no disabilities. Among those who do use computers and the Internet, those with multiple disabilities, those with difficulty typing, and those with difficulty leaving home are more likely than people with other disabilities and those without disabilities to use the technology to obtain government information (U.S. Department of Commerce, 2002, pp. 69–70). These user rates demonstrate the potential of digital government for increasing access to government information.

Many individuals with disabilities employ assistive technologies such as screen readers and voice recognition software to enable them to use computers and access the Internet. Assistive technologies, however, may be incompatible with some Web page designs. Web designers typically assume “use of several physical capabilities or combinations of capabilities which may be absent among those with disabilities—sight for viewing the monitor, manual dexterity for typing on the keyboard, and hand-eye coordination for using the mouse” (Berliss et al., 1996). Visual impairments, which also affect the older population, limit comprehension and effective use of many Web portals (Becker, 2004). Visual comprehension can be impaired by a variety of factors, including font size, patterned background images, banner blindness caused by images that look like ads, cluttered visual fields, color palettes, and screen length (Becker, 2004, 2005).

Guidelines for making government Web sites more usable for people with disabilities are found in both federal and state legislation and have also been promulgated by national agencies (Jaeger, 2004a, 2004b; Sobie, 2003). Six different federal laws develop the legal concept of equal access with respect to e-government. These include Sections 504 and 508 of the Rehabilitation Act of 1973, as amended, the Americans With Disabilities Act of 1990, the Individuals With Disabilities Education Act of 1998, the E-Government Act, the Assistive Technology Act, and the Telecommunications Act of 1996. The most explicitly relevant standards are found in Section 508 of the 1998 Amendments to the Rehabilitation Act (29 U.S.C. § 794d), which states, in part, that when developing, procuring, maintaining, or using electronic and information technology, agencies must give disabled employees and members of the public access to information that is comparable to access available to others. Section 508 provisions only apply, however, to the federal government. More general provisions, which can be interpreted to require the same standards of equitable access, are found in the Americans With Disabilities Act and in the revisions to the Rehabilitation Act of 1973, as a condition of receiving federal funding.

These laws require that governments provide qualified individuals with disabilities equal access to their programs, services, or activities unless doing so would fundamentally alter the nature of their programs, services, or activities or would impose an undue burden. Although legislation is an important step toward improving accessibility, enforcement has been limited in many countries, including the United States (Carvin et al., 2004). A study in the United Kingdom found that about 150 public employment authorities failed to meet criteria for the disability code of practice for online accessibility established under the British Disability Discrimination Act of 2004, thereby preventing those with disabilities from using this public service and marginalizing them in the job market (Woolfson, 2004).
Standards for accessibility have also been developed by the World Wide Web Consortium (W3C). An aim of the W3C is to explain how to make Web content accessible to people with disabilities and to define target levels of accessibility. The W3C identifies four main principles and 13 guidelines that speak directly to technical standards and are similar to those on the U.S. Web sites based on Section 508 but include certain additional items. For example, one standard is to allow users to avoid content that could cause photosensitive epileptic seizures. The W3C maintains current accessibility guidelines on its Web site (http://www.w3.org/TR/WCAG20/) and also provides a list of evaluation and repair tools for correcting or retrofitting Web pages.

Some agencies, such as the U.S. Department of Education, interpret Section 508 of the Rehabilitation Act, when considered in conjunction with the Assistive Technology Act (29 U.S.C. 3001), to require state governments to provide access to technology for the disabled, but that link is not well established nor is it uniformly accepted (Noble, 2002). The enactment of federal law pertaining to disability and accessibility has, however, influenced some states to examine technological accessibility for the disabled and to implement similar legislation (Patterson, 2002). At the same time, federal legislation such as Section 508 may have also spurred computer manufacturers and software providers to make their products user friendly for people with disabilities (Friel, 2001).

Given the multitude of federal laws and policies, one might expect a relatively uniform and high level of accessibility to state Web sites. The empirical evidence suggests otherwise and should come as no surprise when one considers where the issue of Web access falls within the U.S. system of federalism. In the context of the U.S. federal system, many issues related to the Internet (e.g., e-commerce and privacy of electronic communications) have been the subject of debate regarding which level of government can and should control policy (Hahn, Layne-Farrar, & Passell, 2003–2004; Jaeger & Thompson, 2003; Teske, 1995). Issues of accessibility have received less attention, but they are similarly positioned in the gray area between the clearly defined spheres of responsibility. As with many policy areas for which there is no clear national government authority, there is considerable variation across the states. This research seeks to contribute to the understanding of the factors that explain why some states provide more access than others.

