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### Does the Digital Divide Matter More? Comparing the Effects of New Media and Old Media Use on the Education-Based Knowledge Gap

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# Does the Digital Divide Matter More? Comparing the Effects of New Media and Old Media Use on the Education-Based Knowledge Gap

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As the Internet has become increasingly widespread in the world, some researchers suggested a conceptual shift of the digital divide from material access to actual use. Although this shift has been incorporated into the more broad social inclusion agenda, the social consequences of the digital divide have not yet received adequate attention. Recognizing that political knowledge is a critical social resource associated with power and inclusion, this study empirically examines the relationship between the digital divide and the knowledge gap. Based on the 2008–2009 American National Election Studies panel data, this research found that, supporting the shift of the academic agenda, socioeconomic

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status is more closely associated with the informational use of the Internet than with access to the Internet. In addition, socioeconomic status is more strongly related to the informational use of the Internet than with that of the traditional media, particularly newspapers and television. More importantly, the differential use of the Internet is associated with a greater knowledge gap than that of the traditional media. These findings suggest that the digital divide, which can be better defined as inequalities in the meaningful use of information and communication technologies, matters more than its traditional counterpart.

As a metaphor, the digital divide affords an opportunity to identify the inequalities between the technological haves and have-nots. Because of sustained attention in the mass media, the digital divide was frequently on the agenda of social, political, and scholarly discussions.

Previous research on the digital divide focused on inequities in the *access* to and *use* of digital technologies (Bucy, 2000; Hargittai & Hinnant, 2008; Jung, Qiu, & Kim, 2001; Norris, 2001; van Dijk, 2002), which have been called the first- and the second-level digital divides (Attewell, 2001; Hargittai, 2002, 2004; Natriello, 2001). As the Internet has become increasingly widespread in the world, some researchers suggested a conceptual shift of the digital divide from material access to actual use (Gunkel, 2003; Livingstone & Helsper, 2007; Selwyn, 2004). Although this shift has been incorporated into the more broad social inclusion agenda, the social consequences of the digital divide have not yet received adequate attention, especially empirical investigation. So far, the question of exactly what benefits Internet use brings has not been resolved, and “too often it is simply assumed that being online is necessarily a ‘good thing’” (Livingstone & Helsper, 2007, p. 673).

Recognizing that political knowledge is a critical social resource associated with power and inclusion, this study aims to empirically examine the effect of Internet use on people’s acquisition of political knowledge. Current literature in the knowledge gap research has established a relationship between selective exposure to the media and the gaps in knowledge (Drew & Weaver, 2006; Eveland, Shah, & Kwak, 2003; Prior, 2005; Tichenor, Donohue, & Olien, 1970). Yet few studies compare the differential effects between new media and old media use on knowledge gain. Against this backdrop, the present research tries to, from a digital divide perspective, shed some light on how different levels of new media and old media use influence the knowledge gap.

Specifically, this research first compares Internet access and Internet use concerning their associations with users’ socioeconomic status (SES) to seek some empirical evidence for the proposed conceptual shift of the digital divide. The authors then compare the use of the new media and old media in their relationships with status indicators, with a goal to reveal the difference between the nature of new media and old media use. Based on such

difference, this study finally compares the impacts of new media and old media use on the knowledge gap. As information use is the very type of media use that is directly associated with political knowledge (Drew & Weaver, 2006; Eveland et al., 2003; Kim, 2008), this study focuses on the informational use of both new media and old media.

## FROM ACCESS TO USE

The concept of the digital divide was originally defined as a gap between those who have access to digital technologies and those who do not (National Telecommunications and Information Administration, 1998; Selwyn, 2004). A decade of digital divide research reveals that access is associated with age (Loges & Jung, 2001), gender (Wilson, Wallin, & Reiser, 2003), education (Bucy, 2000), income (Rice & Haythornthwaite, 2006), ethnicity (Hoffman, Novak, & Scholsser, 2001; Jones, Johnson-Yale, Millermaier, & Perez, 2009), and geography (Hindman, 2000; Wei & Zhang, 2008a). This was a legitimate focus of inquiry in the early phases of Internet diffusion and contributed to our understanding of the digital inequality.

