

# HomeNet: A Field Trial of Residential Internet Services

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## ABSTRACT

HomeNet is a field trial of residential Internet use with lowered barriers to use. We use multiple longitudinal data collection techniques, including server-side instrumentation. This paper is an initial description of how diverse families used the Internet in the first five months of the trial, and of variables that predicted this usage. The results have implications for design (e.g., provide more help for adults to get started), for marketing (e.g., lower income people have as much desire for on-line services as do upper income people), and for research (e.g., understand why teenagers' lead family computing).

## Keywords

Human factors, communication applications, empirical studies, Internet, electronic mail, world wide web, social impact.

## THE HOMENET PROJECT

"I really want to move to Antarctica—I'd want my cat and Internet access and I'd be happy."  
—16 year old HomeNet participant, 1995.

In the 1980s, personal computers and networking transformed workplace communication [11]. As these social changes took place, few researchers and developers looked at networking in the home. And when they did look, they did so narrowly—seeing networking at home as an extension of networking in the office.

In the 1990s, computers are moving into the home at an enormous rate. In contrast to the 1980s, telecommuting and

other workplace applications are not the only, or even the main, reasons for this change. By 1994, approximately 31% of US households had a computer [12], and in 1994, computers for the home represented 40% of PC sales. The potential for families, businesses, and community services is enormous. Yet we still lack an understanding of the changes taking place. In particular, we know very little about which electronic services are valuable to people across incomes in diverse communities. We also know little about how to make electronic services more valuable—whether through better design, better training, or a different array of services.

HomeNet is an empirical field trial of residential Internet use whose goal is to increase our knowledge about the use and impact of residential electronic services. It is a true, pretest-posttest field experiment. It uses a longitudinal panel design to study families over time. The project soon begins its second year. Our goal in this early report is to describe how average citizens (as represented in our study) use the Internet and to predict what leads them to use it.

## Diverse HomeNet Families

Our current knowledge of electronic services in general and the Internet in particular is based upon the behavior of the predominately upper income, white male professionals who buy computers and have used these services in the past (e.g., [13]). Moreover, the income and education gap between users and non-users of on-line services has been increasing during the last ten years [1]. Our research presumes that as computers become cheaper and on-line services easier to use, future users of these services may well be unlike current users. Therefore we set out to investigate how a broader sample of people would use and value electronic services.

To accomplish this goal, the HomeNet project is based on a service model with low barriers to entry. We loaned families a computer, or if they preferred, sold it to them at half price. Each family also received a high speed modem, and an extra telephone line as well as full Internet accounts

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CHI 96 Vancouver, BC Canada

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for each family member above age 8 who wanted one. We simplified Internet access. All computers included a turnkey system—for access to the entire Internet—to newsgroups, the World Wide Web, electronic mail, MUDs, and special HomeNet chat newsgroups. Our software configuration allowed family members to use Internet services without learning the details of any computer operating system. Their Internet services were individualized, for example, by providing each family with a Web homepage pointing to information sources tailored to their identified interests. They received approximately three hours of training. We also offered on-line support through a help newsgroup and email, and an evening telephone help desk staffed by college students.

We recruited an initial sample of 48 families (157 individuals) through the public high schools of four neighborhoods in Pittsburgh, PA, selected for their demographic diversity. In each school, we recruited students who worked on the school newspaper and their families, as well as at least one journalism teacher and teacher's family. The common bond of journalism gave students from different schools something to discuss as we put the project on-line.

The result of these procedures is that while the HomeNet sample is not representative of the US population, it is more demographically diverse than existing Internet demographics (see Table 1).

N	157
Race	24% minority
Gender	57% female
Generation	42% <18 years old
Family income	25% <\$35,000

Table 1: HomeNet sample demographics

**DATA COLLECTION**

The HomeNet project uses five sources of data: (1) computer-generated usage records of email traffic, newsgroups read and posted to, Web sites and MUDs visited, and time on the Internet; (2) pre-trial, bi-monthly, and post-trial questionnaires; (3) an archive of HomeNet newsgroup messages; (4) a log of help requests, and (5) home interviews. The analyses reported in this paper rely mainly on the computer-generated usage data, in-depth interviews with 14 families, and the pretest questionnaire. All subjects signed detailed informed consent forms.

