Chapter 4
Family Life, Children and the Feminization of Computing

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Introduction

With the entry of new technologies into the home, we are witnessing a proliferation of descriptors for the emerging home environment. These include such terms as smart homes (Harper, 2003; Chetty, Sung and Grinter 2007), home automation and devices (Hamill 2006), the networked home (Venkatesh, Kruse and Shih 2003; Little, Sillence and Briggs 2009), the home of the future (Venkatesh et al., 2001), digital living (Anderson and Tracey 2001; Bly et al., 2006), and of course the one offered in this book: the connected home. In general, they all seem to be pointing to the same story: that the modern home in this new media/internet age is undergoing a transformation. Home life as previously understood is changing. Computing and computers are of course central to this. But how and in what ways?

It is in this context that we examine the evolution of computer use at home and its impact on family life. Our focus here is based less on speculation or scenario building and more on empirical, attitudinal data that we have collected over a ten year period. During this time, beginning in 1999, we completed four waves of national surveys of U.S. households (1999, 2003, 2008 and 2010). We present the results of these surveys as a way to summarize the developments during this 10+ year period, highlighting what we think are the salient changes.[1]

The fundamental questions we address in this study are: what is the nature of computer use patterns in families over time?; who are the key players in the family who account for these developments?; and what are the attitudes of members of households to these changes?

To answer these questions we need to pause and remark on the structure of families. It is commonplace to say that this structure is based on membership: legal, biological, and affective (parents, children, companions, lovers, etc.). It is obvious

[1] This material is based upon work funded by the U.S. National Science foundation under Grant No. 0121232. Any opinions, findings and conclusions reflected in the material are those of the authors and do not necessarily reflect the views of the National Science Foundation.

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R. Harper (ed.), *The Connected Home: The Future of Domestic Life*,
DOI 10.1007/978-0-85729-476-0_4, © Springer-Verlag London 2011

too that the life cycle will affect a family, whether they are younger or older, for example, and all that implies about other activities – schools, work and so on. Gender too is a concern. But one should not forget either that families can be classified as single adult or multimember adult families and they can be with or without children. Granted that this is not an exhaustive list of all the ways that one might categorise families, we want to argue that these characteristics are sufficient to draw enough information from our survey results to arrive at some interesting patterns of computer use over time. More particularly, given these different configurations, our focus is on the following research questions:

- What are the longitudinal computer use patterns in families?
- What are the computer use patterns among families with and without children?
- What are the gender differences in use patterns?
- What are the age differences in use patterns?

Methodology and Research Findings

Study Sample: Data from national surveys of home computer use completed in 1999, 2003, 2008 and 2010 are used in this chapter.[2] The surveys are part of a larger study of personal computer use conducted by researchers at the Center for Research on Information Technology and Organizations (CRITO) located at the University of California, Irvine. These telephone surveys focused only on those households where there was a personal computer in use in the home. The households were selected through random digit dialing. All those within a household who were knowledgeable about the household computer use and were over the age of 18 were eligible. Respondents reported on their own behavior as well as the behavior of other members in the household. They were asked about the use of the home computer, their attitudes regarding the home computer, other electronic devices in the household as well as the contribution of the home computer to the household activities.

In 1999, according to the *US Department of Commerce* (2010), 65% of the US households owned a computer (a desktop or portable) and this increased to 78% by the year 2009. In 1999, of the households with computers, 38% had broadband connection and this increased to almost 90% by 2010.

We present some key results from our on-going study (1999 to 2010) in the following sections. First, we provide a detailed description of computer uses by families during the period of our study. Second, we examine how household computer uses vary between families with children and without children. Third, we examine

[2] The 1999 survey was conducted as part of Project NOAH (National Outlook for Automation in the Home); 910 households were interviewed by telephone with a response rate of 36.3%. The 2003 and 2008 surveys were conducted as part of Project POINT (People, Organizations and Information Technology); 1200 telephone interviews were completed for each survey with response rates of 44.3% (2003) and 26.2% (2008). The 2010 survey (also part of Project POINT) sampled both landline and cell phone only households with response rates of 24.1% for the cell phone only sample and 30.7% for the landline sample (landline sample also included cell phone users).

some relevant gender related issues. In the final section we draw some conclusions for future research in this area.

