Journal of Economic Psychology 8 (1987) 161-180
North-Holland

A POST-ADOPTION ANALYSIS OF COMPUTING IN THE HOME *

Alladi VENKATESH and Nicholas VITALARI
University of California, Irvine, USA

Received November 4, 1985; accepted December 9, 1986

This article discusses how households adapt to an emerging technology, 'computing in the home'. Using a sample of 282 households who own personal computers, the study examines several issues connected with the patterns of utilization and problems in adopting a new technology. The results show that utilization patterns vary according to prior knowledge, household structure and length of ownership. Implications are drawn for further research in the area of household/technology interaction.

Introduction

The recent growth in information and communication technologies has aroused a great deal of popular and scholarly interest (*Advertising Age* 1985; *Psychology Today* 1984; Rogers 1986; *TIME* 1983; Turkle 1984). In particular, the phenomenon of 'computing in the home' has given rise to much debate because of its potential impact on different segments of the society (McQuarrie and Langmeyer 1987; Venkatesh and Vitalari 1986; Vitalari and Venkatesh 1986). Not since the emergence of the television about thirty years ago, has there been a technology with such possibilities for social change. With the diffusion of computer technology extending to the household level, there are several interesting and important issues relating to and resulting from its adoption. The purpose of this study is (a) to evaluate the specific ways households utilize the computing technology, (b) to identify general segments of usage and relate them to selected household characteristics, (c) to determine the specific changes in time allocation

* Requests for reprints should be sent to A. Venkatesh, Graduate School of Management, University of California, Irvine, CA 92717, USA.

0167-4870/87/$3.50

patterns across a variety of home-centered activities resulting from computing in the home, (d) to determine the levels of satisfaction across different technology-related factors, and (e) to derive some theoretical generalizations relating to household–technology interaction.

Research issues

While a number of popular articles have looked at the home computing phenomenon, the two previous research studies, Rogers (1986) and Dickerson and Gentry (1983) are most germane to the present study. The first study looked at the diffusion of home computers using a small sample of 77 families in Silicon Valley. The second study, examined the profiles of the adopters and non-adopters using demographic and psychographic characteristics. Our study goes one step further and investigates the computer usage patterns and the computer's impact on household activities. When people buy new technologies they do not necessarily use them as originally intended and sometimes find new uses not contemplated earlier. Also because of limited familiarity with the product prior to purchase, the only way they can comprehend the technology is by trial and error. Thus from the point of view of consumer decision making, the critical decisions are less to do with the acquisition of the technology than how to use the technology to meet consumers' needs, and adapt to the potential inherent in the technology itself. Consistent with this argument, in this study, we examine the computer usage patterns and experiences of some of the early group of buyers of home computers.

The first set of research issues concerns the patterns of home computer usage and changes over time. The rationale for this question is twofold. One relates to the characteristics of the technology itself and the other to the characteristics of the user. Given the complexity and the multi-functional nature of computer technology, it is likely that usage patterns do vary. Moreover, they are likely to vary according to the consumer's (a) prior experience with computers (e.g., in work settings), (b) the learning experience that results from continued product use after its acquisition, and (c) the household structure.

Existing research on new product adoption points to the importance of product familiarity and comprehension as factors contributing to the ease of adoption (Johnson and Russo 1984). However, the research in this area is concerned with how familiarity with the product influences the search for information prior to purchase decision and the choice between different alternatives. Our interest is in extending this idea further and examining how these factors affect the actual use of the product. A valid hypothesis here is that people with prior experience are more likely to be able to use computers for more complex applications. A related hypothesis is that the length of ownership might create enough product familiarity so that after passage of time it would not matter if the users had prior experience or not because one cancels the other.

We also investigate the role of household structure in determining computer usage. One important aspect of household structure is the presence or absence of children in the home. A major theme in the popular literature suggests that computers are instruments for societal advancement and an important investment in the future of children (Cohen 1982; *Psychology Today* 1984). The extent of the use of computers by children is an indication of the commitment of the household to this concept. Accordingly, our study sets out to investigate if there are any major differences in computer usage patterns between households with children and without children.

Another set of questions deals with the impact computers have on the time spent on some home-centered activities. The idea that new technologies create an impact on time allocation across other home-centered activities has been researched in the past. Robinson (1980) has argued that, while the technology of the automobile makes a faster commute to work possible, the automobile also makes it possible to live farther from work, so that the travel times of automobile owners and non-owners are the same. Weiss (1969) found a similar homeostatic trade-off in the impact of television, which took away time from reading and radio listening and generally preserved the overall life styles of T.V. viewers. It is reasonable to assume that the use of home computers will have an impact on how time is allocated to other activities, but the nature of the impact will vary across households.