As more and more people have gone online and started using the Internet for an increasing number of activities, researchers have begun to reconsider the notion of the digital divide. Some scholars offered a refined understanding by seeing the digital divide as a complex and dynamic phenomenon that is essentially multifaced (van Dijk, 2002; van Dijk & Hacker, 2003). Kling (1999) classified access into technical access (the physical availability of technology) and social access (the mix of professional knowledge, economic resources, and technical skills required for effectual use of technology). Attewell (2001) pointed to divides at two levels: the "first digital divide" that refers to the differential access to computers and the Internet, and the "second digital divide" that includes the disparities in computer and Internet use. Hargittai (2002) suggested a similar differentiation between access and ability to use as the first-level and "second-level digital divide."

No matter what terminology was used, the research agenda have shifted substantially from material access to the range and quality of use, transcending simple binaries of access/no-access or use/non-use (Gunkel, 2003; Livingstone & Helsper, 2007; Selwyn, 2004). There is an ongoing consensus that simply being connected will not necessarily solve potential sources of inequality. As a most recent study found, it is the types of activities for which people use the Internet that will matter most in examining potential divides (Hargittai & Hinnant, 2008). For example, if the Internet is used as a toy rather than as a tool, it may not enhance the user's life chances (Jung et al., 2001). In fact, many researchers have observed a "usage gap"

between those who use digital technologies for information and those who use it largely for entertainment (Bonfadelli, 2002; Hargittai & Hinnant, 2008; Livingstone & Helsper, 2007; van Dijk, 2002). Although some have argued that recreational use of the Internet may have beneficial consequences (Livingstone & Helsper, 2007; Sandvig, 2001), most agree that information uses are more preferable because they are more likely to increase the user's political knowledge, participation, life chances, and social inclusion (Clark, 2003; Hargittai & Hinnant, 2008; Warschauer, 2003).

The next question, therefore, is how to understand the "second-level digital divide" as compared to the first level. Research shows that social status continues to matter. Howard, Rainie, and Jones (2001) found that education is positively associated with certain types of online activities, such as sending e-mail; searching for financial, political, or government information; and banking online. Madden (2003) discovered that people with higher education and household income are less likely to download music or use instant messaging but more likely to use the Internet for news, work, travel arrangement, and product information. Hargittai and Hinnant (2008) found that those with higher levels of education use the Web for more "capital-enhancing" activities, including seeking political or government information, exploring career opportunities, and consulting information about financial and health services.

As the Internet has spread to the majority of the American population, the disparities in Internet access have been fading between different SES segments. Data about access statistics suggest that the digital divide has disappeared in the United States based on some of the social demographic criteria. Some researchers, for instance, found that the gender divide no longer existed in Americans' access to the Internet (Ono & Zavodny, 2003; Wasserman & Richmond-Abbott, 2005). However, when the detailed measures of Internet use were considered, scholars found that men and women have unequal exposure to the medium (Cooper, 2006; Cotten & Jelenewicz, 2006; Jackson, Ervin, Gardner, & Schmitt, 2001; Ono & Zavodny, 2003). Consequently, the shrinking of the access divide and the emergence of the "second-level digital divide" is expected to make SES a weaker predictor of material access and a stronger antecedent to the use patterns. More important, compared to the question of whether to adopt a medium, the issue of what content to use is more strongly associated with factors like interests and skills that are directly related to SES (Eveland & Scheufele, 2000; Kim, 2008). As information use is of particular concern to our examination of knowledge gap, we hypothesized the following:

- H1: SES is more closely associated with the informational use of the Internet than with the access to the Internet.

## NEW MEDIA VERSUS OLD MEDIA

Numerous studies have shown that SES is a strong predictor of the nature of media use. Although this holds true for both old and new media, such relationship could be stronger for new media.

Indeed, research found that traditional media users vary concerning what kind of content they access according to their thematic interests. For example, children from higher SES backgrounds were shown to be more likely viewers of educational television programming such as *Sesame Street* (Cook et al., 1975). Likewise, those of lower SES are more likely to focus on the sports section of the newspaper, whereas those of higher status are more oriented to the hard news sections or the opinion and analysis pages (Newspaper Association of America, 1998). In general, disparities in selective exposure, acceptance, and retention across education groups (Tichenor et al., 1970) suggest that there is a gap in the use of media content between those of low and high SES (Eveland & Scheufele, 2000).

