

Computer Use in the United States:
The Bureau of the Census Surveys

Robert Kominski
Population Division
U.S. Bureau of the Census

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This paper reports the results of research undertaken by Census Bureau staff. The views expressed are attributable to the author, and do not necessarily reflect those of the Census Bureau.

Introduction

Over the past twenty years, computers and computing technology have become widely disseminated in our society, as increases in efficiency and reductions in size have reduced costs and allowed the introduction of computers for countless thousands of different applications. At a human level, computers have gone from being the instrument of a fairly technically specialized group of workers to a common tool of many different kinds of people. The diffusion of the computer as an "everyday tool" like the telephone or television is not yet fully complete - everyone (or virtually everyone) in the society does not own or use a computer. Nevertheless, computers continue to be more and more integrated into our daily lives, and what was once regarded as science fiction speculation - a computer in every home - is now regarded by many persons as a logical inevitability.

Perhaps what is so surprising in the growth of the use of this tool is how little we really know about the patterns of availability and use. Until recently, most information on this topic came from the numerous marketing organizations concerned with identifying socio-demographic groups with high likelihoods of purchasing computer-related items (e.g., hardware and software). Another source of data are the sales figures and associated information collected by each company producing computer equipment. Neither of these data sources are particularly appealing - the marketers tend to use relatively small-scale samples and concentrate on brand-usage issues; specific companies know only about their own equipment, and know nothing about the non-owners.

This paper is about a data source that provides a comprehensive look at the U.S. population in terms of their ownership and use of computers. The intention of these data is not to provide product-specific information about computers and software, nor is it to offer great detail about persons' depth and complexity of knowledge of computing tasks. Rather, these surveys have been designed to develop a descriptive portrait of the computer as a critical component of the educational and skill levels of the general population. The survey, conducted twice during the 1980's, provides a detailed look at computers not as a consumer product, but as an important component of everyday life.

The Data

Every month the U.S. Census Bureau conducts a large scale national sample survey of the U.S. population called the Current Population Survey (CPS). This survey has been conducted monthly by the Bureau since the early 1940's, and is sponsored by the Bureau of Labor Statistics. The reason for this sponsorship is that the CPS was created primarily to monitor the status of the American labor force. The main statistic derived from the CPS is the monthly national unemployment rate, as reported in the news.

The CPS is a national survey of the civilian noninstitutional population using a sampling design that is referred to as a stratified multistage cluster sample. In essence, a variety of sampling units are chosen across the country. These sampling units are areas chosen to reflect the diversity of the country across lines of age, race, sex

and a variety of other factors. Then, within these large sampling units, smaller units are chosen for interviews. These smaller units, clusters, are usually a group of several households. Interviews are conducted with all members of each of these chosen households; the sample generally has about 57,000 households in sample. Results of the interviews are weighted to provide nationally-representative estimates of the total U.S. population.

In addition to the basic questions asked about employment and other work activities (e.g., type of job, hours worked), special supplementary questions are asked in some months. Since the late 1940's one of the basic supplements that has been administered on a yearly basis is a set of questions asked each October about school enrollment. These questions are designed to determine the number of persons enrolled in school at various levels (nursery through college) and the characteristics of these schools (public/private, two-year/four-year) as well as the characteristics of the persons attending (and not attending). The October supplement has proven to be a useful and reliable indicator for tracking and detecting changes in the school population over time.

Each year, a series of standard questions is asked to maintain the ongoing yearly estimates of school enrollment and characteristics of students. In addition, however, other questions are often added to address a specific issue or concern of the Department of Education and the National Center for Education Statistics (NCES), which sponsor the supplements in part. These questions vary on a yearly basis, and are designed to reflect more immediate data needs, or topics that do not need assessment each year.

