

Determinants of Health Kiosk Use and Usefulness: Case Study of a Kiosk Which Serves a Multi-Cultural Population

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329 patients in a multi-cultural surgery in Nottinghamshire, England used a touch-screen health information kiosk in the practice and then filled in an online questionnaire after they had searched the system. This questionnaire sought background information on the patient's age, gender, country of birth and employment status as well as data on the use and usefulness of the kiosk. Ease of kiosk system use was found to be significant in determining both use and

satisfaction variables. Older users and those not born in the UK were less likely to find the system easy or very easy to use. Employment status was also found to impact on kiosk use; both UK born and non-UK born skilled workers were found to use the kiosk more as compared to other groups. These findings help identify user populations who are good targets for information kiosks as well as the most effective ways to provide consumer health information via kiosk.

Introduction

The UK Government is set on using digital information platforms to expand the provision of health information to the general public. The policy document *Information for Health*, for example, is underpinned by the notion that 'access to the right information at the right time is a crucial ingredient of modern healthcare' (NHS Executive 1999). This resulted in a massive initiative known as 'NHS Direct'. This consists of a battery of information services, such as two Web sites (NHS Direct Online <http://www.nhsdirect.nhs.uk> and the National Electronic Library for Health <http://www.nelh.nhs.uk/>), a telephone hotline and touch-screen kiosks to achieve the goals of informing patients (and in doing so, improving the health of the nation) and alleviating the overburdening pressure on the state-run National Health Service. Mobile phones and digital interactive television health information services are also being planned, with the latter beginning pilots in April 2001. Behind all these initiatives lies the presumption that

the very act of providing people with information leads to a better health outcome, although this could, of course, simply be improving the dialogue between patient and health professional which might then lead to better treatment. It might of course also lead to fewer visits to the doctor and might also help in reducing some of the inequalities inherent in the current provision of health information.

The study reported here investigates some of these issues and concerns in light of the use of a touch-screen information kiosk sited in a surgery that services a largely ethnic population. It constitutes one of a series of studies being conducted as part of a research project for The Department of Health on the impact of providing digital consumer health information [1].

Aims and objectives

The aims and objectives of this study were to determine whether patients' personal characteristics have an impact on the use of a touch-screen

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kiosk and the way its value is perceived. In particular we were seeking to discover whether country of birth, age, gender and employment status impact upon the key use metrics (number of pages viewed and the time spent on a session and viewing a page) and information outcome variables. A variety of techniques are used to test the association, including linear and logistic regression modelling. A kiosk in an area of intermediate deprivation, with a multi-cultural population was chosen to see whether there was any evidence to support the contention that these groups are among the digitally excluded.

Previous research

Previous research has highlighted two main areas that are likely to impact on touch-screen health kiosk use. These are the age of the user and the user's previous use of technology.

The age of the user has been shown to impact on kiosk use. Naven et al.'s (1996) analysis of 'Healthpoint' information kiosks found no difference in use between women and men, but found that older people were less likely to use the kiosk. The survey's figures indicated that 20% of those under 50 had used their kiosks compared to 13% of those over 50. Nicholas et al. (2000, 2001c) in an ongoing study of 'Intouch with Health' kiosks found that health consumers aged over 55 were less likely to use the kiosk than younger people were. Medical respondents, reported in Williams et al. (2001), as part of the same research, suggested that elderly patients with poor vision may use a finger to guide their eye when reading on screen. This would adversely affect navigation, as the touch-screen would inevitably be involuntarily activated, calling up unsolicited pages. The elderly might well not use new technology for a variety of reasons. It is common, for example, for people to lose their manual dexterity with age, making it difficult to use a keyboard or mouse (Hoot and Hayslip 1983). However Pearson et al. (1999) found in a study of a touch-screen cancer information system, that older patients (and males) expressed more satisfaction with the content than younger females, suggesting that low use of technology may not necessarily equate with a lack of interest in information. Nicholas et al. (2000, 2001c) also showed that younger people were heavy users of touch-screens. This is in line with

previous research – Douglas et al. (1995), for example, found evidence that teenagers responded well to computer-based health information systems though they found users were concerned about privacy. One of the reasons for kiosk use by teenagers was that they were attracted by the novelty factor.

Potential users' previous use of technology has also found to impact on kiosk use. Pearson et al. (1999) found, perhaps not surprisingly, that those with previous experience with technology or computers were less likely to think the information too technical and overwhelming. Further Nicholas et al. (2001d), in a study of two Cornish kiosks, found that those who thought the kiosk navigational structure was easy to use were more likely to be satisfied with the information found. Nicholas et al. (2001a) identified microwave ownership as an indicator of technology proficiency and areas with increased microwave ownership were found to have a higher kiosk use. Pearson et al. (1999) also found that those with experience with using a video, microwave and cash card (ATM) would be more likely to find a kiosk easier to use.