Nevertheless, such a gap could be greater for the Internet users than for traditional media users. Although selective exposure exists among traditional media users, it is somewhat constrained by the form, structure, and content of traditional media. Newspapers, for example, provide readers with strong cues regarding the top stories of the day through headline size and prominence as well as article position and length (Graber, 1988). Television also sets audiences' agenda by cues such as the order and length of the stories as well as the times of repetition. More important, research has shown that traditional media have a relative emphasis either on news (e.g., newspapers) or on entertainment (e.g., television; Chaffee & Frank, 1996; Lee & Wei, 2008; Postman, 1986) that results in a rather homogeneous supply of content from traditional mass media. Thus, the association between selective exposure and education is, to some extent, diluted by the nature of old media. To put it simply, within a specific old medium, people do not have many choices.

In contrast to traditional mass media, the new media such as the Internet provide much more diverse content and an unprecedented level of user controllability. The content supply on the Internet is not structured by journalists and is, therefore, heterogeneous and potentially unlimited (Bonfadelli, 2002). The Internet also provides far more choices and less salience cues than do traditional forms of media. Through a comparison of the readers of the print versus the online editions of the *New York Times*, Tewksbury and Althaus (1999) found that online readers were exposed to fewer articles concerning international, national, or political issues and were less likely to attend to stories that traditionally were grouped in the front page of print newspapers. Furthermore, in comparison to the old media, effective use of the Internet requires a much more active and skilled user (Hargittai &

Hinnant, 2008; Wei & Zhang, 2008b). When all these features work together, a consequence is a greater variety of individual content-specific usage patterns, discriminated by the user's backgrounds and status (Bonfadelli, 2002; Scheufele & Nisbet, 2002).

The expansive freedom of the Internet is expected to break the shackles set by the old media and makes people's use of it largely a reflection of their content preferences and socioeconomic status. It can therefore be hypothesized that status indicators would have greater impact on the use patterns of the Internet than on those of the traditional media.

H2: SES is more strongly associated with the informational use of the Internet than with that of the traditional media.

## EFFECTS ON THE KNOWLEDGE GAP

The conceptual shift from access to use has been incorporated into the social inclusion agenda, drawing scholarly attention to the social consequences of "engagement" (or lack thereof) with information and communication technology (ICT; Livingstone & Helsper, 2007; Selwyn, 2004). As Warschauer (2003) put it,

A framework of technology for social inclusion allows us to re-orient the focus from that of gaps to be overcome by provision of equipment to that of social development to be enhanced through the effective integration of ICT into communities and institutions. (p. 14)

Knowledge gain is a critical form of social inclusion associated with differential media use. Again, it applies to both new media and old media. With a long tradition in communication research, the knowledge gap theory provides a framework for understanding the unequal distribution of knowledge. Tichenor et al. (1970) hypothesized that as mass media-information is disseminated within a social system, people with higher SES tend to acquire this information at a faster rate than people with lower SES. As a result, the gap in knowledge between these segments tends to increase (pp. 159–160).

As one of the five potential factors explained by Tichenor et al. (1970), selective exposure to traditional media contribute to the knowledge gaps between high and low SES segments of society. Drawing from the 1996 British Social Attitudes survey data, Newton (1999) found a strong association between broadsheet newspaper reading and higher levels of political knowledge, self-assessed interest, and understanding of politics

but very weak correlation between tabloid reading and both mobilization and malaise. Likewise, Holz-Bacha and Norris (2001) found that preference for public television was associated with higher levels of political knowledge, whereas preference for commercial television was associated with lower levels of knowledge. In addition, research showed that television news watching was positively related to political knowledge, whereas entertainment preference was negatively linked to knowledge (Eveland et al., 2003; Prior, 2005; Putnam, 2000). The general conclusion of this research is that informational uses of the mass media, whether reading newspapers or watching news programs, have procivic consequences (Shah, Cho, Eveland, & Kwak, 2005).