In 1984, NCES approached the Bureau about adding a supplement on computer use by students. Eventually, the questions were modified to reflect not only use in schools, but ownership and use at home, as well as use at work. In this way, we felt we would be able to assess the overlap of use patterns in three fairly critical domains, home, school and work. The questions were designed to assess general levels of ownership and use, as well as frequency and kinds of use. Questions were modified for children to reflect the fact that they do not hold jobs. One problem in administering the supplement was to find an acceptable definition of "computer". We were not able (and did not want) to use brand-names to define computers. Instead we used a general definition which read: "These computers may be personal or home computers, minicomputers, or mainframe computers. These questions do not refer to hand-held calculators or games, electronic video games, or systems which do not use a typewriter-like keyboard." The idea was to eliminate from consideration the large number of electronic systems which are designed primarily for game-playing, and which have no general application for computing tasks. The questions asked in 1984 are shown in Attachment 1.

In 1989 we were asked by NCES to update the information collected in 1984. The 1989 supplement (Attachment 2) asked virtually the same questions as the initial supplement, but added some additional information. For example, a question on hardware peripherals was added to determine the usage of items like laser printers, modems and other devices. In addition, a list of uses at work was added, and the home uses list was expanded from 6 to 15 specific applications.

Findings from the Surveys

The results of each of the two surveys have been presented in the Current Population Reports Series P-23 (numbers 155 and 171); most of the data presented in this paper are taken from these reports. Response to the supplements was quite good, with only small levels of nonresponse (about 3% of households in each of the two surveys). Table 1 shows some of the basic data for households for each of the two years. In 1984 about 8.2 percent of households had computers, by 1989 this had risen to 15 percent. As the data show, ownership was strongly related to household income. There was also a fairly strong relationship between the presence of children and ownership of a computer.

Most of the questions about computer saturation are asked in terms of persons, not households, so this is the focus for most of our work. Table 2 shows some simple patterns of access and use for children, ages 3 to 17, while table 3 concentrates on adults ages 18 and older.

Table 2 shows the distribution of access and use for children across a variety of dimensions measured in the study. For example, while the proportion of kids who had access to computers rose substantially from 1984 to 1989 (15.3 to 24.2%), the proportion with computers who used them stayed about the same (74.2 to 71.1%) or actually dropped a bit. Data for race and Hispanic origin groups shows there were substantial differences in access in the two time periods - Whites overall had much greater access. However, differences in use rates were small, given that a computer was available. On the other hand, there were fairly large differences between boys and girls in usage rates, even though there was very little difference in the proportions having a computer at home.

Even more interesting patterns of access and use are apparent across other dimensions. A strong relationship exists between the education of the householder and computer ownership. Moreover, this relationship appears to have gotten stronger in 1989. The proportion of children living with low-educated householders who owned computers did not change (staying around 3.5%), but for those with 4 or more years of college, the ownership level rose from 30.4% to 48.6%. If one looks at the usage rates, however, there is very little difference based on income, save for the somewhat lower rates expressed by children from very low-income households. Also, note that in both time periods the usage rates hover around 70%, even though a substantially larger number and percent of children had access to a computer in 1989 than in 1984.

Table 2 also shows levels of use for children in school. Data such as these must be accepted with some caution, since detail on the amounts or kinds of use were not collected in this survey. Nevertheless, the data show that use at school rose from 28 to 46 percent in the time period. Increases were fairly universal across all groups, however, note that rates of use in school are also related (in both time periods) to family income and education of the householder. In a previous analysis of the 1984 data only (Kominski, 1987), I was able to show that a substantial amount of the variance in school use rates was attributable to household income, even when simultaneously controlling for other factors. The 1989 data would

seem to indicate that this is probably true for that time period as well.

Table 3 presents data on the access and use patterns for adults at home and work (the reports previously cited also show data for school use, which I have excluded here). The first line of Table 3 shows that home access of computers increased for adults in the period of 1984-1989, as it also did for children. Usage rates also rose somewhat, going from 53 to 58%. As with children there are strong differences across race and Hispanic groups in terms of ownership of computers. Differences in rates of use are less pronounced, but are still evident. A large gender difference in 1984 had closed substantially by 1989, but still showed higher rates of use by men than women. As with children, some of the strongest differentials were along the lines of educational attainment and family income. The data show that both ownership and use are strongly related to educational attainment. Family income, while having a strong association with ownership, shows only a weak relationship with use.

