

Information Technology Attitude Scales for Health (ITASH): Project Report



Research Project

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Contents:

3.	Literature Review.....	6
4.	Methodology.....	9
4.1.	Development of Scale.....	9
4.2.	Ethics.....	10
4.3.	Distribution.....	11
4.4.	Analysis – establishment of scales in the ITASH questionnaire.....	11
5.	Results.....	12
5.1.	Response rates.....	12
5.2.	Establishment of the scales.....	12
5.3.	Reliability of the scales.....	13
5.4.	Validity of the scales.....	13
5.5.	Analysis of scale scores and demographic factors.....	13
5.6.	Demographics of respondents.....	14
5.6.1.	Trust.....	14
5.6.2.	Age.....	14
5.6.3.	Gender.....	15
5.6.4.	Professional or Occupational Group.....	16
5.6.5.	Time professionally qualified.....	18
5.6.6.	Highest level educational qualification.....	19
5.6.7.	Work Setting.....	19
5.6.8.	Length in Post.....	20
5.7.	Frequency of using a PC at home.....	21
5.8.	Uses of home PC.....	21
5.9.	Frequency of using a PC at work.....	22
5.10.	Uses of PC at Work.....	23
5.11.	Formal computer training.....	24
5.12.	Computer Qualification.....	25
5.13.	Experience of computer use.....	25
5.14.	Confidence in computer use.....	27
6.	Discussion.....	28
8.	References.....	31
9.1.	Appendix 1 - Ethical Approval.....	35
9.2.	Appendix 2 – Covering Letter and Information Sheet.....	37
9.3.	Appendix 3 – Questionnaire and Attitude Scale.....	39
9.4.	Appendix 4 – Letter to respondents for 2 nd round.....	51

9.5.	Appendix 5 – Strong & Brodt Scale	52
9.6.	Appendix 6 Included and excluded scale items.....	53
9.6.1.	Efficiency of Care Scale (17 items)	53
9.6.2.	Education, Training and Development Scale (17 items)	53
9.6.3.	Control scale (14 items)	54
9.6.4.	Discarded items.....	54

Figures

Figure 1	Age	15
Figure 2	Professional and occupational groups	18

Tables

Table 1	numbers of completed questionnaires.....	12
Table 2	NHS Trusts	14
Table 3	Responses to Scales 2 and 3 by Trust	14
Table 4	Age.....	14
Table 5	Gender.....	15
Table 6	Gender differences on Scale 1	16
Table 7	Gender differences on Scale 3	16
Table 8	Professional or occupational group.....	16
Table 9	Time qualified.....	18
Table 10	Highest level of qualification.....	19
Table 11	Work setting.....	20
Table 12	Length in post	20
Table 13	Frequency of using a PC at home	21
Table 14	Uses of home PC.....	21
Table 15	Frequency of using a PC at work.....	22
Table 16	Effect of frequency of PC use at work on attitudes – Scale 1	23
Table 17	Effect of frequency of PC use at work on attitudes – Scale 2	23
Table 18	Effect of frequency of PC use at work on attitudes – Scale 3	23
Table 19	Uses of PC at work	23
Table 20	Formal computer training	24
Table 21	Differences in attitude on Scales 1, 2 and 3 related to computer training	24
Table 22	Computer qualification	25
Table 23	Experience of computer use.....	26
Table 24	Experience of computer use and attitudes on all three scales.....	26
Table 25	Confidence in computer use	27
Table 26	Confidence in computer use and attitudes on all three scales.....	28

1. Introduction

The introduction of Information Technology (IT) in the National Health Service (NHS) has a long history although the use made of IT varies widely between different geographical and practice areas (Brennan, 2005).

Since the publication of the Information for Health Strategy (DoH, 1998) and more recently the 'National Programme for IT' (NPfIT), the use of computer applications within the NHS has been increasing.

The major programmes within NPfIT are:

- the NHS Care Records Service (NHS CRS)
- Choose and Book, an electronic booking service
- a system for the Electronic Transmission of Prescriptions (ETP)
- a new national broadband IT network for the NHS (N3)
- Picture Archiving and Communications Systems (PACS)
- IT supporting GPs including the Quality Management and Analysis System (QMAS) and a system for GP to GP record transfer.
- Contact - a central email and directory service for the NHS.

These programmes costing over £6 billion are being introduced into all sectors of the NHS within the next few years.

One of the barriers to successful implementation and use of IT in the NHS is believed to be the attitude of staff to IT use, however there is limited research on this topic and no validated instruments for measuring NHS staff attitude to IT.

A variety of NHS organisations at Strategic Health Authority or Trust level have surveyed IT use and attitudes e.g. Training Needs Analysis conducted by Avon, Gloucestershire and Wiltshire WDC (AGW WDC 2004). Medix surveys of the attitudes of doctors and nurses have shown increasingly negative attitudes (Medix 2005 & 2006, RCN 2004). Kirshbaum (2004) studied the attitudes of staff in two NHS trusts as a factor in preparedness for electronic patient records. The effects of information sources on the behaviour of health professionals are more difficult to measure, although Wishart and Ward (2002) showed differences in attitudes towards information technology when nurses were compared with teacher training students.

There are several models and tools used elsewhere in the world and in other sectors, however none of those that have been used in the United Kingdom (UK) have been validated, and the tools from elsewhere have not been applied in the UK context. Thurstone (1967) suggests that statements in an attitude scale should be as brief as possible, and that they should be able to be endorsed or rejected in accordance with their

agreement or disagreement with the attitude of the reader. Fishbein and Ajzen (1975) compared the advantages of using Likert Scales with others and found little difference between them.

The Technology Acceptance Model (TAM) (Davis, 1993, Venkatesh, 2000) as extended by Dixon into the Information Technology Adoption Model (ITAM) (Dixon 1999, Venkatesh et al, 2003) may provide a context to study the acceptance, or otherwise, of IT in the NHS. All of the studies in this area show that attitude is an important predictor of use of IT. An alternative, but related model which may be applicable is the Rogers' Innovation-Diffusion Model (Rogers, 1995) as explored by Lee (2004) when examining nurses' attitudes in Taiwan.

Stronge and Brodt (1985) over 20 years ago, studied this area in the United States of America (USA) with their Nurses' Attitudes Towards Computers (NATC) questionnaire. Others have continued this work, however none were seen as being appropriate, valid and reliable for use in the NHS, because of the different healthcare systems or the use of American phrases.

2. Purpose/Objective:

The primary aim of this study was to develop and test a scale which can be used to examine the attitudes of NHS staff towards Information Technology (IT), both in general and specifically in the workplace.

The main objectives of the research were to:

- Review existing tools for the measurement of attitudes to IT
- Develop an attitude measure specific to the health care field
- Test for reliability, uni-dimensionality and validity

3. Literature Review

A variety of studies have been carried out to examine attitudes to IT both in the healthcare sector and more widely around the world, which fall into different themes depending on their methodology and findings.

The brief review below considers studies from the educational field before moving to those from the healthcare sector from around the world, in particular nursing, and concludes with consideration of the widely used Nurses Attitudes Towards Computers (NATC) questionnaire developed by Stronge and Brodt (1985).

Several studies have been carried out in higher education, McFarlane et al (1997) who looked at teachers and McMahan (1997) in her PhD work used attitude scales based on the work of Loyd and Gressard (1984) to identify factors likely to influence computer usage amongst students in higher education. The attitude scales covered computer

anxiety, confidence with computers, liking of computers and their perceived usefulness. This was later used with nursing students in the same university (Sinclair and Gardner, 1999).

Moody et al (2004) in the US used a scale which focused on IT access and usability in clinical practice, with the majority of nursing respondents indicating the user friendliness of the electronic health records systems.

In the UK Newton (1995) studied care planning via computers and used scales to measure respondents' attitudes but these were more related to the care planning process rather than to computer use.

Rosenbloom et al (2004) in the USA used an attitude scale developed by a consensus panel addressing categories including impact on workflow, efficiency, quality of care, results reporting, guideline implementation and other topics pertinent to the use of computerized care provider order entry (CPOE).

Other US researchers (Pizzi et al 2005) created their own scale based on literature about electronic prescribing to ascertain physicians' motivation, although their sample may have been biased as responses were collected from doctors who accessed an Internet service. They found differences between electronic prescribers and traditional prescribers related to where they practiced in the US, their age and whether they worked in publicly funded medical facilities or private practice.

Outside of the English speaking countries similar studies have been undertaken.

