

Has The Internet Become Indispensable? Empirical Findings and Model Development

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Introduction

We seem to be in the midst of an Internet revolution and entering the age of digital connectivity. The pace of social change resulting from the diffusion of this technology, both nationally and globally is, by many accounts, dramatic. In less than ten years, the Internet has become indispensable to many people in their daily lives. What are the consequences of this? In this paper, we introduce the idea that the Internet is becoming increasingly essential to families and the society at large, present some data to support our contentions and develop a conceptual model that allows for the testing of key hypotheses related to Internet indispensability as next steps.

As Hannemyr (2003) has empirically demonstrated, “the adoption rate of the Internet has exceeded that of earlier mass communication technologies by several magnitudes,” making it an “irreversible” innovation. Studies have also shown that an important consequence of an entire generation of our nation’s youth growing up with the Internet is that Internet use is gradually displacing television as their main source of entertainment, communication and education (Lenhart, et.al. 2001).

In this paper we explore the idea that the Internet has become indispensable to people in their daily lives, and develop a conceptual model that allows us to address the research questions this idea raises. The idea is that the Internet has become so embedded into the daily fabric of people’s lives that they simply cannot live with out it. How is the Internet indispensable and in what ways? For which groups of people is it indispensable, for what tasks, and how has this changed their lives and our society as a whole?

We take on these questions as follows. First, we provide some data from two national studies of American households that support our contention that the Internet has become indispensable on several key dimensions. Next, we summarize broader discussions of indispensability drawn from the literature. Then, we present our conceptual model and suggest research directions for the future. We conclude with several comments on the social and policy implications that arise from the fact that increasing numbers of individuals would be unwilling to give up their access to the Internet if asked, as they have come to consider it indispensable.

The Internet is Becoming Increasingly Indispensable

Numerous studies demonstrate the changes in user characteristics and patterns of Internet use. Space limitations preclude an exhaustive analysis, but we refer the interested read to the supporting references.

Important Internet Usage Trends Among the General Population, College Students and Families in the United States

Table 1 summarizes the evolution in Internet user characteristics in the general U.S. population over time. These data were gathered from the Pew Internet and American Life Project (Madden 2003). The number of adult Americans using the Internet has increased 50% from 2000 to 2003, reaching 126 million users in 2003. Most of this increase is accounted for by individuals 30 years and above, although younger users are still the most wired. The increase is recorded among both men and women equally. In terms of race, blacks show the highest increase during this period, although they still lag behind Whites and Hispanics.

(Table 1 about here)

Compared to the general population, college students are its heaviest users. By 2002, fifty nine percent of all Americans had ever gone online, compared to eighty six percent of all college students (Jones 2002). College students report that the Internet has become an integral part of their education and has actually enhanced their educational experience. It is used for managing all aspects of their academic and social life. The Internet is so pervasive in the lives of this generation that it has become a natural extension of their selves. College social life has been fundamentally transformed by the Internet.

Longitudinal data gathered by one of the authors as part of the National Science Foundation supported Projects NOAH and POINT at the Center for Research on Information Technology at the University of California at Irvine support our contention that the Internet has become indispensable in contemporary social life. The study design included national probability samples of 906 and 1200 American households for the years 2000 and 2003 respectively¹. A demographic summary for the samples appears in Table 2.

(Table 2 about here)

In 2000, over three-quarters (77 %) of computer-owning households in the sample reported having an Internet connection in the home; by 2003, this figure had jumped to 94%. This supports many other surveys suggesting that the Internet is now ubiquitous. Both the 2000 and 2003 samples acknowledged the Internet to be a major source of communication and information.

Top in-home applications among regular computer users include email, games and hobbies, news and information, travel and vacation planning, online shopping, and health information seeking (See Figure 1). The biggest changes from 2000 to 2003 are in online banking (24% to 60%), online shopping (40% to 76%), gathering health information (46% to 76%) and travel/vacation planning). Many other uses of computers have developed in the past few years. Thus for example, other salient applications in 2003 for

¹ A detailed description of the sampling frame and these data and the NOAH and POINT Projects is available at <http://www.critio.uci.edu/>.

which data were not available for 2000 are instant messaging, accessing government services, and participation in community activities, all via the Internet. These various developments indicate how the technology has become *domesticated* in the last few years.