A final set of questions deals with the levels of satisfaction of the respondents with computer-related factors. In consumer behavior literature, the notion of consumer satisfaction has received much attention. With a few exceptions, these studies have focused on post-purchase satisfaction rather than the use behavior satisfaction (Day 1977; Oliver 1980). In other words, the existing research puts more emphasis on customer's satisfaction with the process of acquiring goods, which includes the act of purchase and the immediate post-purchase experience. This study goes beyond the consequences of purchase transaction, and examines the usage levels and use satisfaction which are quite critical issues in the adoption of new technology.

To summarize, the research questions are:

(1a) What uses did the households have in mind prior to the acquisition of the computing technology and how did the uses change after purchase?
(1b) What differences exist between households with children and without children regarding how the technology is utilized?
(2) What differences in the uses of computing technology exist among households, given: (a) prior experience (or no experience), and (b) length of ownership?
(3) What is the impact of the technology on selected home-centered activities? And how does this vary according to prior experience and length of ownership?
(4) What is the level of satisfaction and dissatisfaction with the computing package and how does this vary based on prior experience and length of ownership?

Methodology

Sample description

The sample for the study was drawn from a membership list of 24 active computer clubs in Southern California. The sample was screened for adequate representation of the users of major brands of personal computers (Apple, IBM, Radio Shack etc.) with the additional requirement that the computers be used at home. The sample excluded households whose ownership was limited to electronic game machines or those systems at the very low end of the market (e.g., Timex or Sinclair). Our operational definition of a home computer is, a personal computer in home setting, capable of performing at least three functions such as word processing, running educational software, business programs, and games. The sample was purposive and drawn from an initial list of 320 households to yield a final, usable sample of 282.

Survey instrument

The questionnaire consisted of several items: the reasons for buying the computer, the actual uses of the computer after purchase, the impact of the computer on the time spent on selected home-centered activities. Also included in the questionnaire were Likert type scales for measuring the respondent's satisfaction levels for various computer attributes. The categories of variables used in the analysis were demographics, characteristic of the household structure, length of ownership, previous experience with computers, types of computer use, household activities, and satisfaction with the computing package. The questionnaire was pre-tested for readability, presentation and formatting by using a group of 25 personal computer users in the local area.

Data analysis method

A major part of the data analysis uses the log-linear technique, which was recently developed for analyzing contingency tables (Goodman 1970; Fienberg 1977). For this study, log-linear analysis was considered most appropriate because the type of data in our study was mostly categorical, and partly ordinal. Since our research questions were formulated in terms of establishing statistical relationships including interaction terms, the log-linear analysis was considered superior to the traditional contingency table analysis. We also found other advantages. The log-linear method allowed us to look at several categorical variables simultaneously. The model does not confuse the marginal relationship between a pair of categorical variables with the relationship when other variables are present. We were further able to perform the analysis of multi-factor and higher-order interactions among variables. Finally, by formulating a nested hierarchy of models, we could partition the goodness of fit statistic into several additive parts, and test each part separately for statistical significance.

The usual formulation for contingency table analysis is linear in the logarithm of the expected cell frequencies $[m_{ij}]$ so that, using the notation of Fienberg (1977), for two dimensions with r and s categories, the model is given by

$$\log m_{ij} = U + U_{1(i)} + U_{2(j)} + U_{12(ij)}, \quad i = 1 \ldots r;\ j = 1 \ldots s.$$

The model is saturated involving row and column effects and interactions, but other models can be formulated by equating sets of parameters to zero. In higher dimensions, the formulation is similar with much greater scope for unsaturated models of various kinds.

In reporting the findings, our strategy is to present the results in a parsimonious manner. Because of the problems of interpretation, the incidence of too many interaction terms, and the occurrence of small cell values with higher order n-way tables, the analysis is limited to 3-way tables at the most. In the following, we describe the procedure adopted in the study for analyzing the relationship between three variables.

Consider variables, A, B and C, such that A and B are independent variables and C is the dependent variable. Using these three variables, we try to fit the following models but consider model 4 as the basic model.

$[A]\,[C]$	(model 1, conditional equiprobability),
$[B]\,[C]$	(model 2, conditional equiprobability),
$[A]\,[B]\,[C]$	(model 3, mutual independence),
$[AB]\,[C]$	(model 4, marginal associations, $A \& B$),
$[AB]\,[AC]$	(model 5, marginal associations, $A \& C$),
$[AB]\,[BC]$	(model 6, marginal associations, $B \& C$),
$[AB]\,[AC]\,[BC]$	(model 7, full first-order).