Patterns of use at work are also detailed in Table 3. Among all adults with jobs, use of a computer at work rose from 24.6 to 36.8% from 1984 to 1989. Increases were evident for all subgroups examined. Some patterns of use at work reflect underlying differences in the demographic composition of various occupations. For example, the data show that women are much more likely to use a computer at work than are men. This is due in large part to the kinds of jobs held by women. A sizable proportion of women work in administrative support and clerical occupations (about 43% of all working women in the 1989 survey). This category includes jobs like secretary, sales clerk, and administrative clerks. The women in this group reported high levels of computer use - 58.2%. This factor acts to contribute to the higher overall level of computer use at work by women than by men, even though one might argue that the kind of computer work done in these jobs is relatively mundane. Usage rates at work by income and educational attainment also demonstrate that persons in higher-level jobs, especially technical positions, are more likely to use a computer at work.

In general, the data show a fairly stratified society in terms of ownership and use of computers. At home, the ability to buy/afford is very important in determining who has a machine. Reductions in cost, coupled with increases in applications, made home computers more available in 1989 than in 1984. Among homes that owned computers, however, there were very few differences across groups in terms of usage rates, especially among children. For adults, some differences are more readily apparent, but these seem associated with employment-related factors. In both time periods, persons who used a computer at work were more likely to both own and use a home computer than the national average. At work, large proportions of persons report using computers, but one needs to remember that many "low-tech" jobs may still involve using a computer. Telephone operators, telemarketing sales clerks, and airline reservationists spend virtually their entire workday logged on as active computer users, but these are not necessarily glamorous jobs.

Closing Points

As I have previously noted, most of the results presented here are taken from the two reports issued by the Census Bureau on the 1984 and 1989 surveys. Each of these are available from either the Government Printing Office, or from the Education & Social Stratification Branch in the Population Division at the Census Bureau. The reports have a variety of comparable data for the two time periods. The 1989 report also has a series of tabulations showing computer use at work by detailed occupation and industry types.

In addition to these two reports, public use datafiles of the two surveys are also available. These datafiles have the person record data (interviews) for each respondent in the survey, and for each respondent contain the full array of questions asked in the computer supplement, the school enrollment supplement, and the basic labor force questions of the CPS. The datafiles, because of their size, are available only as magnetic 9-track tapes. Potential users should keep in mind that these datafiles contain approximately 150,000 data records, each with 250 characters of information. Persons interesting in purchasing these files can contact the Customer Services Branch of the Data User Services Division on (301)-763-4100. Inquiries should be made about the October 1984 or October 1989 Current Population Survey(s).

Our future plans to collect additional supplements on computer use are not clear at this time. It is certainly the case that just as in the period between 1984 and 1989, large-scale changes have occurred in computer applications, ownership and use during the past several years. A next logical time for a third computer supplement would be in October 1994, ten years after the original survey was conducted. Financing for this study, as with the previous two, is contingent on availability of funds and desire to collect the data, from the Department of Education, which financed the other two studies. At this time, it is not possible to determine if the desire or funds will be available, but if they are, we would anticipate the production of a new report sometime in late 1995.