Assessing and Explaining State Performance on E-Government Accessibility

Within the context of e-government research, it is important to note that this study is not intended to evaluate how well or how much a state is providing in terms of e-services. Instead, we examine within the context of any level of e-government provided by a state to what extent that service is equally accessible to individuals with disabilities. In an effort to understand why some states are more proactive than others on this issue, we examine the extent to which variations in state performance on e-government accessibility can be explained and understood in the context of conventional state sociopolitical variables.

Measuring E-Government Accessibility

For the purposes of this research, accessibility of state government Web sites to individuals with disabilities is based on data collected by West (2004b). He provided a measure that indicates the percentage of a state government’s Web pages that are accessible to individuals with disabilities. These data are widely used for studies of e-government and are reported on a regular basis in the Book of the States (Council of State Governments, 2002). The data on diversity and e-government access are particularly informative because of the scope of the sites examined and the relatively broad standards applied to rate site accessibility. West did not limit his analysis to 50 state home pages. Instead, he examined 1,569 state government Web sites, encompassing “portal or gateway sites as well as those developed by court offices, legislatures, elected officials, major departments, and . . . agencies serving crucial functions, such as health, human services, taxation, education, corrections, economic development, administration, natural resources, transportation, elections, and agriculture” (West 2004b, p. 3). In addition, the standards West applied for determining accessibility are relatively lenient. For a Web site to be rated as accessible to the disabled, a site could meet any one of three standards. It could have either text telephone or phone numbers for telephonic device for the deaf, it could be deemed disability accessible by a nonprofit group that rates Internet sites, or it could meet the standards of the W3C or legislative acts such as Section 508 of the U.S. Rehabilitation Act of 1973 (West, 2004b, p. 21).

Using this standard, on average 37% of state Web sites are accessible to individuals with disabilities. West Virginia provides the lowest level of access to individuals with disabilities (7%) and North Dakota the highest (91%). In 39 states, fewer than half of the Web pages are accessible. In general, states in the Midwest and Northeast regions provide a larger percentage of accessible Web pages (mean of 43% and 42%, respectively), whereas the Southern states (mean of 30%) lag behind (West, 2004b).
Explaining Variations in State E-Government Access

We identified a number of factors that would appear to have the potential for making state governments more aware of the issues of usability and accessibility as potential hindrances in the public’s engagement in digital government. There has been a steady promulgation of federal legislation prohibiting discrimination against those with disabilities in e-government access, accompanied by some state-based legislation; widely available guidelines and standards for promoting usability and accessibility, including resources and tools to facilitate efforts to make Web sites and Web portals more accessible; and steady advances in the capability of available hardware and software for meeting these standards. Despite these advances in policies, guidelines, and technological capacities, there is considerable variation in the level of accessibility of state e-government.

What explains the variation in state e-government accessibility? We examine potential explanations for state performance on providing e-government access to diverse populations that are drawn from arguments grounded in four areas: demographic, political, administrative, and economic. We use variables used by others engaged in the study of e-government and comparative state policies, as well as some variables specific to our particular interests, to evaluate the extent to which each of these areas—individually and collectively—contribute to an understanding of state e-government accessibility. Our model includes two demographic variables, three political variables, three administrative variables, and one economic variable. The discussion now turns to providing an explanation of each of these four areas and the nine variables used in our analysis.

The demographic explanation is based on the notion that states with larger populations will experience economies of scale in association with widespread use of e-government. Population size has been repeatedly observed to help explain the extent of e-government services. State population helps explain overall state e-government performance (West, 2000), and local government population size is a significant predictor of IT innovation (Brudney & Selden, 1995), computer and Web site adoption (D. F. Norris & Demeter, 1999; D. F. Norris & Moon, 2005), and the level of sophistication of Web sites (Holden et al., 2002). As such, we include a measure of state population as an explanatory variable and expect to find that states with larger populations will, in general, provide greater access.

Another aspect of the demographic explanation is premised on the notion of states responding to the specific needs of their populations. Thus, states with higher levels of diversity will be more responsive to the needs of diverse populations. Because our focus is on e-government service to a particular segment of the population, we use a measure of the size of that particular population and expect that states with more diverse populations will provide greater e-government access to diverse groups than will those states with less diverse populations. More specifically, we expect that states with larger proportions of disabled individuals will provide disability access for a greater percentage of their Web sites than will those states with smaller proportions of individuals with disabilities. Thus, in addition to using a measure of state population, we also measure the percentage of people of the state population with disabilities. Although McNeal et al. (2003) found that state racial diversity was negatively related to states’ level of e-government services, they did not specifically examine its relationship to e-government accessibility for diverse populations, as we do here.