The partitioning of chi-square for these models will yield the following results:

effect of B = difference between models 3 and 1,
effect of A = difference between models 3 and 2,
effect of AB = difference between models 4 and 3,

Data analysis and results

Some preliminary results

Demographics

Most respondents are male (95%) and many (75%) are married. The average respondent is 38 years old and highly educated, with 90%

reporting at least some college education and 60% having completed a college degree. More than 70% of the sample report family incomes exceeding $30,000. About 67% of the respondents are in the technical, professional, or managerial occupation groups. About 47% of the families have children with 81% of them reporting 1 or 2 children.

As expected, our sample is clearly upscale and supports the findings of Rogers (1986) and Dickerson and Gentry (1983).

Other characteristics

Interestingly, 43% or our sample own video cassette recorders, which was above the national average when the data were gathered. A large proportion of them (94%) read computer-related magazines. In 94% of the cases, the decision to buy the computer was made by the respondent only, and the average expenditure for a computer system for the sample was $1,500. The most commonly owned computer systems were Apple (22%), IBM (21%), Radio Shack (36%), and Commodore (10%). The rest included other systems. Finally, 77% of our sample had computer experience prior to purchase while 23% had no prior contact with computers.

Research question 1: Comparison of intended uses and actual uses

How does the planned use of home computers by the households compare with actual uses? The results are summarized in table 1.

There are two main parts to the table, which include the frequencies of intended uses and the frequencies of actual uses. These are again decomposed into three columns each. Thus column I represents the frequencies of major intended uses for the entire sample. Columns II and III give the same information for households with children and without children. Columns IV, V and VI are analogous to columns I and II and III but represent actual uses. Using these six columns, several comparisons can be made.

The log-linear analysis of columns II and III reveal that the *planned uses* of households with children, and households without children, are different. In log-linear terms, the model of independence does not fit well (LR χ^2 12.12, *df* 5, $p < 0.05$). However, the log-linear result for *actual uses* columns V and VI) shows that the model fits well (LR χ^2 3.61, *df* 5, $p = 0.6068$). Let us now examine the actual cell frequencies to gain some insights.

Table 1
A comparison of intended vs actual uses.

	Intended uses			Actual uses		
	(I) Entire sample [a]	(II) Households with children	(III) Households without children	(IV) Entire sample	(V) Households with children	(VI) Households without children
Business	(1) [b] 42 (23.7%)	(2) 15 (17.6%)	(1) 27 (29.3%)	(2) 38 (21.6%)	(3) 16 (19.0%)	(2) 22 (23.9%)
Education	(2) 41 (23.2%)	(1) 25 (30.6%)	(3.5) 16 (17.4%)	(4) 28 (15.9%)	(4) 12 (14.3%)	(3) 16 (17.4%)
Finance/ home management	(3) 29 (16.4%)	(3.5) 13 (15.3%)	(3.5) 16 (17.4%)	(6) 13 (7.4%)	(6) 7 (8.3%)	(6) 6 (6.5%)
Hobby	(4) 25 (14.1%)	(6) 8 (9.4%)	(2) 17 (18.5%)	(5) 18 (10.2%)	(5) 10 (11.9%)	(5) 8 (8.7%)
Word processing	(5) 24 (13.6%)	(3.5) 13 (15.4%)	(5) 11 (12.0%)	(1) 43 (24.4%)	(2) 18 (21.4%)	(1) 25 (27.2%)
Entertainment/ games	(6) 16 (9.0%)	(5) 11 (12.9%)	(6) 5 (5.4%)	(3) 36 (20.5%)	(1) 21 (25.0%)	(4) 15 (16.3%)

Log-linear analysis summary
Columns II and III

	LR χ^2	*df*	*p*	Pearson χ^2	*p*
(a)	12.12	5	0.0332	11.92	0.0359

(b)	λBus	λEdu	λFin	λHob	λWP	λEnt	λHHC	$\lambda HHWC$
	0.406	0.382	0.036	−0.112	−0.153	−0.559	−0.040	0.040
(c)	Observed–expected:							
	Bus	*Edu*	*Fin*	*Hob*	*WP*	*Ent*		
	(−5.2, 5.2)	(6.3, −6.3)	(−0.9, 0.9)	(−4.0, 4.0)	(0.5, −0.5)	(3.3, −3.3)		
Columns V and VI								
(a)	LR χ^2	*df*	*p*	Pearson χ^2	*p*			
	3.61	5	0.6068	3.60	0.6081			
(b)	λBus	λEdu	λFin	λHob	λWP	λEnt	λHHC	$\lambda HHWC$
	0.343	0.037	−0.730	−0.405	0.466	0.343	−0.045	0.045
(c)	Observed–expected:							
	Bus	*Edu*	*Fin*	*Hob*	*WP*	*Ent*		
	(3.8, −3.8)	(0.8, −0.8)	(−2.5, 2.5)	(−2.1, 2.1)	(−1.4, 1.4)	(1.4, −1.4)		

[a] Entire sample here is 177 because we have included only those respondents who stated they had prior uses in mind before purchase.
[b] Rankings are in parentheses.

