NEW SOCIAL SURVEY PERSPECTIVES ON THE DIGITAL DIVIDE

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ABSTRACT

Most studies of the digital divide are concerned with the simple criterion of access, usually in the convenient locale of one's home. That divide could be exacerbated by usage differences after such access has been achieved, however. This article takes advantage of usage data from the General Social Survey and other surveys to examine whether more highly educated respondents also have such advantages in usage processes after access has been achieved. Education has emerged from the NTIA and other national surveys as a more important multivariate predictor than income.

Using a framework developed by DiMaggio and Hargittai (2001), it is found that college-educated respondents possess clear advantages over high-school educated respondents in using the Internet to derive occupational, educational and other benefits. The clearest advantage appears in terms of the types of sites visited, uses made and political discussion. Here, multivariate evidence shows that education—and occasionally income, age and marital status—is associated with consistently more long-term uses related to enhanced life chances via work, education, health or political participation; education is also related to less use for simple, short-term, entertainment or personal purposes. The advantages to the college educated are also evident in their keeping in contact with a wider range of friends and relatives, particularly by email. On the other hand, in several areas (e.g. search strategies employed; receiving assistance from relatives) little gap by education exists.

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Much has been written about the "digital divide," the gap between societal *haves* and *have-nots* in their access to the powerful new information technologies, particularly as embodied in the Internet (e.g., Norris 2001; Wilhelm 1999). Originally coined to convey the gap in access in found in government surveys conducted by the National Telecommunication and Information Administration (NTIA 1995; 1997; 1999; 2000; 2002), the term, has spawned a great deal of policy and academic controversy. Digital divide implies that significant minorities of the population are effectively denied access to a technology that, like other public facilities like libraries and superhighways, is thought to be open to anyone.

In this article, results from some recent surveys are reviewed to add broader perspectives on the nature and trends in this form of information inequality. Main evidence comes from the General Social Survey (GSS), which in years 2000 and 2002 contained an Internet module of up to 20 minutes worth of information on respondents' use of the Internet. Respondents were asked not only about their Internet access, but also about what sites they visited, how they drew on their social networks for assistance, their skills and information about how to use the Internet, and how the Internet fit into their usage of previous news media and other sources of information. The analytic value of the GSS lies in the quality of its sample (more than 2500 respondents interviewed in person each year, with a response rate above 70%) and the comprehensiveness of its data, in which time-series data on hundreds of social-trend questions have been asked since 1972. In addition, results from the original NTIA surveys and other surveys are cited to provide additional context on which information gaps do and do not exist.

Earlier Divides: First, some historical perspective is needed about information divides in American society that have existed long before the Internet came into existence. Indeed, one of the most often replicated results in the social science literature is known as "the increasing knowledge gap hypothesis" (Gaziano 1993; Tichenor et al. 1969; Robinson 1967), which postulates that information media almost invariably increased the gap between the information *haves* and *have-nots*. One of the first studies to document the effect was the 1947 "Cincinnati experiment," in which that city was targeted as a testing ground to find ways of increasing public information about the United Nations. After an intensive six-month multimedia campaign, however, the proportion of residents who were familiar with the UN was unchanged from prior to the campaign. Those who were already informed did become better informed, but the have-nots remained have-nots (Hyman and Sheatsley 1950).

A more recent and familiar example concerns the highly popular children's TV program, *Sesame Street*, created to reduce the gap in preschool children's academic ability and skills using the power of public television to reach all segments of the population. Once again, however, watching *Sesame Street* was found to increase the preschool knowledge of middle-class children

more than that of the working-class children it was intended to help (Cook et al. 1975). More recently, TV news programs have been found to inform already informed viewers more than those who are less informed (Robinson and Levy 1986).

Thus, it is little surprise to find that the already information rich were most likely to be found cruising the new low-cost information superhighway, and the major beneficiaries of the Internet's information potential. Nor is it surprising that the demographic factor most related to information acquisition in general, namely education, is the factor most related to access to the Internet in the NTIA studies. Much has been written about the dramatic differences in access by income, including the assumption that lack of income is the most important factor in limiting access, because of the relatively expensive technological equipment involved. Multivariate analysis of the NTIA data, however, demonstrates that education, not income, best predicts whether someone is online (Table 1). There it can be seen that the average highest-minus-lowest difference across rows (income) is 32 percentage points, compared to 56 points down the highest-minus-lowest columns (education) for the population group aged 18-64; that conclusion is reinforced by the MCA regression results in Appendix Table 1. The same patterns emerge from the GSS data described below. Thus the Internet is an information medium that requires education to recognize and realize its full potentials; income is an important predictor but secondary to the related factor of education.