The political explanation is based on the assumption that partisan politics may affect support for and commitment to access for certain populations. Measures of partisan control of state government are commonly included in comparative states analyses, despite their long history of demonstrating no statistically significant relationships with many state policies and spending patterns (Dye, 1966; Winters, 1976). In the area of e-government, the partisanship variables have shown more promise. D. F. Norris and M. J. Moon (2005) found that lack of support from elected officials is an impediment to e-government, in general, and McNeal et al. (2003) found that state partisanship was a critical factor in explaining digital government innovation in the states. Specifically, McNeal et al. found that states with Republican legislatures offered 8% more online services than did states with Democrat-dominated legislatures. Republicans were also more inclined to support e-government as a means of reducing the size of government, cutting costs, and making government more efficient (Mossberger et al., 2003). Similarly, West (2000) found conservative states more likely to have extensive e-government.

Several studies indicate the importance of measuring the partisanship of multiple branches of government (Smith, 1997; Wiggins, Hamm, & Bell, 1992). Smith advises that the partisanship of the executive and legislative branches should be measured separately rather than in a composite measure and that the measure of legislative partisanship should be a continuous indicator based on percentage of total seats rather than a discrete measure simply indicating which party has a majority. For our purposes, because the state practice we are attempting to explain represents a largely technical (read:
administrative) concern rather than a major policy issue, a third measure of partisanship is examined. In addition to the governor’s party affiliation and the partisan composition of the legislature, we include a measure of partisanship of state administrators. This is in keeping with notions that the “ideas, norms, routines, and choices” of nonelected administrators influence policy, in addition to the influences of elected officials (Maynard-Moody, 1989, p. 137).

Because access for individuals with disabilities is not an issue about which partisan conflict arises, the general patterns of partisan effect on e-government are expected to hold. That is, in keeping with the findings of McNeal et al. (2003) and Mossberger et al. (2003), Republican control of state government is expected to help explain state performance on disability access. Alternatively, political variables may have no consistent explanatory capacity across the states (Wiggins et al., 1992).

Although decisions about whether to provide access and where to rank that task in the context of other state priorities may fall to elected officials, the practical decisions about how to provide access and on which pages will generally fall to administrative staff. Thus, some examination of administrative factors is appropriate as well. The administrative explanation is premised on the notion that administrators will apply their energies where elected officials provide resources and direction. One aspect of this has to do with the allocation of budget resources; that is, expenditures are a reflection of budget priorities (Jacoby & Schneider, 2001), and administrative attention will follow the appropriations. For our purposes, the budget expenditures of interest are those related to state spending on services for individuals with disabilities and state spending on IT. If Web site accessibility is considered to be part of the full range of services provided to the disabled, states with higher spending on services for the disabled might be expected to provide greater levels of access. If Web site accessibility is considered a largely technical IT issue, the variations in access may be more closely associated with IT expenditures (see Note 1).

Another aspect of the administrative explanation is drawn more directly from the policy implementation literature and is premised on the notion that administrators will faithfully implement a state’s policies. As such, the existence of clearly articulated state policy regarding Web site access for individuals with disabilities is anticipated to help explain variation in state performance. We expect that states that have adopted their own state technical assistance policies will provide higher levels of access to the disabled than will states that rely solely on federal laws or voluntary guidelines. The policy implementation literature repeatedly documents that the clarity, specificity, and strength of public policies are crucial factors in explaining the effectiveness of their implementation (Ingram & Schneider, 1990; Montjoy & O’Toole, 1979; Van Horn & Van Meter, 1976). For our purposes, the relevant state policy is generally referred to as the state technical assistance policy, and more specifically, we refer to the Web site accessibility standards within those policies.