**HOW DO FAMILIES USE THE NET?**

**It is hard to get started**

Currently, even the easiest-to-use computers and applications pose significant barriers to peoples' use of on-line services. Potential Internet users vary widely in their computer skill, and many have little computer experience. Among the HomeNet participants, 21% reported never having used a computer before the trial started. In contrast, 17% used a home computer at least daily.

Getting started was a major problem for many of the families. Connecting to the Internet is far more difficult than getting telephone or TV service. It requires that people correctly navigate a complex sequence of steps, from obtaining and setting up a computer, to establishing telephone service, to learning application software, to defining and remembering a password. Even with help and our simplified procedure, HomeNet participants had trouble connecting to the Internet for a wide variety of reasons—bad telephone lines and busy signals, passwords forgotten, depressed shift-lock keys on keyboards, erased login scripts, buggy software, and so forth.

Many participants lacked the skills to diagnose problems, in part because they did not have clear models of how components of the overall system operated. Their problems were more likely to be solved quickly if other family members or friends were more sophisticated than they or if they felt comfortable revealing their ignorance to the strangers on a help desk. Although teens typically became the most skilled computer users in their families, they were sometimes reluctant to share their expertise with their parents. Some participants blamed themselves for problems that were due to software bugs or overtaxed servers. Others asked for help from the project staff—122 times over the first 6 weeks of the trial period. The frequency of requesting help declined as people got started (or gave up), and as participants became more skilled in navigating the Internet.

**Internet Use Is Strong in the Aggregate, But Varies Widely and Declines With Time**

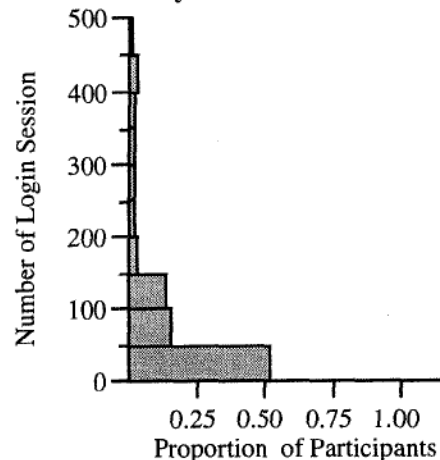


Figure 1. Distribution of logging into the Internet.

Of the 157 participants who received Internet accounts, 126 logged into the Internet (i.e., dialed in to the HomeNet server) from home at least once during the first 22 weeks of the trial. Participation differed enormously among them. Figure 1 shows the distribution of Internet sessions per person. While the modal number of logins was less than twice a week, some participants logged in multiple times per day and had accumulated almost 500 logins during the first 22 weeks of the trial. The first three columns in Table 2 show some descriptive statistics about participants'

