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Catherine A. Middleton
Ryerson University, catherine.middleton@ryerson.ca

Jordan Leith
Ryerson University

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Intensity of Internet Use in Canada: Exploring Canadians' Engagement with the Internet

Paper for the Statistics Canada 2007 Socio-Economic Conference

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Catherine Middleton
School of Information Technology Management, Ryerson University
catherine.middleton@ryerson.ca

Jordan Leith
Communication and Culture, Ryerson University
jleith@ryerson.ca

Intensity of Internet Use in Canada:
Exploring Canadians' Engagement with the Internet

Using Canadian Internet Use Survey data, this paper explores measures of engagement with the Internet. Measures of engagement provide a means of understanding how Internet users interact with the Internet. While the concept of engagement cannot directly measure users' skills, competences or comfort levels with the Internet, it can provide a proxy understanding of Internet users' readiness to embrace the Internet in their daily routines. This allows for a discussion of Internet usage that moves well beyond simple questions of access toward an understanding of how (and/or whether) Canadians can become full participants in an information-based society.

Introduction

The Household Internet Use Survey (HIUS) was conducted annually by Statistics Canada from 1997-2003. As the title indicates, this survey collected data about Internet adoption by Canadian households. The survey chronicled increased Internet adoption by Canadian households on a year over year basis (Statistics Canada, 2004). The first Canadian Internet Use Survey (CIUS) collected data on Canadians' Internet usage in 2005. This biennial survey replaces the HIUS, and measures "the extent and scope to which individual Canadians use the Internet" (Statistics Canada, 2005a). Although data from the two surveys cannot be directly compared because of the different units of analysis (individuals vs. households), many usage patterns observed in the CIUS data appear to confirm trends and relationships that were evident in the HIUS data.

In 2003, approximately 55% of all Canadian households (6.7 million households) had at least one member who regularly used the Internet from home. By 2005, an estimated 61% of

Canadian households (7.9 million) had Internet connections, indicating that growth in Internet adoption continued, but at a slower rate than observed earlier in the decade (Middleton & Sorensen, 2005). In 2003, approximately 65% of the households with home Internet connections had high-speed connections, a number that increased to 81% in 2005 (Statistics Canada, 2004, 2006). These numbers put Canada among the countries with the highest Internet penetration in the world (International Telecommunication Union, 2006), suggesting that policies to encourage Canadians to connect to the Internet (e.g. Government of Canada, 2005; Manley, 1999) have been successful, and that the 'digital divide,' between those who are connected and those who are not connected, is narrowing.

This is not a paper about the digital divide, and it does not attempt to review the extensive literature on the subject. Nevertheless, a brief discussion of measures of Internet access is warranted here. The term digital divide is used to assess whether individuals can access digital (i.e. information and communication) technologies or whether individuals have the ICT skills and literacy needed to participate in a knowledge economy (Sciadas, 2002a). Those who do not have the necessary skills or access are on the 'wrong side' of the digital divide.

Orbicom and the International Telecommunication Union (ITU) have developed international indicators to measure access to, and participation in, the information society (International Telecommunication Union, 2007; Sciadas, 2003; Sciadas, 2005). These indicators measure 'digital opportunity,' and compare countries based on their 'infostate' scores. These data on Internet and mobile telephony infrastructure availability, access capacity (e.g. skills) and usage provide a valuable starting point for understanding whether citizens have the opportunity to, and do, access the information society, but are insufficient to offer detailed insights on the nature of their participation in it.

DiMaggio and Hargittai (2001) argue that as access to technical infrastructures becomes

more widespread and Internet penetration rates increase, the research focus should shift from the digital divide to 'digital inequality,' defined as "inequality among persons with formal access to the Internet" (p. 1). Similarly, Attewell (2001) describes access as the 'first digital divide,' suggesting that usage is a second, and more critical, digital divide that must be bridged in order to share in the benefits of an information society. Warschauer (2003) notes that "the ability to access, adapt, and create new knowledge using new information and communication technology [ICT] is critical to social inclusion in today's era" (p. 9).

Clement and Shade's (2000) 'Access Rainbow' goes beyond technical infrastructures, showing the importance of social infrastructures to foster environments where citizens can gain the skills and literacy needed to access the Internet and other information and communication technologies. DiMaggio and Hargittai (2001) suggest that digital inequalities are found not only in technical infrastructures (including the quality of access device and connection), but also in social infrastructures including 'autonomy of use' (i.e. whether users have private access to the Internet or must share their access at home or elsewhere), skill levels, support (formal technical support and informal social support), and in the purposes for which the Internet is used (noting that some uses enable the development of 'social capital,' and implying that other uses are less beneficial).