Lai et al (2004) also studied doctors' attitudes to computerized health practice systems, but this time in Hong Kong. The scales they used were adapted from previous studies i.e. Detmer and Friedman (1994), Cork et al (1998) and Teach and Shortliffe (1981). They found attitude is influenced by level of computerization and "Gender and age did not appear to influence the translation of intention to actual implementation" (Lai et al, 2004 p422).

Spanish doctors were studied by Lorenzo & Mira (2004) using their own scale to examine use of the Internet to seek a second opinion and found generally positive attitudes.

In Norway a range of health professions' attitudes to a hospital information system were measured and showed more positive attitudes among medical secretaries, who used the system frequently, than among doctors and nurses, who used it less frequently (Laerum et al 2004).

One of the earliest attitude scales was developed by Stronge and Brodt (1985) who developed a 20 item self-reported 5-point multistep scale questionnaire, which they called the Nurses Attitudes Toward Computers Questionnaire (NATC); this was tested with 48 junior/senior nursing students and faculty at a private Iowa college. They focused

on nurses' broad beliefs, concerns, and willingness regarding computers in general. They believed that nurses' complex internal states affect their attitudes toward computer use. Stockton and Verhey (1995 cited in Burkes, 1991) performed a 656-nurse sample psychometric examination of this tool and found a satisfactory overall instrument reliability of 0.92.

In China Liu et al (2000) also used a version of Stronge and Brodt's Nurses' Attitudes Towards Computers questionnaire, along with two other scales based on Thomas (1990) and Burkes (1991) and found a high motivation to use computers but lower scores for beliefs and satisfaction.

In Croatia Brumini et al (2005) have also adapted Stronge and Brodt's Nurses' Attitudes Towards Computers questionnaire for use with staff in two Croatian hospitals finding younger nurses and those with more education showed more positive attitudes towards computers.

Schwiriam et al (1989) adapted the NATC tool to create a 17 item scale which they used with 353 sophomore (first year undergraduate) nursing students and 358 staff nurses. The three factors they identified were computers and patient care, computers and personal security and general attitude. They found that students' attitudes toward computer use in nursing were positive, and the more computer experience students had, the more positive their attitudes. The attitudes of the practising nurses also were generally positive, but differences between students and qualified nurses were observed.

Further items were added to the NATC scale by McBride and Nagle (1996) to create a 20 item self reported psychometric test which they used with 394 hospital Registered Nurses (RNs) and 299 Bachelor of Science in Nursing (BSN) students. They found four factors which influence the positive attitude of nurses. Findings were inconsistent with previous studies in that construct validity of the NATC questionnaire was not confirmed.

Similar work by Jayasuriya and Caputi (1996) developed a similar 22 item scale, which they called the Nurses' Computer Attitudes Inventory (NCATT) for use with 170 Australian nurses which was compared with the NATC. They found similar factors: Computers and patient care, computer anxiety and patient confidentiality. This NCATT scale was also used by Yaghmaie and Jayasuriya (2004) in another study of Australian nurses.

Stricklin et al (2003) also carried out Confirmatory Factor Analysis of the Stronge and Brodt (1985) NATC Instrument with home care nurses and found similar results.

Stronge and Brodt (1985) report that their attitude scale originally included 66 statements, reduced to 20 after the piloting process. Considering that the scale was intended to cover six major issues – job security, legal ramifications, quality of patient care, capabilities of computers, employee willingness to use computers and benefit to the institution – the retention of only 20 statements means that these issues are addressed by two or three statements at the most. The author also claim that approximately equal

number of positive and negative statements were included, but inspection of the scale reveals that there are many more negative statements than positive ones. While this scale has undergone some additional validation and development, for the reasons set out above and the attempt to in this study to study a wider wider range of health professionals, adoption in its original format remains problematic.

The wide range of studies has identified similar factors such as previous experience and education being major factors in the creation of attitudes towards IT amongst healthcare professionals. The findings do seem to reflect international differences in healthcare systems and tools need to take this into account.

4. Methodology

4.1. Development of Scale

The research team (researchers from the professions of adult nursing, midwifery and speech and language therapy) collaborated in the design of the ITASH scale. A number of statements based on issues identified from the literature (e.g. Moody *et al*, 2004, Newton, 1995, Sinclair & Gardner, 1999 and Wishart & Ward (2002)) and practice were generated.

Specific items were included in the questionnaires which identified factors known to influence staff attitudes to IT. Demographic data were also collected including information relating to age group, gender, professional specialty, qualifications and current level of computer use at home and work.

The topic areas covered in the attitude scale (based on factors identified as affecting attitudes to IT) included:

- Quality of care/ Communication
- Benefit to the organization
- Confidence/anxiety/interest
- Dependability issues
- Training issues
- Professional role
- Feelings about change/control

Ten to 15 questions were written for each topic. These were then checked for duplication and relevance. The question order was then arranged so that they were not ordered in groups, to reduce bias and question fatigue (Oppenheim,1992).

A pool of 79 questionnaire items was assembled, in the form of positive and negative statements about the use of IT in health care, with which respondents were invited to agree or disagree, using a Likert scale with four points – strongly agree, agree, disagree, strongly disagree. These were assigned values of (1), (2), (3) and (4) respectively. As it is assumed

that respondents would have an opinion, the neutral point on the Likert scale was omitted. Following completion the statement values were reversed where necessary. The pool of items was then used in two different ways. The first was with NHS staff in a test-retest format to investigate reliability, and the second with staff from the faculty to explore the ITASH questionnaire's validity.

4.2. Ethics

Ethical approval was sought and obtained from the relevant Local Research Ethics Committee, covering the three NHS trusts selected for the study. (Appendix one) In addition approval was gained from the University of the West of England, Faculty of Health and Social Care Ethics Sub-Committee.

NHS staff who volunteered to take part received a letter and research information sheet setting out their rights (Appendix Two).

Reports and publications do not identify any specific individuals or sites.

Questionnaires did contain identifying information, which was needed for the test retest analysis, and therefore were processed and stored in line with the Data Protection Act 1988. They were only accessible to named members of the research team.

Contact details (i.e. personal addresses, postcodes, faxes, emails or telephone numbers) were collected from those who returned the initial questionnaire and agreed to complete the questionnaire again 2 weeks later, to enable us to send them the follow up questionnaire.

The scales were number coded and linked to the respondents' contact details to enable the retest to be distributed for the two sets of results from each participant to be compared. Personal data were only available to a designated member of administrative staff within the Faculty. All data were password protected.

Paper copies of data were kept in a locked filing cabinet within the faculty. The project manager, Rod Ward, acted as custodian for all data generated by the study.

Data will be destroyed five years after the end of the study. In the interim they will be stored in locked filing cabinets in the Faculty of Health and Social Care Research office. Access will only be available to the faculty research manager and the project manager.

An inducement to participants was offered in the form of a draw for book token for one member of staff from each of the three trusts.

A successful application was made to the University of the West of England, Faculty of Health and Social Care Ethics sub committee to ask UWE staff to compare the new scale against a published scale which has been used and validated several times (Stronge and Brodt, 1985).

4.3. Distribution

Advice was received from statistician Dr Jon Pollock about the numbers of respondents needed for the test and retest to demonstrate the reliability of the tool. Approximately 120-150 respondents were required for high reliability and confidence (Streiner and Norman 1995).

Research and Development directors for three trusts agreed to the distribution of questionnaires to their staff. Trust 1 is a trust providing mental health services to users in both acute and community settings; Trust 2 is an acute hospital trust; Trust 3 is a primary care trust

The questionnaires (Appendix Three) were delivered on paper as using online mechanisms, although much easier and cheaper, would bias the results by excluding those without Internet access and those with negative attitudes to IT.

The intention was not to try to obtain a randomised or stratified sample of NHS staff as this would have been beyond the resources of the project. However we did succeed in involving staff from a wide range of professional and occupational groups and work settings.

Between November 2005 and January 2006, 816 questionnaires were distributed via appropriate managers/matrons/professional leads.

Trust 1 (Mental Health) – 470

Trust 2 (Acute Hospital) - 200

Trust 3 (Primary Care Trust) - 146

Follow up questionnaires, with supporting letter (Appendix Four) were sent to all respondents who included their contact details between December 2005 and March 2006.

In order to test for concurrent validity, copies of the ITASH questionnaire and the Stronge and Brodt (1985) scale (Appendix Five) were distributed to members of staff of the University of the West of England, Bristol, Faculty of Health and Social Care.

4.4. Analysis – establishment of scales in the ITASH questionnaire

The questionnaire data from NHS and UWE staff were entered into SPSS for Windows (Version 13.0). Exploratory factor analysis was used to determine factors within the questionnaire.