Background

This study concerned a touch-screen health information kiosk located at the Dale Surgery at Sneinton in the English East Midlands city of Nottingham. Sneinton is an area of intermediate deprivation, with a multi-cultural population. The practice list (number of people enrolled with a doctor at the surgery) is 2,700 with 35–40% being of Asian (mostly of Pakistani-Mirpuri origin), 10% Southern European (Italian) and 5–10% Eastern European. The rest are mostly white UK born. The kiosk was sited in a separate waiting area for patients seeing Dr. Prit Chahal and access was limited to these groups of patients. In an average week (Monday–Saturday), Dr. Chahal sees 130–160 patients. The kiosk located at the surgery was developed by Intouch with Health, a leading UK consumer health information company. Intouch have provided over 70 health information touch-screen kiosks to medical and non-medical outlets around the country. The kiosks are PC-based touch-sensitive medical information systems. To start a session users enter their age and gender. They are then led to a main index page. This has six options: Medical Condi-

Table 1: User survey – variables covered

User details obtained	Questions relating to kiosk use	Outcome variables
Gender	What was your reason for using the kiosk	How useful did you find the information
Age	How easy was it to use the use	Number of pages viewed
Country of birth		Number of information pages viewed
Socio-economic status		Length of session
		Page view time

tions, Surgical Operations, Health News, Support Groups, Healthy Living and Health Directory. A tab indicating ‘more options’ leads to a screen with two more entries: A–Z of the NHS and Travel Clinic.

Although the construction and layout of each section is not quite the same, activating any of the main menu items leads to a further list of contents. In some cases, such as Medical Conditions, the list – often considerable – can be shortened by various methods. One of these is to touch the relevant part of a diagram of a body to limit the list to entries related to this part. Another facility allows users to key in the first letter of the item they seek. Further content selections are then displayed. Indeed in some cases five screens are required to arrive at the required information. There are navigation buttons, although qualitative research has shown that the touch area to activate the return to the last page viewed (‘Prev screen’) may not mean anything to those unschooled in the Internet World Wide Web and the ‘back’ buttons of browsers.

Methods

Users filled in an online questionnaire after they used the kiosk. Staff at Lime Tree Surgery designed the questionnaire, and the areas of questioning are given in Table 1.

Responses were collected over a 4-month period between 26 September 2000 and 31 January 2001. About 17% of patients or 329 people used the kiosk. All the 329 kiosk users filled in the questionnaire and in all 3,046 pages were viewed by them.

Log files are machine-generated records of user activity. Figure 1 furnishes the log of a user session for illustration. The first column codes the

Figure 1: An example of a session from a kiosk log file.

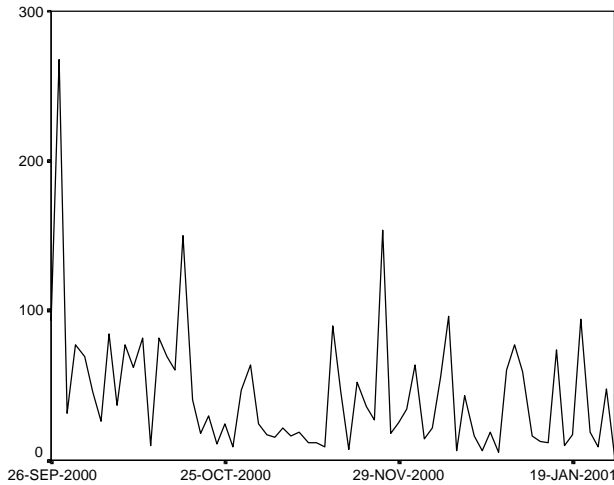
H	10-Jan-1999	Sun	15:14:17	0000	_Male_ 1 under 15
D	10-Jan-1999	Sun	15:14:18	0001	1#####001#XXX
D	10-Jan-1999	Sun	15:14:26	0008	#6#####002#XXX
D	10-Jan-1999	Sun	15:14:32	0014	#6a0#####00001#####003#XXX
D	10-Jan-1999	Sun	15:14:50	0032	#6a2#####00001#####004#XXX
D	10-Jan-1999	Sun	15:15:10	0052	#3-#####600001###005#XXX
D	10-Jan-1999	Sun	15:15:14	0056	#3-###0015#####600001###006#XXX
D	10-Jan-1999	Sun	15:15:21	0064	#3-a###0015#00090#600001###007#XXX
T	10-Jan-1999	Sun	15:15:43	0085	

page. H indicates the beginning of a session, D a successful page view and T is a user generated termination sequence. The next three columns record the date, day and time. The fifth column, starting 0000, records the seconds that have elapsed from entry. The system does not record the time taken by the user to fill in age and gender details that are requested at the beginning of a search session (see sixth column, first row). The “1” to the right of Male is the age grouping and repeats the “under 15” age grouping information. The clock starts when the user selects continue from this page. The data in the second row of the fourth column – 0001 – is the time taken to download the first menu page. This user spent 7 seconds in negotiating the first menu page (sixth column, second row). The numbers and hash signs in the sixth columns refer to page and section identification codes. The 001 at the end of this line is a page counter. The counter though does not count the opening dialogue page where the user records their age and gender. This user session portrayed here lasted 85 seconds; the longest page view was for 21 seconds and the shortest for 4 seconds.

The logs are not completely free of problems. Thus new users may take over the kiosk from a previous user before the system has timed out and defaulted back to the log-in page, resulting in user and session period errors. The Intouch with Health kiosks partly overcome this problem by timing out after only two minutes of user inactivity. Also because of the menu nature of the system many screens viewed constitute nothing more than stops on the way to information.