In the Canadian context, the availability of Canadian Internet Use Survey data allows for further investigation of digital inequalities among Canadian Internet users[1]. In an environment where the Government of Canada is committed to delivering services online, and wants to "migrat[e] citizens from traditional service channels such as the telephone, mail or in-person

[1] It is important to note that there is still an access divide in Canada. About 4 in 10 Canadian households do not have an Internet connection, and access is influenced by income, education, and age (Statistics Canada, 2006). However, the focus of this paper is on differences in usage patterns among Internet users, not on non-users. For a discussion of non-user data collected for the Household Internet Use Survey, see Middleton & Sorensen (2005).

service to the electronic channel" (Government of Canada, 2005), it is important to better understand the extent to which average Canadians are prepared to interact with government through such 'electronic channels.'

Like governments around the world, the Canadian federal government has developed strategies to enable citizens to become full 'participants' in "the new, global knowledge economy of the 21st century" (Government of Canada, 2002, p. 3). While the Internet is not the only means of engagement in a knowledge economy or information society, information and communication technologies make up the infrastructure that provides access to knowledge and information (Kahin & Foray, 2006). There is an "implicit assumption that lack of access to information in a world where access to it is increasingly important can confer disadvantages, or compound them where already present" (SIBIS, 2003, p. 40). Without access to infrastructure, and without the skills and literacy to make use of knowledge and information, citizens may be disadvantaged.

Since 2000, the majority of Canadian households have had at least one member who was a regular Internet user (Statistics Canada, 2001). By 2003, there were Internet users in almost two-thirds of Canadian households (Statistics Canada, 2004), and the Internet was viewed as part of 'everyday life' for ordinary people. It was assumed that as the Internet became 'embedded' in people's lives, they used it more often, for more reasons, becoming more engaged with the Internet over time (Haythornthwaite & Wellman, 2002). But analysis of the Household Internet Use Survey data do not bear these assumptions out completely, showing that just 40% of households could be classified as 'high intensity' in their usage of the Internet in 2003. In high intensity households, at least one user was online 7 times a week, and household members spent more than 39 hours a month online. The 60% of households with low intensity usage patterns carried out fewer online activities than their high intensity

counterparts (Middleton & Ellison, 2006), raising questions about the extent to which the Internet had become embedded in these households.

This paper is motivated by the previous work on intensity of use among Canadian Internet users, and further investigates individuals' engagement with the Internet. The work is exploratory, and seeks to understand whether there continue to be differences in usage patterns among Internet users. The paper proposes measures of intensity and engagement, and discusses how such measures might be used to better understand citizens' readiness for participation in an information society.

Methodology and Data

This paper analyzes the access patterns of Canadian Internet users, in order to develop appropriate measures of scope and intensity of Internet use, and engagement with the Internet. The paper represents a first attempt to analyze the Canadian Internet Use Survey data from the perspective of digital inequality, and focuses on establishing parameters for further study.

Survey data include frequency of Internet usage, time spent online, location of use, types of devices used for Internet access, Internet connection speed, attitudes toward privacy and security, and scope of usage (including measures for electronic commerce, social cohesion, government on line, health and educational uses), in addition to basic respondent demographics. As measured by the CIUS, almost 68% of Canadians (more than 16.7 million individuals) used the Internet in 2005 for non-business use[2,3]. Close to 90% of these Internet users, or approximately 61% of Canadians used the Internet from home for non-business use in

[2] Footnotes indicate data source(s).The variable codes refer to the CIUS Master file (Statistics Canada, 2005b). Please see Appendix 1 for a list of variable codes, questions and descriptions. Statistics Canada (SIEID) or the authors calculated derived variables.

[3] PU_Q01

2005[4].

On the surface, it appears that most Canadians are in a position to participate in the information society, as Internet access is easily available and widely used. Forty-one percent of Canadian Internet users access the Internet from one location, while another 50% access the Internet from two or three locations (e.g. home, school, business) [5]. More than 8 out of 10 (81%) Canadian Internet users accessed the Internet from home using a high speed connection[6] [7], and although fewer than 20% of Canadian Internet users have more than one device in their home that is connected to the Internet[8], it would appear that according to DiMaggio and Hargittai's (2001) measures of digital inequality, technical and autonomous aspects of Internet access for Canadians are no longer a major concern.