Because education is the main predictor of access, then, the following analyses focus on education. Specifically, the research question is whether one finds GSS education differences in the dynamics of how the Internet is used on a day-to-day basis—as well as on simple access to the technology. Do these usage differences serve to exacerbate the digital divide education differences found in access in Table 1?

DiMaggio and Hargittai (2001) identified five dimensions of Internet use that they posited would influence the benefits that users derive from the medium:

1. The quality of equipment used for access;
2. The user's autonomy in ability to access it;
3. The navigational skills needed to understand how to use the complex Web of information stored on the Internet;
4. The social support networks that inform some users to become more familiar with its potentials, and finally;
5. The types of sites the user visits while online.

In the analyses that follow, recent survey measures of these factors are correlated with respondent education to examine the degree to which education shapes not only access, but also use of the Internet. After describing the survey methodology employed to collect data for the GSS Internet module, differences are

TABLE 1: DIFFERENCES IN INTERNET ACCESS BY EDUCATION AND INCOME

Main Statistics							
		INC					
Cells contain: -Means -N of cases		1 less than 20,000	2 20,000 To 34,999	3 35,000 To 49,999	4 50,000 To 74,999	5 more than 75,000	ROW TOTAL
EDUC	1: less than high school	.12 3,701	.20 2,458	.28 1,360	.38 1,001	.49 641	.22 9,161
	2: high school	.28 4,456	.41 5,776	.52 4,604	.61 5,189	.71 3,983	.50 24,008
	3: some college	.57 2,843	.63 3,990	.71 4,084	.77 5,619	.84 5,708	.73 22,244
	4: college graduate	.67 691	.79 1,438	.84 1,907	.88 3,340	.92 5,987	.87 13,363
	5: graduate school	.76 217	.80 403	.86 635	.91 1,436	.93 3,915	.90 6,606
COL TOTAL		.33 11,908	.48 14,065	.62 12,590	.73 16,585	.84 20,234	.63 75,382

SOURCE: YEAR 2001 (NTIA DATA)
[NOTE: SEE APPENDIX: 1 MCA/ANOVA DATA]

reported first, in bivariate form and, second, using MCA correction to control for a number of other demographic attributes of the GSS respondents.

SURVEY METHODOLOGY

Field procedures: The year 2000 and 2002 GSS surveys were conducted as personal in-home interviews that took about 90 minutes to complete with national probability samples of 2363 and 2784 respondents aged 18 and older. At each selected household, one adult person was interviewed at random. Interviewing took place between February and June of each year. The GSS survey, which has been conducted at one-to-two year intervals since 1974 by the National Opinion Research Center (NORC) at the University of Chicago, is generally considered the premier social science instrument for monitoring social life and trends in the United States.

Sampling: Like its predecessors, the 2000 national probability sample was selected in two major stages, with Primary Sampling Units (PSUs) consisting of one or more counties selected at the first stage and segments consisting of one or more blocks selected at the second. The sample included 100 first-stage selections.

The PSUs consisted of metropolitan areas or non-metropolitan counties. Prior to the PSU selection, the United States was divided into 2,489 PSUs; the PSUs were then sorted into strata. The major strata again grouped metropolitan and non-metropolitan PSUs within each of the four Census regions. The non-metropolitan PSUs were further sorted by state; then, within state, by percent minority; and, finally, within populations consisting of minority group members. This sorting encompassed everyone but non-Hispanic Whites. The metropolitan PSUs were sorted by Census division, minority quartile and per-capita income. The sample PSUs were selected using systematic selection, with the selection probability for a PSU proportional to the number of housing units.

The second-stage sampling unit in the year 2000 GSS national sample was again the segment, consisting of one or more adjoining blocks. From three to 26 segments were selected in the 19 largest PSUs ; in each of the remaining 81 sample PSUs, three segments were selected. All told, the national sample includes 384 second-stage selections.

About five housing units per segment were selected. Because the sample is a clustered one, then, the effective sample size is lower than the number of respondents actually selected. Because the year GSS instruments were subdivided into six versions spread across segments, the design effect was much lower than if all respondents in a segment answered the same version.

Interviewer training and interviewer procedures: The interviews were conducted by professional interviewers hired and trained by the National Opinion Research Center NORC. In addition to having participated in a 2 to 3 day general training session before being hired as interviewers, these NORC interviewers went through a mailed training session focusing on the various goals and modules of the year 2000 GSS. To boost response rates, interviewers made repeat visits to households at which no one was home, or the designated household respondent was not available. Enough repeat call-backs were made to such households that the main form of non-response was respondent refusal. Interviewers were able to complete interviews with 70% of designated respondents, compared to earlier GSS response rates that exceeded 75%.