When we compare the intended uses and the actual uses for the entire sample (columns I and IV), we find that the two most frequently mentioned intended uses (column I) are Business (23.7%) and Education (23.2%). However, when we examine column IV for the actual uses, the two most common applications are Word Processing (24.4%) and Games (20.5%). When we extend the analysis further to households with children and without children, for a comparison on intended uses (columns II and III), Education is the major use (30.6%) for households with children, and Business (29.3%) for the other group. As for actual uses (columns V and VI), the figures for households with children are Entertainment/Games at 25.0%, and for households without children the major use is Word Processing at 27.2%.

The pattern of shifts from intended uses to actual uses is quite illuminating. For the entire sample, the shift is from complex to simpler uses. For example, home finance/management application has practically become a non-use. That is because, relatively speaking, home management applications require elaborate software and higher skill levels as compared with word processing, which is clearly the most popular use, and less demanding in terms of task orientation.

The shifts in use patterns among households with children are similar (i.e., from complex to simple). The intended uses are mostly educational but the actual use is entertainment/games oriented. Once again we find the same principle operating. Educational uses are complex and more demanding and entertainment uses are simpler and probably more appealing to the children.

The results clearly demonstrate that consumer expectations regarding how a technology will be exploited starts at a higher level. Consumers may, in fact, justify their initial purchase by somewhat ambitious goals. However, they quickly realize that in order to accomplish their objectives, they have to expend much time and effort and such a realization may cause them to lower their expectations.

Research question 2: Relationship between prior experience, length of ownership and computer use

The results shown in table 2 explain how the use patterns are dependent on prior experience and the length of computer ownership. By prior experience we mean computing knowledge acquired prior to the acquisition of the computer for home use. We selected four uses:

Table 2
Prior experience, length of ownership, uses (log-linear analysis).

Fitted models	*df*	L^2	*p*	Tests	L^2	*df*	*p*
1. *E*, *En*	13	72.97	0.00	1–3	62.29	3	0.01
2. *L*, *En*	11	13.54	0.25	2–3	2.86	1	0.10
3. *E*, *L*, *En*	10	10.68	0.38	–			
4. *EL*, *En*	7	10.21	0.25	3–4	0.47	3	NS
5. *EL*, *EEn*	6	7.25	0.29	4–5	2.96	1	0.10
6. *EL*, *LEn*	4	6.71	0.15	4–6	3.50	3	NS
7. *EL*, *EEn*, *LEn*	3	6.63	0.08	6–7	0.08	1	NS
8. *EW*	13	55.95	0.00	8–10	48.27	3	0.01
9. *L*, *W*	11	60.62	0.00	9–10	52.94	1	0.01
10. *E*, *L*, *W*	10	7.68	0.68	–			
11. *EL*, *W*	7	15.61	0.05	10–11	8.93	3	0.05
12. *EL*, *EW*	6	6.13	0.40	11–12	1.55	1	NS
13. *EL*, *LW*	4	2.62	0.62	11–13	6.04	3	0.01
14. *EL*, *EW*, *LW*	3	2.61	0.46	13–14	0.01	1	NS
15. *E*, *F*	13	49.69	0.00	15–17	38.26	3	0.01
16. *L*, *F*	11	83.69	0.00	16–17	72.26	1	0.01
17. *E*, *L*, *F*	10	11.43	0.32	–			
18. *EL*, *F*	7	17.90	0.05	17–18	6.47	3	0.10
19. *EL*, *EF*	6	10.70	0.09	18–19	0.73	1	NS
20. *EL*, *LF*	4	2.50	0.63	18–20	8.93	3	0.05
21. *EL*, *EF*, *LF*	3	2.48	0.68	20–21	0.02	1	NS
22. *E*, *B*	13	54.48	0.00	22–24	44.55	3	0.01
23. *L*, *B*	11	67.68	0.00	23–24	57.75	1	0.01
24. *E*, *L*, *B*	10	9.93	0.45	–			
25. *EL*, *B*	7	6.89	0.44	24–25	3.04	3	NS
26. *EL*, *EB*	6	6.80	0.34	25–26	0.09	1	NS
27. *EL*, *LB*	4	1.89	0.76	25–27	5.00	3	NS
28. *EL*, *EB*, *LB*	3	1.86	0.60	27–28	0.03	1	NS

Note:

E (previous experience) – yes;
2 categories – no.