Figure 2, which plots the daily number of pages viewed over the survey period, provides a background context for the questions. Plainly use is highly volatile, although there is a downward trend in use. This is in keeping with national trends for kiosk use (Nicholas et al. 2001c).

Figure 2: Daily use pattern: page views per day



Results

Characteristics of the user population

60% of respondents were female. This was higher than expected for surgeries generally where about 51% of users are female (Nicholas et al. 2001c). And in an area of high ethnicity this might prove surprising. Twenty-seven percent were aged under 15. This was lower than expected for surgeries generally where 40% of users were under 15. Thirty-three percent of study users were between 16 and 35 compared to a national figure of 25%, 25% were aged between 36 and 55 compared to an expected 16% and 15% were aged over 56 compared to an expected percentage of 18%.

By far the most important group of users, 44%, described themselves as skilled employed, 13% said that they were skilled unemployed and 10% described themselves as unskilled employed. There were as many unskilled unemployed as there were unskilled employed. Figure 3 provides an indication of the racial mix of the kiosk user population. Forty two percent described themselves as white British, and 31% as Pakistani – which corresponds quite well with the distribution across the practice. In other words ethnicity was not a kiosk use determinant at this level. Seventy-two percent reported that they were UK born, 15% as being born outside the UK and 13% did not say (Figure 4).

Figure 3: Distribution of users by country of origin

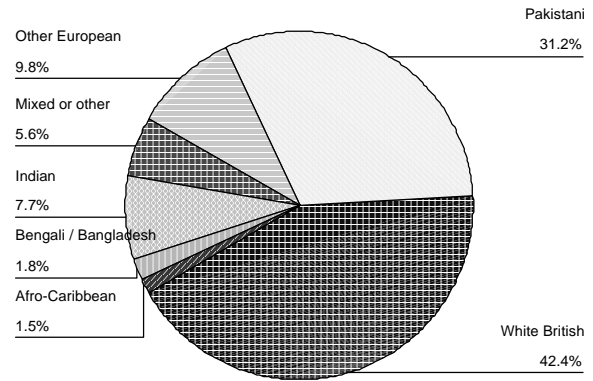


Figure 4: Distribution of users by place of birth

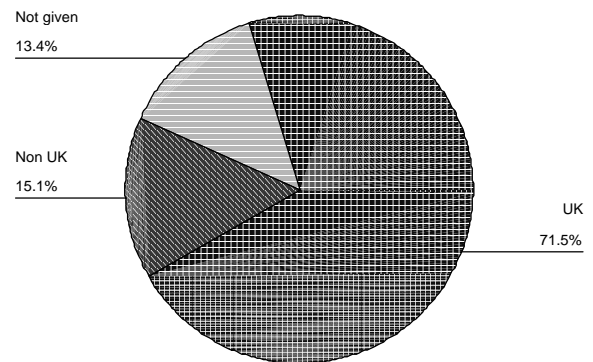
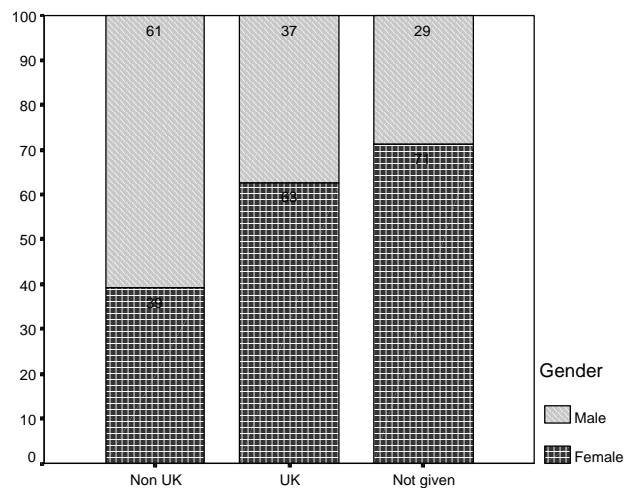


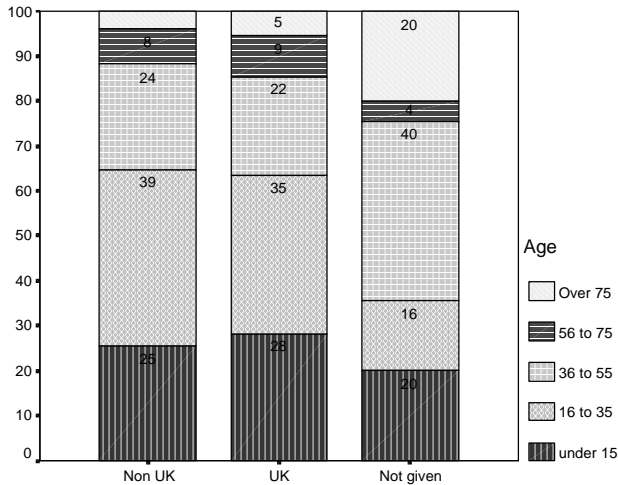
Figure 5: User distribution by gender and place of birth



Chi(2)=12.2 p=.002

Analysing the distribution of users by gender and age and also by place of birth (Figures 5 and 6) produces some interesting and significant results. While females constituted the majority of

Figure 6: User distribution by age and place of birth



Chi(8)=24.3 p=.002

UK born users (63%), almost the exact opposite was true for non-UK born users. Sixty-one percent of non-UK born users were male. The age distribution between UK and non-UK born users was much the same. However, rather more ‘over 75’ users and fewer ‘under 15 years old’ users did not give their place of birth.