5. Results

5.1. *Response rates*

Of the 800 distributed to wards, units and departments in the three trusts, completed questionnaires were received from 151 individuals in Round 1 and 143 respondents in Round 2 (Table 1).

Table 1 numbers of completed questionnaires

	Trust 1 = Mental Health	Trust 2 = Acute DGH	Trust 3 = PCT	Total
Round 1 (test)	78	35	38	151
Round 2 (re-test)	57	28	36	121

NB – Six questionnaires were returned anonymously and therefore these respondents could not be sent a second round questionnaire.

Respondents who fully completed section C (the attitude scales) but omitted some items in sections A or B (demographics) were still included in the analysis.

5.2. *Establishment of the scales*

Exploratory principal components factor analysis was performed which identified three components, with a loading of > 3.1 , as recommended by Watson and Thompson (2006). This pattern of item grouping could be understood and interpreted as representing:

- Scale 1 ‘efficiency of care’
- Scale 2 ‘education, training and development’
- Scale 3 ‘control’

Altogether, 17 items were included in each of scales 1 and 2, while 14 were included in scale 3. The three scales comprise the Information Technology Attitude Scales for Health (ITASH).

The cumulative value of the responses to the statements in each scale becomes the respondent’s score for that scale. For the first and second scales, the minimum score is 17, while the maximum score is 68. Scores from 17 to 34.99, 35 to 50.99 and 51 to 68 indicate negative, neutral and positive attitudes towards the use of computers in health care, respectively.

For the third scale, the minimum score is 14, while the maximum score is 60. Scores from 14 to 28.99, 29 to 41.99 and 42 to 56 indicate negative, neutral and positive attitudes towards the use of computers in health care, respectively.

5.3. Reliability of the scales

To assess the stability of the scales, a test-retest administration of the scales was sent to 145 respondents, of these 121 completed the scales a second time. They completed the scales twice over a period of 2-3 weeks. Pearson's correlation coefficients for the scores on the three scales were found to be 0.88 ($P < 0.01$), 0.75 ($P < 0.01$) and 0.83 ($P < 0.01$) respectively.

The internal consistency of each scale was assessed by means of Cronbach's alpha coefficients. The coefficients obtained were 0.88 ($n = 150$), 0.70 ($n = 150$) and 0.77 ($n = 150$), indicating a satisfactory degree of internal consistency. (Oppenheim, 1992). These results indicate that the ITASH scales meet the accepted criteria for reliability. (Oppenheim, 1992, Spector, 1992).

5.4. Validity of the scales

A publicly available tool (Nurses' Attitudes Toward Computerization Questionnaire, Stronge and Brodt, 1985) appeared to measure similar constructs to one of the three scales – effectiveness of care. Thirty-four members of staff of the Faculty of Health and Social Care at the University of the West of England completed both the newly developed questionnaire and the existing scale from Stronge and Brodt (1985). The results were compared to examine the concurrent validity of the new scales.

Pearson's correlation coefficient was calculated for each of the 3 scales developed: 'Efficiency of Care', 'Education, Training and Development' and 'Control'.

Scale 1 (Efficiency of Care) correlated adequately with the Stronge and Brodt (1985) scale which looked at similar issues ($r = .73$).

Scales 2 (Education, Training and Development) and 3 (Control) looked at different areas to those covered in the Stronge and Brodt (1985) scale and therefore did not demonstrate correlation.

It has not been possible to find measures suitable for establishing concurrent validity of the second and third scales at this time. Further work will be needed to establish the validity of the questionnaire overall.

5.5. Analysis of scale scores and demographic factors

For each of the three scales, ANOVA was used to analyse raw scale scores on the basis of demographic variables and those relating to patterns of computer usage.

After re-coding into attitude groups (positive, neutral, negative), scale scores were also analysed for these variables using the Chi-squared test.

The significance level for the study was set at $p=0.05$ (Bryman and Cramer 2001).

5.6. Demographics of respondents

5.6.1. Trust

Table 2 NHS Trusts

	Frequency	Percent
1 – Mental Health	78	51.7
2 – Acute Trust	35	23.2
3 – PCT	38	25.2
Total	151	100.0

Table 2 shows that 50% of respondents worked for a mental health trust with approximately 25% working for the acute trust and PCT. When an analysis of variance (ANOVA) of the raw scores for each of the three scales according to respondents' trust was conducted (Table 3), differences were found on the 'education, training and development' and 'control' scales ($F=7.225$, $p = 0.001$; $F=3.112$, $p=0.047$ respectively). This suggests that the organisation in which the respondents worked influenced the extent to which they felt prepared for computer use and to which they felt they were able to influence their own working environment.

Table 3 Responses to Scales 2 and 3 by Trust

Trust	Scale 2 education, training and development			Scale 3 control		
	+ve (%)	Neutral (%)	-ve (%)	+ve (%)	Neutral (%)	-ve (%)
1 – Mental Health	21 (26.9)	57 (73.1)	0	26 (33.3)	50 (64.1)	2 (2.6)
2 – Acute Trust	14 (40.0)	21 (60.0)	0	10 (28.6)	25 (71.4)	0
3 - PCT	11 (28.8)	26 (68.4)	1 (2.6)	6 (16.2)	30 (81.1)	1 (2.7)

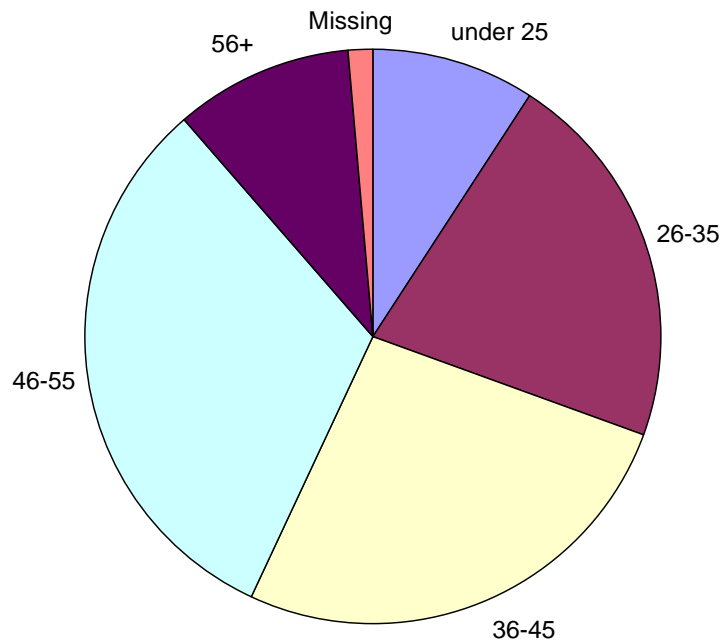
5.6.2. Age

Table 4 Age

	Frequency	Percent
under 25	14	9.3
26-35	32	21.2

36-45	40	26.5
46-55	48	31.8
56+	15	9.9
Missing	2	1.3
Total	151	100.0

Figure 1 Age



Respondents came from a wide range of age groups with over three quarters being between 26 and 55 years, the greatest number falling in the 46-55 range (Table 4 and Figure 1). This may be slightly older than the general age profile of staff in the NHS. An ANOVA of raw scores on each of the scales according to respondents' age revealed no differences, suggesting that age did not significantly influence attitudes toward computer usage.

5.6.3. Gender

Table 5 Gender

	Frequency	Percent
Male	37	24.5
Female	112	74.2
missing data	2	1.3

Total	151	100.0
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Nearly three quarters of the respondents were female (Table 5). An Independent samples t-test of raw scores on each of the scales according to gender was performed. Differences were found on 'efficiency of care' (Table 6) and 'control' (Table 7) scales ($t = 2.922, p = 0.004$; $t = 3.275, p = 0.001$), suggesting that the male respondents showed a significantly more positive response than females in these areas.