L (length of ownership) – less than 6 months;
4 categories – 6 months to 1 year;
– 1 year to 2 years;
– more than 2 years.

En (entertainment use)
W (word processing use)
F (home finance use)
B (business use)
2 categories
} – major use; – not a major use.

entertainment/games (En), word processing (W), finance/home management (F), and business applications (B). We first fitted log-linear models in which experience (E) and length of ownership (L) were treated as independent variables and computer uses as dependent variables.

In the first set of analyses, the models that fit well are (EL, En) and (EL, B) which pertain to the two uses, entertainment and business applications. The models that do not fit well are (EL, W) and (EL, F). The results demonstrate that, once we control for the length of ownership, households do not differ in their use of computers for entertainment and business applications. On the other hand, in the case of word processing and home management/finance, both uses change with time. We have already seen from our earlier analysis (table 1) that the shift from intended to actual use was marked by the increasing use of the computer for word processing and decreasing use for home management applications. By a different analysis, that is, by introducing the length of ownership variable very specifically into the model, we are able to establish a similiar result. The fact that the length of ownership does not affect the use of the computer for entertainment and business applications can be explained in two ways. Probably the presence of children accounts for the continued use of computers for entertainment. As for business applications, we would explain that the computers are basically business- or work-oriented machines. Historically, computers have been developed to meet the work-related needs of individuals and organizations. To the extent that individuals have a good understanding of their work-oriented tasks, they are presumably capable of evaluating the usefulness of computers to meet work-related needs. After all, as most people know, computers are sophisticated versions of office/work-oriented products. Consequently, the type of decisions that consumers make at the time of purchase regarding business applications are less likely to undergo change.

Research question 3: Impact on selected activities

When a new technology arrives in the household, it has an impact on the way time is allocated to activities that computing might displace. Earlier studies on automobile and television have recorded this type of impact (Belson 1967; Robinson 1980).

Table 3
Prior experience, length of ownership, impact on activities (log-linear analysis).

Fitted models	df	L^2	p	Tests	L^2	df	p
1. E, T	20	108.61	0.00	1–3	55.96	3	0.01
2. L, T	18	114.57	0.00	2–3	61.92	1	0.01
3. E, L, T	17	52.65	0.00	–			
4. EL, T	14	51.41	0.00	3–4	1.24	3	0.01
5. EL, ET	12	33.69	0.00	4–5	17.72	2	0.01
6. EL, LT	8	33.59	0.00	4–6	17.82	6	0.01
7. EL, ET, LT	6	14.52	0.02	6–7	19.07	2	0.01
8. E, F	20	69.17	0.00	8–10	52.84	3	0.01
9. L, F	18	79.71	0.00	9–10	63.38	1	0.01
10. E, L, F	17	30.72	0.03	–			
11. EL, F	14	16.33	0.30	10–11	14.39	3	0.01
12. EL, EF	12	6.75	0.87	11–12	9.58	2	0.01
13. EL, LF	8	5.15	0.74	11–13	11.18	6	0.01
14. EL, EF, LF	6	3.76	0.70	13–14	1.39	2	NS
15. E, S	20	81.23	0.00	15–17	67.81	3	0.01
16. L, S	18	87.40	0.00	16–17	73.98	1	0.01
17. E, L, S	17	13.42	0.71	–			
18. EL, S	14	8.13	0.88	17–18	5.29	3	NS
19. EL, ES	12	5.73	0.93	18–19	2.40	2	NS
20. EL, LS	8	6.75	0.56	18–20	1.38	6	NS
21. EL, ES, LS	6	4.39	0.62	20–21	2.36	2	NS
22. E, R	20	81.27	0.00	22–24	63.75	3	0.01
23. L, R	18	84.97	0.00	23–24	67.45	1	0.01
24. E, L, R	17	26.07	0.07	–			
25. EL, R	14	17.52	0.24	24–25	8.55	3	0.05
26. EL, ER	12	5.10	0.95	25–26	9.55	2	0.01
27. EL, LR	8	9.91	0.27	25–27	7.61	6	0.05
28. EL, ER, LR	6	2.83	0.83	27–28	7.08	2	0.05

Note:
E (previous experience) – yes;
2 categories – no.

L (length of ownership) – less than 6 months;
4 categories – 6 months to 1 year;
– 1 year to 2 years;
– more than 2 years.

T (television watching)
F (time spent with family)
S (sleeping)
R (recreation)
3 categories
} – decreased; – same; – increased.