Our results are presented in Tables 4.1 thru 4.6. In Table 4.1 we provide a description of the different roles technology plays based on the perceptions and experiences of survey respondents. Table 4.2 is a summary of the types of uses during the periods of data collection and changing patterns of use over time. Table 4.3 provides a summary of results based on the composition of households (children vs. no children). Table 4.4, which is an elaboration of Table 4.3, provides a summary of results based on the size and composition of households. Table 4.5 presents parental views and concerns about children's use of computers. Table 4.6 is a summary of data focusing on gender based uses of the computer.

The Enabling Mediating and Transforming Nature of Technology

To capture the role of technology, we asked our respondents to indicate how computers have affected their lives. The computer has certainly played a key role as seen from the information gathered from our samples of respondents over the ten year period (Table 4.1). Its transformative role is quite evident from the responses from our subjects. While it has played a vital role in terms of its enabling and mediating functions, a larger number of its impacts are in terms of its transformation role. Our respondents have recorded progressively their agreement over the four periods of data collection on various impact statements. In this summary, for the sake of convenience, we focus primarily on the 2010 column in Table 4.1 but also use other time periods as necessary if data for 2010 is not available.

Table 4.1 The perceived roles of computer use

	Percent agreeing 1999	Percent agreeing 2003	Percent agreeing 2008	Percent agreeing 2010	Role of technology
The computer has saved us time at home	48	51	51	55	Enabling
Computers are difficult to use	16	11	13	--	Enabling
Computers have made it easier to organize family/social events	--	34	33	43	Enabling
Households with a computer are run more efficiently than those without a computer	15	22	--	---	Enabling
Computers in the home take away from family interactions	23	27	30	--	Enabling/ Disabling
The computer has increased the amount of job related work I do at home	43	37	33	--	Mediating
Computers are more useful than in the home	40	39	37	--	Mediating

Table 4.1 (continued)

	Percent agreeing 1999	Percent agreeing 2003	Percent agreeing 2008	Percent agreeing 2010	Role of technology
I have more contact with friends and relatives now that I have email	50	54	48	55	Mediating
It would be difficult to imagine life without a computer at home	44	50	58	61	Transforming
The computer has changed the way we do things at home	40	45	--	52	Transforming
The computer is as essential as any other household appliance	38	51	59	63	Transforming
Having the internet makes me much better informed about the world	47	56	61	66	Transforming
Computers give status to their owners	13	11	--	--	Transforming
Those that are not knowledgeable about computers are falling behind	68	68	68	70	Transforming
Watch less TV as a result of the internet	29	25	23	--	Transforming
The computer has become part of daily routine at home	52	62	63	72	Transforming
The internet helps me look for product information that was not possible before	58	72	72	71	Transforming
The computer has replaced telephone as major communication device	10	16	15	--	Transforming
Reduced our need of daily newspapers	--	--	40	--	Transforming
I do most of my communication with friends using social networking sites	--	--	--	21	Transforming
More productive because we have a computer	--	--	49	48	Transforming
Computer has enabled me to meet new people	--	--	--	22	Transforming

A good percentage (66%) of respondents feel that they are better informed about the world because of the internet. Computers are also seen as contributing significantly to family social life in terms of establishing contact with friends and relatives (55%) and also the use of social networking sites (21%) – which though small, is a recent phenomenon and likely to grow. Certainly there is agreement that those who are not knowledgeable about computers are falling behind (70%). Computers are seen as replacing newspapers as an information source (40% in 2008) – a sign of

digital living. A large number (61%) agreed that it would be difficult to imagine life without a computer and a larger number (72%) feel that the computer has become part of the daily routine. Time saving (55%) is also reported because of the computer as well as being more productive (48%). However, very few (15% in 2008) feel that the computer has replaced the telephone which is still the most important tool for voice communication. In this context, it would be interesting to see what role smart phones would play, especially because smart phones have computer like capabilities.

In summary, the transformation is occurring in terms of technological dependence and initiatives, the indispensable nature of computers to conduct family activities and especially in the areas of communication, information, home management and social networking. While these results demonstrate people's attitudes we will now present some actual behaviors as reported by our respondents.

Computer Uses in the Home – Some Longitudinal Trends

In the 1999 survey, the number of types of computer activities queried was 9. By the time of the 2003 survey, the number of activities had jumped to 14, and by 2008 and 2010 it had increased to 16 types of computer activities (see Table 4.2). This increase reflects the advances in technology, user competencies and learning, increased application areas as well as other structural factors over the years. For example, the use of social media (e.g. Facebook, MySpace) did not show up in our 2003 survey but does appear in more recent years. Table 4.2 shows the frequency of computer use for each of the surveyed time periods along with the rate of change for those activities common across the time periods.