References

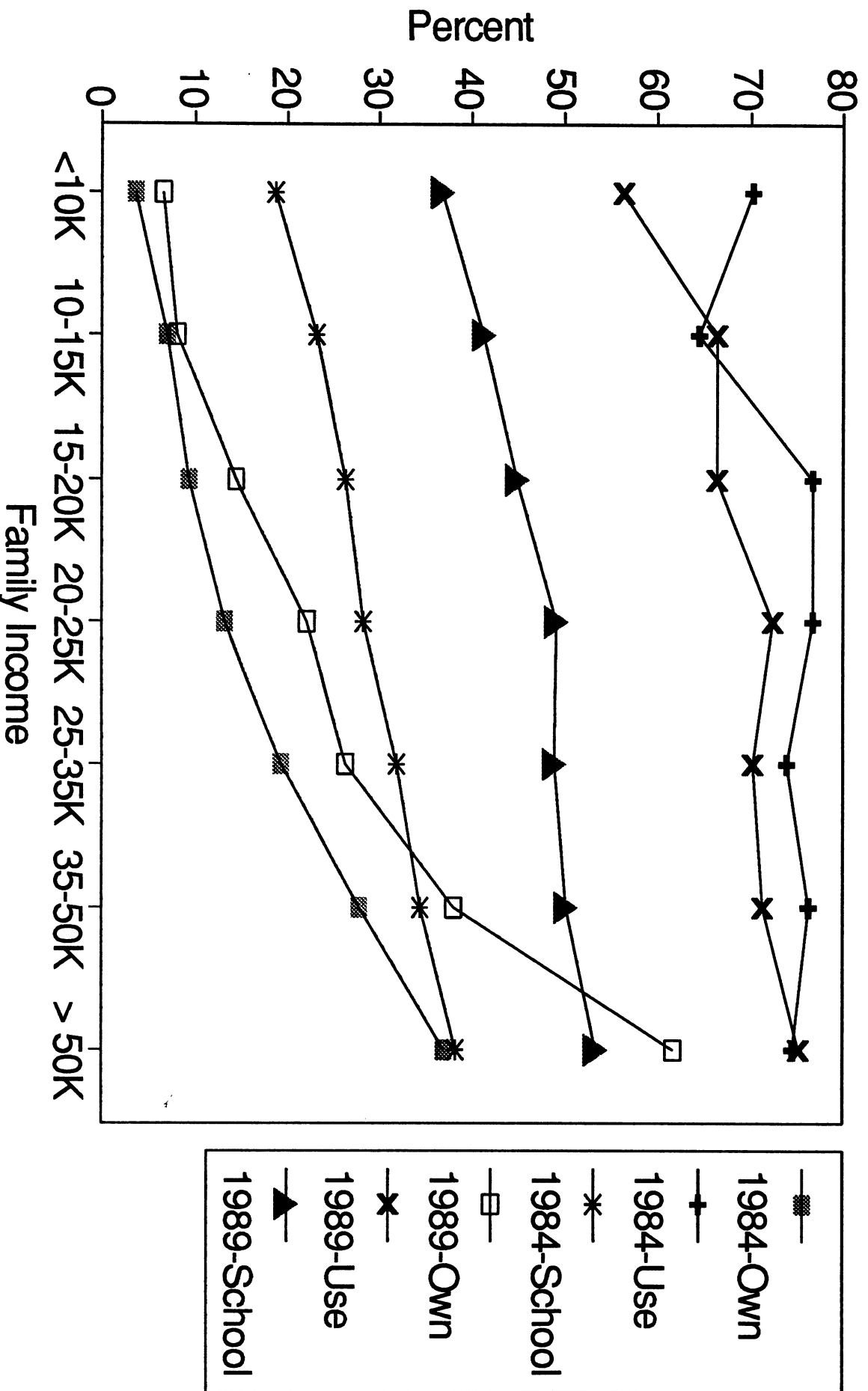
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Computer Access and Use by Children