Table 3 shows the results of the log-linear analysis involving four activities: television watching (T), time spent with the family (F), sleeping (S), and outdoor recreation (R). In the table, experience and length of ownership are designated by E and L. We fitted different models to test the relationship between experience, length of ownership as independent variables, and each of the activities as a dependent variable. Since the relationship between experience and length of ownership is of no theoretical interest, our baseline models are (EL, T), (EL, F), (EL, S), and (EL, R), instead of the models of independence (e.g., E, L, T). As the table shows, for only one out of four activities (sleeping), the baseline model fitted very well. It is clear that, in all the three cases, the conditional interaction between the experience variable and the activity variable, and the conditional interaction between the length of ownership variable and the activity variable are significant. This goes to show that familiarity with the technology either before acquisition or after acquisition has more or less the same effect.

The implication of this result lies in the fact that there is a clear learning effect in regard to the use of computers. Other things remaining equal, the computer users engage in time trade-offs and, while the activities which are suspended are situationally specific, some generalizations can be made. Firstly, computing appears to displace similar activities (TV watching) and reduces time spent on sleeping and family interaction because of the attention the computing activity requires. Secondly, computing activity at the early stages of learning requires more of an individual's time and attention. Consequently, it causes reduction in the time spent on activities such as sleeping and family interaction because both these activities involve the individual in a similar way. The effort and time required to acquire and master computer skills tends to isolate individuals from others.

Levels of satisfaction, experience and length of ownership

The question that we asked of the respondents was how satisfied they were with various computer-related factors.

While most of the respondents were satisfied with a majority of the factors, dissatisfaction was the highest with dealer helpfulness and standardization (table 4). We carried the analysis further to see if the levels of satisfaction are likely to be different among people with prior

Table 4
Frequency distribution of users satisfied with the computer-related factors ($n = 282$).

	Satisfied (%)	Neutral (%)	Not satisfied (%)
Hardware reliability	79	17	4
Software reliability	63	25	12
Documentation – general system	43	35	22
Documentation – application software	31	38	31
Maintenance support	34	46	20
Time for data preparation	40	52	8
Time for data entry	40	51	9
Dealer helpfulness	28	47	53
Standardization	29	22	49

experience and whether it would vary with the length of computer ownership. We hypothesized that people with no prior experience are likely to be less satisfied because it takes them longer to get the technology to work. At the same time, it is also possible that people with prior experience are likely to attempt complex tasks and, therefore, their expectations may be high. In any case, the length of ownership might act as a moderator variable.

To answer these questions, we performed a three-way log linear analysis (table 5). We selected five computer characteristics: hardware reliability (H), software quality (S), general system documentation (G), ease of data entry (D), and standardization (St). Consistent with our earlier approach to the log-linear analysis, we selected the baseline models as (EL, H), (EL, S), (EL, G), (EL, D), and (EL, St). In two of the five cases (hardware reliability and data entry), the baseline models fitted well, and in the other cases, the fit was possible only after the interaction terms were included.

Overall, it seems that both experience and length of ownership affect the levels of satisfaction. For example, we found (not shown in the table) that people with previous experience were more satisfied (65%) with software reliability than people without previous experience (56%). People with no previous experience were more dissatisfied (33%) with general system documentation than people with previous experience (18%). Finally, people with no prior experience were less satisfied (65%) with standardization than people with experience (48%). When we hold the length of experience constant some of the differences disappear. In general, it would seem that there are more differences in the case of software rather than hardware. Since it is the software that permits

Table 5
Prior experience, length of ownership, satisfaction (log-linear analysis).

