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# The Impact Of The Digital Divide On E-Government Use

INTERNET USE HAS BEEN GROWING STEADILY for the past decade. In a recent report, the Pew Internet & American Life Project survey found that 75% of American adults use the Internet.[7] As more citizens turn to the Internet as a medium for communication and commerce, the importance of e-government is rising. According to a 2004 report published by the same organization 77% of Internet users, utilized an e-government service in 2003; a 50% growth rate from 2002.[5] Of those who access government information online, 77% search for information on tourism or recreation, 70% perform research for work or school, 63% download forms, and 62% retrieve information on policies or issues. Agencies are responding to the increase in demand by offering citizens more opportunities to interact with the government online. According to Pulliam,[8] agency spending on e-government initiatives is expected to grow 6.9% annually to $5.8 billion by 2009. Defense Department agencies are expected to spend $152 million in 2009 on e-government efforts, up from $115 million in 2004. Further, civilian agencies are predicted to spend $114 million in 2009, up from $86 million in 2004.[8] Proponents of e-government argue that online services offer constituents numerous benefits, including the improved responsiveness, efficiency and transparency of the public sector. Unfortunately, as a result of the digital divide, the entire population may not realize these benefits.[11]

## The Issue of the Digital Divide

As governments worldwide increasingly implement e-government services, concerns about the potential impacts of the digital divide continue to grow. The digital divide refers to the distinction between the information haves and have-nots; the gap between the computer literate and the computer illiterate. More specifically, it can be argued that two major divides exist: an access divide and a skills divide.

## Access Divide

A lack of access to the Internet is a major element of the digital divide. Research consistently identifies ethnicity, income, age and education as significant predictors of access to technology.[3, 6, 9] According to Wright[12] in 2001, 60% of white households in the U.S. had Internet access, while only 34% of African American and 38% of Latino households did. Similarly, roughly 78% of households with income between $50,000 and $75,000 had Internet access compared to only 40% of those with household incomes between $20,000 and $25,000. Regarding age, Harwood and McIntosh[2] found that young citizens (18-24) and not surprisingly their parents (45-54) report the highest levels of home Internet access, reaching better than 61%. Thomas and Streib[9] suggest that among Internet users, ethnicity and education are important predictors of which Internet users will also utilize government Web sites, with those users more likely to be white and better educated. They surmise that government Web sites seem to draw an

even more exclusive audience than the already somewhat elite audience for the Internet in general.[9]

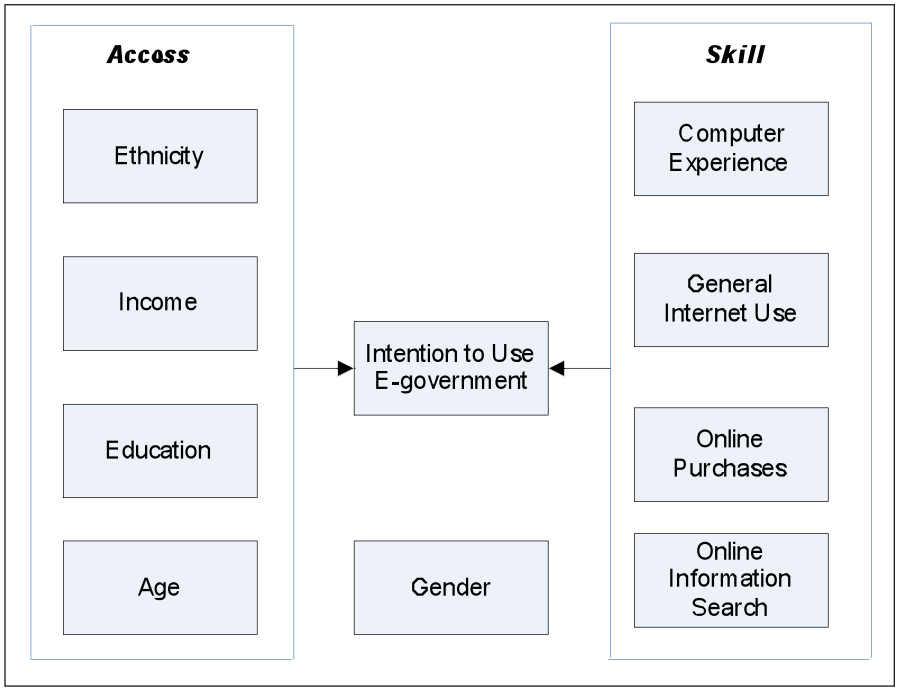
An additional demographic factor that typically affects technology usage is gender. Previous research in e-commerce has demonstrated differences between men and women in their use of online systems.[10] However, the Pew Internet Project report suggests that although men and women have different attitudes toward technology, the surge in the number of women online has eliminated some of the disparity in access between genders. In more recent research, it seems that this argument is supported.[6]