Questionnaire: Five of the six different versions or ballots in the year 2000 GSS, except ballot 3 (n=454), contained some Internet questions. That left 2363 respondents eligible for the Internet module questions on the remaining five ballots, with each ballot representing a separate (and minimally clustered) random sample of the country. All questions about basic or core email and World Wide Web usage were asked of all 2363 respondents across each of the five

ballots. In year 2002, all respondents were asked the core Internet questions, with a little more than half asked the remaining questions. Further details can be found in Kestnbaum et al. (2002).

Adults: The full-probability GSS samples used since 1975 are designed to give each household an equal probability of inclusion in the sample. Thus for household-level variables, the GSS sample is self-weighing. In those households which are selected, selection procedures within the household give each eligible individual equal probability of being interviewed. The GSS does not calculate any post-stratification weights to adjust for differences in respondent factors with U.S. Census Bureau figures.

NTIA and UCLA Surveys: More limited use is made below of data from two other surveys. The first is the 2001 NTIA survey conducted by the U.S. Bureau of the Census, as part of its August CPS survey, which includes all family members over age 3 in samples of almost 50,000 households with response rates above 75%; procedures are described in NTIA (2002). The second is the year 2000 UCLA study, a national RDD telephone survey conducted with over 2000 respondents in the spring of that year (further details can be found in Cole and Robinson 2002).

RESULTS

1) Equipment: Although the GSS surveys did not ask questions about equipment, the 2001 NTIA study did ask about access to broadband among Internet users. Broadband, an "always-on" function, is thought to make access easier and less restrictive and its greater connection speed allows dramatically faster processing of online information. Table 2 parallels Table 1 in showing access to broadband by both education and income for those with Internet access in the NTIA study. In contrast to Table 1, Table 2 shows few dramatic differences by either education or income. Indeed, the only significant difference is found in the most affluent income category of over $75,000 household income (across all education groups).

At the same time, if the analysis were to examine broadband users generally—including Internet non-users as well as users in the denominator—the results would be between those shown in Table 1 and Table 2. That is, income in this context emerges as the main predictor of broadband use overall, although education is almost as important. The importance of income probably reflects the fact that home broadband users usually must pay a monthly service fee (usually to a local telephone or cable-television company).

2) Autonomy: The GSS did include a few questions related to autonomy of use, such as whether respondents had access at work, at others' homes or libraries, as well as at home. Here again, the college-educated possess the advantage of access

TABLE 2: DIFFERENCES IN BROADBAND ACCESS BY EDUCATION AND INCOME

Main Statistics		INC					
Cells contain: -Means -N of cases		1 less than 20,000	2 20,000 To 34,999	3 35,000 To 49,999	4 50,000 To 74,999	5 more than 75,000	*ROW TOTAL*
EDUC	1: less than high school	.15 450	.12 610	.12 552	.16 490	.20 421	*.15* *2,523*
	2: high school	.14 1,015	.13 2,272	.13 2,506	.16 3,488	.21 3,193	*.16* *12,474*
	3: some college	.17 1,227	.14 2,098	.16 2,714	.18 4,247	.23 4,926	*.19* *15,212*
	4: college graduate	.17 369	.15 897	.17 1,399	.18 2,705	.26 5,393	*.22* *10,763*
	5: graduate school	.12 126	.11 282	.13 475	.17 1,229	.25 3,533	*.21* *5,645*
	COL TOTAL	*.16* *3,187*	*.13* *6,159*	*.15* *7,646*	*.17* *12,159*	*.24* *17,466*	*.19* *46,617*

SOURCE: NTIA 2001 DATA
[NOTE: SEE APPENDIX: 2 MCA/ANOVA DATA]

TABLE 3: DIFFERENCES IN AUTONOMY AT WORK

Frequency Distribution		Q82				
Cells contain: -Column percent -N of cases		1 3-5	2 6-7	3 8	4 9-11	*ROW TOTAL*
Q64	1: Closely	28.7 29	19.9 30	21.5 34	10.8 9	20.7 102
	2: Somewhat	22.8 23	27.2 41	27.8 44	34.9 29	27.8 137
	3: Not At All	48.5 49	53.0 80	50.6 80	54.2 45	51.5 254
	COL TOTAL	100.0 101	100.0 151	100.0 158	100.0 83	100.0 493

SOURCE: UCLA 2000 DATA

from multiple sources, as well as the advantage of more computers with Internet access in the home.

To examine access at work, the 2000 UCLA national survey asked respondents who had connections at work how closely their employers monitored their usage. As shown in Table 3, less educated workers were significantly more likely to say their use was monitored "very closely." At the same time, there were no education differences in the near majority who said their use at work was not monitored at all.