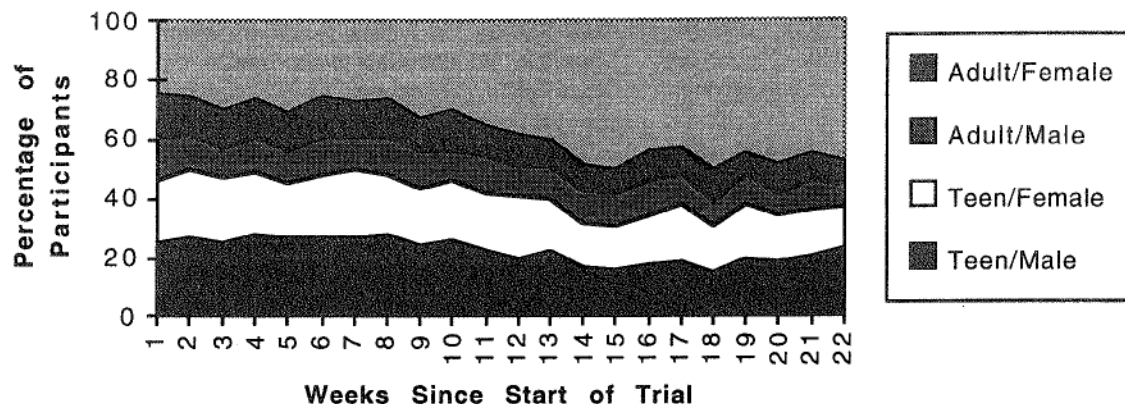


Figure 2. Percent of Participants Logging in Per Week

Note: Percentages have been normalized to an equal number of participants in each demographic group. If everyone in each group used the Internet weekly, then the graph would show four parallel bands, each representing 25% of the users.

use of different Internet services. The distribution of each of these measures is also highly skewed. For example, approximately 12% of those who logged in sent no electronic mail messages over the study period, but one user sent over 2500 messages.

Internet use was initially strong, but declined over time. During the first weeks of the trial approximately three-quarters of the participants logged in at least weekly (see Figure 2). Usage declined to about fifty percent by week 22. A noticeable dip occurred in week 14, when school let out for the summer, as travel, summer jobs, and outdoor activities cut into time on the computer.

Usage differed by generation and gender. For example, at the midpoint of the trial (week 11), 62% of the teenagers logged into the Internet compared to only about 45% of the adults. Among the teenagers, males were much heavier users than females; among adults, males were slightly higher user than females.

#### Net Use Is Interrelated

Most discussion of the Internet distinguishes communication services like electronic mail, from information services like the World Wide Web. The boundary, however, is blurry and growing blurrier as individuals learn to be their own broadcasters or post information to a newsgroup to response to a particular message.

We find that these conceptually distinct services are complementary. People who used communication services were also likely to use information services, and vice versa, and both kinds of use predicted the number of logins to the Internet and the number of hours spent engaged with it. Table 2 shows the descriptive statistics for various measures of Internet use and the correlations among them. Because usage was skewed, measures were converted to the log scale before the correlations were calculated. The

average correlation is high (.70 for all participants shown in Table 1 and .52 for the 88 heaviest users). This result indicates that HomeNet participants who used any Internet service used most of them—electronic mail, newsgroups, and the World Wide Web. Follow-up time-series analyses will allow us to determine whether communication or information consumption is causally prior.

#### Teens Lead the Family

Our data also showed that usage within families was interrelated. In 41 of the 48 families, the heaviest user was one of the children. There was a significant correlation ( $r=.54, n=48, p < .01$ ) between the usage of the heaviest user in the family and the average use by other family members. Heavy use by a child predicted both siblings' ( $r = .43$ ) and parental use ( $r = .42$ ). Because so few adults were heavy users, we cannot tell if their use also drove that of their spouses or children.

#### Participants Discover Communication

According to their pretrial questionnaires, participants didn't see computers as particularly useful for interpersonal communication. They thought computers were valuable for doing school work, for learning, and for performing household chores. Yet like people discovering the telephone at the turn of the century, chit-chat quickly became the dominant use of the Internet, and especially so for teenagers.

Overall, the median teenager sent almost six times as many electronic mail messages as the median adult. The generation difference, however, was greater for males than for females. Teenage males sent 25 times more messages than adult males, while teenage girls sent only six times more messages than adult males. Teenage boys sent almost twice as many messages as teenage girls. Almost all of the teenagers' messages went to other teens (94%), whereas the adults communicated approximately equally to teens and other adults.

	<i>1st quartile</i>	<i>Median</i>	<i>3rd quartile</i>	<i>Logins</i>	<i>Connect hours</i>	<i>Email traffic</i>	<i>Newsgroup messages read</i>
Logins	2	21	91	1.00			
Connect hours	.6	10.9	40.7	.95	1.00		
Email messages sent	0	6	39	.75	.78	1.00	
Newsgroup reads	0	2	36	.63	.66	.67	1.00
WWW hits	0	684	3604	.77	.85	.51	.48

Table 2: Descriptive statistics about measures of Internet use and correlations among them

Note. Descriptive statistics are in raw units. Measures were converted to a log scale for correlations.