Fitted models	*df*	L^2	*p*	Tests	L^2	*df*	*p*
1. *E, H*	20	85.47	0.00	1–3	74.08	3	0.01
2. *L, H*	18	82.79	0.00	2–3	71.40	1	0.01
3. *E, L, H*	17	11.39	0.83	–			
4. *EL, H*	14	8.78	0.84	3–4	2.61	3	NS
5. *EL, EH*	12	5.22	0.95	4–5	3.56	2	NS
6. *EL, EH*	8	6.25	0.62	4–6	2.53	6	NS
7. *EL, EH, LH*	6	2.77	0.83	6–7	3.48	2	NS
8. *E, S*	20	69.86	0.00	8–10	40.91	3	0.01
9. *L, S*	18	91.55	0.00	9–10	62.60	1	0.01
10. *E, L, S*	17	28.95	0.05	–			
11. *EL, S*	14	26.35	0.08	10–11	2.60	3	NS
12. *EL, ES*	12	12.21	0.42	11–12	14.14	2	0.01
13. *EL, LS*	8	15.77	0.04	11–13	10.58	6	NS
14. *EL, ES, LS*	6	9.82	0.13	13–14	5.95	2	0.10
15. *E, G*	20	96.64	0.00	15–17	66.49	3	0.01
16. *L, G*	18	96.31	0.00	16–17	66.16	1	0.01
17. *E, L, G*	17	30.15	0.05	–			
18. *EL, G*	14	29.29	0.01	17–18	0.86	3	NS
19. *EL, EG*	12	15.52	0.21	18–19	13.77	2	0.01
20. *EL, LG*	8	9.05	0.36	18–20	20.24	6	0.01
21. *EL, EG, LG*	6	1.78	0.94	20—21	7.27	2	0.05
22. *E, D*	20	81.23	0.00	22–24	61.23	3	0.01
23. *L, D*	18	64.36	0.00	23–24	44.36	1	0.01
24. *E, L, D*	17	20.00	0.27	–			
25. *EL, D*	14	16.44	0.20	24–25	3.56	3	NS
26. *EL, EEd*	12	15.83	0.20	25–26	0.61	2	NS
27. *EL, LD*	8	11.28	0.19	25–27	5.16	6	NS
28. *EL, Ed, LD*	6	10.72	0.09	27–28	0.56	2	NS
29. *E, St*	20	94.38	0.00	29–31	73.62	3	0.01
30. *L, St*	18	90.77	0.00	30–31	70.01	1	0.01
31. *E, L, St*	17	32.92	0.23	–			
32. *EL, St*	14	20.76	0.01	31–32	12.16	3	
33. *EL, ESt*	12	9.81	0.63	32–33	10.95	2	0.01
34. *EL, LSt*	8	9.39	0.31	32–34	11.37	6	0.01
35. *EL, ESt, LSt*	6	2.38	0.85	34–35	7.01	2	0.05

greater use flexibility (because hardware is a given), the manipulative and cognitive skills of the user play a more important role in this dimension.

Discussion

The main focus of the study was to identify the computer use patterns among early adopters. Given the revolutionary nature of the technology, the significance of how computer users interact with the technology could be substantial. We discuss the implication of our own results, both from the point of view of computing in the home and from a broader perspective of household technologies.

We find that computing in the home involves a high degree of work-related emphasis. This is supported by the fact that the two major uses of computers reported by the sample are word processing and business applications. There is enough evidence from the perspective of technology to suggest that the computer has office/work bias built into it. To the extent that this bias exists, the term 'home computer' appears to be a misnomer. However, the use of this technology for predominantly work-related activities is significant in itself. This is a unique development that could not have been possible without the technology.

Another finding of our study is the way home computers are used by households with children. Although the major *intended* use of the computer for households with children is educational, the major *actual* use is for entertainment. This has two implications. The first is somewhat simpler but is substantiated by industry reports. It is known that the educational software that is now available for children is generally of a mediocre quality and does not meet the educational standards set by the experts in the field. The development of educational software requires a lot of investment and is only possible under the guidance of

---

Note to table 5:

E (previous experience) – yes;
2 categories – no.

L (length of ownership) – less than 6 months;
4 categories – 6 months to 1 year;
– 1 year to 2 years;
– more than 2 years.

H (hardware reliability)
S (software reliability)
G (general system documentation)
D (data entry time)
St (standardization)
3 categories
} – satisfied;
– neither satisfied nor dissatisfied;
– not satisfied.

well-trained psychologists and educators who are usually the type of people developing educational software. We believe that a great opportunity exists for the education industry to capitalize on these opportunities which are now being exploited by the traditional computer firms.

A second implication of the children's use of computers for entertainment and games is once again based on recent industry developments. For example, the companies which market entertainment/games-oriented software are facing a decline in the market demand. The reason is that while computers are complex, multi-functional products, entertainment represents a rather low-level application for the computer. We believe that the matching of a complex technology for a low-level application may not have a long-term appeal to the user. Secondly, there is also a high degree of novelty factor in games and entertainment, and once it wears out the computer's potential to satisfy this need diminishes.

Our study attempted to investigate the role of prior experience in computer use and levels of satisfaction. Our sample was clearly skewed in favor of households (77%) where the major user had prior experience with the computer. The effect of prior knowledge makes a difference in the inititial months of computer ownership and is replaced by knowledge gained over time. Since among the general public, a vast majority have limited or no knowledge of the computer, our results demonstrate that this deficiency can be overcome by continuous use of the computer through adequate training. It is important to note that at the present level of technology, the obtaining of sound computer knowledge is not a trivial task and may take several months. Most market failures in the recent months can be attributed to the aggressive marketing of the product by vendors to the general public without adequately warning the latter about the time and effort required to obtain a working knowledge of the computer.

Our final question relates to how satisfied the respondents are with home computers. While the overall levels of satisfaction are positive, the respondents are less pleased with the operational factors of the computer and certainly displeased with support factors such as dealer helpfulness and standardization. Given that most major manufacturers of computers have limited experience in consumer marketing, we are led to believe that their entry into the marketplace has been somewhat opportunistic and based less on sound consumer research.