Although all states have statements providing Section 508 assurances as a condition of receiving Assistive Technology Act grants, the language and format of state policies differs substantially across states. Some states have enacted their own explicit technical assistance policies for providing accessibility for individuals with disabilities, whereas other states merely indicate support for the principles of Section 508 (Assistive Technology Act Programs, 2005; Rehabilitation Engineering and Assistive Technology Society of North America, 2005). Similarly, some state policies recommend that state agencies improve access, whereas others require compliance with specific accessibility standards (Information Technology Technical Assistance and Training Center, 2004). These policies differ in their level of specificity and the extent to which they present standards in the form of recommendations or requirements. Using these features, state policies can be placed in three categories: (a) vague policy statements with broad recommendations, (b) clear policy statements with specific minimum guidelines and standards, and (c) strong policy statements with compliance required to ensure access (see Note 2). We expect that states that have enacted more detailed and strong policies will provide higher levels of access. Alternatively, we may find that having a policy in place at the state level is not sufficient to assure that the purposes of that policy are implemented—that is, that Web pages are, in fact, user friendly to people with disabilities.

The economic explanation generally asserts that states with greater resources will invest more heavily in technological advances. One factor that appears to inhibit the development of e-government is fiscal constraints (Brudney & Selden, 1995; D. F. Norris & Moon, 2005); thus, variation in state Web site accessibility may be due to the wealth of the state. Smith (1997) notes that per capita income is the most common measure of state wealth used in comparative state analyses. Given that McNeal et al. (2003) found that per capita income was not a significant predictor of state e-government innovation, we do not expect that it will be a significant explanatory variable for e-government accessibility; we include it as a control variable nonetheless. Table 1 provides a summary of the variables used in our analysis, how they are measured, and the data sources.
Factors Explaining Variation in State E-Government Disability Access

Based on the discussion presented previously, we expect to find that states’ performance on providing Web sites accessible to the disabled will be positively associated with population, the percentage of the noninstitutionalized adult population with a disability, state spending on services for the disabled, state spending on IT, and the existence of a state technical assistance policy. Disability access is expected to be negatively associated with Democrat control of state government and unrelated to per capita income. These expected relationships are then tested with ordinary least squares regression analysis.

Ordinary least square regression analysis was performed in an effort to test the explanatory capacity of these variables when considered together and controlling for the effects of the other variables. The goal here is to determine how much of the variation in state Web site accessibility for the disabled can be explained by and understood in the context of the entire set of state contextual variables discussed above. Table 2 presents the results of the regression analysis.

### Table 1

<table>
<thead>
<tr>
<th>Variable</th>
<th>Measure (Values)</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent variable: e-government accessibility</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disability access</td>
<td>Percentage of state government Web sites that meet disability access criteria in 2004</td>
<td>West (2004b)</td>
</tr>
<tr>
<td><strong>Demographic variable: population size</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>State population</td>
<td>State population in 2000</td>
<td>U.S. Census Bureau</td>
</tr>
<tr>
<td>Disabled population</td>
<td>Percentage of the civilian noninstitutionalized population ages 16 to 64 years with a disability</td>
<td>U.S. Census Bureau (2004a) from U.S. Census 2000</td>
</tr>
<tr>
<td><strong>Political variables: partisanship</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partisanship of state administrators</td>
<td>Mean political partisanship of state administrators in the 1990s (scores range from 1.6 to 4.6)</td>
<td>The Book of the States 2002, Table 8.1 (Council of State Governments, 2002)</td>
</tr>
<tr>
<td>1 = Republican</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 = Democrat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Party identification of governor</td>
<td>Party of the governor in office in 2003 (scores range from 1.6 to 4.6)</td>
<td>The Book of the States 2003, Table C (Council of State Governments, 2003)</td>
</tr>
<tr>
<td>0 = Republican governor (n = 26)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 = Democrat governor (n = 24)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Party control of state legislature</td>
<td>Average percentage of seats held by Democrats in both chambers of the state legislature (scores range = 21.5%–84.5%)</td>
<td>The Book of the States 2003, Table 3.3 (Council of State Governments, 2003)</td>
</tr>
<tr>
<td><strong>Administrative variables: financial support and targeted policy</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>State spending on disabilities</td>
<td>State spending on long-term care services for persons with disabilities per $1,000 of personal income (scores range = $7.84–$15.72)</td>
<td>Braddock (2002)</td>
</tr>
<tr>
<td>State spending on information technology</td>
<td>State expenditures on technology (1 = less than $100 million, 2 = $100–$299 million, 3 = $300–$499 million, 4 = $500 million or more)</td>
<td>State &amp; Local Source Book 2002 (2002)</td>
</tr>
<tr>
<td><strong>Strength of state assistive technology policy</strong></td>
<td>Provisions of state technology assistance policy regarding Web site accessibility for individuals with disabilities in 2004 (1 = vague policy statement with broad recommendations (n = 10), 2 = clear policy statement with specific guidelines and standards (n = 20), 3 = strong policy statement with compliance required to ensure access (n = 20))</td>
<td>Assistive Technology Act Programs (2005); Information Technology Technical Assistance and Training Center (2004); Rehabilitation Engineering and Assistive Technology Society of North America (2005)</td>
</tr>
</tbody>
</table>
The model is statistically significant and explains more than one third (as measured by an adjusted $R^2$ of .37) of the variation in state performance on e-government accessibility for individuals with disabilities. Only one variable produces a statistically significant coefficient. The most important explanatory variable is whether a state has its own state technical assistance policy; however, even this variable has limited capacity to explain state performance. Controlling for the effects of the other variables, a 1-unit change in the strength of a state’s technical assistance policy is associated with a 9% increase in Web site accessibility. The gain from having a stronger policy is statistically significant but modest. As stated earlier, on average, 37% of state Web sites are accessible to individuals with disabilities. The mean accessibility for states that have weak and vague Web site accessibility policies is 23%, whereas 35% of the Web sites, on average, are accessible for those states with more detailed policies containing specific technical guidelines, and mean accessibility reaches 46% for those with strong compliance statements in their policies. There remains, however, considerable variation among state accessibility levels within each group, as illustrated in Figure 1.