However, previous research shows that access rates can mask inequalities in Internet adoption. For instance, a closer analysis of Internet connectivity patterns shows how Canadians from lower income, less educated or older backgrounds are less likely to be online (Sciadas, 2002b), a pattern that persists with the 2005 data (Statistics Canada, 2006). In addition, even though a household is online, this does not imply that people in the household exhibit either intensity or breadth of scope in their Internet usage patterns (Middleton & Ellison, 2006), suggesting that their levels of engagement with the Internet may be low. Scope can be measured by considering the types (purposes) of Internet uses reported by Canadians. Measures of intensity of use and engagement with the Internet are more complex, and are not captured by single variables. The dimensions of intensity include frequency of use and hours of

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[4] LU_Q01
[5] Count of location of use variables: LU_Q01, Q02, Q03, Q04, Q06A-H.
[6] High speed variable derived from IU_Q05 and IU_Q01B/D.
[7] It is noted that almost 30% of current Internet users do not have access to high speed Internet connections where they live (i.e. this infrastructure is not available). IU_Q06.
[8] Count of access device variables: IU_Q02A-F.

use. Longevity of usage is also of interest in exploring engagement with the Internet.

Our analysis relies upon analysis of means, correlations and cross-tabulations. Appendix 1 provides an overview of the variables of interest, and footnotes are included throughout this section to identify the variables used in our analyses. In the section that follows, we present some initial analysis of the CIUS data, using various measures to show differences among Internet users. We begin by comparing mean numbers of activities, years online and hours online per week on the basis of demographic indicators, to show differences among user groups. A discussion of the correlations between user demographics and Internet use behaviours is next, followed by in-depth analysis of specific usage patterns.

Findings

Means

To gain a better understanding of the relationships between various measures of engagement with the Internet, interval proximate scales were developed (see Appendix 2 for details). These scales allow for the calculation of means for variables including years online, weekly hours online, and monthly access frequency (times per month), and enable an investigation of demographic differences within, and correlations between, these variables.

Table 1 shows that the average Canadian uses the Internet for approximately nine different activities (scope of use). Online activities are shown in Table 6 below, and indicate the reasons that Canadians go online. The average user has been an Internet user for almost five years (longevity of use), and spends close to eight hours on the Internet each week (time online). A number of groups differed significantly from the means.

TABLE 1: DEMOGRAPHIC COMPARISONS OF USAGE MEANS[9]

		Scope: # Activities	Longevity: Years	Time Online: Hours/Week
	Overall Mean	**9.1**	**4.9**	**7.8**
Age	18 to 24	10.4	5.2	11.7
	25 to 34	10.2	4.9	7.8
	35 to 44	9.1	4.7	6.9
	45 to 54	8.5	4.6	6.9
	55 to 64	7.7	4.6	6.6
	65 and older	6.7	4.1	6.6
Sex	Male	9.7	4.9	8.5
	Female	8.5	4.7	7.0
Geographic Location	Urban	9.3	4.8	8.0
	Rural and small town	8.3	4.5	7.0
Employment Status	Employed	9.3	4.8	6.9
	Self-employed	9.0	4.7	7.7
	Full time student	10.7	5.3	12.7
	Unemployed, or out of the labour force	7.9	4.3	8.0
Education Level	Less than high school	7.4	3.8	8.2
	High school graduate	8.3	4.4	7.5
	Some post secondary	9.9	5.0	10.6
	Trades certificate or diploma	8.3	4.4	6.6
	Community college, CEGEP, etc.	9.1	4.8	6.9
	University certificate below bachelor's	9.5	5.1	7.5
	Bachelor's degree	10.0	5.3	7.8
	Graduate degree (master's or PhD)	10.3	5.4	8.2

Because of its unit of analysis (the household), the HIUS does not allow for a variable that captures the sex of users. However, CIUS data show that women have been Internet users for a shorter period of time than men, and do fewer things when they are online. Non-urban users exhibit lower means in all categories than their urban counterparts.

As might be expected, students are more engaged with the Internet than those in or out of the workforce. Unemployed people or those not in the workforce spend more time online than those who are employed, but carry out fewer activities. In general, those who are more

[9] Activities = Mean of a derived variable counting SUQ01 through SUQ20 and EC_Q01. Years online, education and hours/week are calculated used interval proximate scales, see Appendix 2. Age = CAGEGR6. Sex = CSEX, Geographic location = UR. Employment status = WORK. Education = CEDUCLEV.

educated have been online longer, carry out more activities, and spend more time online. The 'some post secondary education' category includes students, who spend the most time online.

Correlations

Table 2 shows that all of the intensity and engagement indicators are positively related to one another. The strongest correlations were related to the number of activities (scope). This is likely a function of the relatively high number of response categories associated with the activities scale as well as the substantive utility of the indicator in distinguishing users. The correlation between time online and scope, controlling for years online, is 0.305. The strongest relationship is between frequency and scope. Correlations between scope and longevity of use, time online and frequency, and time online and scope were all stronger than 0.3.