From a broader perspective of technology and the households, the study has several implications. When the technology is unfamiliar and complex, users engage in decision processes which have to do with coping with uncertainties and opportunities that the technology presents to the user. This process is evolutionary as well as iterative and cannot be easily understood by merely researching the acquisition stage of technology. We found that the intended uses varied from the actual uses. One important explanation for this variation is that household decision making alters profoundly during the process of technology utilization. If the technology is multi-functional, this process is non-trivial and very involved.

Household technologies can be task oriented (e.g., vacuum cleaners) or pleasure oriented (e.g., television). Intuitively, it would appear that pleasure-oriented technologies have a greater appeal than task-oriented technologies. This is partially confirmed by the increasing use of computers by children for entertainment and games. However, when one examines the market trends, the demand for entertainment-oriented software has declined considerably but the demand for educational software is on the increase. This may appear to be somewhat paradoxical. We offer two explanations. At a simpler level, children can easily tire of game-oriented products when the novelty or challenge wears out. A more complex reason accounts for increased educational use. Parents invest in the future of their children as a way of developing human capital. To the extent that computing technology permits such a possibility, households are likely to exploit this application.

Our study also revealed that the computing technology has displaced some household activities. There are historical parallels to such an impact. For example, television created new modes of entertainment, displacing some other forms (e.g., movie attendance). The extensive use of telephones has reduced written communication. It is not always the case that new technologies displace household activities. Some of them actually lead to improvements in the way some activities are performed. Most household appliances (e.g., washer, dryer, vacuum cleaner) fit this description.

Overall, we believe that in the case of new technologies the benefits sought at the time of acquisition vary from the benefits derived through utilization. One can hypothesize that if the latter are greater than the former, the households develop positive views of the technology. Also if the technologies are multi-functional, the households are likely to experiment until the best balance is obtained between the effort put into the use of the technology and the benefits derived from it.

Conclusions

The household–technology interaction is governed by various factors relating to the household and the technology itself. Using computers as an example of an emerging technology, we were able to show that complex technologies lead to a variety of consumer responses. Our analysis shows that computer users vary in regard to how they use the computers, in their levels of satisfaction and the impact they feel on other home-centered activities. Thus the home computing phenomenon may not be monolithic but is likely to vary across different segments.

References

Advertising Age, 1985. Personal computer marketing. February 7, 13–43.

Belson, W.A., 1967. The impact of television. Hamden, CT: Archon.

Cohen, C.B., 1982. The kid, the Apple, and me. Popular Computing.

Day, R.L., 1977. 'Extending the concept of consumer satisfaction'. In: W.D. Perreault, Jr. (ed.), Advances in consumer research, Vol. 4. Atlanta, GA: Association for Consumer Research. pp. 149–154.

Dickerson, M.D. and J.W. Gentry, 1983. Characteristics of adopters and non-adopters of home computers. Journal of Consumer Research 10, 225–235.

Fienberg, S., 1977. The analysis of cross-classified categorical data. Boston, MA: MIT Press.

Goodman, L., 1970. The multivariate analysis of qualitative data. Journal of the American Statistical Association 65, 226–256.

Johnson, E. and J.E. Russo, 1984. Product familiarity and learning new information. Journal of Consumer Research 11, 542–550.

McQuarrie, E.F. and D. Langmeyer, 1987. Planned and actual spending among owners of home computers. Journal of Economic Psychology 8, 141–159 (this issue).

Oliver, R.L., 1980. A cognitive model of the antecedents and consequences of satisfaction decisions. Journal of Marketing Research 17, 460–469.

Psychology Today, 1984. Special issue on computers and children (September).

Robinson, J., 1980. 'Housework technology and household work'. In: S.F. Berk (ed.), Women and household labor. Beverly Hills, CA: Sage.

Rogers, E.M., 1986. Communication technology: the new media in society. New York: Free Press.

TIME, 1983. Machine of the year (computers). January 3, 12–39.

Turkle, S., 1984. The second self: computers and the human spirit. New York: Simon and Schuster.

Venkatesh, A. and N. Vitalari, 1986. Computing technology for the home: product strategies for the next generation. Journal of Product Innovation and Management 3, 171–186.

Vitalari, N. and A. Venkatesh, 1986. Computing in the home: implications for the provision of government services. Computers, Environments and Urban Systems 11, 81–90.

Weiss, W., 1969. 'Effects of the mass media on communication'. In: G. Lindsay and E. Aronson (eds.), The handbook of social psychology. San Francisco, CA: Chandler.