The empirical evidence illustrates that the states with the worst records of disability access have the weakest policy statements. These include West Virginia and Iowa, which have only 7% and 13% of their states’ Web sites accessible to the disabled, respectively. But Delaware also has a weak policy statement and provides access on 4% the its Web pages. Similarly, whereas two states with the best records of access, North Dakota at 91% and Kansas at 74%, have strong policy statements with compliance requirements, so do states such as Tennessee, Wyoming, and North Carolina, each of which provide access on fewer than one third of their Web sites. The strength of a state policy appears to be an important explanatory variable, but it is neither necessary nor sufficient in understanding variation in state Web site accessibility. Some states provide access even without strong state-level policy, and others make strong policy statements but do not demonstrate corresponding levels of actual accessibility.

Notable for their lack of statistical significance are the expenditure variables used as part of the administrative explanation, the political variables, and the demographic variables representing total state population and the percentage of the state population with a disability. The lack of statistically significant coefficients for any of the partisan political variables suggests that Web site accessibility is neither a Democrat nor a Republican issue. Consistent with the findings of McNeal et al. (2003), per capita income does not demonstrate statistically significant explanatory capacity. When considered collectively, the variables representing demographic, political, administrative, and economic factors generate a model that is statistically significant at the .001 level.

Table 2
Regression Analysis for Disability Accessibility

<table>
<thead>
<tr>
<th>Explanatory variable</th>
<th>Coefficient</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>3.47E-007</td>
<td>.45</td>
</tr>
<tr>
<td>Percentage of noninstitutionalized population age 16 to 64 years with a disability</td>
<td>–2.87</td>
<td>.11</td>
</tr>
<tr>
<td>Democrat partisanship of state administrators</td>
<td>3.20</td>
<td>.29</td>
</tr>
<tr>
<td>Democrat control of governorship</td>
<td>–4.75</td>
<td>.27</td>
</tr>
<tr>
<td>Democrat control of state legislature</td>
<td>–0.16</td>
<td>.33</td>
</tr>
<tr>
<td>State spending on services for the disabled</td>
<td>1.16</td>
<td>.14</td>
</tr>
<tr>
<td>State spending on technology</td>
<td>–2.74</td>
<td>.30</td>
</tr>
<tr>
<td>Strength of state technical assistance policy</td>
<td>9.72*</td>
<td>.002</td>
</tr>
<tr>
<td>Per capita income</td>
<td>0.00</td>
<td>.51</td>
</tr>
<tr>
<td>Constant</td>
<td>54.14</td>
<td>.10</td>
</tr>
</tbody>
</table>

Note: $R^2 = .48$; adjusted $R^2 = .37$. Model significance = .001**. *$p < .01$. **$p < .001$.

The model is statistically significant and explains more than one third (as measured by an adjusted $R^2$ of .37) of the variation in state performance on e-government accessibility for individuals with disabilities. Only one variable produces a statistically significant coefficient. The most important explanatory variable is whether a state has its own state technical assistance policy; however, even this variable has limited capacity to explain state performance. Controlling for the effects of the other variables, a 1-unit change in the strength of a state’s technical assistance policy is associated with a 9% increase in Web site accessibility. The gain from having a stronger policy is statistically significant but modest. As stated earlier, on average, 37% of state Web sites are accessible to individuals with disabilities. The mean accessibility for states that have weak and vague Web site accessibility policies is 23%, whereas 35% of the Web sites, on average, are accessible for those states with more detailed policies containing specific technical guidelines, and mean accessibility reaches 46% for those with strong compliance statements in their policies. There remains, however, considerable variation among state accessibility levels within each group, as illustrated in Figure 1.