Table 6 Gender differences on Scale 1

	+ve (%)	Neutral (%)	-ve (%)
Male	21 (56.8)	16 (43.2)	0
Female	33 (29.5)	76 (67.9)	3 (2.7)

Table 7 Gender differences on Scale 3

	+ve (%)	Neutral (%)	-ve (%)
Male	1.9 (51.4)	18 (48.6)	0
Female	22 (19.8)	86 (77.5)	3 (2.7)

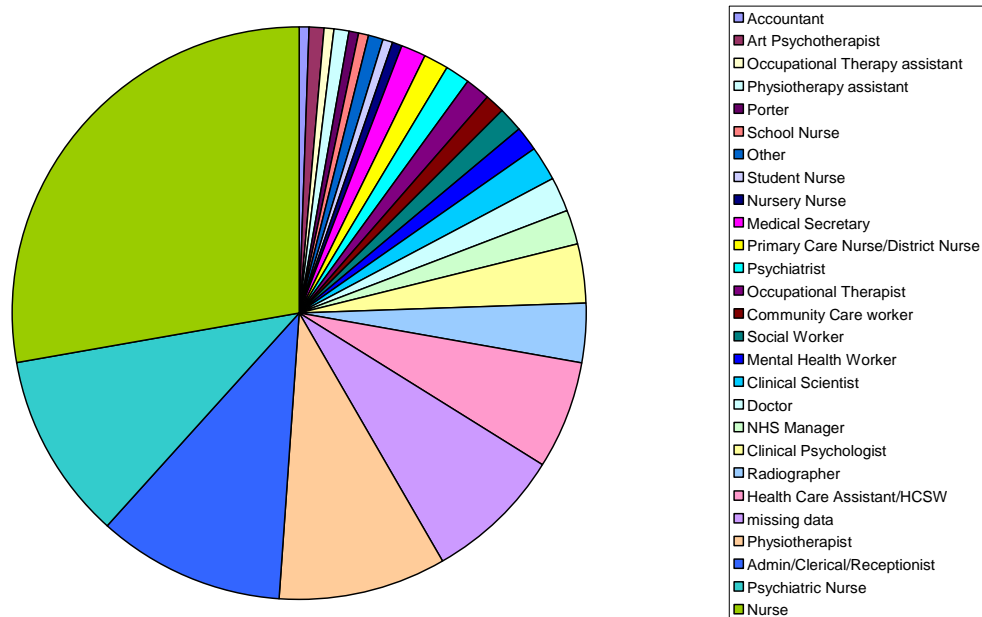
5.6.4. Professional or Occupational Group

Table 8 Professional or occupational group

	Frequency	Percent
Accountant	1	0.7
Art Psychotherapist	1	0.7
Occupational Therapy assistant	1	0.7
Physiotherapy assistant	1	0.7
Porter	1	0.7
School Nurse	1	0.7
Other	1	0.7
Student Nurse	1	0.7
Nursery Nurse	1	0.7

	Frequency	Percent
Medical Secretary	2	1.3
Primary Care Nurse/District Nurse	2	1.3
Psychiatrist	2	1.3
Occupational Therapist	2	1.3
Community Care worker	2	1.3
Social Worker	2	1.3
Mental Health Worker	2	1.3
Clinical Scientist	3	2
Doctor	3	2
NHS Manager	3	2
Clinical Psychologist	5	3.3
Radiographer	5	3.3
Health Care Assistant/HCSW	9	6
missing data	12	7.9
Physiotherapist	14	9.3
Admin/Clerical/Receptionist	16	10.6
Psychiatric Nurse	16	10.6
Nurse	42	27.8
Total	151	100

Figure 2 Professional and occupational groups



Over a quarter of the sample were nurses (Table 8 and Figure 2), the next highest groups being Admin/Clerical and physiotherapists. It is not known how closely this represents the make-up of the wider NHS workforce.

5.6.5. Time professionally qualified

Table 9 Time qualified

	Frequency	Percent
Not Qualified	15	9.9
Less than 1 year	6	4.0
1-2 years	6	4.0
3-5 years	14	9.3
6-10years	20	13.2
11-15 years	15	9.9
16-20 years	11	7.3
21-30 years	38	25.2
30+ Years	12	7.9

	Frequency	Percent
missing data	14	9.3
Total	151	100.0

Over a quarter of respondents had been professionally qualified for more than 20 years and another quarter between five and 20 years. Nearly 10% of respondents did not hold a professional qualification. 9% did not supply this data (Table 9).

5.6.6. Highest level educational qualification

Table 10 Highest level of qualification

	Frequency	Percent
No qualification	2	1.3
Up to & including GCSE (GCSE)	4	2.6
NVQ	6	4.0
Up to & including A level (A Level)	5	3.3
Up to & including Diploma (Diploma Nursing)	23	15.2
Up to & including Bachelors degree (Degree, BSc (Nursing, Physiotherapy etc)	24	15.9
Post Grad Cert (PGCE)	3	2.0
Post Grad Dip (Post Graduate Diploma, Counseling, Physiotherapy	6	4.0
Up to & including Masters Degree (MA, MSc etc)	9	6.0
Up to & including Doctorate (D Clin Psychology, MBBS)	7	4.6
Professional Health Registration (RGN, RM, RMN, MCSP,	35	23.2
Professional Non health Registration (Chartered Institute of	2	1.3
NNEB	3	2.0
Enrolled Nurse	2	1.3
missing data	20	13.2
Total	151	100.0

The majority of respondents had educational qualifications up to and including diploma or bachelors degrees (Table 10), with many also holding professional registration.

5.6.7. Work Setting

Table 11 Work setting

	Frequency	Percent
GP surgeries	1	0.7
Acute Hospital A&E	1	0.7
Acute Hospital Orthopaedic Ward	1	0.7
Hospital Lab	1	0.7
missing data	1	0.7
Community Hospital - Inpatient	2	1.3
Acute Hospital other	2	1.3
Mental health Day Hospital	3	2
Community Hospital - Outpatient	4	2.6
Acute Hospital Surgical Ward	6	4
Mixed hospital & community	7	4.6
Mental health Community	15	9.9
Mental health other	19	12.6
Community	22	14.6
Mental health Inpatient	24	15.9
Hospital (non specific)	42	27.8
Total	151	100

Most respondents worked in hospital settings, but a wide range of community and other settings were also represented (Table 11).

5.6.8. Length in Post

Table 12 Length in post

	Frequency	Percent
less than 1 year	20	13.2
1-2 years	35	23.2
3-5 years	33	21.9
5-10 years	37	24.5

	Frequency	Percent
11-15 years	14	9.3
16-20 years	5	3.3
20-30 years	6	4.0
30+ years	1	.7
Total	151	100.0

Table 12 shows that over a half of respondents had been in post for less than five years and another quarter for between five and ten years.

5.7. Frequency of using a PC at home

Table 13 Frequency of using a PC at home

	Frequency	Percent
never	13	8.6
daily	81	53.6
weekly	41	27.2
monthly	15	9.9
missing data	1	.7
Total	151	100.0

An ANOVA of the raw scores for each scale according to the frequency of respondents' home use of a PC was conducted, which showed no significant differences.

5.8. Uses of home PC

Table 14 Uses of home PC

	Frequency	Percent of respondents
Listening to radio programmes	1	0.7
Publicity Material	1	0.7
Copying CDs	1	0.7
Posters	1	0.7
Running websites	1	0.7
Home business	1	0.7

	Frequency	Percent of respondents
Booking Holidays	1	0.7
MSN-messenger/Instant Messaging	2	1.3
PowerPoint	2	1.3
Photos	2	1.3
Music	4	2.6
Internet chat and/or discussion	6	4.0
Banking	8	5.3
Spreadsheets	20	13.2
Playing games	26	17.2
Shopping	90	59.6
Word-processing	99	65.6
Email	109	72.2
Information gathering from Internet	114	75.5

The use of the internet for information gathering and email were the most common uses of a PC at home, followed by word processing, shopping and playing games (Table 14).

5.9. Frequency of using a PC at work

Table 15 Frequency of using a PC at work

	Frequency	Percent
daily	125	82.8
weekly	23	15.2
monthly	3	2.0
Total	151	100.0

Table 15 shows that 82.8% of respondents used a computer daily at work. An ANOVA of raw scores for each of the three scales according to frequency of work use (Tables 16, 17 and 18) revealed significant differences on all three scales ($F = 4.208, p = 0.017$; $F = 5.928, p = 0.003$; $F = 5.690, p = 0.004$ respectively). Those using the computer more frequently at work appeared to display more positive attitudes. NB as only three respondents scored negative attitudes only neutral and positive scores are reported.