3) Skills: With regard to the (third) aspect of navigational skills, Table 4 shows the diversity of strategies used by GSS respondents to access Web sites. The most popular way is to use a direct link from the home page (used about 55% of the time), and the second most popular is to type in the address itself (51%) and then to use a search engine (46%). The use of either these two most popular strategies does not consistently or notably differ by education. (It is possible of course that the specific search engine used may vary by education, but this cannot be determined from the available data.) For the next most popular strategy of using bookmarks (37%), however, college graduates are 10 points more likely to use them than the high-school educated; this strategy gained most popularity between 2000 and 2002. With regard to the final two strategies, selecting options from directories (27%) and using hyperlinks (30%), no education differences are again found. As summarized in the last row then, differences in diversity of strategies is not related to education.

Table 5 shows breakouts by education for two relevant skill questions— self-proclaimed ability to learn about software and knowledge of Internet terminology. In (a) looking for online help and (b) using manuals, the more educated do have an advantage over the less educated. More than 75% of college graduates consult online help compared to only 49% of those Internet users with less than a high school degree; for using manuals, the figures are 80% vs. 54%. The "high school incomplete" group is more likely to call the software company for help (c) or consult someone at work for help (d). They are no less likely to ask nonworking colleagues than the college-educated (e), nor are they much less likely to pay someone for help or to say that try to figure software problems out themselves (f, g).

The row labeled *Internet Term Familiarity*, shows differences on familiarity and knowledge questions about specific Internet terms like mp3, e-zines or search engines. While college graduate users scored more than 10 on a scale of familiarity with these terms, users with a high school degree or less had familiarity scores of fewer than 8 on this scale, a difference that is highly significant.

TABLE 4: ESTIMATE OF AVERAGE PERCENT USE* OF VARIOUS INTERNET NAVIGATION STRATEGIES

16. Now I'd like to ask you about how you navigate around the Web. How frequently do you use each of the following ways of getting to the site you visit?								
	High School Inc	High School Grad	Some College	College Grad	Grad School	TOTAL	2000	'02
(n=)	(61)	(195)	(315)	(215)	(188)	(974)		
a. Use a direct link from your starting page (the page that you see when you go onto the Web)	50%	59%	56%	52%	54%	55%	56%	52
b. Type (or paste in) the Web address yourself	47	54	50	52	47	51	55	51
c. Use a search engine	42	40	49	48	48	46	46	47
d. Use a bookmark	27	35	35	41	41	37	32	48
e. Go to a category directory or Web guide and select an option	27	28	28	27	23	27	29	23
f. Go from a hyperlink in another site that you are visiting	30	28	31	30	32	30	30	30
Number used	2.23	2.44	2.49	2.50	2.55	2.46		

*Based on a scale from 0%=Never to 100%=Almost always

Source: 2000 and 2002 national samples from the General Social Survey (GSS)

4) Social Support: The second part of Table 5 refers to social support (DiMaggio and Hargittai 2001), here in relation to solving software problems. In general, one does not find many education differences in this list among those who use family members for support. However, college graduates are much more likely to cite a fellow worker or supervisor as a source of support, and college graduates are as much as 10 points more likely than those with a high school education or less to cite a close personal friend or other friend as a source of support.

More generally, more educated people claim to have a broader range of social contacts than those with less education. Indeed, the data in Table 6 show that college graduates claim to have almost double the number of contacts seen during a year than those who have not completed high school, and they keep in contact with these people, either in person, by phone, by postal mail and in meetings. But the biggest difference is found in email contact, with college

TABLE 5: COMPUTER SOFTWARE SUPPORT AND INTERNET TERM FAMILIARITY BY EDUCATION

35. When you want to learn how to do something new with your software and you need advice on how to do it, which of the following do you do? (Name as many as are correct.) [PROMPT:Anything else?]					
	High School Inc	**High School Grad**	**Some College**	**College Grad**	**Grad School**
(n=)	(41)	(130)	(204)	(158)	(119)
a. Look in the online "help" provided as part of software	49%	64%	71%	74%	77%
b. Look in a printed manual, book, or CD that tells how to use the software	54	66	77	79	80
c. Call the software company to get help	24	42	45	55	48
d. Ask someone at your workplace or school for help	54	53	64	69	68
e. Ask someone else you know for help	81	86	84	80	77
f. Pay someone to help you	5	12	11	14	13
g. Figure it out yourself	78	81	91	90	87
Internet Term Familiarity	*7.6*	*8.0*	*9.8*	*10.5*	*10.2*
II. Do the people (d or e) you can ask for advice include? (Name as many as are correct):					
(n=)	(62)	(258)	(379)	(249)	(202)
a. Spouse or partner	35%	45%	45%	39%	42%
b. Son or daughter	26	38	29	24	28
c. Mother or father	31	20	22	23	21
d. Brother or sister (incl in-laws)	40	42	39	44	37
e. Other family	42	38	36	27	28
f. A teacher	20	13	23	20	30
g. A fellow student	25	11	21	22	23
h. A supervisor or trainer at work	20	40	40	53	46
i. Other co-worker	37	54	59	75	77
j. A close personal friend	67	70	70	78	80
k. Other friend or acquaintance	55	59	60	66	70
l. A librarian	10	16	19	16	21