The empirical evidence illustrates that the states with the worst records of disability access have the weakest policy statements. These include West Virginia and Iowa, which have only 7% and 13% of their states’ Web sites accessible to the disabled, respectively. But Delaware also has a weak policy statement and provides access on 4% the its Web pages. Similarly, whereas two states with the best records of access, North Dakota at 91% and Kansas at 74%, have strong policy statements with compliance requirements, so do states such as Tennessee, Wyoming, and North Carolina, each of which provide access on fewer than one third of their Web sites. The strength of a state policy appears to be an important explanatory variable, but it is neither necessary nor sufficient in understanding variation in state Web site accessibility. Some states provide access even without strong state-level policy, and others make strong policy statements but do not demonstrate corresponding levels of actual accessibility.

Notable for their lack of statistical significance are the expenditure variables used as part of the administrative explanation, the political variables, and the demographic variables representing total state population and the percentage of the state population with a disability. The lack of statistically significant coefficients for any of the partisan political variables suggests that Web site accessibility is neither a Democrat nor a Republican issue. Consistent with the findings of McNeal et al. (2003), per capita income does not demonstrate statistically significant explanatory capacity. When considered collectively, the variables representing demographic, political, administrative, and economic factors generate a model that is statistically significant at the .001 level.

Summary of Findings

Taken as a whole, this research provides some interesting insights into state patterns of e-government accessibility. For example, access for the disabled was found to be partially a function of the strength of a state’s own policy regarding technical assistance and Web site accessibility access. This one variable, which represents an aspect of the administrative explanation, helps explain roughly one third of the variation in state Web site accessibility. Most of the traditional measures of state policy variation do not help us understand variation on state disability access. Need, wealth, spending, and partisan control of government are not the crucial factors. In addition, policies, whether at the federal level or at the state level, are insufficient to ensure access. The multitude of federal laws regarding disability access have not resulted in widespread state accessibility, and mere adoption of a state policy is not a guarantee of state responsiveness to this population.

Thus, the results of this research offer mixed support of prior research findings. Our research does not support
the findings that the size of the population matters in explaining e-government performance (Brudney & Selden, 1995; Holden et al., 2002; West, 2000); we found that population size was not significant in explaining the extent of state Web site access for individuals with disabilities. This may be, in part, a function of the limited variation observed in the disabled population variable. Given the small size of this population, the traditional economies of scale that have been shown to contribute to relationships between state population and many broad-based technological advances (Brudney & Selden, 1995; Holden et al., 2002; D. F. Norris & Demeter, 1999; D. F. Norris & Moon, 2005; West, 2000) are less relevant with respect to this narrowly defined aspect of technological performance.

The significance of the administrative or policy variable in explaining some variation in disability access is supportive of prior research findings. The clarity, specificity, and strength of public policies are well-documented factors in explaining the effectiveness of their implementation (Ingram & Schneider, 1990; Montjoy & O’Toole, 1979; Van Horn & Van Meter, 1976), and our findings support that idea. State technical assistance policies tend to be very specific and to make explicit references to government uses of technology and equal access for individuals with disabilities. As such, it is not surprising that this policy helps explain some variation in state performance in providing disability access. Even the most strongly worded policy statements tend to lack enforcement provisions, which may explain the limited capacity of this variable to account for variation in state performance. In addition, the clear policy directives from the federal government provide the opportunity for a state to be responsive even in the absence of a strong state policy.

The absence of statistically significant coefficients for either of the expenditure variables suggests that general support at the state level for either services for individuals with disabilities or enhanced technology is insufficient in achieving Web site accessibility. This finding may also reflect that the costs of making Web sites accessible are relatively small compared to other services in the realm of either IT or services for individuals with disabilities. Making Web sites accessible requires attention to the issue but not necessarily the investment of considerable resources. For proponents of increased Web site accessibility for individuals with disabilities, this finding would suggest that their attention would be better directed to lobbying for improved enforcement of existing federal and state policies than simply focusing on increased spending.