(Figure 1 about here)

Additional analyses (not presented) show that Internet users are increasingly satisfied with their online experiences. In 2000, slightly less than half (49%) of the users were satisfied with the ease of getting online; this rose to nearly three quarter of all users (71%) by 2003. Users are also more satisfied with Internet access speeds (32% in 2000 compared to 52% in 2003). Clearly, technological standards and quality are constantly improving and these technology improvements are having important, positive effects on satisfaction. Internet users' overall experiences increased in satisfaction from 64% to 76% from 2000 to 2003.

Table 3 addresses the impact of the computer on people's lives, as the computer has become virtually indistinguishable from the Internet for many people. The change from 2000 to 2003 in perceptions of computers can be interpreted, in part, as due to the increase in home Internet connectivity mentioned above. From 2000 to 2003, more people reported that computers had become part of their daily routine (52% to 62%); facilitated increased contact with friends and relatives via email (48% to 54%); changed how they do things at home (40% to 45%); and replaced the telephone as the major communication device (10% to 16%). In somewhat broader terms, over this three year period, more people reported that it would be difficult to imagine life at home without computers (44% to 50%), and that the computer is as essential as any other home-based technology (39% to 51%).

(Table 3 about here)

Taken as a whole, these results reveal important developments in Internet use. There are changes in the inherent characteristics of the Internet and Internet use is diffusing into new areas. The Internet continues to be an information and communication tool, but the types of information sought on the computer have expanded considerably. The Internet has also become a major home management tool as it is now used extensively for online shopping and financial management. The Internet is becoming indispensable to many daily activities.

What Does it Mean For Something to Be Indispensable?

The above results show that on many fronts, the Internet has made its mark on people's lives. But what does it mean for something to be indispensable?

Notions similar to indispensability have been researched in consumer environments by various scholars who have used equivalent terms such as "necessities", "essential products," or "products one cannot do without." Such indispensable products can be at

one extreme very utilitarian and functional or at the other extreme very symbolic with great personal significance. Products of the opposite character – dispensable products - are deemed to be frivolous, unnecessary wasteful, hedonic luxuries, or products one can do without. The research questions in this area address consumer dispositions toward such products, the level of dependence, and the process by which products achieve the indispensability status.

We believe that something becomes indispensable if it becomes part of one's daily routine. Daily routine (examples include reading a newspaper, watching the news on television, checking one's email) leads to ritualization of activities (for example, reading the morning paper, watching the evening news, checking one's email each day during breakfast).

This ritualization provides a sense of security and predictability. Ritualizing daily routines helps people cope with day-to-day stresses and strains. In the long run, familiar routines can even lead people to be more efficient and productive and feel more satisfied. For those for whom the Internet is a daily ritual, the lack of Internet access will be perceived as a disruptive event. Thus it is important to note that the notion of guaranteed access is closely linked to indispensability.

Daily routines involve micro-level practices. Much of the Internet rhetoric includes grand schemes and major changes in the economy and society. While these are certainly worthy of attention, we believe that the indispensability of the Internet arises not from such grand schema but from micro-level practices. That is, it is the small things that people use the Internet for on an everyday basis that makes it so integral to people's lives.

Finally, it is a fact that some individuals are more technologically savvy than others. We consider them to possess the highest technological capital. Because they have the technological capital, they also have the social capital to go with it. The relationship between the technological knowledge of people and their social empowerment has been discussed widely in the literature (Robalino 2000). The argument presented is that in a knowledge economy, knowledge becomes a critical as well as a controlling resource. The power knowledge bestows on individuals is translated into social capital. This explains why in the Internet age so much attention is paid to young people including children who seem to be on the forefront of technological developments with power to shape the future. The difference between these savvy individuals and those less savvy is one provocative way to define the digital divide. According to one estimate, the tech-savvy represent 30% of Internet users (Shih and Venkatesh 2004) and includes three sub-segments: the technological sophisticates, highly educated high socio-economic status individuals, and college students. For these groups, the Internet is not only indispensable but central to their very lives.