Several of the teens discovered communication services that allowed them to exchange messages with friends and strangers in real time (Internet Relay Chat and various MUDs). One girl who had never dated started dating a boy she met over a chat service. Because of what seemed to be almost addictive behavior among some of the teenagers who used the real-time communication services, several parents imposed limits on their children's computer use.

### Both Mass Market and Individualized Information Services Have Appeal

#### *Directories and popular culture*

Only a few newsgroups and World Wide Web sites were popular with most participants. The most frequently accessed services were directories and indexes, like Yahoo and Lycos, which provide taxonomies and search capabilities for people to find information. Directory and repository Web sites represented half of the top 10 Web sites, ordered by number of users accessing each site. Many participants accessed information about popular culture, including sports and entertainment, from newsgroups and Web sites. For example, men visited sites that provided information about the Pittsburgh Penguins, Pirates and Steelers, the local sports teams, and teens downloaded cartoons and songs from rock groups. One mother and her teenage-daughter regularly participated in a newsgroup to keep up with the soap operas they missed.

#### *Sex*

HomeNet participants also looked at sexually-oriented newsgroups, such as the alt.sex.\* hierarchy and the Web sites published by Penthouse and Playboy. When newsgroups were ordered by the number of users who examined them one or more times over the first 5 months of the study, 13 of the top 30 newsgroups had sexual themes. But the sexually-oriented newsgroups do not hold their readers. When newsgroups were ordered by the number of "followers"—users who read them 3 or more times over the 5 months—then only 4 of the top 30 of this group were sexually oriented. Males were more likely to access these offerings than females and teens of both genders accessed them more frequently than adults, holding constant their overall use of the Internet. But less than 50% of the sample ever accessed a sexually-oriented newsgroup even once, and only 20% accessed a sexually-oriented newsgroup three or more times.

When asked about their children's access to pornography on the net, parents told us they trusted their children to avoid inappropriate content. Some said the sexually-oriented materials that they personally checked out were no worse than the materials easily available to their children in the corner drug store. It is unclear, however, how general are these attitudes, given our sample of urban parents.

#### *Local services*

Local information and communication services had special appeal to participants in the trial for two reasons. First, times for movies houses, buses schedules, and information on sports teams, social services and community development are all more useful when they are local. In one local newsgroup, teens from several area high schools shared information about which Department of Motor Vehicle testing station gave the easiest parallel parking tests. Local information services also provide people with satisfying social identities. People want to participate in and be part of groups, and geography provides one basis for group formation. Teenagers preferred communication forums that were limited to their own high schools. They complained when their communication areas were "invaded" (their term) by interlopers from other schools, and asked for controlled-access forums for their own groups.

#### *Individualized services*

Although services providing directory information and information about popular culture and the local environment appealed to many participants, the modal information service appealed to only one or two participants. The 126 participants who used the Internet accessed 1146 different newsgroups and more than 4000 different Web sites. Of the 1146 newsgroups visited, 328 were "followed"—accessed at least 3 or more times by at least one reader. When subset of newsgroups are ranked by number of followers, 78% were followed by just one user and only 10% were followed by 3 or more users. Similarly, 62% of followed Web sites were followed by only 1 reader and 23% were followed by 3 or more.

The information services that appealed to one or two people were extremely varied. Newsgroups ranged from those associated with hobbies (e.g., needlepoint) to religion (e.g., Jewish culture) to professions (e.g., tax preparation).

### Internet Use is Expressive

Our discussion of using the Internet to this point has focused on interpersonal communication as a way to build and maintain social relationships and on information services as a way to become informed or entertained. Participants also used their computers and the Internet as ways to express themselves. Six trial participants wrote their own World Wide Web home pages, one touting his high school and another showing off his creative writing. Besides this public expression, some participants personalized their home computers by creating new background patterns or substituting curses or musical phrases for the traditional warning sounds. Teenagers were most likely to engage in both types of expression. Many reported that mastering the techniques necessary to personalize their computers was satisfying in its own right. Most of the adults whom we interviewed considered mastering these techniques to be a waste of time and an obstacle to their use of the computer.