Consistent with Internet adoption patterns over time, age is an important variable, and is negatively associated with all intensity and engagement indicators, especially scope of use (-0.277). This relationship is also observed in the means table above, with older users doing fewer online activities, and spending less time online.

Negative correlations between education and time online, and between income measures (personal and household) and time online and frequency may reflect the influence of students and warrant further investigation[10].

[10] Students tend to have moderate education and low incomes, but likely differ from other low income and moderately educated groups in their markedly high intensity usage of the Internet.

TABLE 2: CORRELATIONS[11]

	Longevity	Time Online	Frequency	Activities	Age	Education	HH Inc	Pers Inc
Longevity	1	0.180	0.246	0.377	-0.142	0.243	0.105	0.075
Time Online	0.180	1	0.358	0.347	-0.146	-0.016	-0.032	-0.083
Frequency	0.246	0.358	1	0.479	-0.147	0.064	-0.011	-0.046
Activities	0.377	0.347	0.479	1	-0.277	0.182	0.073	0.028
Age	-0.142	-0.146	-0.147	-0.277	1	-0.148	-0.052	0.008
Education	0.243	-0.016	0.064	0.182	-0.148	1	0.077	0.075
HH Income	0.105	-0.032	-0.011	0.073	-0.052	0.077	1	0.964
Personal Income	0.075	-0.083	-0.046	0.028	0.008	0.075	0.964	1

All correlations are significant at the 0.01 level.

Intensity: Frequency and Time Online

According to CIUS, approximately two-thirds of Canadians used the Internet at least once a day[12], and slightly more than half (53.3%) used the Internet at home for less than five hours per week. Another 38% of users were online between 5 and 19 hours per week. Less than 10% of Canadian Internet users spent more than 20 hours online at home per week[13].

Users' time online and frequency of usage can be combined into a measure of intensity of usage. In analysis of the Household Internet Use Survey, households that reported using the Internet at home 'at least 7 times per week' (HU_Q03), and spent more than 39 hours online per month (HU_Q04) were categorized as 'high intensity' (Middleton & Ellison, 2006). As noted earlier, 40% of households were categorized as high intensity households. Moving from the household level of analysis to the individual level of analysis, the threshold for a high intensity user is lowered, with individuals who use the Internet daily, and for more than 5 hours during a

[11] Correlations are based on the interval proximate values for years online, weekly hours online, online frequency, education and activity count. Age is RESPAGE, household income is INC_Q02, and personal income is INC_Q04.

[12] IU_Q03

[13] IU_Q04

typical week (20 hours a month) considered high intensity users[14]. CIUS high intensity users are shown in the top right quadrant of Table 4, representing 42% of Internet users. The other three quadrants show low intensity users[15], who go online infrequently, or for limited amounts of time, or both.

TABLE 4: INTENSITY OF INTERNET USE

	Weekly or less	Daily
≥ 5 hours	4.3% *Infrequent, high hours*	42.4 *High intensity*
<5 hours	30.3% *Occasional users - Low intensity*	23.1 *Frequent, low hours*

This table provides an initial indication of how users differ. From an access perspective, all of these users are equal, as they are all Internet users. But from an intensity perspective, there are important differences among users. As demonstrated in the means calculations, and confirmed in Table 5, intensity of use varies by age. There is a much larger proportion of the 18 to 24 year old group in the high intensity category, and larger proportions of 35 to 64 year olds in the low intensity category. Those 65 years of age and older likely have more leisure time than their younger counterparts. This may explain why there are more high intensity users in this age group than in some of the younger age groups.

TABLE 5: INTENSITY BY AGE CROSS-TABULATION

	18 - 24	25 - 34	35 - 44	45 - 54	55 - 64	65 +	Total
Low Intensity	35.2%	52.9	64.6	66.1	64.6	62.2	57.6
High Intensity	64.8%	47.1	35.4	33.9	35.4	37.8	42.4

An analysis of sex of Internet users (Table 6) shows that men are over-represented in the high intensity category, and women are over-represented in the low intensity category.

[14] High hours, high frequency: HHHF.

[15] These quadrants are HHLF 'infrequent, high hours,' LHLF 'occasional users,' and LHHF 'frequent, low hours.' Collectively, these three quadrants comprise the 'low intensity' users.

TABLE 6: INTENSITY BY SEX CROSS-TABULATION

	Male	Female	Total
Low Intensity	51.8%	63.3	57.6
High Intensity	48.2%	36.7	42.4

Scope of Use

Canadian Internet users were asked which of 21 different online activities they had done in the past twelve months. As shown in Table 6, the most popular online activities were e-mail and general Internet browsing. More than half of Canadians also used the Internet to check the weather, road conditions, news or sports information, to search for travel, health and government information and to pay bills or do other electronic banking. The least common activities were downloading television and movie files.