A Conceptual Model of Indispensability

We developed a conceptualization of Internet indispensability (See Figure 2) as a model to guide our investigation. This model provides a conceptual framework that allows us to address a series of important research questions, along with their individual, social and policy consequences. We consider individual behavior to be constituted by a set of socio-cultural, technological, and individual-psychological elements that operate on various levels. The socio-cultural elements are generally considered to be at the macro level. The individual and psychological elements are at the micro level. Technology permeates all levels. The individual is simultaneously subject to all these forces. As we will describe, the outcome of user behavior in the Internet environment results in a series of “experienced dualities” (e.g., Mick and Fournier 1998) which lead to a transformation process that alters the self-identity of the individual. In this case, the nature of the change in self-identity is a conviction that the Internet is indispensable for the individual.

Conceptually, as Internet activities become part of the daily routine of individuals and social groups, the Internet becomes integrated into their lives. Formally, we state that the first set of conditions for Internet indispensability relate to its ubiquity in both socio-cultural and technological contexts. We define ubiquity in terms of two major elements in the model—the different segments of the society using the Internet and the contexts of use (Box 1), and the access points for its use (Box 3). The underlying idea is that as more segments of the population use the Internet in different contexts (work, family, school etc), the greater its diffusion and potential impact. Similarly, the greater the access points for the Internet the greater its use and impact.

(Figure 2 about here)

There are also a set of technology-related antecedents, inherent to the Internet medium itself (Box 2). These enabling characteristics – fundamental properties of the Internet environment - specify the power of the technology, its versatility and its productive potential. The enabling characteristics define a computer-mediated environment which literally calls out for multiple access points to function optimally for its users. Thus, a related technological aspect is the prevalence of access points for the Internet (Box 3) which represents the ubiquity of the Internet, and directly impacts the nature of Internet users’ daily routines and activities.

A third determinant of activities performed on the Internet is individual in nature (Box 7). This recognizes the fact that individual difference variables including personality characteristics, needs, and demographics are important determinants of online behavior. Together, these three categories of determinants impact the individual’s daily routines and activities, impact the way the individual uses the Internet in their life (Box 4).

A critical intermediate consequence of our model is the nature of people’s experiences as a result of their engaging in the daily routine of Internet use. We represent these experiences in terms of a set of dualities (Box 5). The dualities represent the limits of the Internet (positive and negative) and the general tension that the Internet creates among

users (see also Mick and Fournier 1998). A natural consequence of these experiences is the transformation process (Box 6) that Internet use imposes on the individual, society and the economy.

Many of the activities that individuals engage in online are really the seeds for major transformational processes. In this way, the cumulative effects of micro-level phenomena can lead to social transformations on a major scale. This could include the formation of new practices and behaviors, new social relationships and transaction modes, new communication patterns and the like. Note that the overall impact of transformation will not be the same across all social groups and individuals.

Transformation means you have a new identity and sense of self. Consider email use as an example. Individuals start to use email for practical benefits, to communicate with friends, family, or co-workers. It is doubtful that any new user would find such use immediately indispensable. As the user gains more experience, a number of dualities will be experienced. Email empowers the individual by giving them a capability for instantaneous communication they did not have before, but as the incoming volume of email begins to accelerate, and the pressure to keep up with email exchanges builds, a sense of entrapment ensues. The user must work through this empowerment/entrapment duality, and alter his or her behavior or thinking in ways that permit a successful resolution. Much of this behavior change involves the establishment of new rituals, in this case, daily rituals for managing one's email. We noted earlier that ritualization is an important component of indispensability. Successful change is a positive experience, engendering increased confidence, more self-assurance, competence, confidence and mastery. Such users now feel they are in control of email, rather than email controlling them.