TABLE 6: NUMBER OF SOCIAL CONTACTS BY EDUCATION

	High School Incomp.	High School Grad	Some College	College Grad	Grad School
(n=)	(597)	(1059)	(1032)	(508)	(414)
4. a. Not counting people at work or family at home, about how many other friends or relatives do you keep in contact with at least once a year?					
Number of contacts	19	23	26	35	37
b. Of these _____ friends and relatives, about how many do you stay in contact with by:					
(n=)	(613)	(1079)	(1047)	(514)	(422)
i. Seeing them socially, face-to-face	10	12	13	17	16
ii. Talking with them on the telephone	9	11	13	15	17
iii. Exchanging cards or letters through U.S. postal mail	5	8	8	12	13
iv. Seeing them at meetings or events related to church, clubs, or other groups	5	7	7	10	10
v. Communicating through electronic mail	1	3	6	10	12

graduates estimating more than five times as many people contacted than those with a high school education.

Much of that difference is due to the fact that less educated people have less access to email. Table 7 examines the estimated number of messages among users, and here the differences by education are minimal, either by messages received or sent, or in terms of personal one-to-one messages. However, the college-educated are about twice as likely to exchange emails with work or business contacts as are the high-school educated, and in the extent of contact with friends and especially group acquaintances is higher among college graduates as well. As in Table 5, in contrast, email contacts with family members are just as likely among the less educated as the more educated.

Table 8 also shows minimal difference by education in rates of making new contacts through the Internet. However, college graduates are far more likely to have met a romantic partner or coworker through the Internet than are the high-school educated. Differences in contacts with business associates, friends, neighbors and others are minimal.

5) Sites Visited: Turning to the final concern, types of sites accessed, the GSS included several questions asked in two separate series shown in Tables 9 and 10. The first asked about frequency of visits to 21 generic types of sites in the last 30 days, the second about 12 types of activities done on the Internet in

TABLE 7: NUMBER OF E-MAIL MESSAGES BY EDUCATION

	High School Incomplete	High School Grad	Some College	College Grad	Grad School
(n=)	(50)	(178)	(306)	(215)	(178)
14 Thinking now about all your home, work or other computer sites					
a. About how many email messages do you send from all these computers on an average day?	10	7	9	15	13
b. About how many of these _____ messages are personal one-to-one, rather than sent to members of a group or e-list?	8	5	5	9	8
c. About how many messages do you receive on all these computers on an Average day?	28	20	22	25	26
d. About how many of these _____ messages are personal one-to-one, rather than ones you receive as a member of a group or e-list?	11	9	8	11	13
Do any of the personal one-to-one messages you receive or send come from:					
e. People at your workplace	20%	33%	47%	52%	60%
f. Business or work contacts away from your workplace	24	34	45	58	60
g. Family members who live with you	22	21	17	23	25
h. Other family members	72	74	72	77	77
i. Friends	74	84	86	90	90
j. Members of your church	2	18	20	18	20
k. Members of other groups or associations to which you belong	22	33	39	52	58

the previous year on a simple "yes-no" basis. The correlations in the final columns of Tables 9 and 10 summarize the extent to which the respondents' education predicts more frequent visits to that site or more frequent uses made.

TABLE 8: SOCIAL INTERNET CONTACT BY EDUCATION

34 a. Did you ever first come into contact with someone on the Internet– through a chat room, bulletin board, news group, discussion forum, or other interactive site, or through their Web page —with whom you later established a relationship outside the Internet?					
	High School Incomplete	High School Grad	Some College	College Grad	Grad School
(n=)	(73)	(291)	(430)	(290)	(240)
% Yes	19%	9%	10%	11%	12%
b. Did any of these people become: (Of those meeting someone)					
(n=)	(15)	(27)	(43)	(33)	(28)
b. Spouse or partner	0%	4%	22%	12%	25%
c. Girlfriend or boyfriend	22	26	40	36	39
d. Coworker	11	7	9	18	25
e. Other business associate	22	15	19	27	21
f. Neighbor	0	15	3	0	7
g. Friend	78	82	88	82	89