Research shows that there is a similar relationship between different Internet use and political knowledge (Drew & Weaver, 2006; Kim, 2008). More important questions, however, are how people actually use a medium and how they vary in their use of new media and old media. The answers would have something to do with the user's SES (Wei, 2009). The aforementioned stronger association between SES and Internet information use may serve as a mechanism through which new media and old media use influence knowledge gain differently. Specifically, while exposed to a particular medium, people with high SES tend to acquire knowledge at a greater rate because they are more likely to attend to information-oriented content. When the medium is a traditional one, such as newspaper or television, the relative homogeneous nature of the content supply tends to set a limit to the user's free selection. This will result in a discounted knowledge gap between SES segments. When the medium is the Internet, the heterogeneous and unlimited supply of content reduces the external influence of media form on the user's active selection. Thus, the SES-based knowledge gap is likely to be widened among Internet users than among traditional media users. As Bonfadelli (2002) argued, "In comparison to the traditional media, the Internet fosters audience fragmentation and individualized information seeking; and this could result in an increasing disintegration of individual agendas and the amount of shared knowledge" (p. 73). Consequently, the following hypothesis was formulated:

- H3: The SES-based knowledge gap is larger among Internet users than among traditional media users.

## METHOD

### Data

Data for the present study came from the advance release of the 2008–2009 American National Election Studies Panel Study. The data set includes six waves of political surveys of respondents who were U.S. citizens age 18 or



older as of Election Day. Respondents were recruited as two cohorts by random-digit-dialing methods from households with a landline telephone in all 50 states and the District of Columbia, excluding areas without electoral votes. Panelists were then invited to complete monthly surveys on the Internet. Those without Internet access were offered a free Web appliance, MSN TV 2, and free Internet service for the duration of the study. A total sample of 3,049 adults were surveyed in January, February, June, September, October, and November 2008. The first cohort joined the study by January, and the second was added in September.

This study used Wave 9 and Wave 11 for hypotheses testing because of three considerations: (a) the second cohort was added in Wave 9, resulting in substantially more cases in the subsequent data set; (b) Wave 9 contained adequate measures of media use variables, whereas Wave 11 had the most comprehensive measures of political knowledge; and (c) the panel data of these two waves allowed us to detect possible causal relationship between media use and political knowledge.

## Measures

*Political knowledge.* Twelve items in Wave 11 survey asked respondent's political knowledge. Six of the questions were concerned with background knowledge about two presidential candidates. For instance, "What state does U.S. Senator John McCain represent in Congress?" The other 6 questions asked respondents' knowledge about the U.S. political system, such as "How many U.S. Senators are there from each state?" The full list of questions and exact question wording were presented in the appendix. Correct answers were coded as 1 and other answers were coded as 0. All 12 items were summed to create an index of political knowledge, with an alpha of .86.

*The access to the Internet.* Internet access was measured by a single yes-or-no question: "Do you have Internet access at home?" Responses were measured on a dichotomous scale with 1 representing yes and 0 representing no.

*The informational use of media.* Four questions were asked about respondent's informational use of media. Specifically, respondents were asked, during a typical week, how many days do they (a) watch news on TV, (b) listen to news on the radio, (c) watch or read news on the Internet, and (d) read news in a printed newspaper, not including sports? Responses were measured on a 0- to 7-point scale.

**SES.** As in most knowledge gap literature, SES was indicated by respondent's formal education. It was measured on a 1- to 14-point scale from no schooling completed to professional or doctorate degree.

**Demographic variables.** Suggested by previous studies (see Delli Carpini & Keeter, 1996; Eveland & Scheufele, 2000; Verba, Burns, & Schlozman, 1997), several demographic variables play a key role in predicting media use and political knowledge. Specifically, age, gender (dummy-coded male), race (dummy-coded White), income (a 1- to 9-point scale representing nine ranges from the lowest [less than \$5,000] to the highest [\$175,000+]), and party identification (a 1- to 3-point scale from Democrat to Independent and to Republican) were used as controls. Descriptive statistics of all variables and their bivariate correlations are shown in Table 1.

Statistical Procedures

A multivariate regression was performed with access to and informational use of the Internet as criterion variables and demographics as predictor variables. As access and use were measured on different scales, they were transformed into *Z* scores before entering into the model. To statistically compare education's relationships to Internet access and use, an *F* test was then carried out to test the significance of the difference between coefficients across models. Similar procedures were used to compare the associations between education and the informational use of different media. Stata Special Edition 10 was used to conduct data analysis due to its advantageous capacity in the test of coefficients across different models.