Communication networks have long been known as vehicles for people to express themselves, for example, by assuming different personas in newsgroups [4]. Among our sample, group communication was easier technically than personalization of the computer (although we found in our home visits that some participants had trouble locating desirable newsgroups and Web sites). Both adults and teens engaged in group communication, and many became consistent members of virtual groups. Teens who became relatively sophisticated computer users gave advice in the HomeNet help group to strangers in the trial who were having trouble. Several adults shared their professional expertise on newsgroups: an accountant his tax knowledge and a doctor his knowledge of arthritis. Others offered advice on their hobbies: one woman gave advice on raising exotic pets.

### PREDICTORS OF INTERNET USE

We used linear regression analyses to identify the characteristics of HomeNet participants that predicted Internet usage differences. Because of the high correlations among usage measures, our dependent variable in this analysis is a composite, operationalized as the average of the standardized usage scores for sending and receiving electronic mail, reading and posting in newsgroups, and accessing World Wide Web sites (all in the log scale) across the first 5 months of the study. The predictor variables were measured on the pretrial questionnaires, before participants had Internet access.

These variables were grouped into four categories for purposes of analysis (Table 3). The category boundaries are arbitrary, but generally conform to the way home computing has been discussed in the literature, that is, as influenced primarily by economic and demographic factors, psychological or personality dispositions, computer skill and experience, and interest in various information sources (e.g., [12],[14]).

Below, we discuss each category of variables and the effects of each category singly. Then we construct an overall model, using all the significant variables from the previous

analyses. This is an exploratory analysis, and does not use strong theory to test a deductive model. Also, it is a preliminary analysis examining only main effects on aggregate use. In later stages of this research we will investigate interactions, effects over time and differential predictions for communication and information services.

### Demographics

Five demographic/economic variables are cited often in the literature on home computing: income, education, race, gender, and generation.

#### *Income*

Given the substantial investment required to purchase a computer, few families with low incomes have one [1]. By making computers and Internet access available to all participants in the trial, we are able to determine whether income has an effect on using the Internet once families have passed the hurdle of acquiring a computer. Household income was operationalized as the average of the household incomes reported by adults in a family.

#### *Household education*

Early adopters of home computing were well educated, professional people who often used computers to extend their work hours [14]. The task of purchasing the right hardware and software package, assembling the computer at home, and using the machine for useful purposes against the odds of breakdowns, was daunting. We made usability a strong goal in our trial, and asked whether enhanced usability might reduce the impact of education on usage. Household education was operationalized as the average of the highest grade completed by the adults in the family.

#### *Race*

Home computers are less common in minority households than white ones, even controlling for income and education [1]. It has been argued that minority students do not have equal access to computing both at school and at home [10]. We tested if race difference in computing holds for home use of the Internet, once families have acquired a computer. Race was treated as a binary variable, coded as 1 for whites and 0 for others.

#### *Gender*

In schools, playrooms, and computer clusters, girls often do not seem as attracted to computers as boys do. A host of stereotypes including societal, educational and familial attitudes are said be working against women in computing [7]. We tested whether the gender gap often discussed in the literature affected Internet use at home. Gender was treated as a binary variable, coded as 1 for males and 0 for females.

#### *Generation*

A generation gap in adopting new technology seems as strong today as ever. Youngsters and young people typically adopt many new electronic home technologies (such as VCRs and Walkmen) well before adults. We expected the students in the sample to be heavier users of the Internet because they are curious, have time for exploration, and have had some formal training on computers. Generation was treated as a binary variable,