TABLE 6: PARTICIPATION IN VARIOUS ONLINE ACTIVITIES

Activity		% of Total
SU_Q01	E-mail	91.3%
SU_Q20	General browsing	84.0
SU_Q15	Weather/road condition	66.6
SU_Q07	Travel information	63.1
SU_Q14	View news sports	61.7
SU_Q05	Search for health information	57.9
SU_Q09	Electronic banking	57.8
SU_Q08	Pay bills	55.0
SU_Q03	Search for Canada government information	52.0
EC_Q01	Ordered personal goods or services	45.8
SU_Q06	Education	42.9
SU_Q19	Research community events	42.3
SU_Q11	Play games	38.7
SU_Q02	Chat or messenger	37.9
SU_Q12	Obtain music	36.6
SU_Q13	Obtain software	31.8
SU_Q10	Research investments	26.2
SU_Q16	Listen to the radio	26.1
SU_Q04	Use to communicate with government	22.6
SU_Q17	Download/watch TV over home Internet	8.5
SU_Q18	Download/watch movie on home Internet	8.3

What does a list of online activities reveal about engagement with the Internet? Those for whom the Internet has become an important part of daily life are expected to conduct more of their activities online than those for whom the Internet is simply a tool for information searching

or casual communication. As such, a count of online activities can help explain a user's engagement with the Internet. The list may also provide proxy information about the skill of Internet users, as it is possible that users do not undertake certain activities (e.g. listening to the radio, communicating with the government or watching TV online) because they do not know how. The list can also be clustered into types of uses, to show whether certain types of activities (e.g. communication, entertainment, banking and purchase activities) are more popular among, or more relevant to, certain groups of users.

Engagement with the Internet can be assessed by considering the breadth of activities users undertake during their hours online. Users can be categorized as high, medium or low scope users, with about a third of Canadians in each category (see Table 8). Those who partake in a larger number of online activities also spend more time online, with 52.7% of high scope users online for 5 or more hours from home each week (high hours). Conversely, low scope users spend less time online, with 46.1% online for less than 5 hours each week (low hours).

TABLE 8: SCOPE OF USAGE BY TIME ONLINE

Scope of Usage	Low Hours	High Hours	Total[16]
Low (1-7 activities)	46.1%	14.4	31.0
Medium (8-11)	34.2%	32.9	33.6
High (≥12)	19.7%	52.7	35.1

Further exploration of the relationship between age and engagement can be done with a cross-tabulation between age groups and scope of online activities. Large differences between age groups were found. The 'total' column in Table 9 shows that Canadians are split roughly equally among the three activity levels. However, the individual age columns show that older users (from age 35 up) are more likely to be low activity users, whereas users under the age of 35 are more likely to be high activity users.

[16] Based on the activities count, scope data excludes 0.6% of users who did not indicate any online activities.

TABLE 9: SCOPE BY AGE CROSS-TABULATION

	18 - 24	25 - 34	35 - 44	45 - 54	55 - 64	65 +	Total[17]
Low (1-7 activities)	20.6%	21.8	31.3	36.8	46.2	56.4	31.9
Medium (8-11)	33.6%	33.0	33.6	34.6	32.6	30.1	33.4
High (≥12)	45.7%	45.1	34.5	28.1	20.8	12.4	34.4

Similarly, women are lower activity users than men. As shown in Table 10, women are over-represented in the low activity group, and under-represented in the high activity group.

TABLE 10: SCOPE BY SEX CROSS-TABULATION

	Male	Female	Total
Low (1-7 activities)	27.0%	36.6	31.9
Medium (8-11)	32.1%	34.6	33.4
High (≥12)	40.5%	28.4	34.4