TABLE 1  
Descriptive Statistics and Intervariable Correlations

Variables	M	SD	1	2	3	4	5	6	7	8	9	10	11
1. Education	10.89	1.69	1										
2. Male	.46	.50	.05	1									
3. Age	50.82	15.46	-.02	.09	1								
4. White	.80	.40	-.08	-.03	.11*	1							
5. Income	4.75	2.43	.41***	.04	-.01	.08	1						
6. Party	1.87	.92	-.14*	.06	.03	.16*	.13	1					
7. Internet	3.32	2.67	.17***	.11*	-.07***	.03	.13*	.03	1				
8. Television	4.88	2.25	-.08	.02	.36***	.07	-.03	.06*	.06**	1			
9. Newspaper	3.41	2.82	-.03	.08	.37***	.03	.05	.00	.03	.28***	1		
10. Radio	3.30	2.56	.08	.08	.07**	.00	.05	.02	.19***	.14***	.14***	1	
11. Knowledge	5.95	3.26	.16**	.11*	.13***	.08	.18***	.04	.12***	.06**	.10***	.07***	1

\**p* < .05. \*\**p* < .01. \*\*\**p* < .001.

Multiple regression analysis was performed to examine the effects of media use on knowledge gaps. Tichenor et al. (1970) argued that both longitudinal and cross-sectional data are appropriate for testing knowledge gap hypotheses. This study used the technique of statistical interaction between education and a news media use variable to test the equality of relationship between education and knowledge at different levels of media use. Such technique was first used by McLeod, Bybee, and Durall (1979), and later applied by more researchers (e.g., Eveland, 1997; Eveland & Scheufele, 2000; Kim, 2008; Kwak, 1999). If the interaction term is positive and significant, it indicates a stronger association between education and knowledge for those high in media use than for those low in media use. More important, given the individual-level measure of media use, this technique allows us to detect potential differences in knowledge gaps across different media (Eveland & Scheufele, 2000), a focus of the current study. Specifically, demographic variables were entered as the first block, followed by the four interaction terms as a second block. Comparisons can be made between interaction terms based on their standardized regression coefficients.

RESULTS

H1 predicts that SES is more closely associated with the informational use of the Internet than with the access to the Internet. As shown in Table 2, education, a surrogate of SES, is indeed more strongly associated with the informational use of the Internet ( $B = .22, p < .01$ ) than with the Internet access ( $B = .01, ns$ ), and the difference between these two coefficients is

TABLE 2  
Multivariate Regression Predicting Internet Access and Use

<i>Independent/Dependent</i>	<i>Internet access</i> b (SE)		<i>Internet info use</i> b (SE)		F
Education	.01	(.01)	.22**	(.08)	6.56*
Male	.05	(.03)	.48	(.26)	2.77
Age	-.002*	(.001)	-.01	(.01)	.34
White	.08*	(.04)	.16	(.33)	.07
Income	.20***	(.04)	.39	(.33)	.34
$R^2$	.13		.05		
F	10.93***		3.60**		

Note.  $N = 385$ .  $B$  is the unstandardized regression coefficient with standard error in the parentheses. Data were from Wave 9.

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

statistically significant,  $F(1, 379) = 6.56, p < .05$ . Differences between coefficients of other demographic variables are not statistically significant across models. This lends support to H1.

H2 states that SES is more strongly associated with the informational use of the Internet than with that of the traditional media. Results in Table 3 demonstrate that education is a stronger predictor of the informational use of the Internet ( $B = .20, p < .05$ ) than that of television ( $B = -.10, ns$ ), newspaper ( $B = -.10, ns$ ), and radio ( $B = .12, ns$ ). The coefficient for Internet is significantly different from that for television,  $F(1, 400) = 9.00, p < .01$ , and newspaper,  $F(1, 400) = 7.19, p < .01$ , but not from radio,  $F(1, 400) = .59, ns$ . This indicates that the relationship between SES and the informational use of the Internet is at least stronger than those between SES and the two most popular forms of traditional media. Thus, H2 is partly supported.

H3 is that the SES-based knowledge gap is larger among Internet users than among traditional media users. Figure 1 graphs the interaction effects of news media use and education on political knowledge. It is shown that, when the informational use of the Internet increases, people with higher levels of education tend to learn a lot more than less educated people, widening the gap between different SES groups. The difference in knowledge between low and high education groups among heavy Internet users is 3.41, but among light Internet users the value is only 0.36. The change in knowledge difference is 3.05. This gap-widening tendency is somewhat replicated in the plot of newspaper use but with a smaller change in knowledge difference—only 1.97. The interaction effects were not found for informational use of television and radio, according to the figure.