Clearly a significant number of activities have shown an increase between 1999 and 2003. The major increases were in the areas of email (22%), news/weather/sports (25%), online shopping (48%), travel (50%), online banking (97%) and health-related information (67%). Job related work (2%) was steady and school related work declined (-20%). (This decline is an artefact of data collection because we did not differentiate between families with children and without children. See Table 4.3.) In fact most major increases occurred during this period in both computer use activities and in usage frequency. The early 2000s were a critical period in technology development. This reflects partly the versatility of the computer, the increasing rise of the internet and the introduction of broadband (wireless) connections over this period. In other words, as the technology became more versatile, the opportunities for different uses increased.

To more fully highlight the growth and changes in use over this 11 year period, we divided the percentage of users for each activity into three categories: top quartile (75% and above), second quartile (50%-74%) and the lower half (49% and below).

In 1999 (the early internet period), only two computer activities were engaged in by a significant number of users: hobbies and entertainment (86%) and email (78%). Activities favored by the second quartile of computer users in 1999 included job related work (71%), news, weather and sports (63%), school related work (59%),

Table 4.2 Household level uses of computer over time

Percent using:	1999	2003	2008	2010	X^2 (p)	Rate of change 1999-2003 (%)	Rate of change 2003-2008 (%)	Rate of change 2008-2010 (%)
Email	77.9	95.0	96.3	98.1	0.00	21.951	1.368	1.869
Job-related work	71.0	72.2	63.4	66.0	0.00	1.690	-12.188	4.101
School-related work	59.1	47.2	45.9	62.6	0.00	-20.135	-2.754	36.383
Online shopping	51.9	76.7	79.7	84.6	0.00	47.784	3.911	6.148
Online banking	30.6	60.2	66.7	76.6	0.00	96.732	10.797	14.843
News, weather and sports	63.5	79.5	76.2	88.6	0.00	25.197	-4.151	16.273
Health-related information	45.8	76.6	82.8	82.6	0.00	67.249	8.094	-0.242
Hobbies, games and entertainment	85.8	87.9	87.4	83.8	0.01	2.448	-0.569	-4.119
Travel and vacation planning	54.8	82.0	85.2	77.6	0.00	49.635	3.902	-8.920
Calendar		38.4	38.5	45.7	0.00		0.260	18.701
Photographs and videos		54.6	75.9	84.3	0.00		39.011	11.067
Instant messaging		52.6	45.4		0.00		-13.688	
Family or personal webpage/website		15.1	24.5		0.00		62.252	
Online networking			44.4	76.1	0.00			71.396
Online phone calls			13.1	25.0	0.00			90.840
Online journals or blog			25.6	43.5	0.00			69.922
Family and household recordkeeping				59.1				

Size of sample by year: 1999=909; 2003=1200; 2008=1199; 2010=1197

and travel and vacation planning (55%). By 2003, 95% of users reported using email and 88% were engaged in hobbies, games and entertainment uses. In addition, joining the top quartile were travel and vacation planning (82%), news, weather and sports (79%), online shopping (77%) and health-related information (77%). Job related work declined, relatively speaking, in terms of its rank. As we get closer to 2008/2010, we notice some significant shifts as well as some consolidation. Email use continues to be the highest (96% and 98%) and hobbies, games and entertainment emerge as a favored use (87% and 84%). Uploading and downloading of photographs and videos increased significantly from 55% in 2003 to 76% in 2008 and 84% in 2010. Although not as meteoric, online banking continued to rise from 60% in 2003 to 67% in 2008 and 77% in 2010. Online networking, little known or used in 2003, demonstrates the speed at which new uses of the home computer have diffused. While in 2008, 44% of the households reported using an online network site such as MySpace, Facebook and LinkedIn, by 2010 a full 76% reported using these sites.

There are other significant trends of note. Job related work across the population stayed steady between 1999 (71%) and 2003 (72%), but declined in 2008 (63%) and continued steady in 2010 at 66%. Thus the prevailing view that the computer's main role is to transfer work from office to the home and is a work tool provided a limited vision of where the technology was going. It is true that school and job for many families formed the cornerstone of why the computer was initially purchased. However, other major shifts in usage reflect the changes in the use of the home computer over time. Initially, the introduction of the computer into the home was more utility driven and with progression of time, it has become an emotional as well as social technology within the family context.