Table 16 Effect of frequency of PC use at work on attitudes – Scale 1

	Daily (%)	Weekly (%)	Monthly (%)
Neutral	74 (78.7)	18 (19.1)	2 (2.1)
Positive	49 (90.7)	4 (7.4)	1 (1.9)

Table 17 Effect of frequency of PC use at work on attitudes – Scale 2

	Daily (%)	Weekly (%)	Monthly (%)
Neutral	84 (80.8)	19 (18.3)	1 (1)
Positive	40 (87)	4 (8.7)	2 (4.3)

Table 18 Effect of frequency of PC use at work on attitudes – Scale 3

	Daily (%)	Weekly (%)	Monthly (%)
Neutral	83 (79)	19 (18.1)	3 (2.9)
Positive	40 (95.2)	2 (4.8)	0

5.10. Uses of PC at Work

Table 19 Uses of PC at work

	Frequency	Percentage of Respondents
Communicating with other practice members	1	0.7
ICPA	1	0.7
Financial ledger/databases	1	0.7
IT bases assessment (face)	1	0.7
Policy Development	1	0.7
Presentations	1	0.7
Diary	2	1.3
Database design /use	2	1.3
Designing Information Capture Documents	2	1.3
Booking Appointments	3	2.0

	Frequency	Percentage of Respondents
Patient Registration	3	2.0
Internet chat and/or discussion	3	2.0
Playing Games	4	2.6
Stock ordering	27	17.9
Management	32	21.2
Spreadsheets	34	22.5
Patient Data/Records	87	57.6
Word-processing	103	68.2

Word-processing was the most common use of a PC at work, but over half of the respondents were also using computers for patient data or records. Approximately a fifth of respondents were also using them for management tasks, spreadsheets and stock ordering (Table 19).

5.11. Formal computer training

Table 20 Formal computer training

	Frequency	Percent
Yes	49	32.5
No	100	66.2
missing data	2	1.3
Total	151	100.0

Table 20 shows that two thirds of respondents had received no formal computer training. An Independent samples t-test of raw scores on each scale according to respondents' possession of a computer qualification (Table 21) was carried out, with differences observed for all three scales ($t = 2.029$, $p = 0.044$; $t = 2.702$, $p = 0.08$; $t = 2.932$, $p = 0.04$ respectively). Respondents with a formal computer qualification displayed more positive attitudes on each of the scales.

Table 21 Differences in attitude on Scales 1, 2 and 3 related to computer training

	Scale 1			Scale 2			Scale 3		
	Efficiency of Care			Education, Training and Development			Control		
	+ve (%)	N (%)	-ve (%)	+ve (%)	N (%)	-ve (%)	+ve (%)	N (%)	-ve (%)

	Scale 1 Efficiency of Care			Scale 2 Education, Training and Development			Scale 3 Control		
Yes (n=49)	23 (46.9)	26 (53.1)	0	22 (44.9)	27(55.1)	0	19 (38.8)	30 (61.2)	0
No (n=100)	31 (31)	66 (66)	3 (3)	24 (24)	75 (75)	1 (1)	23 (23)	73 (73)	3 (3)

5.12. Computer Qualification

Table 22 Computer qualification

	Frequency	Percent
City & Guilds	3	2.0
HND Computing	1	.7
ECDL	11	7.3
CLAIT	11	7.3
In house systems training sessions	4	2.6
Touch typist, Word & Excel	3	2.0
RSA	10	6.6
New CLAIT	1	.7
part of PCGE	1	.7
Degree - Computer Science	1	.7
NVQ level ½ - IT	2	1.3
No qualification/No answer	103	68.2
Total	151	100.0

The vast majority of respondents did not give any computer qualification. Of those that did 11 held had European Computer Driving License (ECDL), and 21 Royal Society of Arts (RSA) Computer Literacy and Information Technology (CLAIT) qualifications.(Table 22)

5.13. Experience of computer use

Table 23 Experience of computer use

	Frequency	Percent
0	4	2.6
1	2	1.3
2	9	6.0
3	23	15.2
4	13	8.6
5	18	11.9
6	18	11.9
7	33	21.9
8	19	12.6
9	5	3.3
10	7	4.6
Total	151	100.0

Table 23 shows how respondents rated their experience of computer use. Those who rated themselves as 0,1,2 and 3 were grouped as “low experience”, 4,5 and 6 grouped as “medium experience” and those who rated themselves 7,8,9 and 10 as “high experience”. A Kruskal-Wallis H-test of respondents’ attitudes on each of the three scales, coded into low medium and high experience groups was conducted. Differences were found on all three scales. (Scale 1 $KX^2 = 13.52$, d.f = 2, $p < 0.001$; Scale 2 $KX^2 = 15.63$, d.f. = 2, $p < 0.001$; Scale 3 $KX^2 = 35.99$, d.f. = 2, $p < 0.001$). Those who rated their experience of computer use more highly generally showed more positive attitudes on all three scales. (Table 24)

Table 24 Experience of computer use and attitudes on all three scales

	Scale 1 Efficiency of Care			Scale 2 Education, Training and Development			Scale 3 Control		
	+ve (%)	N (%)	-ve (%)	+ve (%)	N (%)	-ve (%)	+ve (%)	N (%)	-ve (%)
Low experience (n=38)	6 (15.8)	31 (81.6)	1 (2.6)	5 (13.2)	32 (84.2)	1 (2.6)	4 (10.8)	31 (83.8)	2 (5.4)

	Scale 1 Efficiency of Care			Scale 2 Education, Training and Development			Scale 3 Control		
	+ve (%)	N (%)	-ve (%)	+ve (%)	N (%)	-ve (%)	+ve (%)	N (%)	-ve (%)
Medium experience (n=83)	34 (41.0)	48 (57.8)	1 (61.4)	32 (38.6)	51 (61.4)	0	23 (27.7)	59 (71.1)	1 (1.2)
High experience (n=30)	14 (46.7)	15 (50)	1 (3.3)	9 (30.0)	21 (70)	0	15 (50)	15 (50)	0

5.14. Confidence in computer use

Table 25 Confidence in computer use

	Frequency	Percent
0	2	1.3
1	4	2.6
2	9	6.0
3	11	7.3
4	16	10.6
5	19	12.6
6	15	9.9
7	33	21.9
8	20	13.2
9	13	8.6
10	9	6.0
Total	151	100.0

Table 25 shows how respondents rated their confidence in computer use. Those who rated themselves as 0,1,2 and 3 were grouped as “low confidence”, 4,5 and 6 grouped as “medium confidence” and those who rated themselves 7,8,9 and 10 as “high confidence”. A Kruskal-Wallis H-test of respondents’ attitudes on each of the three scales, coded into low medium and high confidence groups was conducted. Differences were found on all

three scales. (Scale 1 $KX^2 = 17.12$, d.f. = 2, $p < 0.001$; Scale 2 $KX^2 = 19.16$, d.f. = 2, $p < 0.001$; Scale 3 $KX^2 = 47.48$, d.f. = 2, $p < 0.001$). Those who rated their confidence in computer use more highly generally showed more positive attitudes on all three scales. (Table 26) Those who rated their confidence in computer use more highly generally showed more positive attitudes on all three scales.

Table 26 Confidence in computer use and attitudes on all three scales

	Scale 1 Efficiency of Care			Scale 2 Education, Training and Development			Scale 3 Control		
	+ve (%)	N (%)	-ve (%)	+ve (%)	N (%)	-ve (%)	+ve (%)	N (%)	-ve (%)
Low confidence (n=26)	4 (14.8)	22 (81.5)	1 (3.7)	4 (14.8)	22 (81.5)	1 (3.7)	2 (7.7)	22 (84.6)	2 (7.7)
Medium confidence (n=50)	27 (32.9)	53 (64.6)	2 (2.4)	23 (28)	59 (72)	0	17 (20.7)	64 (78)	1 (1.2)
High confidence (n=75)	23 (54.8)	19 (45.2)	0	19 (45.2)	23 (54.8)	0	23 (54.8)	19 (45.2)	0

6. Discussion

Prior to discussing the findings of this study it is important to recognize the limitations.

Attempts were made throughout the study to reduce potential bias and accurately represent the responses of the population; however, the sample size was small when compared with the total population of the NHS in the three trusts.

The response rate which obtained 151 completed questionnaires out of the 800 distributed may be because of the distribution methods employed, which involved sending the questionnaire to a central contact, often a unit administrator or manager who then left them in coffee rooms and staff areas for individuals to complete. As a result of Data Protection Act (1988) it was not possible to obtain lists of names and details of individual staff, which would have allowed a more targeted approach. As respondents were self selecting there may be a difference between those who chose to complete the questionnaire and those that did not, possibly reflecting their attitude towards the subject area.

Those who completed the scales were not randomised, and had self selected to participate. Representativeness is not claimed but the study did secure a range of participants from a range of NHS organisations. It is not known how closely the demographics of the respondents, including the age, gender, educational level and experience profile, along with levels of IT experience and qualification, represents match the make-up of the wider NHS workforce. The respondents were all from three NHS trusts, within one Strategic Health Authority therefore local initiatives and factors may have influenced the results.

This study should be read in the light of several attempts over the last 20 years to develop scales which will measure attitudes towards IT in healthcare and elsewhere (eg Brumini (2005), Kirshbaum (2004), Rosenbloom (2004)). However very few have been rigorously validated and there are none which have been used in the UK's NHS.