Ease of use

Table 2 compares those who found the kiosk ‘very easy’ to use with those who found it either ‘easy’ or ‘not easy’ to use. A logistic regression was used to assess the impact of user characteristics. Table 2 details the results.

The analysis indicated that both age and UK born skilled users had an effect on whether people found the kiosk very easy to use. In particular those users born in the UK and who were employed as skilled workers were just under twice as likely to find the kiosk very easy to use compared to non-UK born users, and UK born unskilled users. Furthermore – and expectedly, those aged over 75 were approximately eight times less likely to find the system very easy to use compared to other users. Figure 7 and 8 visually presents the results.

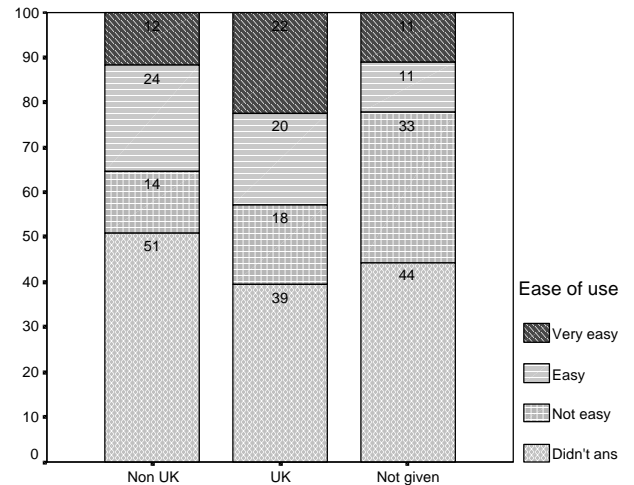
These results are not surprising. One would probably expect UK born skilled workers to find the system very easy to use, as many of them would have had experience of using information technology (IT) at work. It appears, however, that

Table 2: Did you find the kiosk easy to use (1=very easy 0=easy, not easy)

Variables in the Equation	N	Log odds (S E)
Place of Birth and Economic status		
All others	119	
UK born and skilled	77	1.76† (.39)
Age		
All other age groups	180	
Over 75	16	0.13* (1.05)

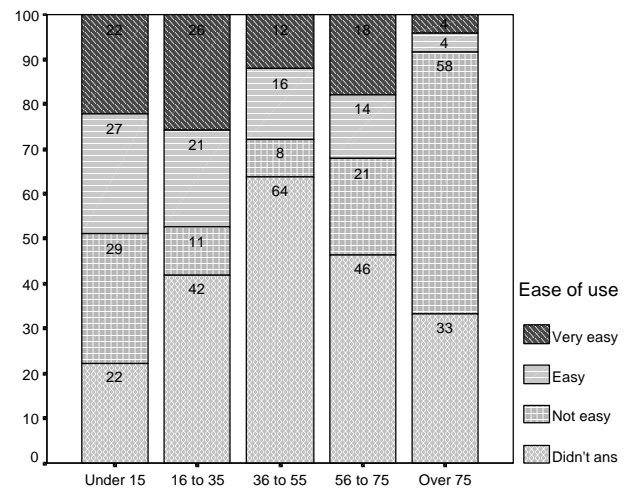
Levels of Significance (Wald’s Statistic):
 †<0.1, *P<0.05, ** p<0.01; *** p<0.001.

Figure 7: Place of birth by ease of use



Chi(8)= 13.5 p=.036

Figure 8: Age by ease of use



Chi(6)= 23.1 p=.001 (grouping Over 75s with 58 to 75)

non-UK born users may not be exposed to IT to the same extent, as they were less likely to find the system very easy to use. Of course, there may be additional factors at work here, such as lan-

Table 3: Did you find the kiosk easy to use (1=very easy 0=easy, not easy)

Variables in the Equation	N	Log odds (S E)
Age		
All other ages	161	
Aged over 75	10	22.7** (1.11)
Age by Place of birth	171	
Age by Non-UK		
16 to 35 by UK		0.26** (.50)
36 and over by UK		0.76 (.46)

Levels of Significance (Wald’s Statistic):

†<0.1, *P<0.05, ** p<0.01; *** p<0.001.