TABLE 3  
Multivariate Regression Predicting the Informational Use of Different Media

<i>Independent/Dependent</i>	<i>Internet</i> <i>B (SE)</i>	<i>Television</i> <i>B (SE)</i>	<i>Newspaper</i> <i>B (SE)</i>	<i>Radio</i> <i>B (SE)</i>
Education	.20* (.08)	-.10 (.07)	-.10 (.08)	.12 (.09)
Male	.53* (.25)	.00 (.22)	.27 (.26)	.41 (.26)
Age	-.01 (.01)	.04*** (.01)	.05*** (.01)	.01 (.01)
White	.21 (.33)	.13 (.28)	-.23 (.33)	.01 (.34)
Income	.40 (.33)	.01 (.28)	.50 (.33)	.12 (.34)
$R^2$	.04	.09	.11	.02
$F$	3.56**	7.52***	9.66***	1.61

*Note.*  $N = 408$ .  $B$  is the unstandardized regression coefficient with standard error in the parentheses. Data were from Wave 9.

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

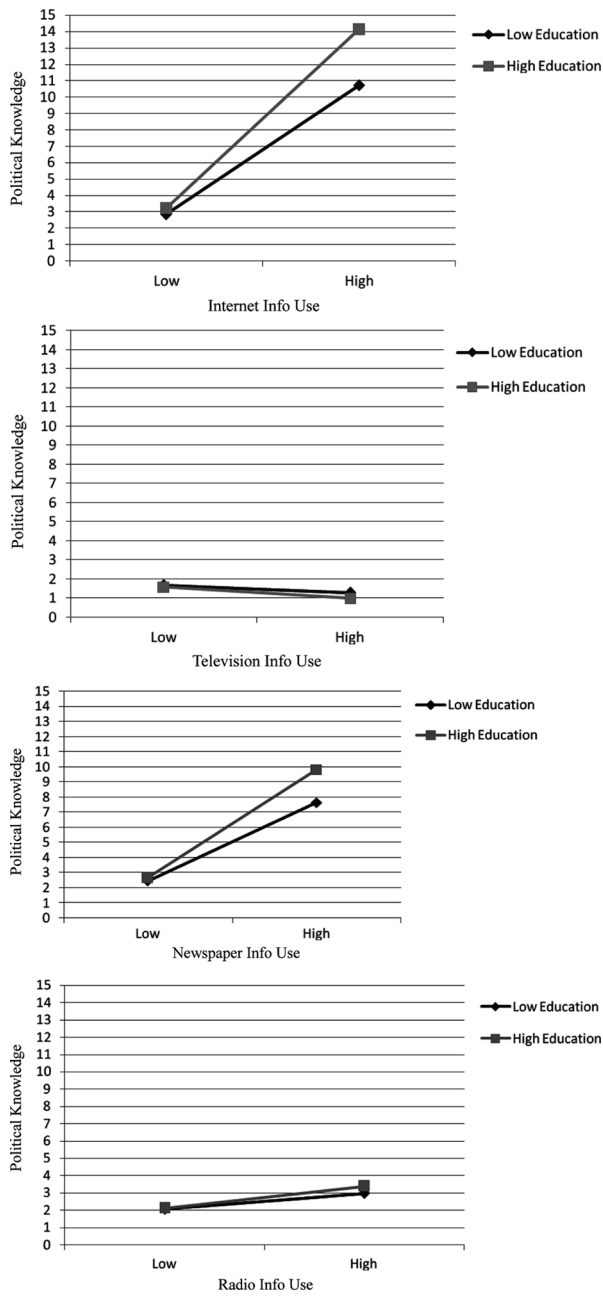


FIGURE 1 Interaction effects of education and media info use on political knowledge.

TABLE 4  
Predicting Political Knowledge

<i>Variable</i>	<i>Model 1 <math>\beta</math></i>	<i>Model 2 <math>\beta</math></i>
Block 1		
Male	.09	.07
Age	-.02	-.06
White	.06	.04
Education	.05	-.02
Income	.21**	.17*
Democrat–Republican	.10	.11
Block 2		
Internet $\times$ Education		.16*
Television $\times$ Education		-.01
Newspaper $\times$ Education		.10
Radio $\times$ Education		.02
$R^2$	.08	.11
$F$	2.87*	2.37*

*Note.*  $N = 207$ . Data for all independent variables were from Wave 9, and data for dependent variable were from Wave 11.