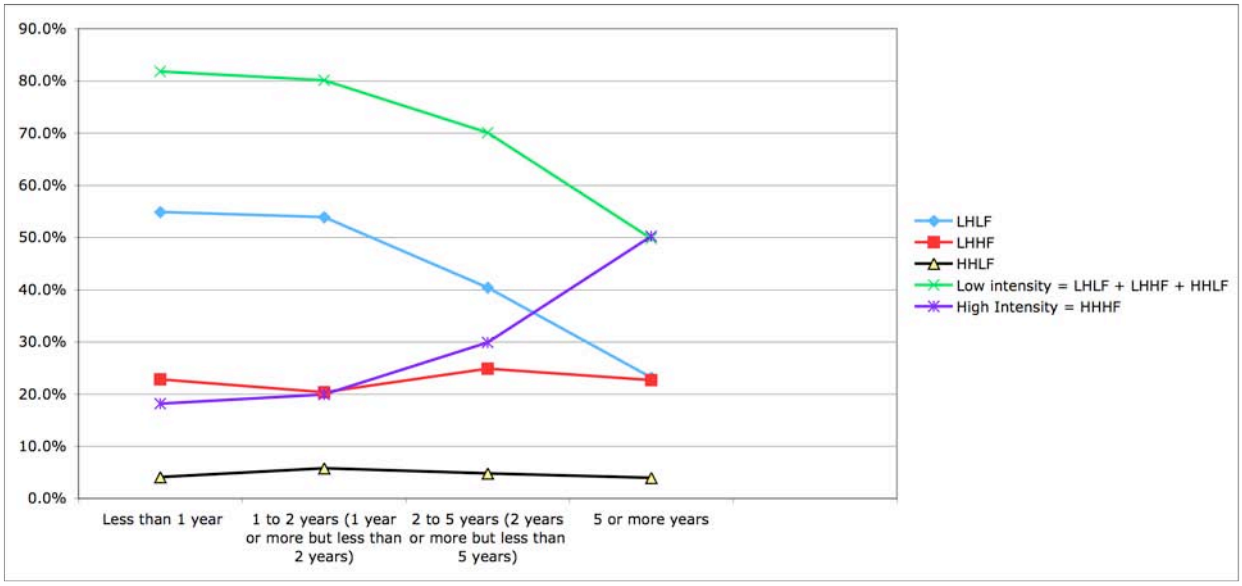
Longevity

The majority of Canadians who are current or former Internet users have been online for five or more years (63.2%). Fewer than 13% have used the Internet for less than two years[18]. While the CIUS does not offer opportunities for longitudinal analysis, comparisons between groups defined by their chronological experience with the Internet can be made.

[17] The total here differs from Table 8 because of different numbers of observations for hours/frequency variables and demographic variables.

[18] EV_Q02

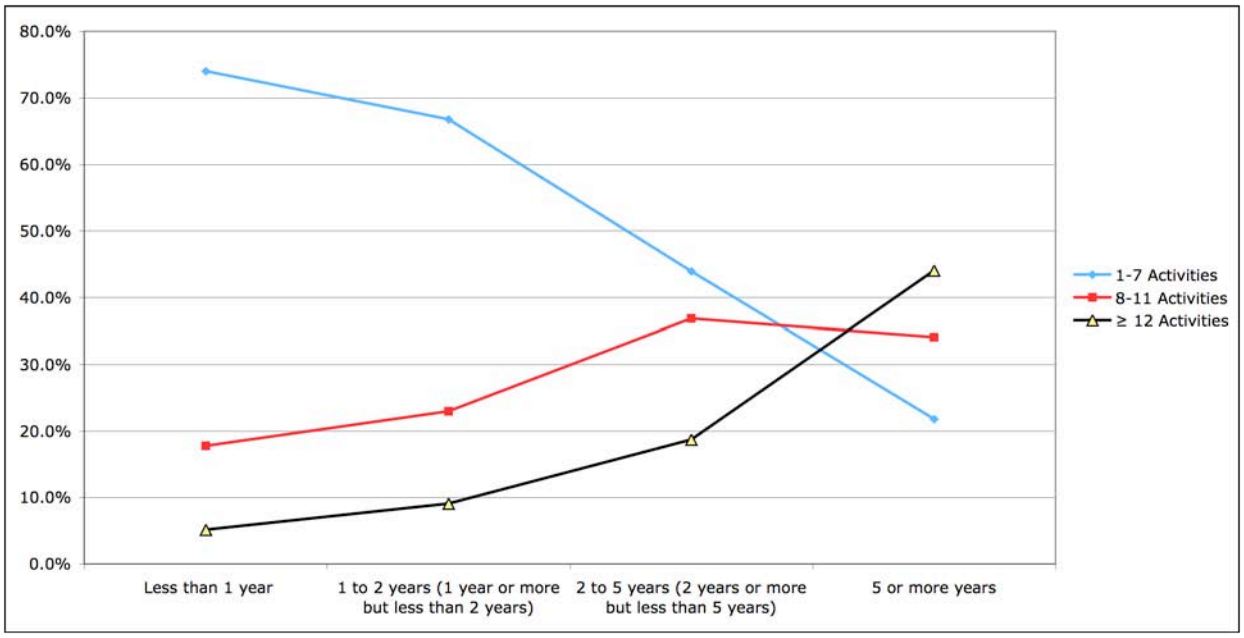
FIGURE 1: INTENSITY OF USE BY YEARS ONLINE (LONGEVITY)



The data suggest that as longevity of Internet use increases, the number of low intensity users (the green line in Figure 1) falls, and the number of high intensity users (the purple line) increases. There are approximately the same numbers of high intensity (50.2%) and low intensity (49.8%) users among those who have been online for five or more years. Fifty-five percent of users who had been online for less than one year were a part of the low hours, low frequency (LHLF) group. In contrast, less than a quarter of those who had been online for 5 or more years met the criteria of the LHLF category. The low hours, high frequency (LHHF) and high hours, low frequency (HHLF) lines on the graph suggests that users in these groups have fairly steady intensities of use over time.