### Skills Divide

In addition to a disparity in access, there is also a substantial percentage of the population that lacks the skills necessary to effectively interact with the government online. Mossenburg et al.[6] identify two components of this skill divide: technical competence and information literacy. Technical competencies are "the skills needed to operate hardware and software, such as typing, using a mouse, and giving instructions to the computer to sort records a certain way." Information literacy is "the ability to recognize when information can solve a problem or fill a need and to effectively employ information resources." Researchers have found that the old, less-educated, poor and minority individuals (African Americans and Latinos) were more likely to need computer assistance (such as help using the mouse and keyboard, using email, or using word processing and spreadsheet programs), although recent studies show some of the differences disappearing after a year or two of use.[4] The Pew Internet and American Life project reports have explored the percentage of citizens who use the Internet to send e-mail, make purchases, and search for product and health information as an indirect measure of computer skills. In the survey we report on here, we use four proxy measures of technical competence and information literacy: years of computer experience, frequency of Internet use in general, frequency of purchases online, and frequency of information search online.

Figure 1 summarizes the access and skills divide demographics that are expected to affect one's intention to use an e-government service. In this article, we report on a study of the effects of access and skill inequities as illustrated in the figure on e-government usage. Based on the above discussion, we expected that technical competencies as well as ethnicity, income, age and education would be major determinants of e-government usage, while gender would not. Hence, gender is represented as a separate box in the figure.

**Figure 1. Digital Divide and E-Government Usage**




### Description of the Study

We surveyed a diverse group of citizens to identify the demographic characteristics that differentiate users from non-users of e-government services. In order not to be limited by the actual agency we considered, we selected two of the most popular services available to all citizens in of the Commonwealth of Virginia: the state's income tax online payment service and the state's Department of Motor Vehicle site where citizens can renew licenses, pay fees, etc. Prior studies have found that of those who conduct transactions online with the government, 16% are filing taxes, 12% are renewing drivers' licenses, 7% are renewing professional licenses, 4% are seeking fishing or hunting licenses, and 2% are paying fines.[6] One limitation of this study is that we used a convenience sample from one region of the U.S. While we believe many of the digital divide issues identified are applicable to other areas, the perceptions of these citizens may differ from other citizens.

We developed, tested, and validated two versions of a survey, one for Department of Motor Vehicles (DMV) and one for the Department of Taxation (TAX). Survey questions and instructions were worded according to which version of the survey the respondents received. We then administered the survey at a community-wide concert in a rural town in Virginia conducted by the Moscow Boys Choir. The two versions of the instrument were handed out randomly, and roughly half of the respondents answered one version and the other half the other (DMV: 51 and TAX: 54). Tests were performed to control for bias towards a particular state government agency with respect to respondent demographics. There were no statistical differences between the respondents for the two versions of the survey.

Using an open concert allowed us to get responses from a wide variety of individuals who differed in terms of their age, income and use of technology. We received 105 completed and usable responses. The ages of the subjects ranged from 14 – 83, with an average age of 36. The years of work experience varied from zero to 50, with an average of 12 years. The range of family income was from less than $10,000/year to more than $300,000/ year. Thirty-nine per-

**Table 1. Internet and Web Experience. Percentage of respondents who...**

| | |
|---|---|
| had convenient access to the Web | 96% |
| used the Web everyday | 80% |
| used the Web to gather information several times a week | 67% |
| used the Web to make a purchase never or less than once a month | 61% |
| used the Web to gather information from the government | 83% |
| had used the Web to complete a government transaction. | 66% |

cent of the sample was male. 56% of the subjects were Caucasian; 26% were minorities (African-American, Hispanic, Asian, and Arabian); and the other 18% did not report their ethnicity. Overall, as can be seen from Table 1, the sample included experienced Internet users although many had not purchased goods or services on the Web.

### Which Demographics Have an Impact on E-Government Use?

Statistical analyses (Chi-square and ANOVAs tests) revealed that for the access divide income, education, and age were significant predictors of intentions to use e-government services. Ethnicity and gender were not predictors. Regarding the skills divide, Internet usage and online information search experience were significant predictors of intentions, while computer experience and prior online purchases were not.