October 1984 & 1989



Computer Access and Use by Adults

October 1984 & 1989

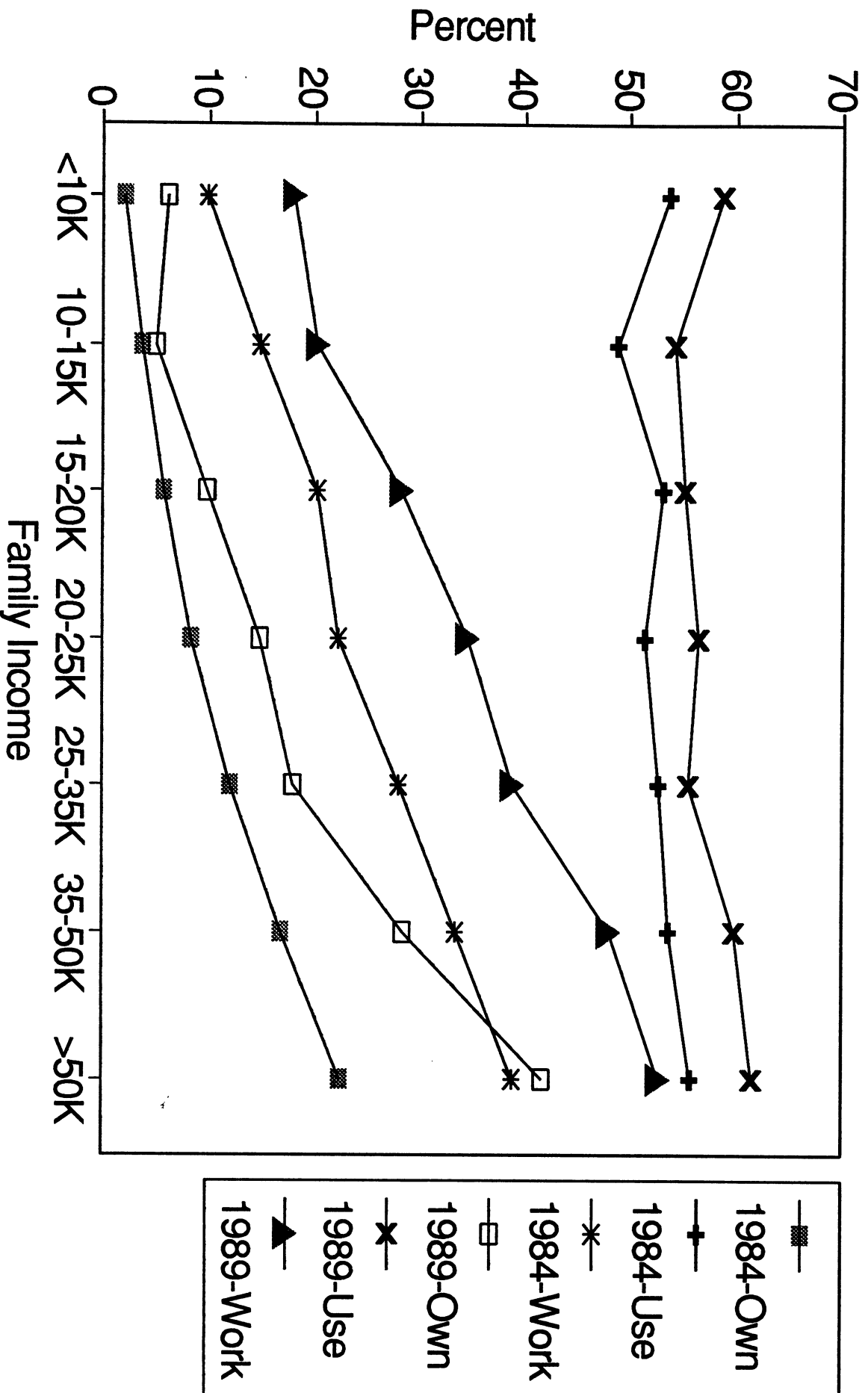


Table 1. Households with Computers, by Presence of Children, Family Income, and Age of Householder: October 1984 and 1989

Subject	1984		1989	
	All households	% with computer	All households	% with computer
Total households.....	87,073	8.2	94,061	15.0
Household income:				
Less than \$10,000.....	22,313	1.7	18,477	4.8
\$10,000 to \$14,999.....	12,612	3.6	11,138	4.9
\$15,000 to \$19,999.....	9,913	5.5	15,817	9.3
\$20,000 to \$24,999.....	8,632	8.4	7,505	14.5
\$25,000 to \$34,999.....	13,049	12.2	12,694	17.9
\$35,000 to \$49,999.....	9,306	17.4	12,287	27.8
\$50,000 or more.....	6,447	22.9	3,389	40.6
Income not reported.....	4,800	7.6	7,531	13.0
Presence of children:				
Some Children 6 to 17.....	24,914	16.0	24,007	25.7
No children 6 to 17.....	62,159	5.1	70,054	11.4
Age of householder:				
Under 25 years.....	5,769	5.1	5,354	9.3
25 to 34 years.....	19,575	9.7	21,282	15.1
35 to 44 years.....	17,147	15.8	20,322	24.5
45 to 54 years.....	12,745	10.4	14,458	22.9
55 years and over.....	31,836	2.9	32,644	6.6

Table 2. Use of Computers at Home and School by Persons 3 to 17 Years Old: October 1984 and 1989