In both series, there are clear divisions of content related to level of education. Table 9 shows that sites visited in the first eight items that deal with finances, education and news and the 19th item that deals with science are all correlated above .10 with education, In contrast, the 8 items that correlate below .05, and in some cases below .00, with education include entertainment and Web sites devoted to leisure or avocational interests. (The correlation of education with use of four types of sites – sports, arts, health and religion – ranges from .05 to .10). The cell entries in Table 9 refer to estimated visits per month, with values assigned as follows: 1.5 to sites visited one or two times, 4 to sites visited three to five times and 7 to sites visited more than five times. The largest discrepancy and highest correlation is found for work-related sites, with college graduates averaging almost 4 visits per month vs. closer to 1.6 visits for the high-school educated.

The nine positively correlated site types (marked with an asterisk in Table 9) were then formed into a simple index by adding the Table 9 values together, resulting in a scale that ran from 0 to 63 visits, with an average of 14.7 visits per month.

TABLE 9: SITE TYPES VISITED BY EDUCATION (IN ESTIMATED VISITS PER MONTH)

17. In the past 30 days, how often have you visited a Web site for _____?						
	High School Incomplete	**High School Grad**	**Some College**	**College Grad**	**Grad School**	**Cor-relation**
(n=)	(96)	(355)	(547)	(350)	(308)	
*a. Financial Information	1.2	1.3	1.8	2.4	2.4	**.18**
*b. Sites related to school	.6	.6	.9	.8	.13	**.11**
*c. Other educational site	1.5	1.4	1.8	1.9	2.4	**.13**
*d. Sites related to work	1.4	1.7	2.2	3.9	4.0	**.31**
*e. News, current events	2.5	2.6	31	38	39	**.17**
*f. Gov'ment information	1.0	9	1.4	1.7	2.1	**.19**
*g. Political information	.5	.6	1.0	1.1	1.2	**.13**
*h. Travel	1.3	1.6	2.0	2.5	2.6	**.15**
i. Sports	1.0	1.4	1.5	1.9	1.7	**.06**
- j. Music/concerts	1.7	1.4	1.6	1.4	1.4	**-.03**
k. Visual arts/ museums	.4	.5	.6	.7	.8	**.09**
- l. Television or movies	.9	1.0	1.1	1.3	1.2	**.03**
m. Health and fitness	1.0	1.3	1.6	1.6	1.7	**.08**
n. Religion/church	.2	.5	.6	.6	.7	**.06**
- o. Games computer play	2.7	2.1	1.7	1.2	.8	**-.24**
- p. Humor	1.8	1.5	1.3	1.1	1.1	**-.10**
- q. Sexually explicit sites	.4	.5	.3	.4	.3	**-.04**
- r. Personal home pages	1.3	.8	.8	.7	.8	**-.03**
*s. Science	.9	.8	1.2	1.4	1.9	**.19**
- t. Hobbies and crafts	1.8	1.7	1.6	1.5	1.3	**-.06**
- u. Cooking, recipes	.9	1.1	1.1	1.0	.9	**-.03**
Positive correlation with education						
- Negative or no correlation with education						

Similarly, the 8 non-correlating or negatively correlating items (marked with the negative (-) sign in Table 9) were added together to get a scale with an average of 10.5 monthly visits (out of 56 possible visits).

An MCA regression program was then applied to the two scales, with education, income, age, race, marital status and gender as predictors. Of these

six predictors, only two correlated positively with the positive (education-enhancing) scale, education and gender, with men reporting about 2 more visits than women—far lower than the 7.5 visit spread between college-educated and high-school-educated respondents. There were 2-to-3 visit differences between the middle-aged and the elderly and between highest and lowest income groups, but these differences were not large enough to be statistically significant. Those with more education clearly were more likely to visit Web sites that have work or informational value.

With respect to sites devoted to avocational concerns, education and income were negatively related to use, but the differences of 1 to 2 visits were not large enough to be statistically significant. All four other factors, however, were significantly predictive, with non-black minorities, men, the never-married and those under 25 all making almost 2 more monthly visits to such sites than other users.

A very similar pattern emerges for the 12 uses of the Internet in the past year as identified in Table 10. The seven items (a b c d e h i) marked with an asterisk refer to finances and travel. When these seven items related to finances and travel are combined into an index, after MCA adjustment that index is positively and significantly related to both higher education and higher income, as well as to being male, between the ages of 25 and 54, never married and non-black.