The test-retest results confirmed that the ITASH scales developed in this study showed a high degree of consistency between the first and second application and also demonstrated satisfactory internal consistency. They were compared for concurrent validity with a scale (Stronge and Brodt, 1985) which has been in use in several countries for many years.

The findings were consistent with the body of literature relating to healthcare staff's attitudes to IT which show that previous experience and exposure are major determinants of attitude formation (Moody, 2004). The role of the individual in an organisation and the way in which IT are introduced, along with the purpose of the introduction are also known to be relevant to attitude formation (Doolan, 2003).

As the pace of implementation of electronic records systems and other initiatives under the NHS's NPfIT increases the involvement of staff in the use of IT will increase. IT will become vital for both organisational objectives and individual patient care, therefore it is important to be able to identify factors which will influence staff use and evaluate the effectiveness of strategies designed to change attitudes amongst the staff.

Following the analysis of the results 48 items were found to provide the best indicators: 17 in the Efficiency of Care Scale, 17 in the Education, Training and Development Scale and 14 items in the Control scale. These comprise the ITASH scales, which are set out, along with the items which have been discarded, in appendix 6.

The development and testing of the scale was the primary purpose of this study however several interesting findings have also been obtained. Unsurprisingly, in the light of previous literature, those who have undertaken computer training, with or without obtaining formal qualifications leads to more positive attitudes towards IT. The more that individuals used a PC at work the more positive their attitudes were, but this was not influenced by the amount of PC use at home. There is also some indication that the type of organisation influenced the extent to which staff felt prepared for computer use. The age of respondents in this study did not have any significant effect on attitudes towards IT, however males showed more positive attitudes than females in relation to the

'efficiency of care' and 'control' scales. Attitudes on all three scales positively correlated with the respondents self reporting of their experience and confidence in computer use.

These initial results suggest that in the predominantly female NHS workforce consideration needs to be given to strategies which will influence the attitudes of staff towards IT, which may include training provision and exposure to computers.

The primary purpose of this work was to develop scales which could be used to measure attitudes towards IT in the UK's NHS. This has been achieved and the reliability of the scales has been demonstrated against accepted criteria. The validity of scale 1 'Efficiency of Care' has been established by comparison with the established Stronge and Brodt (1985) scale, however further work is needed to examine the validity of scales 2 (Education, Training and Development) and scale 3 (Control).

7. Conclusion and Recommendations

Whilst acknowledging the limitations of the study, the results suggest that the developed scale offers a measure that can be used to establish staff attitudes towards IT use in the healthcare sector in relation to the efficient delivery of care.

All three scales have been shown to be reliable, however only scale 1 'efficiency of care' has validity when compared to established instruments. Further research is needed to examine the validity of scale 2 'education, training and development' and scale 3 'control'. It would also be useful to see further research into the relationship between the different professional groups and their attitudes towards IT.

The results obtained while developing and testing the scale give a snapshot of a selection of the NHS staff in three different types of NHS trust which show fairly frequent use of IT at work, primarily for word-processing, but to a lesser extent for patient records and communication. When this is compared with the demographics of the population, including the levels of IT training and qualification, and the factors demonstrated to influence attitudes to IT it would be useful for NHS organisations to investigate ways in which a predominately female workforce can be helped with IT.

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9. Appendices

9.1. Appendix 1 - Ethical Approval



Bath Research Ethics Committee

Forbes Fraser Building
Research Ethics Office
Royal United Hospital
Combe Park
Bath
BA1 3NG

Telephone: 01225 825725
Facsimile: 01225 825725

28 October 2005

Dear Mr Ward

Full title of study: Information Technology Scales for Health
REC reference number: 05/Q2001/231

Thank you for your letter of 18 October 2005, responding to the Committee's request for further information on the above research and submitting revised documentation.

The further information has been considered on behalf of the Committee by the Chair.

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation as revised.

Ethical review of research sites

The Committee has designated this study as exempt from site-specific assessment (SSA). The favourable opinion for the study applies to all sites involved in the research. There is no requirement for other Research Ethics Committees to be informed or SSA to be carried out at each site.

Conditions of approval

The favourable opinion is given provided that you comply with the conditions set out in the attached document. You are advised to study the conditions carefully.

Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

<i>Document</i>	<i>Version</i>	<i>Date</i>
Application	5.0	16 September 2005
Investigator CV		09 September 2005
Protocol	1	01 April 2005
Covering Letter		09 September 2005
Letter from Sponsor		06 September 2005
Compensation Arrangements		01 August 2005
Questionnaire	2	18 October 2005
Advertisement	1	18 October 2005
Letter of invitation to participant	1	09 September 2005
Participant Information Sheet	1	09 September 2005
Participant Consent Form	1	09 September 2005
Response to Request for Further Information		18 October 2005
Letter from Funder		16 May 2005

Research governance approval

You should arrange for all relevant NHS care organisations to be notified that the research will be taking place, and provide a copy of the REC application, the protocol and this letter.

All researchers and research collaborators who will be participating in the research must obtain research governance approval from the relevant care organisation before commencing any research procedures. Where a substantive contract is not held with the care organisation, it may be necessary for an honorary contract to be issued before approval for the research can be given.

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees (July 2001) and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

05/Q2001/231

Please quote this number on all correspondence

With the Committee's best wishes for the success of this project

Yours sincerely

Chair

9.2. Appendix 2 – Covering Letter and Information Sheet

Study Number: 05/Q/2001/231

Version 2

Date 20.10.05

Dear colleague,

I am writing to you to ask you to take part in a small research project.

The project “*Information Technology Attitude Scales for Health (ITASH)*” aims to develop and validate a tool to measure the attitudes of NHS staff towards Information Technology (IT), which is becoming increasingly important in healthcare. The intention is to ensure that the questionnaire accurately identifies the factors which influence these attitudes. It can then be used to measure the effectiveness of various strategies to assist with the implementation of IT in the NHS.

If you are willing to participate and complete the enclosed questionnaire, and a further one in a couple of weeks, which should each take about 30 minutes to complete, you will be entered into a prize draw and could win a £25 book token.

Please complete the enclosed questionnaire and return it to me in the pre paid envelope by *****

The enclosed Information sheet should provide you with all the information you need to decide whether you are willing to take part, but if you require any further information please do not hesitate to contact me.

Yours sincerely,

Rod Ward

Information Technology Attitude Scales for Health (ITASH)

Study Number: 05/Q/2001/231

Version 2

Date 20.10.05

You are being invited to take part in a research study. Before you decide it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.

Thank you for reading this.

The purpose of this study is to develop and validate a tool to measure the attitudes of NHS staff towards Information Technology (IT), which is becoming increasingly important in healthcare. The intention is to ensure that the questionnaire accurately identifies the factors which influence these attitudes. It can then be used to measure the effectiveness of various strategies to assist with the implementation of IT in the NHS.

The questionnaire is being sent to 300 staff in each of 3 trusts, during the autumn of 2005, to try to get a wide selection of NHS staff.

It is up to you to decide whether or not to take part. If you do decide to take part you can keep this information sheet and are asked to sign the enclosed consent form, and complete the questionnaire. Please return these in the pre-paid envelope. You will be sent another questionnaire in a couple of weeks to enable us to see if we are getting consistent answers to the questions. If you decide to take part you are still free to withdraw at any time and without giving a reason.

The information you provide will be kept confidential and no individual will be identified in any reports.

Everyone who completes both questionnaires will be entered into a draw, as a thank you for completing them, and one person from each trust will receive a £25 book token. A summary report will be available to all participants, it is also hoped to publish a report of the study in a peer reviewed journal.

The study is being funded by the University of the West of England, Faculty of Health and Social Care, School of Adult Nursing, Research and Staff Development Scheme, and has been reviewed by the Bath Research Ethics Committee.

If you have any questions or require further information, please do not hesitate to contact me:

Rod Ward,

Thank you in advance for taking part in this study.