Figure 2 suggests that scope of use changes as users become more experienced with the Internet. In comparison with those who have been online for longer, those with less than one year of online experience participate in far fewer Internet activities. This finding supports the assumption that users engage in a wider breadth of activities as they become more familiar with the Internet.

FIGURE 2: SCOPE OF USE BY YEARS ONLINE (LONGEVITY)



Discussion

The objective of this paper is to assess measures of digital inequality in usage among Canadian Internet users, with a view to developing methods for understanding Canadians' readiness to participate in a knowledge or information-based society. As noted earlier, the concept of engagement is a way of understanding the extent and nature of individuals' Internet usage, moving beyond simple access metrics to assess their abilities (and willingness) to incorporate the Internet into their daily activities in ways that encourage access to knowledge and participation in digital society. Direct measures of engagement are not included in many standard information society measures (SIBIS, 2003, does include indicators for digital literacy and training, but these alone do not fully address engagement).

CIUS data allow for explorations of scope and purpose of Internet usage, and intensity of usage, but provide no direct measures of user skills, competence or support for Internet

access[19]. Although the analysis offered here is preliminary, and mainly bivariate in nature, it does clearly show that there are differences in Internet usage patterns among Canadian Internet users. In particular, differences in intensity and scope of usage are observed based on the length of time an individual has been an Internet user, and based on the age and sex of the user.

There are correlations between various single usage measures (hours spent online, frequency of use, number of years experience, number of activities), and between these measures and demographic indicators. The number of activities a person does online is most strongly correlated with frequency of online access. Not surprisingly, infrequent users do not do use the Internet for as many purposes as frequent users. What this correlation does not reveal is whether infrequent users are infrequent users because they do not find many online activities to be valuable, or whether they only do a few things online because they choose not to access the Internet frequently (perhaps because Internet access is difficult for them). What is important is that there are definite differences between users who are online frequently (more than once a day) and those who are infrequent users, differences that may impact their levels of engagement with the Internet.

As this work continues, the number and nature of online activities can be further analyzed to better understand users' skills and levels of interest in using the Internet. A cluster of 'basic' activities required to participate in the information society can be identified, and differentiated from activities that serve other purposes (e.g. entertainment, commerce). By differentiating activities on the basis of whether they help users develop 'social capital' for participating in a knowledge economy, it is possible to understand whether differences in intensity of use are

[19] The CIUS does measure barriers to Internet access, but only for non-users and dropouts: PU_Q06A-M, NU_Q07A-N, NU_Q08, NU_Q09.

representative of digital inequalities, or simply reflect individuals' personal choices to use the Internet in specific ways. In other words, further analysis is needed to determine the impact of being a low intensity or minimal activity user, as being in this position may be a matter of choice or a result of not having sufficient access or skills to become more engaged with the Internet.

A useful activity when conducting further analysis will be to develop profiles of users, based on their levels of engagement with the Internet. Profile building will be enhanced by multivariate analysis, to control for variables like age, sex and online experience. One reason for developing user profiles is to identify those groups that are at risk of being disenfranchised as the Internet becomes more central to society. Data can be used to articulate the differences between highly engaged Internet users and those who are minimally engaged, with a view to better understanding whether minimally engaged users are at risk. If so, analysis may provide insights as to how to encourage users to become more engaged with the online environment. Additional variables can be included in this analysis. For example, CIUS data report on locations of use, availability of access devices, and speed of Internet connections, which are infrastructure-related factors that might be addressed to increase engagement levels.

Of particular interest is the impact that Internet experience has on engagement. This paper showed that on average, users become more engaged with the Internet over time, as measured by increased scope of activity, and increased intensity of use. But is experience sufficient to ensure that new users will eventually become highly engaged with the Internet? What threshold level of engagement is needed for competent participation in the information society, and how long does it take an average new user to get there? Will the threshold change? Will today's new users (who are typically older, less educated, and perhaps less motivated to get online) have the same experiences as users who were earlier adopters? These

questions move beyond the realm of quantitative data analysis based on the CIUS data, and provide the foundation for further data collection, both quantitative (with a direct focus on engagement measures) and qualitative.