The 3-item index for the three games/personal uses in Table 10 is significantly related to lower education and income, and to being male, under age 35 and unmarried; race was unrelated to use of these functions. That is consistent with the predictors of entertainment/personal site usage in Table 9.

Table 11 shows that college educated users are also more likely than the less educated to use the Internet to participate in or inform themselves about politics and policy issues. Education is the major predictor of Internet use for such purposes; age is also a significant predictor, with older users holding the advantage. In response to follow-up questions on political topics discussed, more educated respondents were more likely to report discussing the economy, foreign affairs, environmental issues, political campaigns, taxes and news headlines. When these items are incorporated into an index, education remains the most significant predictor of following such content on the Internet; the highest-income and oldest respondents also report higher use of the Internet for such political content.

Moreover, in surfing political Websites, the college educated are 8 to 13 points more likely to say that they have visited Websites without any particular point of view, or with a point of view that challenged pre-existing political opinions. Finally, they are 3 to 4 times more likely to report that Web political content led to their signing a petition, contacting an elected official or attending a political demonstration.

TABLE 10: INTERNET USES BY EDUCATION LEVEL

19. In the past 12 months, that is, from (INSERT CURRENT MONTH) 1999 through (INSERT CURRENT MONTH) 2000 have you used the Web to do each of these things:						
	High School Incomp.	**High School Grad**	**Some College**	**College Grad**	**Grad School**	**Cor-relation**
(n=)	(32)	(100)	(180)	(139)	(138)	
*a. Look for information you needed for your work?	42%	45%	56%	74%	84%	**.30**
*b. Home finances or banking?	34	39	58	59	63	**.19**
*c. Look for information about a product that you might want to buy?	74	71	80	88	86	**.14**
*d. Actually buy something?	50	42	56	70	71	**.20**
*e. Invest money in a stock or mutual fund?	6	9	14	22	21	**.16**
- f. Tried to meet new people for social purpose?	27	16	15	15	11	**-.07**
g. Look for information about a health concern or medical problem?	57	55	61	66	69	**.10**
* h. Make an airplane or other travel reservation?	24	25	42	55	55	**.25**
i. Locate someone's phone number, email, or mailing address?	49	50	51	55	66	**.12**
- j. Play a game with someone on another computer?	32	24	22	17	12	**-.13**
- k. Look for a new job or explore career opportunities?	37	37	49	50	48	**-.07**
- l. Go to a chat room, news group, discussion forum, etc. to discuss political/policy issues, current affairs, or political campaigns?	32	20	19	20	22	**-.02**
*m. Go to a Web site to find info about political/policy issues, current affairs, or campaigns?	18	23	75	39	50	**.14**

TABLE 11: POLITICAL INTERNET TOPICS BY EDUCATION

20. In the past 12 months, have you used the Web to find out about or discuss?						
	High School Incomplete	**High School Grad**	**Some College**	**College Grad**	**Grad School**	**Correlation**
(n =)	(32)	(100)	(180)	(139)	(138)	
a. The economy	22%	32%	48%	54%	50%	**.15**
b. Abortion issues	14	10	12	8	9	**-.04**
c. Morality/family issues	25	30	32	20	30	**-.02**
d. Foreign affairs	34	31	53	55	57	**.16**
e. Race relations	22	16	17	20	24	**.06**
f. Environmental issues	28	36	42	43	48	**.09**
g. Political campaigns	28	38	43	48	57	**.09**
h. Gun control	19	18	20	22	20	**.02**
i. Taxes	31	32	48	49	43	**.08**
j. Gender/women's issues	41	37	34	29	34	**-.04**
k. News headlines	63	67	79	85	86	**.16**

SUMMARY AND CONCLUSIONS

Most research on the digital divide concerns variation in access to the Internet by socioeconomic status, gender, race, age and place of residence. This article demonstrates that those who have made it online are also unequal with respect to *the ways* they use the medium, especially the content they access from the vast stores of information and decision-making guidance the Internet provides. More detailed research on hardware and software, autonomy, and user skill may reveal more such differences. As DiMaggio and Hargittai (2001) hypothesized, college-educated respondents possess clear advantages over high-school educated respondents in using the Internet to derive occupational, educational and other informational benefits.

As shown in Tables 9-11, the clearest advantage appears in terms of sites visited, uses made, and political discussion. Here, multivariate evidence shows that education—and occasionally income, age and marital status—is associated with consistently more uses related to work, education, and political and social

engagement, as well as with fewer entertainment or avocational uses. The advantages to the college educated are also evident in their use of the Internet to maintain broader and more dispersed social networks of friends, co-workers, and participants in social or community groups, both in general and, especially, using email. (These differences disappear when one compares email contacts with family members.)