The lack of statistically significant results regarding any of our political variables is in keeping with the findings of Wiggins et al. (1992) that partisanship may influence state policy, but there is no consistent pattern across states as to which branch of government is most influential. Our findings of the lack of significance of the measure of per capita income are consistent with the earlier findings of McNeal et al. (2003) regarding the extent of state online services.

**Conclusion**

Our findings show that for the most part state governments are not meeting the needs of individuals with disabilities in the way they present information on their Web sites. Moreover, our findings reinforce the important lesson that creation of a policy alone (i.e., state technical assistance policy) is not sufficient to create proactive behavior and that implementation of policy intentions must be monitored. Finally, our findings contribute to the body of work examining factors that account for differences in responsiveness among state governments, supporting the findings of previous research with respect to the limited role of political party, population size, and per capita income.

Our findings suggest that states with strong compliance-oriented technical assistance policies referencing specific technical guidelines are somewhat more likely than other states to have Web pages that are responsive to the usability needs of people with disabilities. To the extent that a strong compliance-oriented Web site–accessibility policy is associated with greater responsiveness
to the needs of users with disabilities, development of formal technical assistance policies not only may reflect policy makers’ priorities but also may create an awareness of the needs of diverse users of government Web sites and an understanding of how states can accommodate those needs. State officials who are responsible for Web page design and online services may need to be made aware of the resources available to them for advancing accessibility. A recommendation for practice from this study is that specific technical policy directives, implementation guidelines, and enforcement provisions may be required to enhance the accessibility and usability of digital government. Vague expressions of priorities in the form of broad policy statements or general expenditures for disability services and IT will not produce results. Similarly, in the absence of clear authority on the part of the national government on this issue, reliance on federal laws to ensure state Web site accessibility appears to be insufficient. Whether Web pages are constructed in-house or outsourced, state officials should govern Web design with a policy that expresses the need for compliance with usability guidelines and standards.

State Web site accessibility policies vary in terms of the form in which they are articulated; they may be in the form of statutes, statewide or agency-specific policies, executive orders, guidelines, or memoranda from high-ranking officials (see Note 3). Statutes tend to carry the greatest legitimacy and afford the greatest jurisdictional coverage; however, they often include vague language as a result of the give-and-take associated with the lawmaking process. At the other extreme, guidelines often contain detailed technical information, but they do not carry the weight of law. We recommend that states express their commitment to Web site accessibility in a combination of formats rather than relying on any single medium. Regardless of the format, or formats, selected, state policy makers are encouraged to pay close attention to the language and provisions of these policy statements. We recommend six specific practices: State policies should provide a clear and compelling justification for the policy, require compliance rather than merely encourage or recommend attention, reference specific accessibility standards rather than general principles, require validation or testing of Web sites, specify a third-party compliance monitor, and articulate a formal complaint procedure and explicit sanctions for noncompliance.

The rationale for a state Web accessibility policy may be grounded in recognition of the increasing need to utilize electronic information or technology (California), commitment to inclusion and universal access (Indiana), or ensuring that people with disabilities have equal access to public information (Vermont). At this stage, the policy should clearly state that it applies to electronic information accessible to a full range of users, including members of the general public. That rationale then provides the basis for mandating compliance with specific accessibility standards. We consider it essential that states move beyond merely authorizing a state entity to develop plans or encouraging agencies to take steps to improve access to require compliance.

To facilitate compliance, states must clearly articulate the standards by which conformity will be measured. There are several legitimate standards that can be applied, including Section 508, W3C, or individual state guidelines. We recommend that a state select one set of standards rather than referencing several. We consider any of these options viable but suggest that states specify which set of standards to apply rather than allowing individual agencies to select which standards to use. Specific language such as “All Web pages must conform to Priority 1 checkpoints established by the World Wide Web Consortium’s (W3C) Web Access Initiative” or “All Web site content and applications must comply with Section 508 checkpoints” is preferable to language such that Web sites should conform to “generally acceptable standards for Internet accessibility for people with disabilities.”