The key outcome of this transformation process is the indispensability of the Internet (Box 8). In our model, indispensability can arise through two different paths: experiential or rational (see, for example, Epstein 1994 for a discussion of experiential vs. rational thinking styles). We discuss the experiential path first. As noted, dualities (tensions or conflicts) are experienced as the individual uses the Internet to perform various activities. If the dualities introduced by the use of the Internet are successfully resolved, transformation results from the resolution of the conflicts that the Internet presents. These transformations feed back in the model to impact both the individual as well as the larger social system. Indispensability is a key individual outcome. We call this "experiential" indispensability as it represents a long-term, persistent change in the individual's feeling and inherent belief system that the Internet has become indispensable to her/him.

Additionally, we theorize that the Internet can also become indispensable on a short-term, transient basis as it allows essential activities to be conducted with a favorable cost/benefit ratio. This type of indispensability, through a rational path, is much more easily shaken by introduction of an innovation which better meets the individual's needs. It is the more traditional view of indispensability, and does not arise from a transformation process stimulated by the resolution of an experienced duality.

Finally, the tension between structure and agency (Orlikowski 1992) is central to the notion of how indispensability is played out; Internet indispensability relies on the role played by both structure (Box 1) and agency (Box 7) in determining the various activities that individuals engage in (Box 4).

The Consequences of Indispensability

Some of the broader issues in Internet development concern individual and social consequences of indispensability, and their larger implications to, for example, social welfare and policy issues. At the individual/social level, the issues include but are not limited to: altering perceptions of the space-time continuum, human communication and interactions at local and global levels, blurring the boundaries between the real and the virtual, the paradoxical nature of technologies, and both positive and negative psychological consequences.

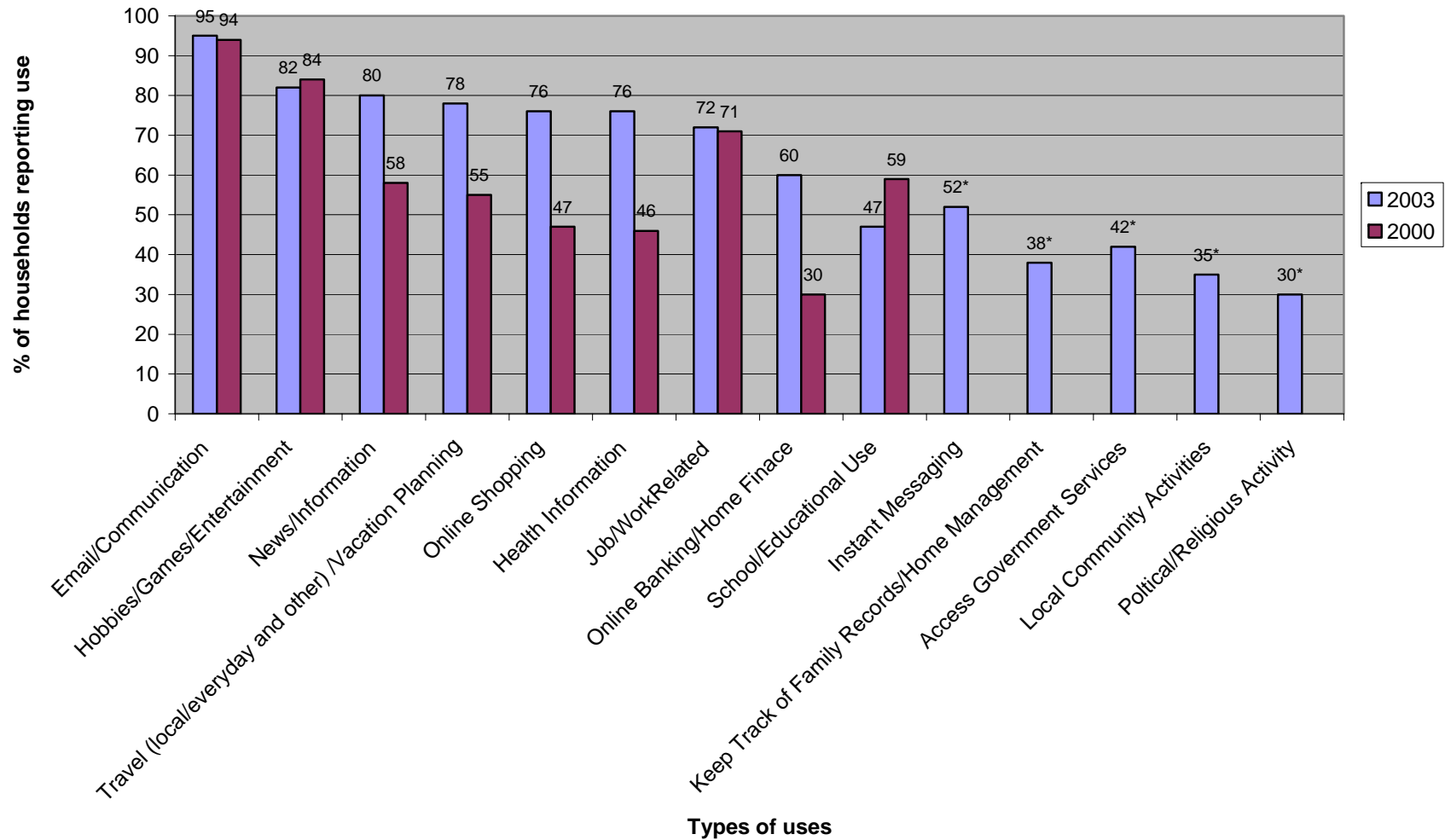
Two important policy debates include the digital divide (Hoffman and Novak 1998; Warschauer 2003) and the ongoing controversy over the impact of computers on education in our schools (Cuban 2003). Research shows that the Internet has not touched all segments of our society equally: the lower socio-economic levels are among those least likely to enjoy access.