Characteristic	1984			1989		
	Computer at home		% using computer at school	Computer at home		% using computer at school
	Percent	% using		Percent	% using	
Total, 3 to 17 years.....	15.3	74.2	28.0	24.2	71.1	46.0
Race:						
White.....	17.1	74.0	30.3	26.7	71.7	48.2
Black.....	6.1	75.9	15.9	10.6	65.0	35.1
Other.....	10.6	76.1	27.8	28.1	69.3	43.6
Hispanic origin:						
Hispanic.....	4.6	67.4	18.2	9.6	64.3	37.5
Non-Hispanic.....	16.2	74.4	28.9	25.9	71.4	47.0
Sex:						
Male.....	16.8	80.3	29.0	25.2	74.0	46.0
Female.....	13.6	66.4	27.0	23.1	67.9	46.0
Region:						
Northeast.....	19.3	75.6	30.8	30.4	71.8	49.1
Midwest.....	15.9	75.3	33.9	24.0	72.0	50.0
South.....	12.3	72.2	21.3	20.6	69.7	42.1
West.....	15.8	73.9	29.4	25.1	71.5	45.0
Educational attainment of householder:						
Elementary: 0 to 8 years.....	3.5	62.1	18.2	3.6	53.4	32.8
High school: 1 to 3 years.....	4.9	73.9	21.5	9.2	59.1	38.5
High school: 4 years.....	12.0	73.6	26.7	16.6	68.3	45.7
College: 1 to 3 years.....	20.5	73.6	31.1	30.6	71.0	49.8
College: 4 years or more.....	30.4	75.9	36.7	48.6	74.7	52.1
Family income:						
Less than \$10,000.....	3.4	70.2	18.5	6.5	56.4	36.8
\$10,000 to \$14,999.....	6.9	64.5	23.0	8.1	66.3	41.4
\$15,000 to \$19,999.....	9.3	76.8	26.4	14.5	66.6	44.9
\$20,000 to \$24,999.....	13.0	76.8	28.2	22.0	72.5	49.2
\$25,000 to \$34,999.....	19.4	73.9	31.8	26.2	70.4	48.8
\$35,000 to \$49,999.....	27.8	76.3	34.4	38.0	71.3	50.3
\$50,000 or more.....	37.0	74.6	38.4	61.7	75.1	53.4
Income not reported.....	19.5	69.6	29.5	25.0	74.9	41.5

Table 3. Use of Computers at Home and Work by Persons 18 Years and Older: October 1984 and 1989

Characteristic	1984			1989		
	Computer at home		% using computer at work	Computer at home		% using computer at work
	Percent	% using		Percent	% using	
Total, 18 years old and over.....	9.1	53.3	24.6	17.3	58.4	36.8
18 to 21 years.....	9.8	52.3	14.7	22.2	58.5	22.6
22 to 24 years.....	6.8	60.2	26.3	14.5	61.2	36.7
25 to 34 years.....	10.5	65.4	29.4	16.3	66.9	40.9
35 to 44 years.....	16.8	51.3	28.3	26.9	60.5	42.4
45 to 54 years.....	9.9	42.3	22.1	23.1	54.2	36.6
55 to 64 years.....	4.8	42.0	17.7	11.8	46.5	27.0
65 years old and over.....	1.5	28.4	5.9	4.6	36.0	13.6
Race:						
White.....	9.6	53.4	25.3	18.3	59.2	37.8
Black.....	4.4	54.0	18.3	8.4	50.6	27.6
Other.....	9.8	48.3	23.9	20.9	51.3	36.4
Hispanic origin:						
Hispanic.....	4.1	45.6	16.4	8.0	54.0	22.5
Non-Hispanic.....	9.4	53.5	25.0	18.0	58.6	37.9
Sex:						
Male.....	9.9	63.1	21.2	18.5	65.2	31.6
Female.....	8.3	42.8	29.0	16.2	51.4	43.0
Region:						
Northeast.....	10.2	49.8	24.9	19.5	53.5	36.9
Midwest.....	8.9	54.5	23.7	16.2	59.2	35.8
South.....	7.7	51.6	22.7	15.2	57.5	36.0
West.....	10.3	57.9	28.4	20.0	63.8	39.1
Educational attainment:						
Elementary: 0 to 8 years.....	1.4	15.5	2.6	2.9	12.1	3.1
High school: 1 to 3 years.....	3.3	37.5	6.3	6.5	33.8	9.8
High school: 4 years.....	7.7	44.0	19.6	13.0	45.6	29.0
College: 1 to 3 years.....	13.2	57.6	31.1	23.4	60.5	45.5
College: 4 years or more.....	17.6	63.6	41.7	33.7	71.2	57.8
Family income:						
Less than \$10,000.....	1.9	53.7	9.7	6.1	58.6	18.0
\$10,000 to \$14,999.....	3.6	48.8	14.9	4.9	54.2	20.2
\$15,000 to \$19,999.....	5.7	53.0	20.3	9.9	55.1	28.3
\$20,000 to \$24,999.....	8.3	51.4	22.2	14.9	56.4	34.7
\$25,000 to \$34,999.....	12.0	52.8	28.1	18.1	55.5	38.8
\$35,000 to \$49,999.....	17.0	53.6	33.5	28.5	59.9	48.1
\$50,000 or more.....	22.4	55.7	39.0	41.7	61.4	52.6
Income not reported.....	8.4	51.4	21.9	15.6	55.3	34.8