20-30 years []
30+ years []

Please give us your contact details so that we can send you the follow up questionnaire

Name:

Address:

B. ABOUT YOUR COMPUTER USE

1. How often do you use a computer **at home**? (please circle the most appropriate answer)

never daily weekly monthly

2. What do you use a home computer for? (please circle **all** that apply)

playing games gathering	wordprocessing	Internet for information
email rooms	Internet for shopping	Internet for chat/discussion
spreadsheets	other (please give details)_____	

3. How often do you use a computer **at work**? (please circle the most appropriate answer)

never daily weekly monthly

4. What do you use a work computer for? (please circle **all** that apply)

patient data/records status) (eg blood results, xrays, etc)	ordering/stock control	management (eg off duty, bed status)
playing games gathering	wordprocessing	Internet for information
email rooms	Internet for shopping	Internet for chat/discussion
spreadsheets	other (please give details)_____	

5. Do you have any formal training in computer use (eg CLAIT, RSA, ECDL)? (please circle the appropriate answer)

Yes No

If Yes, please give details_____

6. How would you rate your experience in terms of computer use? (please circle the appropriate answer)

C. YOUR FEELINGS ABOUT USING COMPUTERS

For each of the following statements please circle **one** number of response that **best** reflects how you would feel or behave:

1 = *Strongly Agree* 2 = *Agree* 3 = *Disagree* 4 = *Strongly Disagree*

1. Using computers is helping to improve patient/client care.
1 2 3 4

2. Where I work, computers have decreased the workload of most staff.
1 2 3 4

3. The computers are too slow.
1 2 3 4

4. It is essential for all health professionals to be able to use computers.
1 2 3 4

5. The sort of information I can get from the computer helps me give better care to patients.
1 2 3 4

6. I am satisfied with the amount of computer training I have received.
1 2 3 4

7. I have all the computer skills I need for my job.
1 2 3 4

8. Using computers makes my communication with other health professionals faster.
1 2 3 4

9. I worry that the use of computers in health care may undermine patient confidentiality.
1 2 3 4

10. I believe computers can help us deliver individualised care.
1 2 3 4

11. Computers make orientation of new staff more difficult.
1 2 3 4

12. I lack confidence in my computer skills.

1 2 3 4

For each of the following statements please circle **one** number of response that **best** reflects how you would feel or behave:

1 = *Strongly Agree* 2 = *Agree* 3 = *Disagree* 4 = *Strongly Disagree*

13. I feel that the user is in control of the computer.

1 2 3 4

14. Using computers makes my communication with other health professionals less reliable.

1 2 3 4

15. I prefer situations where I can depend on someone else's ability rather than just my own.

1 2 3 4

16. Where I work, the software/computer programs/packages are easy to use.

1 2 3 4

17. It isn't worthwhile for health care professionals to acquire computer skills.

1 2 3 4

18. The cost of the system would be better used employing more staff.

1 2 3 4

19. I find computers boring.

1 2 3 4

20. I can usually get help quickly when I need some advice about using a computer.

1 2 3 4

21. Whenever something good happens to me I usually feel it is because I have earned it.

1 2 3 4

22. I get discouraged when doing something that takes a long time to achieve results.

1 2 3 4

23. The time I spend with patients is reduced because of the time I spend at the computer.

1 2 3 4

24. I would like to know more about computers.

1 2 3 4

For each of the following statements please circle **one** number of response that **best** reflects how you would feel or behave:

1 = Strongly Agree 2 = Agree 3 = Disagree 4 = Strongly Disagree

25. I think we are in danger of letting computers take over.

1 2 3 4

26. I could carry out my professional role well without computer skills.

1 2 3 4

27. I am satisfied with the level of computer training I have received.

1 2 3 4

28. I can't think of any benefits associated with using computers at work.

1 2 3 4

29. When something is going to affect me I learn as much about it as I can.

1 2 3 4

30. Where I work, computers help to improve the way care is delivered throughout the organisation.

1 2 3 4

31. When changes are implemented at my workplace, doing my job becomes very difficult.

1 2 3 4

32. There are enough printers for everyone to print what they need.

1 2 3 4

33. I enjoy using computers.

1 2 3 4

34. The computers where I work often break down.

1 2 3 4

35. Using computers helps to increase professionals' knowledge base.

1 2 3 4

36. I usually feel informed about changes that take place in my organisation.

1 2 3 4

For each of the following statements please circle **one** number of response that **best** reflects how you would feel or behave:

1 = *Strongly Agree* 2 = *Agree* 3 = *Disagree* 4 = *Strongly Disagree*

37. The speed with which I can access information on the computer helps me give better care to patients.

1 2 3 4

38. The computer training I have received has helped me to be efficient at work.

1 2 3 4

39. Computers help staff to work together efficiently throughout the organisation.

1 2 3 4

40. I generally feel confident working with computers.

1 2 3 4

41. Computers make me feel stupid.

1 2 3 4

42. Using the computer cuts down the amount of paperwork I have to do.

1 2 3 4

43. Time spent on computers is out of proportion to its benefits.

1 2 3 4

44. I would like to have on-going training to help me improve my computer skills.

1 2 3 4

45. There are too few computer terminals available for the number of staff.

1 2 3 4

46. The way I use the computer gives me more time to spend with patients.

1 2 3 4

47. I prefer to learn the facts about something from someone else rather than having to dig them out for myself.

1 2 3 4

48. When I have a problem I usually follow the advice of colleagues.

1 2 3 4

For each of the following statements please circle **one** number of response that **best** reflects how you would feel or behave:

1 = *Strongly Agree* 2 = *Agree* 3 = *Disagree* 4 = *Strongly Disagree*

49. I have opportunity to feed back to the organisation.

1 2 3 4

50. I'm often unsure what to do when using a computer.

1 2 3 4

51. Use of electronic health records are more of a hindrance than a help to patient care.

1 2 3 4

52. When changes happen, my organisation copes well on the whole.

1 2 3 4

53. I only attend computer training because I have to.

1 2 3 4

54. I have less control over my professional practice because of the requirements of the computer system.

1 2 3 4

55. Figuring out computer problems appeals to me.

1 2 3 4

56. Computer skills are becoming more and more necessary for health care professionals.

1 2 3 4

57. I feel I need more training to use the computers properly.

1 2 3 4

58. At work I feel that my opinions are disregarded by the organisation.

1 2 3 4

59. My computer skills are an 'add-on' to my professional skills.

1 2 3 4

60. In order to be successful in my career I need to be able to work with computers.

1 2 3 4

For each of the following statements please circle **one** number of response that **best** reflects how you would feel or behave:

1 = *Strongly Agree* 2 = *Agree* 3 = *Disagree* 4 = *Strongly Disagree*

61. I do not understand how people can enjoy working with computers.

1 2 3 4

62. I can usually get help quickly when I have a computer problem.

1 2 3 4

63. I feel there are too many computers around now.

1 2 3 4

64. Using computers is a normal part of my professional role.

1 2 3 4

65. I avoid using computers whenever I can.

1 2 3 4

66. I am easily able to learn new computer skills.

1 2 3 4

67. The printers often give trouble.

1 2 3 4

68. I am able to choose when I use the computer at work.

1 2 3 4

69. Computer training is boring.

1 2 3 4

70. Where I work, computers make staff less productive.

1 2 3 4

71. I do not feel that I am given help to cope with new demands at work.

1 2 3 4

72. I sometimes feel very intimidated by the thought of using a computer.

1 2 3 4

For each of the following statements please circle **one** number of response that **best** reflects how you would feel or behave:

1 = *Strongly Agree* 2 = *Agree* 3 = *Disagree* 4 = *Strongly Disagree*

73. For me, knowing I've done something well is more important than being praised by someone else.

1 2 3 4

74. The computer training provided by my organisation is poor.

1 2 3 4

75. When health professionals use computers, the healthcare system is more efficient.

1 2 3 4

76. I like jobs where I can make decisions and be responsible for my own work.

1 2 3 4

77. Using a computer is more trouble than it's worth.

1 2 3 4

78. Where I work, the organisation provides adequate support for staff to use the computer system efficiently.

1 2 3 4

79. The computer training I have received has helped me to use the computer efficiently.

1 2 3 4

Please add any comments about anything related to your attitude to computers or this questionnaire.

Thank you for your help.

Please return your completed questionnaire in the reply paid envelope to:

Rod Ward
Faculty of Health & Social Care, University of the West of England,
Glenside Campus, Blackberry Hill, Bristol BS16 1DD

9.4. Appendix 4 – Letter to respondents for 2nd round

«Name»
«Address_line_1»
«Address_line_2»
«Address_line_3»
«Address_line_4»
«Address_line_5»

Date: 24/05/2007

Dear «Name»

Thank you for your involvement in the Information Technology Attitude Scales for Health (ITASH) project.

I am writing again to ask you to complete the second stage by filling in the enclosed questionnaire. You will see that this is exactly the same as the first. This is so that we can compare your responses this time with those you gave previously. Your second completion is a **vital** aspect of the project, because we need to ensure that the questionnaire can get consistent answers.

We hope to complete the analysis of responses in the spring and will then send a summary report to each of the trusts involved. We would like to reassure you again that all information given will be treated in the strictest confidence. No individual will be identified in any resulting reports or publications.

Please complete and return your second questionnaire as soon as possible. You will then be entered into a draw, with one person from each of the three trusts involved in the project receiving a £25 book token.