Users with more education are even advantaged in matters of the heart, as they are more likely to report starting up new romantic relations with persons met online. Their greater skill levels are evident in their greater tendency to report solving software problems using online help and consulting manuals. Social-network advantages are evident in the fact that they are more likely to report that coworkers, other work contacts and friends help them solve software problems.

In contrast, the education gap is not evident in several areas, such as the search strategies that people use to find information online and the ability to get help from family members. Nor do the less educated report sending or receiving fewer email messages.

One final measure of potential inequality concerns two aspects of time, as shown in Table 12—weekly hours of use and years on the Internet. Weekly hours of use of email is highly correlated with years of education, with those with graduate education using email more than twice as much (5.6 hours) as those with only a high school education (2.6 hours).

In contrast, weekly hours of Web use are not consistently higher among those with a college degree. However, college graduates again have a marked edge in years of experience (5.6 vs. 4.3) over the high-school educated. Finally, they have a slight edge in self-assessed ability to use the Internet. In each of these respects, then, the college-educated continue to be better able to exploit the new technology of the Internet. Future research will assess the extent to which these temporal factors account for the edge that more educated Internet users possess with respect to the dimensions of use described in this analysis.

TABLE 12: DIFFERENCES IN INTERNET TIME FACTORS BY EDUCATION

	High School Inc	High School Grad	Some College	College Grad	Grad School	Correlation
Email Hrs	2.0	2.7	3.7	4.6	5.6	**.16**
WWW Hrs	6.3	5.2	5.7	5.4	6.1	**.02**
Years online	4.1	4.3	5.0	5.6	5.6	**.30**
Ability to Use	3.7	3.6	3.9	4.1	3.9	**.14**

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APPENDIX: 1) MCA/ANOVA DATA FOR TABLE 1

Analysis of Variance						
	SSQ	Eta_sq	Df	MSQ	F	P
Main effects	4,207.186	.241	8	525.898	2,998.950	.0000
EDUC	1,778.812	.102	4	444.703	2,535.932	.0000
INC	804.753	.046	4	201.188	1,147.281	.0000
Interaction	64.507	.004	16	4.032	22.991	.0000
Residual	13,214.664	.756	75,357	.175		
Total	17,486.357	1.000	75,381			

MCA Table					
Dependent variable: INT (Overall Mean = .634)					
Independent variables		N	Unadjusted	Adjusted	Difference
EDUC	1: less than high school	9,161	-.414	-.327	.088
	2: high school	24,008	-.132	-.109	.024
	3: some college	22,244	.092	.084	-.007
	4: college graduate	13,363	.236	.183	-.053
	5: graduate school	6,606	.269	.193	-.077
	Eta / Partial beta		.441	.348	-.093
INC	1: less than 20,000	11,908	-.301	-.193	.108
	2: 20,000 To 34,999	14,065	-.150	-.096	.053
	3: 35,000 To 49,999	12,590	-.011	-.001	.010
	4: 50,000 To 74,999	16,585	.096	.067	-.029
	5: more than 75,000	20,234	.209	.125	-.084
	Eta / Partial beta		.373	.235	-.138
Multiple R				.491	
Multiple R-Squared				.241	

2) MCA/ANOVA DATA FOR TABLE 2

Analysis of Variance						
	SSQ	Eta_sq	Df	MSQ	F	P
Main effects	93.709	.013	8	11.714	77.885	.0000
EDUC	9.691	.001	4	2.423	16.109	.0000
INC	65.272	.009	4	16.318	108.499	.0000
Interaction	3.479	.000	16	.217	1.446	.1103
Residual	7,007.315	.986	46,592	.150		
Total	7,104.504	1.000	46,616			

MCA Table					
Dependent variable: **HESINT2A** (Overall Mean = .188)					
Independent variables		N	Unadjusted	Adjusted	Difference
EDUC	1: less than high school	2,523	-.041	-.022	.020
	2: high school	12,474	-.029	-.019	.010
	3: some college	15,212	.000	.004	.004
	4: college graduate	10,763	.031	.020	-.011
	5: graduate school	5,645	.024	.003	-.021
	Eta / Partial beta		.063	.038	-.025
INC	1: less than 20,000	3,187	-.033	-.027	.005
	2: 20,000 To 34,999	6,159	-.054	-.049	.005
	3: 35,000 To 49,999	7,646	-.039	-.037	.003
	4: 50,000 To 74,999	12,159	-.015	-.015	.000
	5: more than 75,000	17,466	.053	.049	-.004
	Eta / Partial beta		.109	.100	-.008
Multiple R				.115	
Multiple R-Squared				.013	