Clearly, the volume of computer use has changed across the eleven year period under study. Some explanations are possible for these trends. First, as stated earlier, computers were seen less as merely work/education tools as was the case in the pre-internet or early internet period. Computers had become versatile, and also thanks to the power and potential of the internet, the usage potential offered greater depth. That is, as technology advanced and other possibilities have emerged the relative positions of work/education related uses took a back seat, as it were. In addition, computer users had become quite comfortable and familiar with computers to the point the technology was no longer alien to the family environment and was considered a necessity and an integral part of the domestic ecology. And, in the case of educational use, schools and educational institutions progressively became better equipped with computers than before and had become highly advanced presumably leading to greater and more sophisticated applications in the school environment.

Another way of looking at this is that at least in the case of educational use, there is indeed not a decline in the domestic front if we take into consideration those families with children compared to those without children. Since our sample includes both families with children and without children, our hypothesis is that educational use declines may not be recorded among families with children. To test this, we divided our sample into families with children and without children. In 1999, 83% of the households with children reported schoolwork use. In 2003, 64%

(vs. 40%) reported schoolwork use which jumped to 78% (vs. 36%) in 2008 and 80% (vs. 51%) in 2010 (see Tables 4.2 and 4.3 for 2010).

Families with Children and Without Children

Household composition is an important factor to consider when looking at the kinds of home computer uses. Table 4.3 breaks down home computer use by households with children versus households without children in 2010. It can be easily seen that for the year 2010, 80% of the families with children used computers for educational purposes compared to only 51% in those families with no children (as reported above). There are also other differences between families with children and without children. For example, differences are also observable in the use of the home computer for hobbies, games and entertainment (92% vs. 79%), for obtaining information regarding news, weather and sports (92% vs. 86%), uploading and downloading of photos and videos (91% vs. 81%), online banking (83% vs. 73%), online networking (87% vs. 70%), family and household recordkeeping (64% vs. 56%) and even online journaling and blogging (48% vs. 41%). Clearly, the presence of children makes a difference.

One other explanation for the differences between families with children and families without children may be that there may be more members per family with children compared to families without children. In other words, it may be more a question of family size than the presence of children in the household. That is, families with more members may also be using computers to a higher degree whether children are present or not.

Table 4.3 Uses of home computer by presence of children in household, 2010

	No. children (N=704)	Children (n=479)	Total (n=1183)	X^2(p)
Email	98.2	97.9	98.1	.775
Job-related work	65.1	68.1	66.3	.299
School-related work	51.0	79.7	62.7	.000
Calendar	43.9	48.6	45.8	.112
Online shopping	84.2	86.3	85.0	.334
Online banking	73.0	82.7	76.9	.000
News, weather and sports	86.3	92.3	88.7	.001
Health-related information	83.5	51.4	82.6	.360
Hobbies, games and entertainment	78.6	92.5	84.3	.000
Travel and vacation planning	79.5	75.8	78.0	.131
Photographs and videos	80.7	90.8	84.8	.000
Online networking	69.6	86.7	76.5	.000
Family and household record keeping	55.7	64.2	59.2	.004
Online phone calls	23.5	27.5	25.1	.116
Online journals or blogs	41.4	47.6	43.9	.036

To address this issue and refine our analysis further, we divided our sample into the following four categories: single adult, two adults with no children, 3 or more adults with no children and households with children (Table 4.4). The idea behind this is to see if the real differences are between small families vs. large families under the realistic assumption that families with children are generally larger than families without children. Thus the differences between households with children and households without children mentioned earlier may cancel out if we take into consideration the size of the household. As can be seen from Table 4.3, households with children still account for differences in some major categories of use - online banking, news, weather and sports, hobbies, games and entertainment, family and household recordkeeping, and, of course, school-related work. However, the 3+ adult households show greater values compared to children households on the following categories: job-related work, calendar, online journals and blogs, and travel and vacation planning. In all these cases, both categories of households (3+ adult households and households with children) score higher values than single person or and in many cases, two adults only households.