Computer Ownership and Use Questions: October 1984 CPS

Asked of persons 14 years and over.

LEAD IN: The next set of questions has to do with ...'s DIRECT or "HAND'S ON" use of computers with typewriter-like keyboards. These questions do NOT refer to hand-held computers or computer games which do not have a typewriter keyboard.

NOTE: Ask items 44 & 45 once of first respondent in household. Transcribe directly for following respondents and begin with 46.

44. Is there a computer in this household?

- Yes (Ask 45)
No (Fill 46)

45. In what year was the computer purchased?

(If more than one, answer for the most recent.)

- 1984 1981 Before 1980
1983 1980 Don't know
1982

46. CHECK ITEM: Entry in item 20A or 21B (Working or with a job)

- Yes (Ask 47)
No (Skip to 48)

47. Does ... directly use a computer at work?

- Yes
No

48. CHECK ITEM: Entry of "Yes" in 30 (Enrolled in school)

- Yes (Ask 49)
No (Skip to 50)

49. Does ... directly use a computer at school?

- Yes
No

50. CHECK ITEM: Entry of "Yes" in 44 (Computer in household)

- Yes (Ask 51)
No (Fill 54)

51. Does ... directly use a computer at home?

- Yes (Ask 52)
No (Fill 54)

52. At home does ... use the computer for: (Read categories - mark all that apply)

- | | |
|--|--|
| Video Games <input type="radio"/> | Wordprocessing . . . <input type="radio"/> |
| School assignments . . . <input type="radio"/> | Learning to use the computer . . . <input type="radio"/> |
| Household record keeping, taxes, etc. <input type="radio"/> | Other uses not listed above <input type="radio"/> |
| Job or business related activities . . . <input type="radio"/> | |

53. During the last month, on average how many days per week did ... use the computer at home?

- | | | |
|------------------------------|------------------------------|---|
| 7 days <input type="radio"/> | 3 days <input type="radio"/> | Less than once a week <input type="radio"/> |
| 6 days <input type="radio"/> | 2 days <input type="radio"/> | Has not used it in the last month . . . <input type="radio"/> |
| 5 days <input type="radio"/> | 1 day <input type="radio"/> | Don't know <input type="radio"/> |
| 4 days <input type="radio"/> | | |

Asked of persons 3 to 13 years.

The next set of questions has to do with ...'s DIRECT or "HANDS ON" use of computers with typewriter-like keyboards. These questions do NOT refer to hand-held computers or computer games which do not have a typewriter keyboard.

59. Does ... directly use a computer at school?

- Yes
No

60. Does ... directly use a computer at home?

- Yes (Ask 61)
No (End questions)

61. At home does ... use the computer for: (Read categories - Mark all that apply)

- Video games
School assignments
Learning to use the computer
Other uses not listed above . . .