Predictor Variable	Demographic	Psychological	Computer	Media	Overall
Intercept	-.07 (.73)	.08 (.29)	.11 (.18)	.07 (.95)	-.05 (.75)
Income	-.03 (.89)				
Education	-.01 (.23)				
Race (white = 1, other = 0)	.52 (.00)				.46 (.01)
Gender (male = 1, female = 0)	.29 (.03)				.32 (.02)
Generation (adult = 1, child = 0)	-.86 (.00)				-.61 (.00)
Innovativeness		.23 (.00)			.13 (.05)
Sociability		.19 (.01)			.10 (.12)
Hassles		-.17 (.04)			-.11 (.13)
Time pressure		.03 (.71)			
Depression		.26 (.00)			.12 (.13)
Computer Skills			.29 (.01)		.18 (.01)
Computer Experience			-.26 (.00)		-.24 (.00)
Computer Value			.10 (.32)		
Applications' Value			-.11 (.19)		
Phone				.09 (.23)	
Newspaper				.05 (.51)	
Books				.18 (.02)	.03(.67)
Music				.14 (.07)	
TV				-.16 (.03)	-.14 (.03)
R Square	.33	.17	.14	.12	.45
N	132	131	121	129	129

Table 3. Predicting Internet Use.

Note. - Table entries are Beta coefficients for predicting Internet use. Except for the binary variable of race, gender, and generation, the independent variables have been standardized with a mean of 0 and a standard deviation of 1. *P*-values are in parentheses.

coded as 1 if a participant's age was 21 or greater and 0 otherwise.

The second column of Table 3 shows how the demographic variables were related to Internet usage in our sample. Neither income nor education predicted usage. This finding suggests strongly that once economic barriers are removed, people across socioeconomic lines will use the Internet. By contrast, race, gender, and, especially, generation were strong predictors of Internet usage in our sample: whites, males, and teens were more likely to use the Internet than minorities, females, and adults, respectively. These effects all speak to strong cultural or social forces on Internet usage. Of all the variables, the difference between children and adults was the strongest predictor in the category, and turned out to be the strongest predictor across all analyses.

### Psychological dispositions

We chose five variables within the category of psychological dispositions.

#### *Innovativeness*

We measured people's willingness to experiment with new ideas and fashions. We adapted an innovativeness scale [8] used by marketing researchers to predict people's adoption of new products and services (e.g., "I like to experiment with new ways of doing things."); Cronbach's Alpha = .41).

#### *Sociability*

Since several of the most popular services on the Internet support interpersonal communication, we measured a person's tendency to socialize and have social skills, adapting a social extroversion scale [2] (e.g., "I like to mix socially with people."); Cronbach's Alpha = .74).

#### *Hassles*

Hassles are problems in daily life ranging from one's car breaking down to one's child getting sick at school. We speculated that those with a more harried lifestyle would be less likely to learn and use the Internet. This measure is the number of daily hassles each subject reported in the week prior to the pretrial survey [6].

#### *Time pressure*

People with too many responsibilities and little free time are unlikely to have the slack resources necessary to learn a new technology or to explore its value. We measured time pressure by adapting a scale measuring overload in organizations [3] (e.g., "I often feel under stress because I don't have enough time."); Cronbach's Alpha = .74).

#### *Depression*

The Internet could provide social support for those who lack it locally. We measured depression to investigate whether those measuring higher on this variable would be more likely to use the Internet to try to obtain support. It is possible, however, that the lack of energy and enthusiasm associated with depression would inhibit people from using

the Internet. Our measure of depression was taken from [9]. (e.g., "I felt sad"; Cronbach's Alpha = .83)

The results of this analysis, shown in the third column of Table 3, are that innovative and sociable people used the Internet more, and those who listed many hassles used the Internet less. People under time pressure did not use the Internet less than people with more free time. (This result is the same when we used time diary data on hours spent at work or school.) Also, depressed people used the Internet more than those who were not depressed. Innovativeness and sociability are correlated with healthy psychological status whereas depression is not. These results suggest that the Internet appeals to people at both ends of the continuum of psychological status, perhaps for different reasons.

#### **Computer experience and attitudes**

The literature on individual differences in computing performance strongly suggests that technical abilities, experience, and attitudes will predict Internet usage.

##### *Computer Skills*

People with good computer skills should have an advantage in attempting to use the Internet, if only because they can deal with some of the technical problems that invariably arise. We developed a five-item scale to measure perceived computer skills. (e.g., "I am very skilled at using computers.;" Cronbach's Alpha = .86).