Figure 9: UK born users by ease of use and age

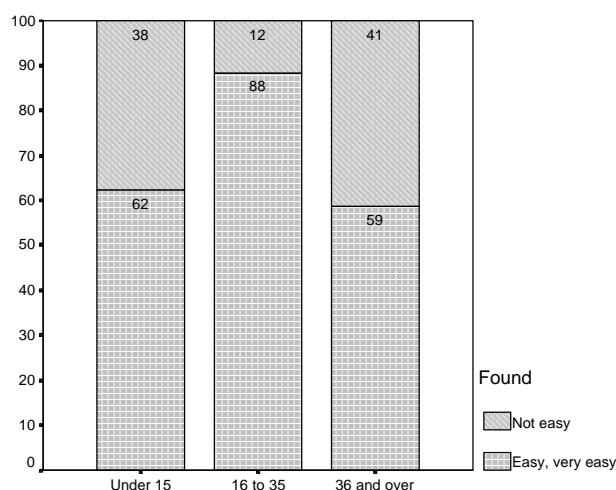
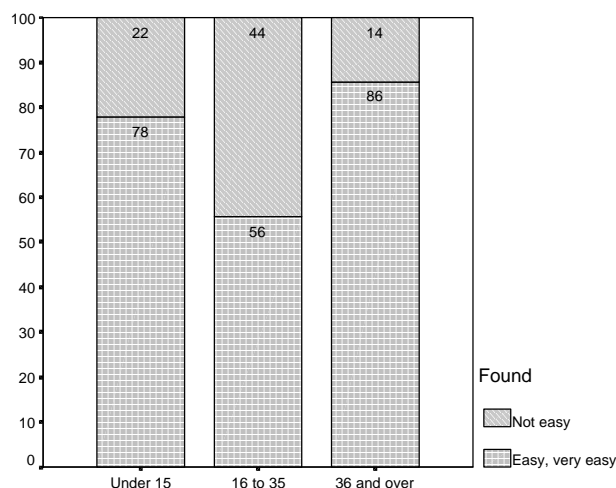


Figure 10: Non UK born users by ease of use and age



guage difficulties. Those aged between 18 and 35 were more likely to find it easy or very easy.

An alternative model was fitted this time to the outcome of whether the user found the system “not easy” to use. The results are given in Table 3.

Whether the user found the system “not easy” was dependent on their age and age by place of birth. Those aged over 75 were about 22 times more likely to say that the system was “not easy” compared to other users. Apart from being worrying in its own right, this statistic is even more alarming when one considers that those surveyed were at least users while many other older people may not have used the system for fear of being unable to negotiate it adequately. Perhaps older users already saw the kiosk as a technology that was beyond them.

Place of birth by age was also found significant, with the significant category being UK born users between the age of 16 and 35; this group is about four times less likely to find the kiosk “not easy” compared to other groups. The results are best understood by looking at Figures 9 and 10. Only 12% of UK born users between 16 and 35 reported the system not easy to use, whereas 44% of non-UK born users found it not easy to use. The results indicate a culture effect but mainly in the 16–35 age group and suggest that non-UK born users in this age group may need help in using the kiosk.

Use outcomes

Three use metrics were collected: the number of pages viewed, session length and page view time. Linear regression models were fitted to the outcome variables to assess the impact of user characteristics (Table 4). None of the models turned out to be particularly good – the variables included in the table, for example, explained less than 20% of the variation in the number of pages viewed. This is a statistically poor outcome and clearly there must be other variables not covered by this analysis that explain use.

Unsurprisingly, ease of use was a significant factor in all three metrics of use – for the number of pages viewed, session length and page view time. In all cases the coefficient was positive and those finding the system easy to use and very easy to use were likely to view more pages and generally spend more time on a session and viewing a page. There is a lesson there for all information providers. The value of the coefficient was negative for those finding the system not easy to use and was positive for those who find the kiosk very easy to use.

Table 4: Estimated coefficients of fitted regression models
Models^{*}

	N	Number of pages viewed	User Session length	Page view time
Gender				
Female	203			
Male	134			
Age				
Under 15	90			
16 to 35	112			
36 to 55	83			
55 to 75	28			
over 75	24			
Country of birth				
Didn't say	45			
Non UK	51			
UK born user	241	-0.32* (0.14)		
Socio-economic status				
Skilled employed	148	0.33** (0.12)	0.52*** (0.16)	
Skilled unemployed	43			
Unskilled employed	33			
Unskilled unemployed	33			
Other not specified	80			
Reason for use				
Curios	186			
Specific enquiry	56			
Have been told to	39			
Other	56			
Ease of use				
Not Easy	65	-0.25‡ (0.15)	-0.45* (0.20)	-0.22‡ (0.12)
Easy	66			
Very Easy	65	0.43** (0.15)	0.53** (0.20)	0.20‡ (0.12)
Gender Age Interaction				
Other	170			
Females "under 15 to 55"	167	0.38** (0.12)	0.60*** (0.16)	0.26* (0.10)
Gender Age Interaction				
Other	337			
Males "56 to 75"	11		0.86‡ (0.51)	0.98** (0.31)
Place of birth status interaction				
Other	199			
UK born Skilled employed	138			0.22* (0.11)
Gender Status Interaction				
Other	306			
Male unskilled	31			-0.38* (0.19)
R-squared		0.20	0.23	0.19

Levels of Significance (t-test statistic): ‡ P<0.10, *P<0.05, ** p<0.01; *** p<0.001.

^{*} Number of pages viewed, user session length and page view time were not normally distributed and the logarithmic transformation of these variables were used. Residual plots indicated evidence of poor specification and coefficient are indicative direction only.

Whether the user was born in the UK had an impact, but only on one metric – the number of pages viewed in a session. Surprisingly the coefficient was negative, suggesting that those born in the UK will view fewer pages compared to other users. Place of birth and employment status was fitted to the outcome page view time and compares UK born users in skilled employment to other users. The coefficient was positive and

argues that UK skilled workers have a longer page read time compared to other users.

Employment status was found to have an effect on both the number of pages viewed and session time. In particular if the user was a skilled worker then this had a positive effect on use. It is thought that this group would be more technologically proficient having had experience of information technology tools through work.