Most state policies have no provision for mandating validation and testing, monitoring compliance, filing complaints, or imposing sanctions for noncompliance, and we consider these to be major shortcomings of those policies. We recommend that states require testing and validation of accessibility compliance. A simple method is to require that agency Web sites be BOBBY approved and display the logo indicating their conformity, as required by North Dakota. Alternatively, the state may require each state agency to annually validate the accessibility of its Web content for persons with disabilities and to develop a plan of corrective action, as mandated in New York. Relying on self-monitoring is not sufficient. A logical third-party monitor is a state’s chief information officer or its IT office. Another possibility is a Web site design review team or working group. We were disappointed to note that only one state, Missouri, requires that individuals with disabilities be involved in accessibility reviews; this should be a component of all state policies. We also advise that complaint procedures be specified in state policy. Complaints may be handled within the agency (Arizona), with the chief information office (Maine), or in court (Kansas). One of the most detailed complaint processes is described in the Missouri IT Accessibility Standards, which state that each agency must designate a
person, office or entity to process complaints and shall make that information publicly available. The complaint process shall minimally include an investigation of the allegation, an attempt to resolve the complaint, and written communication regarding the findings and final decision or disposition of the complaint. . . . State departments and agencies are encouraged to establish an internal complaint process that includes an appeal to another unit independent of the agency in question. (Office of Information Technology, State of Missouri, 2003, p. 13)

Finally, for accessibility policy to be taken seriously, states must impose some sanctions for agencies that do not conform. When sanctions are provided, they generally are in the form of injunctive relief.

Our research findings also suggest several avenues for future research that could provide more insight into the factors that contribute to different levels of state Web site accessibility for individuals with disabilities. As a first step, the quantitative 50-state comparative analysis presented here provides a necessary overview and contributes to our understanding of factors associated with variation in state Web site accessibility. More in-depth qualitative case studies are warranted to better understand the decision-making context and issue dynamics in individual states. Some possible research questions for subsequent studies include, Which official (or officials) made decisions about Web site accessibility in a given state? Were such decisions made at a centralized or decentralized level? Were they made by individuals in high-level elective or appointive office or by technocrats? What factors were considered in making decisions about Web site accessibility? How instrumental were individuals with disabilities—in state government, in lobbying organizations, or in the general public—in advancing the issue of Web site accessibility? For those states with the lowest levels of Web site accessibility, did they make conscious choices to not make their Web sites accessible or was it an oversight due to lack of awareness? These and many other interesting questions beg to be answered in follow-up studies.

The efficiency gains of e-government are widely accepted and lauded, but what about equity? Digital government has great potential for improving quality of life through access to public information and services and, ultimately, contributing to citizen empowerment and political participation by making the portals of government more readily available. Substantial research and public policy has focused on the digital divide, and efforts to close the gap have been advanced by law, professional guidelines and resources, and increasingly available and sophisticated technology. Yet our findings suggest that although most states appear to recognize people with disabilities as part of the digital divide, they are not demonstrating results in making digital government accessible to people with disabilities. As official Web sites become more advanced and sophisticated in the services they offer, the costs to those excluded become higher.

Notes

1. Although not represented in the model presented in Table 2, we also tested an interactive variable to see whether states with higher expenditures in both disability services and technology would provide more Web site access. The interactive variable did not generate a statistically significant coefficient, nor did it alter the values or significance of other coefficients in the model. The value of $R^2$ remained identical, and the adjusted $R^2$ value was slightly lower (.33) with this variable included. In the interests of parsimony, we report the model without the interactive variable.

2. States scored as 1 on the variable measuring strength of the accessibility policy include Arizona, Delaware, Illinois, Iowa, Ohio, Oklahoma, Louisiana, Mississippi, South Carolina, and West Virginia. A score of 2 was assigned to the following states with moderate strength policies: Alabama, Alaska, Colorado, Georgia, Hawaii, Indiana, Maryland, Massachusetts, Minnesota, Montana, Nebraska, New Hampshire, New Jersey, New Mexico, Rhode Island, South Dakota, Utah, Vermont, Virginia, and Washington. Strong policies, scored as 3, exist in Arkansas, California, Connecticut, Florida, Idaho, Kansas, Kentucky, Maine, Michigan, Missouri, Nevada, New York, North Carolina, North Dakota, Oregon, Pennsylvania, Tennessee, Texas, Wisconsin, and Wyoming.

3. The Information Technology Technical Assistance and Training Center maintains up-to-date information on its Web site (http://www.itatc.org) regarding state accessibility laws, policies, standards, and guidelines, including those addressing Web site accessibility, with excerpts of the state provisions and links to the full-text versions.

References


Nadia Rubaii-Barrett is an associate professor of public administration at Binghamton University. Her research and teaching interests focus on issues of diversity as they relate to policy, administration, and pedagogy.

Lois Recascino Wise is a professor in the School of Public and Environmental Affairs at Indiana University. Her research and teaching interests center on management policies and practices, with a special focus on the public sector and managing for diversity.
Copyright of Journal of Disability Policy Studies is the property of PRO-ED and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.