### Demographics Not Affecting E-government Use

Contrary to our prediction, neither ethnicity nor frequency of Internet shopping and computer experience were significant predictors of e-government use. Because ethnicity has often been touted as one of the digital divide factors, we expected this factor to be important in our sample. Another controversial study presented a few years ago found similar results. Greensburg[1] suggests that the digital divide is not race-based but instead due to a combination of factors, including income, age, and education. Perhaps, the effect of ethnicity diminishes in the presence of more salient demographic factors, such as the ones included in this study. Future research should continue to explore the relationship between ethnicity and other prominent demographics. The non-significant results may also be due in part to the artifacts of our sample. The majority was Caucasian with only 26% being minorities. Yet, 18% preferred not to report ethnicity. It could be that this large proportion of the sample might have been from a minority and preferred not to reveal it, thereby affecting our results. While ideally we would want everyone to identify his or her ethnicity, we felt this was not appropriate for a voluntary survey.

The results that frequency of online purchases and computer experience did not affect e-government use are somewhat surprising. There could be several explanations for this. First, our sample was active in Internet shopping in general and had substantial computer experience, resulting in low variability for these variables. It could also be that shopping is a completely different activity than transacting with the government. Except for daily staples, which are typically bought at the local grocery store, shopping is an optional activity that individuals can perform at their will and in their own time. Conversely, citizens often have no choice to interact with the government, and often must do so in specific time frames. Finally, it is possible that while previous computer experience and online purchases may be effective measures for e-commerce users, they are not for e-government users because these users tend to be an elite group among Internet users.[9] Hence, previous computer experience and online purchases are not sufficient proxies for the skills possessed by e-government users. These findings, together with the significance for frequency of Internet use and information search suggest that one must be careful in selecting the construct meant to represent the technical skills of e-government users in future research.

### Why Should Governments Care?

Unlike organizations in the private sector, government agencies have a charge to make their information and services available to everyone. However, the uneven distribution of computer access and skills biases the governments' ability to make their online services equally accessible and beneficial. As a result, adoption of e-government is limited to those who have access to the technology and possess the skills necessary to utilize e-services. By providing electronic services to a select group of people government agencies miss the opportunity to interact with and solicit feedback from a larger portion of the population. Hence it is imperative for government agencies to identify which demographic groups are being excluded from this innovation and then implement policies to encourage inclusion.

The Internet can be used to enhance government-to-citizen interaction in many ways, from e-participation to e-consultation. Results of this survey indicate that in addition to general demographic barriers to Internet access, one's ability to effectively use the Internet, in particular the ability to use the Internet to retrieve information, has a significant impact on intentions to use e-government. As a result, government agencies should be particularly attentive to the manner in which they present online information. Government Web sites should be designed with ease of navigation in mind, with for example both content and interfaces well organized to provide relevant information that is complete and concise.

It seems that e-government is hindered by the digital divide. While our results support this notion, they also make us think that it could be that e-government also contributes to the digital divide. E-government represents yet another technical innovation that certain members of society are excluded from. Benefits such as increased convenience and responsiveness could mobilize the technically savvy while disenfranchising those who are less efficacious regarding computer use. Government agencies should implement programs and initiatives that seek to lessen the current gaps between the technology haves and have-nots. This is especially important given the increased focus on online service delivery. The current gap for the access divide might eventually lessen as a result of the general growth in computer and Internet access in society. Also, the high likelihood of access for young citizens could decrease this gap over the long run.6 Yet, the current divide is cause for concern. In addition to ac-

cess divide factors, barriers to the skills divide can be a result of the difficulties of the economically disadvantaged and older citizens to learn the skills necessary to effectively use this medium. Future research should explore the impact of the access divide on the skill divide. Government, business, and education leaders need to develop concerted efforts to improve the learning capabilities and capacities for individuals on the lower end of the digital divide.

## Conclusion

This research explored the effects of demographic variables identified in the digital divide literature on usage of e-government services. Consistent with previous literature, income, education, age, and frequency of Internet use significantly impact use of e-government services. Typically, those more likely to use e-government services include younger citizens, citizens with higher levels of income, citizens with higher levels of education, and citizens who use the Internet for other tasks. This confirms that the digital divide has a major impact on e-government usage. It is imperative that government agencies not only acknowledge this divide, but also take steps to diminish it. When government services and information are easily accessible to all groups the entire population will benefit from a more informed citizenry and more accountable government. C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