Table 5: Did the user find an information page (1=yes 0=no)

Variables in the Equation	N	Log odds (S E)
Employment status		
Other	113	
Skilled employed	83	1.93* (0.32)
Gender and Age		
Men and Females over 55	103	
Females under 15 to 55	93	3.10** (0.34)
All others		
Males 16 to 35	28	2.16 (0.50)
Males 36 to 55	13	0.89 (0.67)
Males 56 to 75	5	7.14† (1.18)
Ease of use		
Not easy	65	
Easy	66	1.80 (0.38)
Very easy	65	2.38* (0.38)

Levels of Significance (Wald's Statistic):

†<0.1, *P<0.05, ** p<0.01; *** p<0.001

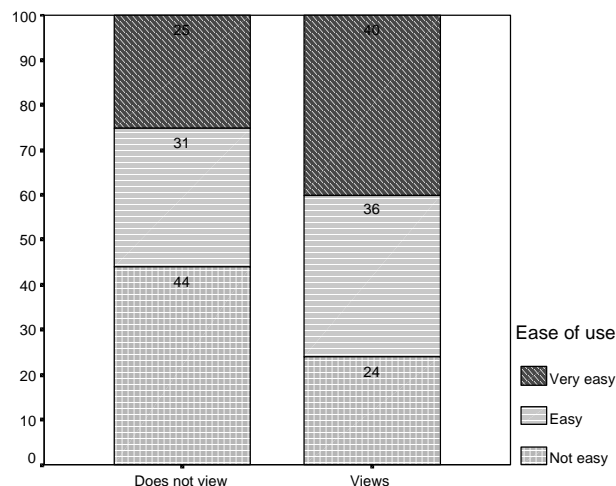
This would impact on both their navigational skills and understanding of computer terms and hence would be expected to lead to greater use.

An interaction effect between employment status and gender was found to be a significant factor determining page view time. Unskilled men were likely to have a shorter page view time compared to other users.

Age and gender were found to be significant but only when considered together, in particular women younger than 55 and men aged between 56 and 75. The results indicate a positive effect on the number of pages viewed, length of session and page view time for females aged under 55 and for males between 56 and 75 compared to other users. This may reflect different health interests between men and women. Women are more likely to be co-opted as the family health worker, particularly when children are involved, and hence will be significant users of health information (Nicholas et al. 2001a). The results for men were less obvious but suggest that men become increasingly focused on their health, perhaps a little belatedly, when they reach middle age.

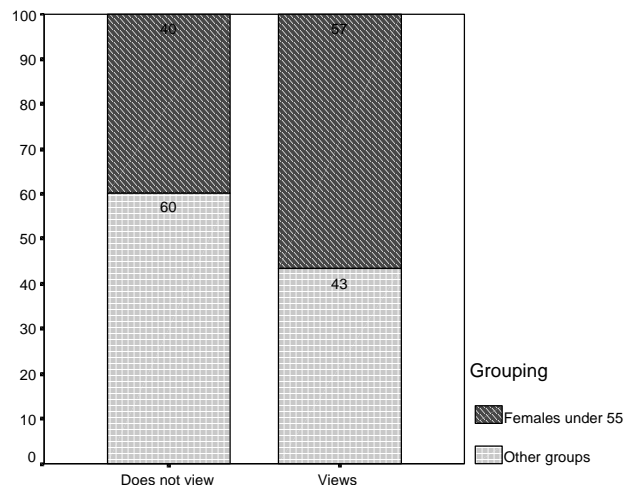
Reasons for use, such as directed to go to the kiosk by the doctor, looking for a specific condition and general browsing, were not found to be significant in any of the models fitted, although it might have been expected that they would be. Previous research (Nicholas et al. 2001c) found that use at locations where a medical professional shows patients how to use the kiosk was likely to

Figure 11: Ease of use by whether an information page located



Chi(2)=9.58 p=.008

Figure 12: Gender and age of user by whether an information page found



Fisher exact test 2-sided .003 1-sided .002

be higher compared to kiosk locations where no help was available. The question asked in this study was different and asked only if users were directed to use the kiosk.

Kiosk pages can be grouped into menu pages and information pages (the former navigate you to the latter). Previous work had shown that many users fail to arrive at an information page (Nicholas et al. 2001b). The variable whether the user actually found an information page was recorded. The variable is also an outcome variable and to model this a logistic regression model was used. The results are given in Table 5.

Table 6: Did the user print off at least one page (1=yes 0=no)

Variables in the Equation	N	Log odds (S E)
Employment status		
Other	113	
Skilled employed	83	1.57‡ (0.27)
Gender and Age		
Men and Females over 55	170	
Females under 15 to 55	167	1.57‡ (0.27)
All others	326	
Males 56 to 75	11	3.44‡ (0.66)
All others	313	
Those aged over 75	24	0.29‡ (0.78)
Reason for use		
Curious	186	
Specific inquiry	56	2.24* (0.34)
Been told too	39	3.07** (0.39)
Other	56	0.76 (0.42)

Levels of Significance (Wald's Statistic):
‡<0.1, *P<0.05, ** p<0.01; *** p<0.001

The results show that employment status was significant and those in skilled employment were approximately twice as likely to find an information page compared to other users. Gender by age was also significant, in particular females aged under 55 were three times more likely to find an information page compared to men and females over 55 (see Figure 12). Furthermore there is evidence that men between 56 and 75 were seven times as likely to find an information page. Ease of use also had an effect. Those finding the system easy or very easy were a little under two and half and four times as likely to find an information page compared to those finding the kiosk not easy to use. Figure 11 visually displays the relationship between ease of use and whether an information page was found. Twenty-four percent of those people who found an information page said they did not find the system easy to use compared to 44% of people who did not find an information page and who thought the system difficult to use.