Table 4.4 Uses of home computer by size and composition of household, 2010

Percent using	Single-person household (n=149)	2-person adult household (n=337)	3+ adult only household (n=218)	Children household (n=479)	Total (n=1183)	X2(p)
Email	96.6	98.5	99.1	97.9	98.1	.348
Job-related work	57.7	61.4	75.7	68.1	66.3	.000
School-related work	33.6	40.1	79.4	79.7	62.6	.000
Calendar	39.3	38.7	54.6	48.6	45.7	.001
Online shopping	79.2	84.5	87.6	86.3	85.1	.123
Online banking	71.3	73.8	73.1	82.7	77.0	.002
News, weather and sports	84.6	85.6	88.1	92.3	88.6	.007
Health-related information	71.1	88.1	85.3	81.4	82.7	.000
Hobbies, games and entertainment	68.5	78.7	85.1	92.5	84.2	.000
Online networking	59.1	65.7	83.0	86.7	76.6	.000
Photographs and videos	72.5	78.9	89.0	90.8	84.8	.000
Travel and vacation planning	69.1	80.9	84.3	75.8	78.0	.002
Family and household record keeping	51.7	55.7	58.0	64.2	59.1	.017
Online phone calls	20.7	21.0	29.2	27.5	25.1	.047
Online journals or blogs	32.9	34.1	59.1	47.6	44.0	.000

Given the above analysis we reach two major conclusions. First, somewhat obvious, household size matters in terms of level of use. That is, the larger the household size, the greater the number of uses and levels of use. A more important result is

that households with children out score any other type of household. *Thus a very important result is that one meaning of computers is that in order to call it a family computer, children's presence does matter.* This may be a typical conclusion that we may reach about some other technologies in the home. For example, one can make a reasonable hypothesis that households with children have a greater use of kitchen appliances (e.g. refrigerators, stoves, dishwasher/dryer), other appliances (e.g. clothes washer/dryer), television (entertainment), digital camera and so on. The implications for technology producers can be quite profound.

Parental Concerns and Issues Regarding Children's Use of Computers

The question of parental concerns and exercize of power and control over children through the construction and operation of rules is an important topic in the family literature (Grieshaber 1997). Such controls are instituted in everyday life settings that include mealtime rituals, educational/recreational activities and other issues concerning personal grooming, attire, language use, leisure time activities and so forth. Thus the context of home computer use may be considered another instance of parental responsibilities and supervision. On the other hand, one may ask the question, are computers qualitatively different? This is also an issue of moral ordering of the households as discussed by Strain (2003).

The context of children's use of computers is a rapidly growing area of research (Livingstone 2009, Subrahmanyam 2000). The question we pose in this section is what are the parental views and concerns regarding the use of computers by their children? (See Table 4.5 for results). Certainly, the computers are viewed as an important educational tool (75%). On a very positive note, a large percentage of parents (75%) feel that children are more knowledgeable about computers than adults. This gives credence to the fact that there has now emerged a computer generation, that is, youngsters who are growing up as users of computing technology and take to it like ducks to water. However, an equal number of our respondents (75%) also express concern about what their children are accessing on the internet. At the same time, only a small percentage (36%) feel that computers make children anti-social, while 32% disagree with this view. Roughly half of the sample (48%) think that their children are spending too much time on the computer. On the other hand, a very small percentage (27%) feel that computers discourage creativity and nearly half the sample (48%) disagree with this statement. In other words, computers are not viewed as inhibiting creative aspects of children's learning.

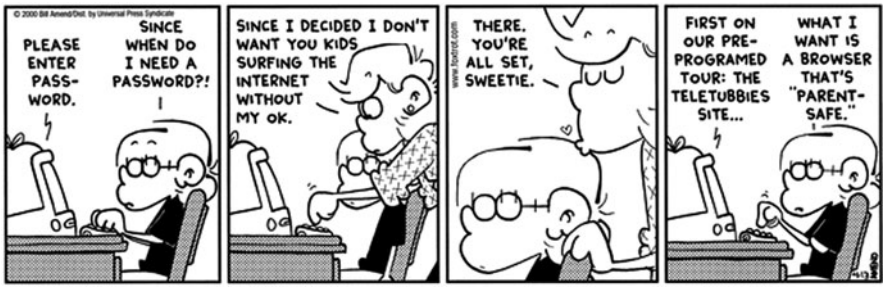
Parents also pursue some control measures to keep their children in check. For example, 57% of the parents checked to see which websites their children visited. Almost equal numbers of parents (58%) worked along with their children on computers. We have to presume that this is true of families with much younger children rather than teens. Half of the sample limited the amount of time children can be on the internet. Control measures were also extended to school activities. Half of the sample (51%) reported using email to communicate with teachers and half of them (53%) said they go on the school website to check for homework assignments.

Table 4.5 Parental views and controls of children's use of computers

Statements	% Agreement
Computers contribute positively to children's educational experience	75
Children are more knowledgeable about computers than adults	74
Computers make children anti-social	36 (disagree 32%)
Computers discourage creativity	27 (disagree 43%)
Our children are spending too much time on computers	48
We are really concerned about what our children are accessing on the internet	75
Checked to see what websites our children visited	57
Worked on the computer with children	58
Limited the amount of time children can be on the internet	53
(I/We) Used email to communicate with our children's teachers	51
Checked school website about children's homework	52

n=479

The tension between parental concerns and children's mildly irritable reaction to their parents' interference is humorously yet realistically captured in the following "Fox Trots" comics.