62. During the last month, on average how many days per week did ... use the computer at home?

- | | |
|------------------------------|---|
| 7 days <input type="radio"/> | 2 days <input type="radio"/> |
| 6 days <input type="radio"/> | 1 day <input type="radio"/> |
| 5 days <input type="radio"/> | Less than once a week <input type="radio"/> |
| 4 days <input type="radio"/> | Has not used it in the last month . . . <input type="radio"/> |
| 3 days <input type="radio"/> | Don't know <input type="radio"/> |

(End questions)

Computer Ownership and Use Questions: October 1989

Questions asked of persons 3 to 14 years old:

Questions asked of persons 15 years old and over:

LEAD IN: This next set of questions has to do with ...'s direct or hands on use of computers. These computers may be personal or home computers, mini computers, or mainframe computers. These questions do not refer to hand-held calculators or games, electronic video game systems, or systems which do not use a typewriter-like keyboard.

61. Does ... directly use a computer at school?
 Yes
 No

62. Does ... directly use a computer at home?
 Yes (Ask 63) ↗
 No (Go to 65) ↘

63. At home, what does ... use the computer for? (SHOW FLASHCARD C. MARK ALL THAT APPLY)

Word processing
 Spread sheets
 School assignments
 Graphics
 Bulletin boards
 Programming
 Learning to use the computer
 Games
 Electronic mail
 Other
 Don't know

64. During the last month, on average how many days per week did ... use the computer at home?

7 days Less than once a week
 6 days
 5 days Not used
 4 days in last month
 3 days
 2 days Don't know...
 1 day

65. Was ... attending or enrolled in a regular school in October, 1988, that is, October of last year?
 Yes
 No

END QUESTIONS

50. CHECK ITEM
 Entry of "Yes" in item 30 (ASK 51)
 All others (GO TO 52)

51. Does ... directly use a computer at school?
 Yes
 No

52. CHECK ITEM
 Entry of "Yes" in item 44 (ASK 53)
 All others (GO TO 56)

53. Does ... directly use a computer at home?
 Yes (ASK 54)
 No (GO TO 56)

54. At home what does ... use the computer for? (SHOW FLASHCARD B. MARK ALL THAT APPLY)

Word processing
 Household records/finances
 School assignments
 Connect to computer at work/work at home
 Home-based business
 Bulletin boards
 Desktop publishing/newsletters
 Learning to use the computer
 Spread sheets
 Programming
 Graphics
 Games
 Telemarketing
 Databases
 Electronic mail
 Other
 Don't know

55. During the last month, on average how many days per week did ... use the computer at home?

7 days 1 day
 6 days Less than once a week
 5 days once a week
 4 days Not used
 3 days in last month
 2 days Don't know...

LEAD IN: This next set of questions has to do with ...'s direct or hands on use of computers. These computers may be personal or home computers, mini computers, or mainframe computers. These questions do not refer to hand-held calculators or games, electronic video games, or systems which do not use a typewriter-like keyboard.

ASK ITEMS 44, 45, and 46 ONCE OF FIRST RESPONDENT IN HOUSEHOLD. TRANSCRIBE DIRECTLY FOR FOLLOWING RESPONDENTS AND BEGIN WITH ITEM 47.

44. Is there a computer in this household?
 Yes (ASK 45)
 No (FILL 47)

45. In what year was the computer purchased?

1989 1985
 1988 1984
 1987 Before 1984
 1986 Don't Know

46. Which of the following items does this computer have? (READ LIST - MARK ALL THAT APPLY)

Floppy disk drive Color monitor
 Hard disk drive Dot matrix printer
 Telephone modem Laser printer
 Laser printer Plotter
 Joystick or mouse control Don't know

47. CHECK ITEM
 Entry of NA in item 20A or item 21B (ASK 48)
 All others (GO TO 50)

48. Does ... directly use a computer at work?
 Yes
 No

49. At work, what does ... use the computer for? (SHOW FLASHCARD A. MARK ALL THAT APPLY)

Word processing Analysis
 Bookkeeping Spread sheets
 Computer-assisted design (CAD) Sales
 Calendar/scheduling Games
 Electronic mail Invoicing
 Inventory control Graphics
 Programming Databases
 Desktop publishing/newsletters Instruction
 Communications Other
 Don't know