\* $p < .05$ . \*\* $p < .01$ .

Table 4 presents the multiple regression results illustrated in the figure. Based on the standardized regression coefficients in Model 2, the interaction term of education and the informational use of the Internet is the strongest and the single significant predictor of political knowledge ( $\beta = .16, p < .05$ ). None of the interaction terms with traditional media is statistically significant. This indicates that the education-based knowledge gap is greater among those who have different levels of Internet information use than among those who have different informational use of the traditional media. H3 is therefore supported.

## DISCUSSION

This study compares Internet access and Internet information use regarding their relationships with the user's socioeconomic status. Results show that education, a surrogate of SES, is more closely associated with the informational use of the Internet than with the access to the Internet. Moreover, education is the only demographic factor that makes a difference in predicting Internet access and information use. This indicates that the usage divide is more evident between SES segments than is the access divide of the Internet.

This finding empirically supports the shift of public debate and academic agenda from Internet access to Internet use. As disparities in actual use

patterns of the Internet are more pronounced between social strata than gaps in technological access, the so-called second-level digital divide deserves more scholarly attention and public concern. In comparison to access, the quality and quantity of Internet use is a more critical source of digital inequality as the Internet becomes increasingly widespread. Perhaps the digital divide should be defined as the “gap between those who can effectively *use* new information and communication tools, such as the Internet, and those who cannot” (Benton Foundation, 2001, p. 1). Or as Gunkel (2003) argued, the term digital divide “is originally and persistently plural” (p. 504). On one hand, there is a constellation of digital divides that represent various social, economic, and technological inequalities and discrepancies. On the other hand, this term is “a moving target” (Compaine, 2001, p. 5) that changes denotations at different times and in different contexts.

Another finding is that SES is more strongly associated with the informational use of the Internet than with that of the traditional media (newspaper and television in particular). The higher the individual's SES, the higher his or her level of informational use. This relationship is stronger for Internet users than for the traditional media users, resulting in more fragmented use patterns on the Internet.

The stronger association between SES and Internet use warns that the digital inequality is more severe than its analog counterpart. Although traditional media are attended to differently by different SES segments, such discrepancy is more apparent among Internet users. The ease of access to the Internet is exactly the facilitator that reinforces social stratification in the cyberspace. Although enthusiasts predict that widespread Internet access would reduce inequality by lowering the cost of information and empower those underprivileged (Anderson, Bikson, Law, & Mitchell, 1995), this finding supports the pessimistic view that increasing internet penetration will exacerbate rather than reduce inequalities (Kim, 2008; Livingstone & Helsper, 2007; Scheufele & Nisbet, 2004). Entering into the cyberspace is only the first step of digital inclusion. What content to use and how to utilize the power of the Internet would be more important questions.

So what? The final contribution of the present research is to provide an answer to this question. As Selwyn (2004) noted, much contemporary debate over the digital divide focuses solely on the means, rather than the ends, of the use of ICT. The consequence of accessing and using ICT remains a “fundamental yet often unvoiced element of the digital divide debate” (Selwyn, 2004, p. 349). Comparing the effects of new media and old media uses on knowledge gain, this study discovered that the differential use of the Internet is associated with a greater knowledge gap than that of the traditional media. This suggests that the “digital divide” deserves more attention than the “analog divide” not only because the new media are

digitally different from the old media but also because the new media exacerbate the status-reinforcing qualities of traditional media.

The digital divide *does* matter more in the sense that it accentuates and extends gaps in political knowledge that have long been observed to result from traditional media use. As inequalities in knowledge tend to lead to exclusion from social resources and inequalities in political participation and social power (Delli Carpini & Keeter, 1996; Nadeau, Nevitte, Gidengil, & Blais, 2008; Verba et al., 1997), the findings reported here empirically support the assumption that the digital divide has serious implications for democratic institutions. As Norris (2001) argued, the Internet may function to reinforce inequalities of power and knowledge, producing deeper gaps between the information rich and poor, and between the activists and the disengaged. This is probably why Castells (2002) pointed out that digital exclusion is one of the most damaging forms of exclusion in our society.