Fox Trots classics by Bill Amend. Adapted from FoxTrot © 2000 Bill Amend. Used by permission of Universal Uclick. All rights reserved

To summarize the parental concerns and views, our results show that they range from positive to cautious to negative. Reading between the figures, we might say that most parents view computers as beneficial to the educational experience of their children and their development.

Gender Related Issues – Feminization of Home Computing

Over the years, there have been active debates and issues concerning differences in technology use by females vs. males both at home and at work (Dholakia 2006, Klawe, Whitney and Simard 2009). In fact, some have argued and contested that the word "technology" itself is male oriented because of connotations associated with complex machinery, and technical-rational, non-emotional qualities – in general the

meanings attached to "tool" orientation and work-related artefacts (Cockburn 1994). On the other hand, history tells us that women have engaged in industrial and farm labor as well as in operating office equipment and doing production work in factories, textile mills and the like. In addition, in the domestic sphere, there has been research showing that women, because of their domestic roles, have been the main users of many household appliances and gadgets associated with their roles and in fact are more knowledgeable than men when it comes to everyday technologies and artefacts – the implication being that there is no natural division in terms of competencies or predilections between males and females but one based on social roles men or women play. This is not the place to revisit these debates in a major way, but it is important to contextualize our present study.

To provide a deeper understanding of these issues we present some gender-based trends in our study. Our results are summarized in Table 4.6 which is reconstructed from our survey results. To keep it simple, we are presenting 2010 survey results in the table. In order to capture gender differences in usage patterns, we identify situations where differences between males and females show up in our results. We also feel that in order to refine these results, we need to take into account whether these differences show up within age categories. Thus one hypothesis is that since computers are a recent phenomenon, perhaps younger females show different patterns of use compared to older females. Consequently, their uses may be more similar to males and in some cases may even exceed male patterns based on specific contexts of use and relative familiarity. In general, as more women begin to use computers at home, this phenomenon may be described as *feminization* of computing technology at home.

As shown in Table 4.6, here are some highlights. In terms of the overall sample, there are no gender differences in the use of email, online shopping, online banking, games/entertainment, uploading photos and instant messaging. However, there is a tendency towards more male engagement in the following categories: news and sports, pursuing hobbies, job-related work at home, watching a video, calendar, online networking, online journals and blogs, and making phone calls. Conversely, in the overall sample, a higher percentage of females are involved in health-related information, and maintaining a webpage. These results show that males report higher percentage than females in their use patterns. However, if we control for age, different gender-based use patterns emerge. Here are some interesting results:

More females in the age group 18–30 use email. In the educational use of computers, there is no difference between males and females in the 18-30 age group. More females are engaged in uploading photos in the age groups 18-30, 31-45, and 46-60. As far as online journal/blogging is concerned, females and males use it in the same proportion in all age groups under 60 and there are no differences.

To sum up, in the aggregate, a higher percentage of males are involved in nine activities, more females are involved in two activities, and an equal proportion of males and females in six activities. But that is not the correct story. Once we control for age, a higher percentage of younger females are more involved than males in online networking, email, and uploading photographs. In addition, more females are involved in online banking within the 31-45 age group. In other words,

Table 4.6 Gender-age differences in home computer use

Category of use	Actual use	Total sample - all Households(%)	Age differences	Gender differences	Age/Gender differences	Summary: Female domination in general (Female, Same, Male)
Communication	Email	94	None. All ages report high level use.	None. Both genders report high level use.	More females than males in the 18-30 age group (73% to 51%) and more males in 61+ age group (70% to 50%) daily users of email	Female
Information	Health Related	80	Highest use in the 18-30 group (85%) and the lowest in 61+ group (77%)	More females (82%) than males (78%).	More females across all age categories below 60 years and more males in the older category.	Female
Learning	Educational use a) Households with children b) Households without children	a) 78 b) 30	a) 31-45 highest b) 18-30 group represents highest use	Overall more males than females	In the 18-35 group males and females are roughly the same. More males in all other groups.	Same
Household Management	Online shopping	76	The lowest is in the 61+ group (66%).	No gender differences	More males (72%) than females (60%) in the 61+ age group.	Same