If you have any questions or require further information, please do not hesitate to contact me.

Once again, thank you for your help.

Yours sincerely,

Rod Ward

Senior Lecturer, Faculty of Health & Social Care, UWE, Bristol

Glenside Campus, Blackberry Hill, Bristol BS16 1DD

Tel: 0117 32 88477 Email: rod.ward@uwe.ac.uk

9.5. Appendix 5 – Strong & Brodt Scale

Instructions: It should not take longer than 10 minutes to complete the questionnaire. Do not omit any item. Read each statement carefully then select one of the five responses. Give your first reaction and response to the statement. Circle only one answer for each statement.

SA = Strongly Agree A = Agree U = Uncertain D = Disagree SD = Strongly Disagree

- | | | | | | |
|--|-----------|----------|----------|----------|-----------|
| 1. A computer increases costs by increasing the nurse's workload. | <u>SA</u> | <u>A</u> | <u>U</u> | <u>D</u> | <u>SD</u> |
| 2. Computers cause a decrease in communication between hospital departments. | <u>SA</u> | <u>A</u> | <u>U</u> | <u>D</u> | <u>SD</u> |
| 3. Computers will allow the nurse more time for the professional tasks for which he/she is trained | <u>SA</u> | <u>A</u> | <u>U</u> | <u>D</u> | <u>SD</u> |
| 4. Part of the increase in costs of health care is because of computers. | <u>SA</u> | <u>A</u> | <u>U</u> | <u>D</u> | <u>SD</u> |
| 5. The time spent using a computer is out of proportion to the benefits | <u>SA</u> | <u>A</u> | <u>U</u> | <u>D</u> | <u>SD</u> |
| 6. Computers represent a violation of patient privacy. | <u>SA</u> | <u>A</u> | <u>U</u> | <u>D</u> | <u>SD</u> |
| 7. Only one person at a time can use a computer terminal and therefore, staff efficiency is inhibited. | <u>SA</u> | <u>A</u> | <u>U</u> | <u>D</u> | <u>SD</u> |
| 8. Computerization of nursing data offers nurses a remarkable opportunity to improve patient care. | <u>SA</u> | <u>A</u> | <u>U</u> | <u>D</u> | <u>SD</u> |
| 9. Computers contain too much personal data to be used in an area as open as a nursing station. | <u>SA</u> | <u>A</u> | <u>U</u> | <u>D</u> | <u>SD</u> |
| 10. Computers cause nurses to give less time to quality patient care. | <u>SA</u> | <u>A</u> | <u>U</u> | <u>D</u> | <u>SD</u> |
| 11. If I had my way, nurses would not ever have to use computers. | <u>SA</u> | <u>A</u> | <u>U</u> | <u>D</u> | <u>SD</u> |
| 12. Computers should only be used in the financial department. | <u>SA</u> | <u>A</u> | <u>U</u> | <u>D</u> | <u>SD</u> |
| 13. Computers make nurses' jobs easier. | <u>SA</u> | <u>A</u> | <u>U</u> | <u>D</u> | <u>SD</u> |
| 14. Paperwork for nurses has been greatly reduced by the use of computers. | <u>SA</u> | <u>A</u> | <u>U</u> | <u>D</u> | <u>SD</u> |
| 15. Orientation for new employees takes longer because of computers and, therefore, unnecessary work delays occur. | <u>SA</u> | <u>A</u> | <u>U</u> | <u>D</u> | <u>SD</u> |
| 16. Nursing data does not lend itself to computers. | <u>SA</u> | <u>A</u> | <u>U</u> | <u>D</u> | <u>SD</u> |
| 17. Computers save steps and allow the nursing staff to become more efficient. | <u>SA</u> | <u>A</u> | <u>U</u> | <u>D</u> | <u>SD</u> |
| 18. The more computers in an institution, the less number of jobs for employees. | <u>SA</u> | <u>A</u> | <u>U</u> | <u>D</u> | <u>SD</u> |
| 19. Increased computer usage will allow nurses more time to give patient care. | <u>SA</u> | <u>A</u> | <u>U</u> | <u>D</u> | <u>SD</u> |
| 20. Because of computers, nurses will face more lawsuits. | <u>SA</u> | <u>A</u> | <u>U</u> | <u>D</u> | <u>SD</u> |

Additional comments: _____

9.6. Appendix 6 Included and excluded scale items.

9.6.1. Efficiency of Care Scale (17 items)

1. Using computers is helping to improve patient/client care.
2. The sort of information I can get from the computer helps me give better care to patients.
3. Using computers makes my communication with other health professionals faster.
4. I worry that the use of computers in health care may undermine patient confidentiality.
5. I believe computers can help us deliver individualised care.
6. Using computers makes my communication with other health professionals less reliable.
7. Where I work, the software/computer programs/packages are easy to use.
8. The cost of the system would be better used employing more staff.
9. The time I spend with patients is reduced because of the time I spend at the computer.
10. I think we are in danger of letting computers take over.
11. Where I work, computers help to improve the way care is delivered throughout the organisation.
12. The speed with which I can access information on the computer helps me give better care to patients.
13. Time spent on computers is out of proportion to its benefits.
14. Use of electronic health records are more of a hindrance than a help to patient care.
15. I feel there are too many computers around now.
16. Where I work, computers make staff less productive.
17. Using a computer is more trouble than it's worth.

9.6.2. Education, Training and Development Scale (17 items)

18. I am satisfied with the amount of computer training I have received.
19. I have all the computer skills I need for my job.
20. It isn't worthwhile for health care professionals to acquire computer skills.
21. I can usually get help quickly when I need some advice about using a computer.
22. I would like to know more about computers.

23. I am satisfied with the level of computer training I have received.
24. I can't think of any benefits associated with using computers at work.
25. Using computers helps to increase professionals' knowledge base.
26. The computer training I have received has helped me to be efficient at work.
27. I would like to have on-going training to help me improve my computer skills.
28. Computer skills are becoming more and more necessary for health care professionals.
29. I feel I need more training to use the computers properly.
30. In order to be successful in my career I need to be able to work with computers.
31. I can usually get help quickly when I have a computer problem.
32. I am easily able to learn new computer skills.
33. The computer training provided by my organisation is poor.
34. The computer training I have received has helped me to use the computer efficiently.

9.6.3. Control scale (14 items)

35. I lack confidence in my computer skills.
36. There are enough printers for everyone to print what they need.
37. The computers where I work often break down.
38. I usually feel informed about changes that take place in my organisation.
39. I generally feel confident working with computers.
40. Computers make me feel stupid.
41. There are too few computer terminals available for the number of staff.
42. I'm often unsure what to do when using a computer.
43. When changes happen, my organisation copes well on the whole.
44. I only attend computer training because I have to.
45. At work I feel that my opinions are disregarded by the organisation.
46. I am able to choose when I use the computer at work.
47. I sometimes feel very intimidated by the thought of using a computer.
48. Where I work, the organisation provides adequate support for staff to use the computer system efficiently.

9.6.4. Discarded items

1. Where I work, computers have decreased the workload of most staff.
2. The computers are too slow.

3. It is essential for all health professionals to be able to use computers.
4. Computers make orientation of new staff more difficult.
5. I feel that the user is in control of the computer.
6. I prefer situations where I can depend on someone else's ability rather than just my own.
7. I find computers boring.
8. Whenever something good happens to me I usually feel it is because I have earned it.
9. I get discouraged when doing something that takes a long time to achieve results.
10. I could carry out my professional role well without computer skills.
11. When something is going to affect me I learn as much about it as I can.
12. When changes are implemented at my workplace, doing my job becomes very difficult.
13. I enjoy using computers.
14. Computers help staff to work together efficiently throughout the organisation.
15. Using the computer cuts down the amount of paperwork I have to do.
16. The way I use the computer gives me more time to spend with patients.
17. I prefer to learn the facts about something from someone else rather than having to dig them out for myself.
18. When I have a problem I usually follow the advice of colleagues.
19. I have opportunity to feed back to the organisation.
20. I have less control over my professional practice because of the requirements of the computer system.
21. Figuring out computer problems appeals to me.
22. My computer skills are an 'add-on' to my professional skills.
23. I do not understand how people can enjoy working with computers.
24. Using computers is a normal part of my professional role.
25. I avoid using computers whenever I can.
26. The printers often give trouble.
27. Computer training is boring.
28. I do not feel that I am given help to cope with new demands at work.
29. For me, knowing I've done something well is more important than being praised by someone else.
30. When health professionals use computers, the healthcare system is more efficient.

31. I like jobs where I can make decisions and be responsible for my own work.

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