Printout requests were also recorded and treated as an outcome. The fact that someone bothered to print out a page provides a strong indication that they found something of particular interest. Table 6 provides the results.

A similar pattern emerged with skilled employed workers and females under 55 both being one and a half times more likely to print off a page compared to other users. Males aged be-

Table 7: How useful was the information found (1=useless 0=useful, very useful)

Variables in the Equation	N	Log odds (S E)
Ease of use		
Not easy	65	
Easy	66	0.08*** (0.47)
Very easy	65	0.11*** (0.45)
Reason for use		
Other	179	
Been told too	17	3.85* (0.59)
Age		
Under 15	70	
16 to 35	65	1.20 (0.42)
36 to 55	30	0.42 (0.60)
56 to 75	15	0.92 (0.68)
Over 75	16	9.14* (1.11)

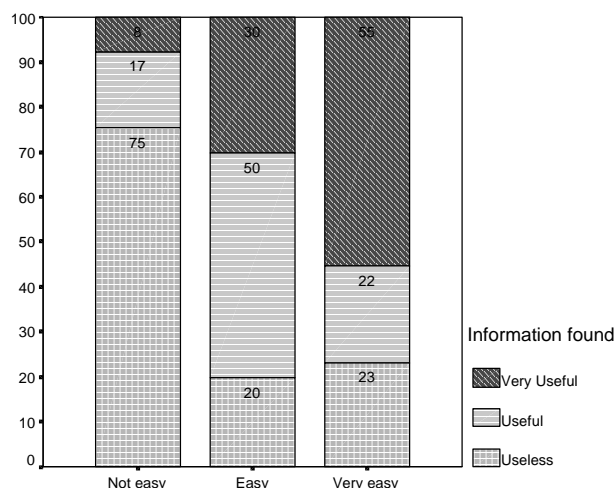
tween 56 to 75 were about 3 times more likely to print off a page and users aged over 75 were about 3 to 4 times less likely to do so. This model included reasons for use, with those who were told to use the kiosk being three times more likely to print a page and those with a specific inquiry just over twice as likely to print a page off compared to curious users and other users.

Usefulness' outcome

The last outcome variable considered was the patient's response as to the usefulness of the information found. Only 58% of users answered this question. This implies that a little under half of the users either did not understand the question or did not feel that their feelings regarding the information provided by the kiosk could fit comfortably into any of the three options – useless, useful or very useful. Of those who did answer, 39% said the information found was 'useless' – a strong condemnation of the kiosk, 30% said it was 'useful' and 31% found it 'very useful'. Users who found the information 'useless' were compared with those who found it useful or very useful. Again a logistic regression was used to fit the outcome (Table 7).

The three variables found to be significant determinants of whether the user found the information of any use were ease of system use, reason for use and age. Users who either found the touch-screen easy or very easy to use were about 10 times less likely to find the information 'useless' compared to users who found the system not easy to use (Figure 13). Fifty-five percent of

Figure 13: Ease of using the kiosk by usefulness of information found



Chi(4)=70.37 p=.000

those finding the system very easy said the information found was very useful, this compares to 30% of those finding the kiosk easy and 8% of those finding it not easy to use. Seventy-five percent of users who found the system not easy reported that the information found was 'useless' to them.

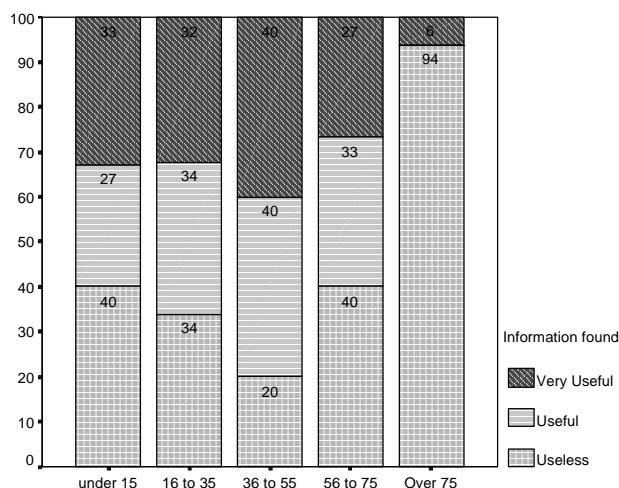
Age was also a significant factor. Ninety-four percent of users aged over 75 reported that the information found was 'useless' to them (Figure 14). This group was 10 times more likely to report that the information found was 'useless' compared to those aged under 15. Users aged between 36 to 55 were most likely to find the information either useful or very useful. Eighty percent of these users found this so. 40% of the age group 56-75 and the under 15s found the information 'useless'. Interestingly those users who had been told to use the kiosk were just under four times as likely to say that the information was useless.