Table 4.6 (continued)

Category of use	Actual use	Total sample - all Households(%)	Age differences	Gender differences	Age/Gender differences	Summary: Female domination in general (Female, Same, Male)
Information	Reading News/sports	71	The lowest is in the 61+ group (59%).	More males (77%) than females (66%).	In each age group more males than females. Males highest (82%) in the 31-45 group and next highest (80%) in the 18-30 age group.	Male
Household Management	Online banking	62	The highest (73%) in the 31-45 age group. The lowest is in the 61+ group (45%).	No gender differences	Both females (75%) and males (71%) highest in the 31-45 age group. More males (58%) than females (34%) in the 61+ age category.	Same
Entertainment/ Recreation	Hobbies	66	Highest in the 18-30 group (82%) Followed by 31-45 group (73%)	More males (79%) than females (61%)	Males (83%) and females (81%) roughly equal in 18-30 age group.	Same
Entertainment/ Recreation	Games and entertainment	67	18-30 age group the highest (88%) followed by 31-45 group (74%). Other groups much lower.	No major difference. Males slightly higher	Males generally higher across all age groups.	Male

Table 4.6 (continued)

Category of use	Actual use	Total sample - all Households(%)	Age differences	Gender differences	Age/Gender differences	Summary: Female domination in general (Female, Same, Male)
Work/Employment	Job related work	56	Higher % in age groups between 18 to 60. Fewer in 61+ group (30%)	Overall male (60%) higher than female (52%).	More males across all age groups.	Male
Learning	Educational use a) Households with children b) Households without children	a) 78 b) 30	18-30 group represents highest use	Overall more males (39%) than females (29%)	In the 18-30 group males and females are roughly the same (46%). More males in all other groups.	Same
Social	Upload photos	70	18-30 group the highest (88%)	Slightly more males (72%) than females (69%).	More females than males in all age groups under 60 except in the 61+ group.	Female
Entertainment	Watch a video	47	18-30 age group the highest users (67%) followed by 31-45 group (59%).	Slightly more males (50%) than females (44%)	Across all age groups, more males than females. Highest difference in the 46+ categories.	Male
Household Management	Calendar	34	Younger age groups more likely to use the computer for calendar.	More males (15%) than females (10%)	Highest percentage of users are males in the 31-45 age group (47%).	Male

Table 4.6 (continued)

Category of use	Actual use	Total sample - all Households(%)	Age differences	Gender differences	Age/Gender differences	Summary: Female domination in general (Female, Same, Male)
Social	Online networking	31	18-30 the highest use group (34%)	More males (34%) than females (28%)	More females (72%) than males (67%) in the 18-30 age group. In general, dominated by 18-30 group in both genders.	Female
Communication	Instant messaging	35	18-30 age group the highest users (59%)	No gender differences.	More males in the 18-30 and 31-45 age groups.	Male
Social	Online journal/blog	20	18-30 the highest use group (34%)	More males (23%) than females (18%).	Males and females roughly equal in under 60 age groups, but more males in the 61+ group.	Same
Social	Maintain webpage	20	18-30 group the highest (32%)	Males and females roughly equal (22 to 18%)	More males in the 18-30 and 31-45 age groups.	Male
Social	Phone calls online	11	18-30 group (16%) most likely to use	Males higher (15%) than females (8%)	Across all age groups more males than females.	Male

in order to study the phenomenon of feminization of computing in the home, we need to look at the data not just in the aggregate level, but across age categories. Clearly, the younger females are at the forefront of computerization as compared to older females. The really laggard group, unsurprisingly, is females in the 61+ age segment. In addition, if we examine the broad category of communication, social networking, and some aspects of home management and health related matters, females are ahead.

At the risk of generalization, one might say that there is a growing feminization of computing in the home front based on the differential roles and interests and not technical competencies.

Conclusions

The results clearly reveal the following trends during the ten year period; some to be expected, and some more surprising.

Within the home, our data shows that communication as a whole has increased, with people spending more time on email and social networking. There has been an increase in the amount of information that people seek, whether it be of a general sort related to the specifics of shopping, health or news and sports. Computer use and the internet has also increased the amount of time given to home management, with people spending more time on online banking and record keeping. Computing has also increased the amount of time given to daily leisure; to hobbies and games. Meanwhile, and external to the home, there has been an increase in the amount of community involvement family members engage in, while computing and the internet has decreased the amount of time they give to their job, to work. Perhaps equally surprising has been the slight decrease in the amount of time given to school related activities –homework and such like. More generally, and finally, our research shows that computer use is more prominent with the presence of children: having kids makes it more likely that computers will suffuse domestic life. Our research also shows that with more computing, there is a growing phenomenon of feminization of the domestic sphere. Women are using computing more and more, certainly more than males within the home – even though males are themselves using computing more. Women use computing not only to undertake the responsibilities of being in touch and being sociable, but also to undertake more of the administrative tasks of the domestic sphere. As they do so, so the home is being feminised through computing.