This study has several limitations. First, information use variables were measured by simple exposure, which is not an ideal way to capture media use. In addition to exposure, how much attention respondents paid to specific media content should be included. Second, the number of valid cases in the longitudinal analysis was relatively small ( $N = 207$ ). Although some statistically significant relationships were established based on this small sample, a bigger sample size is needed to detect more effects of scientific significance. Finally, the data set used in this study is an advance release. Therefore, the findings have to be interpreted with caution.

Overall, this study contributes to the digital divide and knowledge gap literature by comparing access versus use and new media versus old media. As access to the Internet approaches universality, the digital divide can be better defined as inequalities in the meaningful use of information and communication technologies. This inequality is more pronounced among Internet users with different SES than among traditional media users. More important, panel data reveal that the digital inequality matters more than its analog counterpart in that it leads to a greater knowledge gap.

The policy implication of this study is that public policy should follow the conceptual shift of the digital divide. As the UK government wisely predicted, although encouraging those unconnected onto the first rung of the Internet ladder will still be important in the next few years, "for individuals to fully realize the benefits of the Internet we must help them move up the ladder" (Office of the e-Envoy, 2004, p. 11). In addition to the provision of basic access, fostering more advanced uses that enhance life chances and social inclusion would be a more significant challenge to guide future policy. Besides general education, training programs that aim to improve people's cognitive skills and Internet literacy will be possible ways to reduce the digital inequality.



Future research should continue to examine the social consequences of the digital divide, or a better term, the digital inequality. Possible aspects of the consequences would include people's economic production, political participation, social interaction, and other facets of individuals' and communities' "social quality" (Selwyn, 2004).

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## APPENDIX

### Question Wording

#### *Political knowledge*

Next are some questions to help us see how much information about politics gets out to the public. Please answer these questions on your own, without asking anyone or looking up the answers. Many people don't know the answers to these questions, but we'd be grateful if you would please answer every question, even if you're not sure what the right answer is.

What state does U.S. Senator John McCain represent in Congress?

- ☐ Arizona [1]
- ☐ Colorado [2]
- ☐ New Hampshire [3]
- ☐ New Mexico [4]

What state does U.S. Senator Barack Obama represent in Congress?

- ☐ Illinois [1]
- ☐ Michigan [2]
- ☐ Indiana [3]
- ☐ New Jersey [4]

What is Barack Obama's religion? Is he Christian, Jewish, Muslim, Buddhist, or not religious?

- ☐ Christian [1]
- ☐ Jewish [2]
- ☐ Muslim [3]
- ☐ Buddhist [4]
- ☐ not religious [5]

What is John McCain's religion? Is he Christian, Jewish, Muslim, Buddhist, or not religious?

- ☐ Christian [1]
- ☐ Jewish [2]
- ☐ Muslim [3]
- ☐ Buddhist [4]
- ☐ not religious [5]

Before he was elected to the U.S. Congress, where did Barack Obama work?

- ☐ A state legislature [1]
- ☐ The U.S. military [2]
- ☐ An oil company [3]
- ☐ A television station [4]

Before he was elected to the U.S. Congress, where did John McCain work?

- ☐ A state legislature [1]
- ☐ The U.S. military [2]
- ☐ An oil company [3]
- ☐ A television station [4]

Do you happen to know how many times an individual can be elected President of the United States under current laws?

For how many years is a United States Senator elected—that is, how many years are there in one full term of office for a U.S. Senator?

How many U.S. Senators are there from each state?

For how many years is a member of the United States House of Representatives elected—that is, how many years are there in one full term of office for a U.S. House member?

According to federal law, if the President of the United States dies, is no longer willing or able to serve, or is removed from office by Congress, the Vice President would become the President.

If the Vice President were unable or unwilling to serve, who would be eligible to become president next? (The Chief Justice of the Supreme Court, the Secretary of State, or the Speaker of the House of Representatives/The Speaker of the House of Representatives, the Secretary of States, or the Chief Justice of the Supreme Court)?

- ☐ Chief Justice of the Supreme Court
- ☐ Secretary of State
- ☐ Speaker of the House of Representatives

What percentage vote of the House and the Senate is needed to override a Presidential veto? (A bare majority, two-thirds, three-fourths, or ninety percent/Ninety percent, three-fourths, two-thirds, or a bare majority)?

- ☐ A bare majority
- ☐ Two-thirds
- ☐ Three-fourths
- ☐ Ninety percent