##### *Computer Experience*

People with more years of experience also might have an advantage in using the Internet. Our computer experience measure is the number of years participants reported using computers.

##### *Computer Value*

People with more favorable attitudes about the usefulness of computers for work, communication, entertainment, education, and other functions, might use the Internet more. We developed a scale with twelve items to measure the perceived usefulness of home computers across several domains. (Cronbach's Alpha = .83)

##### *Value of Computer Applications*

This construct measured directly the perceived value of popular computer applications, such as word processing, spreadsheets and games as well as networked applications such as e-mail, newsgroups, and file downloading (Cronbach's Alpha = .76).

People with more skill used the Internet more, but surprisingly, people with greater experience with a computer used the Internet less, holding constant their skill. (See the fourth column of Table 3.) Possibly the Internet appealed to veteran computer users less than to novices because exploring computers was less of a novelty. Or, veterans' might have developed an instrumental view of computing, a view inconsistent with the communication, casual exchange of information, and fun that they saw in the Internet culture. The perceived usefulness of computers and applications was unrelated to participants' use of the Internet.

#### **Use of other media**

The Internet may serve as an alternative for other media such as books, telephones, newspapers and TV. Previous literature suggests both substitution and complementarity (e.g., [12]). However, this earlier research did not test whether, for example, TV watchers avoid computers or whether computers pull people away from their TVs. To test this hypothesis, we measured the times per week participants used a home telephone, read a newspaper, read a book, listened to music, and watched TV.

People who read books were more likely to use the Internet, whereas people who watched TV were less likely to use it. (See the fifth column in Table 3.) The text-based nature of most services on the Internet may appeal most to people who read for information and entertainment.

#### **Overall Model**

We constructed a combined model predicting Internet usage in our sample, by including variables from the previous analyses that significantly predicted use. The model explains 45% of the variance in participants' use of a range of Internet services. Generation is the strongest individual predictor; teenagers were much more likely to use the Internet than adults. Race is the second strongest predictor; whites use the Internet more than minorities. This race effect is strongest among the teens (analysis is not shown). Similarly, females used the Internet less than males, and again the effect is largest among the teens (not shown).

Entering the demographic variables into the model reduces the effects of all the psychological dispositions, although participants' innovativeness reliably predicts their Internet use. Among the computer variables, those with more computer skill used the Internet more, whereas those with more computer experience used it less. Finally, people who watch TV were less likely to use the Internet.

#### **CONCLUSION**

When ordinary people are given access to the Internet from home, half of them use it regularly after 5 months. Teenagers are central to Internet use at home, at least in the present sample. They often provided the motivation for their parents to invest in a computer, were often the heaviest users in the family, became sources of expertise within the household, and catalyzed Internet use by other family members. If these findings are generally true, then the family dynamics that characterize teenagers' interactions within families will influence the diffusion of home computing.

Though studies show that high-income, educated white males dominate the Internet, the HomeNet study shows that once financial barriers are lowered, lower income and less well educated people are as likely to become enthusiasts. Race and gender, however, remain associated with Internet usage, perhaps because the Internet's mainly white, male users has created a resource environment most attractive to men and whites. (One HomeNet women complained that there was so much football and so little about fashions on the Web.) The bias in Internet resources might change if more women and minorities sign on.

HomeNet participants communicated heavily and used a wide range of information services. Only a few of the information services were broadly popular. People gravitate towards services that address their idiosyncratic interests. Since most individuals will be interested in only a few of the thousands of services offered them, they need easy ways to personalize their information space so that it reflects their interests as the interests and their resources change over time.

This report on the HomeNet project is preliminary. Later reports will include a larger sample, and will focus on family interactions, on dynamic processes, on use over time of different electronic services, and on the impact of Internet use on individuals, groups, and families. Additional documents about HomeNet are at: <http://homenet.andrew.cmu.edu/Progress/>.

#### ACKNOWLEDGEMENTS

HomeNet is funded by grants from Apple Computer, Bell Atlantic, Bellcore, Intel, The Markle Foundation, The NPD Group, The US Postal Service, and US West. Farallon Computing and Netscape Communications contributed software.

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