References

Anderson, Ben and Karina Tracey (2001), "Digital Living The Impact (or Otherwise) of the Internet on Everyday Life," *American Behavioral Scientist*, 45(3): 456-475.

Bly, Sara, Bill Schilit, David W. McDonald, Barbara Rosario, and Ylian Saint-Hilaire (2006), "Broken expectations in the digital home," in CHI ′06 extended abstracts on Human factors in computing systems (CHI ′06). New York, NY: ACM. 568-573.

Chetty, Marshini., Ja-Young Sung, and Rebecca E. Grinter (2007), "How smart homes learn: the evolution of the networked home and household," in *Proceedings of the 9th international conference on Ubiquitous computing (UbiComp _07*). Berlin, Heidelberg: Springer-Verlag, 127-144.

Cockburn, Cynthia (1994), "Male Dominance and Technological Change." in Heather Clarke, John Candle and Jim Barry, *Organizations and Identities*, Thompson Publishers, 197-203.

Dholakia, Ruby (2006), "Gender and IT in the Household: Evolving Patterns of Internet Use in the United States," *The Information Society*, 22(4): 231-240.

Grieshaber, Susan (1997), "Mealtime Rituals: power and resistance in the construction of mealtime rules," *The British Journal Of Sociology*, 48(4): 649-666.

Hamill, Lynne (2006), "Controlling Smart Devices in the Home," *The Information Society*, 22(4): 241-249.

Harper, Richard (2000), Domestic Design: An Introduction to the Research Issues Surrounding the Development and Design of Interactive Technologies in the Home," *Journal of Personal Technologies, Special Issue on Domestic Computing,* 4(1): 1-6.

Harper, Richard (ed.) (2003) *Inside the Smart Home,* London: Springer-Verlag.

Hoffman, Donna, Tomas Novak and Alladi Venkatesh (2004), "Has The Internet Become Indispensable?: Empirical Findings and Model Development," *Communications of the ACM*, 47(7): 37-44.

Klawe, Maria, Telley Whitney, and Caroline Simard (2009), "Women in Computing – Take 2," *Communications of the ACM*, 52(2): 68-76.

Little, Linda., Elizabeth Sillence, and Pam Briggs (2009), "Ubiquitous systems and the family: thoughts about the networked home," in *Proceedings of the 5th Symposium on Usable Privacy and Security (SOUPS _09*). New York, USA: ACM, 6-9.

Livingstone, Sonia (2009), *Children and the Internet*, Cambridge: Polity Press.

Nippert-Eng, Christina (1997), *Home and Work*, Chicago: University of Chicago Press.

Shklovski, Irina., Robert E. Kraut, Jonathon N. Cummings (2006), "Routine patterns of internet use & psychological well-being: coping with a residential move", in *Proceedings of CHI_2006,* 969-978.

Strain, John D. (2003), "Households as Morally Ordered Communities: Explorations in the Dynamics of Domestic Life," in Harper, Richard (ed.) (2003) *Inside the Smart Home,* London: Springer Verlag, 41-59.

Subrahmanyam, Kaveri (2000). "The Impact of Home Computer Use on Children's Activities and Development. The Future of Children." *Children and Computer Technology*. 10(2): 123-144.

US Department of Commerce (2010), "*Digital Nation: 21st Century America's Progress Toward Universal Broadband Internet Access*".

Venkatesh, Alladi., Erik Kruse and Eric Shih, (2003) "The networked home: an analysis of current development and future trends," *Cognition, Technology & Work*, 5(1): 23-32.

Vitalari, Nicholas., Alladi Venkatesh and Kjell Gronhaug (1985), "Computing in the Home: Shifts in the Time Allocation Patterns of Household," *Communications of the ACM*, 28(5): 512-522.

Venkatesh, Alladi., Stolzoff, Norman Stolzoff, Eric Shih and Sanjoy Mazumdar, (2001) "The Home of the Future: An Ethnographic Study of New Information Technologies in the Home," *Advances in Consumer Research*, 28(1): 88-97.