Further, digital divides occur not only between the poor and the rich, but across many other segments—urban versus rural and lower income school districts versus higher income school districts and so on. Federally mandated programs such as universal service and the e-rate program seek to redress these balances, but the efforts have been highly controversial (Cooper 2002). Thus, while the Internet has indisputably become an essential part of everyday life - and indispensable in many ways - for many individuals in our society, Internet access remains elusive. What price will those individuals, and our society, pay?

An additional triplet of issues that we expect will continue to gain in importance in the next decade concern privacy, protection and security. The Internet's ubiquity has a dark-side, as identity theft reports mount, offensive messages persist, and society angsts over the potential impact of unfiltered information available to children.

This tension between the Internet's enormous potential and user expectations is likely to remain as the pace of technology continues unchecked. The conceptual framework proposed here provides a foundation that will allow us to address these issues in depth.

Figure 1: Household Internet Use 2003 and 2000



*Data for 2000 not available for the last five uses

Figure 2: A Conceptual Model of Internet Indispensability

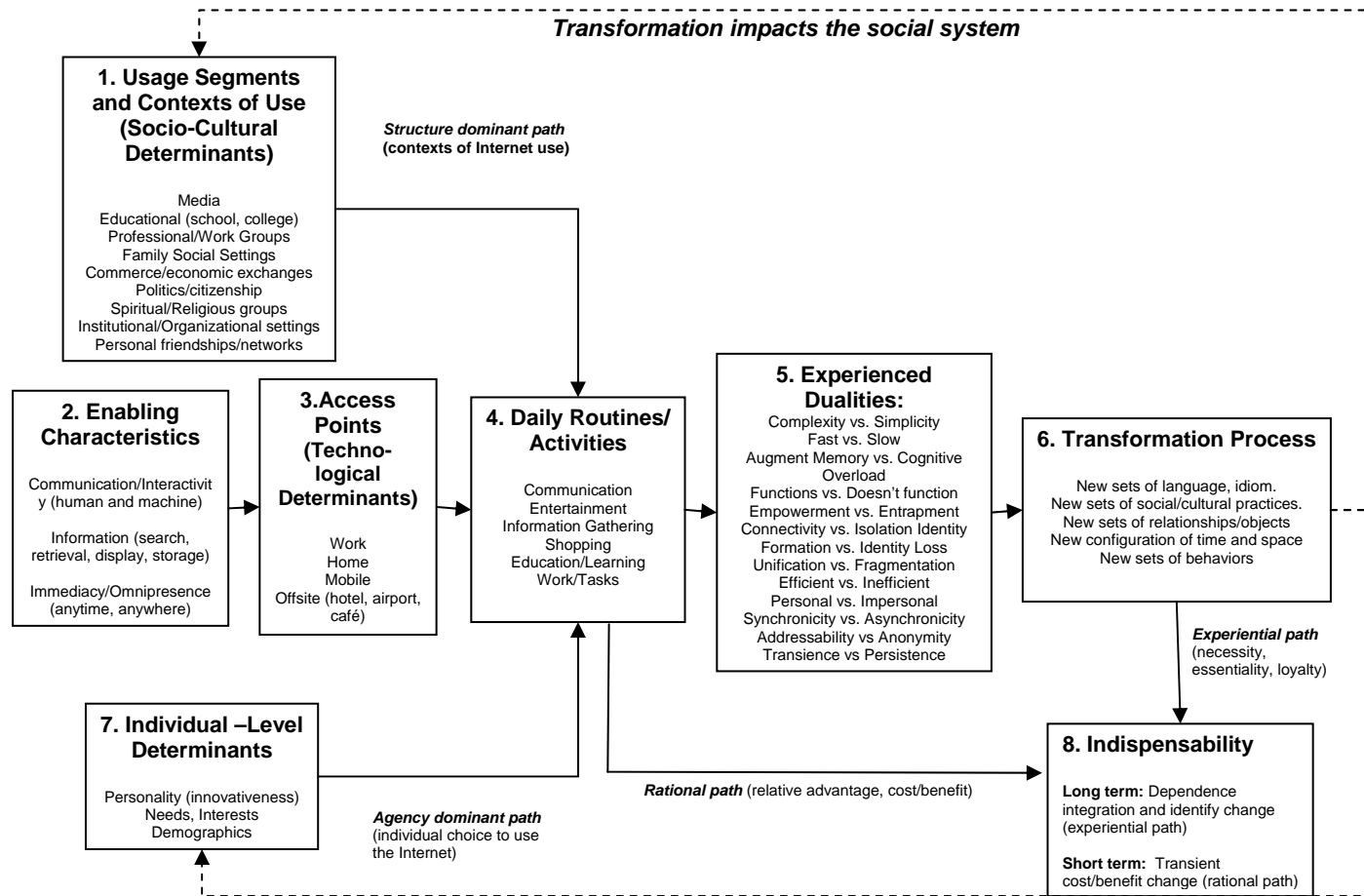


Table 1. Characteristics of American Internet Users (Drawn from Madden 2003)