Conclusions

This paper offers an initial discussion of measures of Internet engagement. It shows that there are differences in usage, based on measures of intensity, scope of online activities, and online experience. However, the paper does not propose a single measure of Internet engagement, suggesting instead that more analysis is necessary to fully understand the meaning of differences in Internet usage. The paper has framed these differences in the context of digital inequality, but without further analysis it is difficult to know whether the differences simply reflect user choices to carefully control their engagement with the Internet and their participation in online society, or whether the differences do show that there are serious consequences for those who are minimally engaged with the Internet. This paper provides a foundation for understanding and developing measures of Internet engagement, and participation in the information society, with a specific application to Canadian Internet usage behaviours as measured by the Canadian Internet Use Survey.

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Appendix 1: Variables of Interest

What the Variable Measures	Question	CIUS Variable
Is the respondent currently an Internet user?	Did you use the Internet during the past 12 months for personal non-business use?	PU_Q01
Autonomy of access, measured by location of Internet usage	During the past 12 months, did you use the Internet from [insert location] for personal non-business use? e.g. home, business, school, library, other location	LU_Q01-05
	At what other location(s), not previously mentioned, did you use the Internet during the past 12 months? e.g. relative's home, friend/neighbour, government location, cyber café, voluntary organization, while traveling, wireless, other location	LU_Q06A-H
Technical characteristics of Internet access and number of access devices	High speed = Yes if IU_Q05 = 1 (high speed), or IU_Q01B = 1 (cable) or IU_Q01D = 1 (satellite)	Derived from IU_Q05 and IU_Q01B/D
	Through what devices can you access the Internet from home? e.g. home PC, laptop, digital TV, console, wireless, other device	IU_Q02A-F
	Is there a cable or telephone high speed Internet service available in your area?	IU_Q06
Scope of use. Calculated by counting the user's number of online activities.	During the past 12 months, have you used the Internet at home for…? email, chat, etc.	SU_Q01-20
	During the past 12 months, have you ordered a good or service over the Internet? (For your personal or household use, not business use.)	EC_Q01
Longevity	How many years have you used the Internet?	EV_Q02
Frequency of use	How often do you use the Internet at home in a typical month?	IU_Q03
Time Online: Hours of use	In a typical week, on average, how many hours do you spend on the Internet, at home?	IU_Q04
Intensity of usage	What is the user's level of engagement with the Internet? To what extent is the Internet a part of the user's daily life? To what extent is the user likely to be ready to participate in an information society?	Derived variables

Appendix 2: Construction of Interval Proximate Scales

Education: Education was measured by the respondent's highest level of educational achievement. Those who did not complete high school were coded as 1. High school graduates were coded as 2. Respondents with some post-secondary education were coded as three. Those with a trade certificate or diploma, community college or CEGEP, university certificate below a bachelor's degree were coded as 3, 4, 5 and 6 respectively. Respondents with bachelor degrees were coded as 7 and those with graduate degrees as 8.

Longevity: Respondents who had used the Internet were asked how many years they have used the Internet. Respondents who indicated that they had used the Internet for less than 1 year were coded as 0.5. Those respondents who said that they had used the Internet for 1 to 2 years were coded as 1.5. Respondents who indicated that they had been online for 2 to 5 years were coded as 3.5. Respondents who said that they had been online for five or more years were coded as 6.

Hours online per week: Respondents who said that they had used the Internet at home in the past twelve months and were connected to the Internet at the time of the survey were asked how many hours they spend on the Internet at home in a typical week. Those who indicated that they were online for less than five hours in a typical week were coded as 2.5. For each of the following categories, respondents were coded as the midpoint value of the category that they identified with: Between 5 and 9 hours, between 10 and 19 hours, between 20 and 29 hours and between 30 and 39 hours. Those who indicated that they are on the Internet for 40 or more hours per week were coded as 50. While this category represents a diverse group of users, only 1.8 percent of respondents were associated with the category. The value of 50 may seem to overestimate the time that many users spend online. However, Morris and Middleton (2005) found that 36% of a sample of Ryerson University undergraduate business students said

that they used the Internet for 7 or more hours per day. About 4% of students in the same survey said that they used the Internet for at least 16 hours per day. This suggests that many Internet users for far more than 50 hours per week.

Frequency Online: Respondents who had used the Internet in the past 12 months and were connected to the Internet at the time of the survey were asked how often they use the Internet in a typical month. We assumed that those who said that they used the Internet at least once a day would also go online more than once per day for a few days each month. They were coded as 35 (30+5). Once a week, but not every day translates to a range of 4 to about 24 times per month. These user were coded as 12 (midpoint of 4 - 24). Respondents that indicated that they used the Internet at least once a month, but not every week, were coded as 2.5. Those who said that they used the Internet less than once per month were coded as 0.5.