Conclusion

User characteristics were found to be significant in determining kiosk use and the main influences proved to be:

- Perceived ease of kiosk use – users finding the system hard to use were likely to spend less time on a search, viewed fewer pages, were less likely to locate an information page and, not unsurprisingly, were more likely to say the information found was 'useless'.

Figure 14: Age of kiosk user by usefulness of information found



Chi(4)=10.72 p=0.030

- Use by those over 75 – this group were likely to find the system difficult to use, were less likely to find an information page and also more likely to find the system useless.
- Female under 55 – these users were more likely to find an information page and to print off a page compared to other users. In addition they were likely to view more pages in a session, spend more time on a session and on viewing a page.
- Male use by those aged between 56 and 75 – this group too appear to be highly motivated kiosk users. They were more likely to find an information page and to print off a page; in addition they were likely to have a longer session time and a longer page view time compared to other users.
- Skilled workers – were identified as being significant users and this probably can be attributed to previous experience of information technology systems. This group was more likely to find the kiosk easy to use, view more pages in a session and spend longer on a session, was more likely to view an information page and more likely to print a page compared to other users.
- Place of birth – this had an impact on kiosk use in terms of whether the user perceived the system as easy to use. However, the variable was found to be associated with other variables including age, gender and socio-economic status. There is a cultural effect but further research is needed to isolate the exact impact of this on kiosk use.

Our findings have clear implications for many of the Government's healthcare aims as stated earlier, and found in such documents as the NHS Executive's (1998) *Information for Health*. The pro-

vision of information via an electronic kiosk at the particular surgery (and others) examined is a clear attempt to put information for the health consumer to the forefront, as the Government aspires. The take-up was less than 20% of the patient throughput – a figure that can be adjusted downwardly when one considers accompanying parents/caregivers etc. who could also have used the service. However such a penetration rate must be considered positive so early in the development of kiosks. Of course, a lack of kiosk use may not necessarily imply a similarly low take-up of information from other sources. The emphasis on providing ever more government services electronically does indicate the high priority the Government places on this medium, and therefore this is possibly a disappointing usage rate, from this perspective. But it is still early days. Current plans to locate NHS Direct kiosks in non-medical centres, and to relay health information through various digital TV channels may help stimulate public health information seeking.

Perhaps a finding of more concern relates to kiosk use by groups such as ethnic minorities and the elderly. These two groups have been targeted by the Government in its drive against health inequalities – both of which were found in a government report (Acheson 1998) to be particularly vulnerable to illness caused by various forms of social deprivation. The poor take-up and low usage among those who did consult the system and the negative views of the elderly do not augur well. Similarly, the greater difficulty in using the system by those not born in the UK implies that the Government needs to consider the specific difficulties of ethnic groups (with one possible measure being, of course, native language content). The greater number of pages viewed by non-UK born users, although a measure of greater use, may actually be the result of a failure to find relevant information.

This overall research programme aims to develop a detailed understanding of how the general public interact with digital delivery of healthcare information. It aims to develop a framework for exploring the wider issues, such as the best formats and organisation of such information, as well as the actual and its potential impact on health inequalities. The research reported here had the narrower objectives of determining whether patients' personal characteristics have an impact

on the use of a touch-screen kiosk and the way it is perceived. Clearly, the findings have provided hard information on use, as related to age, gender and, to an extent, ethnicity. Follow-up fieldwork will explore the deeper issues related to the public's reaction and interaction to and with such systems, but even this relatively small study of one kiosk has hinted at potential recommendations regarding format and presentation.

The issue of language has already been raised, but others merit attention. One of these is the organisation of the information provided. The detailed and hierarchical structure of the system has meant that many users never actually arrive at an information page. Unfortunately the need to allow for a margin of error in the touch activation, and the small size of the screen both preclude a large amount of information per screen. It may be possible, however, to create an indexing or searching system to reduce the number of menu screens. Also, the next generation of kiosks will use Web technology, and they may contain hyperlinks. Other research within the programme (Nicholas et al. 2001a) has shown considerable satisfaction by Web users regarding ease of use.

Both the reported study and other related research (Nicholas et al. 2001c, Williams et al. 2001) have highlighted issues related to health inequalities. Apart from problems with take-up and usage by the elderly, the current study also provides evidence that those in unskilled work – who are possibly not exposed regularly to information technology and/or may have lower education attainment levels – do not find the kiosk as intuitive as other users. Again there are implications for the organisation and presentation of information. It may be appropriate, for example, to organise information into different levels of detail. Touch-screen and 'point and click' interfaces both facilitate such hierarchies of information. The current system has a menu structure that could be described as somewhat 'lateral', in that it organises information by various discrete aspects of a condition (such as 'Support Groups' 'Surgical Operations'). By contrast, 'vertical' layers of pages would offer information on each topic at different depths or levels of detail. Thus, the information could be arranged beginning with the most basic treatment options and instructions (where these can be generalised) and progressing to discussing the condition at various depths. Also it could

possibly emphasise at one level the positive aspects such as in brevity or manageability, progressing only at a deeper level to more detailed information on the physiological aspects or other detailed medical information. For those who simply require basic information, or do not have the language or literacy level to cope with more, there may be fewer menu screens to negotiate, and for others, although more screens would be required, these would all be actual information pages and not simply menu items.

Note

1. The Web, the kiosk, digital TV and the changing face of consumer health information provision: a national impact study. April 2000 – January 2002

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