	Year 2000	Year 2002	Year 2003
No of Adult Americans Online	86m		126m
Size of the online population on a typical day	52m		66m
Men users online	49%		65%
Women users online	44%		61%
Broadband connection			31%
Email use	78m		102m
Instant messaging	39m		52m
Educational use	47m		63m
Users by Race			
White/Caucasian		63%	64%
English Speaking Hispanics		61%	62%
Blacks/African Americans		45%	51%
Age Groups			
18-29	64%		67%
30-49	56%		67%
50-64	36%		59%
65 and over	12%		22%

Table 2: Characteristics of Internet Households in 2000 and 2003 (Drawn from Projects NOAH and POINT*)

	Study 1 Year 2000	Study 2 Year 2003
Sample Size	910 ^a	1203
Household Income		
15,000 or less	2.9%	3.0%
15,001 – 30,000	13.51	9.32
30,001 – 50,000	25.91	14.8
50,001 – 75,000	24.69	21.3
75,001 or more	33.01	45.9
Race ^b		
White	88.1%	84.66%
Black	3.6%	4.9
Hispanic	3.0%	3.5
Asian	2.2%	4.56
Other	1.5%	1.46
Highest Education		
High School and Under	10.4%	7.6%
Bachelor's/Post High School	61.4	56.0
Postgraduate	28.3	35.7
Children in Household		
Yes	44.1%	42.4%
No	55.9%	57.6
Computer Households with Internet Connection	77%	94%
Number of computers in use at home		
One	73%	50.3%
Two	20%	30.7
Three computers	4.8%	11.7

Four or more (Mean number of computers per household)	2.5 (1.39)	8.1 (1.90)
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* Center for Research on Information Technology, UC Irvine, <http://www.crito.uci.edu>

^a Number of households in sample

^b Race taken as the self reported race of the head of the household.

Table 3: People's Perceptions of Computers and Their Impact on Their Lives (drawn from Projects NOAH and POINT)

	2003 Agree %	2000 Agree %	2003 Disagree %	2000 Disagree %
The computer has become part of the daily routine at home.	62	52	24	28
It would be difficult to imagine life without a computer at home	50	44	30	42
The computer has saved time at home.	51	48	25	33
The computer is essential as any other household appliance	51	39	29	41
The computer has changed the way we do things at home.	45	40	29	39
Households with computer are run more efficiently than household without a computer	22	15	46	59
Computers in the home take away from family interaction	27	22	46	53
Computers have made it easier to organize family and social events	34	NA	40	NA
I have more contact with friends and relatives now that I have email	54	48	28	35
The computer has replaced the telephone as the major communicative device in our home	16	10	62	73
We watch less TV as a result of using the computer	25	27	52	49
Computers are more useful in the office than in the home	38	39	37	39
The computer has increased the amount of job related work I do at home	36	39	48	43
Computers are difficult to use	12	16	72	59
Those who are not knowledgeable about computers are falling behind	67	68	13	16
Computers give status to their owners	11	14	68	65

The Internet helps me look for product information	68	44	13	13
Having Access to the Internet makes me feel much better informed	53	43	21	21

References

- Cooper, Mark. (2002), "Does the Digital Divide Still Exist? Bush Administration Shrugs, but Evidence Says 'Yes.'" Consumers Union. <http://www.consumerfed.org/DigitalDivideReport20020530.pdf>
- Cuban, Larry (2003), *Oversold and Underused: Computers in the Classroom*, Harvard University Press.
- Hannemyr, Gisle (2003), "The Internet as Hyperbole: A Critical Examination of Adoption Rates," *Information Society*, 19(2), April-June 111-121.
- Hoffman, D.L. and T.P. Novak (1998), "Bridging the Racial Divide on the Internet," *Science*, 280 (April 17), 390-391.
- Jones, Steve (2002), "The Internet Goes to College: How Students Are Living in the Future With Today's Technology," Pew Internet and American Life Project, September 15. http://www.pewinternet.org/reports/pdfs/PIP_College_Report.pdf
- Lenhart, Amanda, Lee Rainie, Oliver Lewis, Susannah Fox, John Horrigan, Tom Spooner and Cornelia Carter (2001), "Teenage life online: The rise of the instant-message generation and the Internet's impact on friendships and family relationships," Pew Internet and American Life Project, June, 20, 2001. <http://www.pewinternet.org/>
- Madden, Mary (2003), "America's Online Pursuits: The Changing Picture of Who's Online and What They Do," PEW Internet & American Life Project, December 22. http://www.pewinternet.org/reports/pdfs/PIP_Online_Pursuits_Final.PDF
- Mick, David Glen and Susan Fournier (1998), "Paradoxes of Technology: Consumer Cognizance, Emotions, and Coping Strategies," *Journal of Consumer Research*, 25 (September), 123-143.
- Orlikowski, Wanda (1992). The Duality of Technology: Rethinking the Concept of Technology in Organizations. *Organization Science*, 3 (3), 398-427.
- Robalino, David (2000), Social Capital, Technology Diffusion and Sustainable Growth in the Developing World, Research Report No. RGSD-151, Santa Monica, CA, Rand Corporation.
- Shih Chuan-Fong and Alladi Venkatesh, (2004) "Beyond Adoption: Development and Application of a Use-Diffusion Model," *Journal of Marketing*, 68 (1), 59-72.
- Warschauer, Mark (2003), *Technology and Social Inclusion: Rethinking the Digital Divide*, MIT Press.