IT is part of youth culture, but are accounting undergraduates confident in IT?

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Abstract

This paper presents an analysis of the IT skills reported by students on entry to their first year of study for an accounting degree together with preliminary analysis on their perceived changes in IT skills and usage over their first year of study. Despite the folklore that 'our juniors' are all IT literate and highly skilled, the results indicate that we are not yet at the stage where we can assume that all students are comfortable and familiar with the aspects of IT which are important to for their accounting studies. However, the data also indicates that student's IT skills on entry to University are rising and that at least some of our students may no longer be in need of baseline IT training.

Keywords: *Education, Information Technology (IT), Skills, Students*

Introduction

The level of IT skills students bring with them into Higher Education (HE), and to accounting degrees in particular, have important consequences for what we need to teach, both with respect to the generic transferable skills that are increasingly demanded by employers, and for the subject related IT and information handling skills which are part of the craft of Accounting.

The media and 'common-sense' suggest that the increasing prevalence of computers at home and in schools means that the time must be approaching when it will be reasonable to assume that students entering HE will bring with them the basic IT skills that they will need for their studies. Against this is the anecdotal evidence of our own eyes (see for example Gazely & Pybus, 1997) that suggests we are still matriculating some, albeit perhaps a minority of, students who seem to lack even basic IT skills and display very low confidence in their computer skills, which is often reflected in an overcautious approach to the technology and a concentration on technical skills at the expense of thought and reflection on the underlying accounting (and other) issues.

The tension between the 'common assumption' of an IT literate youth and academic staff perceptions that question that assumption gives rise to some important questions for our teaching and curriculum design. For example:

- Has the time come when it can be assumed - just as it is assumed that students can read and write - that students bring with them to HE the IT skills they will need?
- How confident are students in the IT skills they possess?
- What proportion of students are exposed to and confident in their use of IT in general and in the types of packages that they are likely to need in their degree studies and beyond?
- Do some or all students require training (education) in IT Skills? If so, in which skills and at what levels?

This paper presents an analysis of the IT skills reported by students on entry to their first year of study for an accounting degree in the UK, together with some preliminary data on their perceived changes in IT skills and usage over their first year of study. Answers to these questions clearly have implications for curriculum design.

IT skills, students and accounting degrees

There has been substantial professional interest in the IT skills of entrants to the profession. This is reflected in the content of the syllabus (and syllabus proposals) of the various Institutes of Chartered Accountants, for example ICAEW (1989 and 1997a), and of the Chartered Institute of Management Accountants (CIMA, 1996; Harris, 1997).

Further, the 1996 ICAEW survey of professional skills requirements rated 'computer / IT skills' as the third most important skill required of newly qualified Chartered Accountants. It was even ranked above "An understanding of the fundamental principals of accountancy" (ICAEW 1996). Cole (1996) also highlights the importance of IT skills to the future of the profession and to individuals' careers. Internet/communications technologies and advanced productivity tools are identified in ICAEW (1997b) as areas of important skill deficiencies amongst accountants in small and medium-sized businesses.

The professional interest in IT skills influences accounting education in the HE sector via many routes, not least of which is the professional accreditation of accounting degrees. The accreditation / recognition requirements lay down IT skills that have to be covered. They do not, however, specify that IT skills training has to be provided by specific modes of study, accepting that integration of the need to use the skills within other courses may provide adequate coverage (Sangster, 1992).

There has been debate on the issue of the computing content of accounting degrees since at least the early 1980s, as evidenced by the debate over Bhaskar's 1982 proposals. See for example the directly related articles Bhaskar (1983), Collins (1983), Bhaskar & Kaye(1985), Er & Ng (1989) and Collier *et al* (1990), and others since including Williams (1991), Wildey (1990 / 1991) and Togo & McNamee (1995). This debate concentrated on three aspects:

- Computer related curricular content, in the context of the importance of computers to the future of accountancy and the accounting profession.

- The role of computer mediated teaching and learning materials (CAL/CBI).
- The use of computer based accounting and business support tools.

The role of CAL/CBI in the accounting curriculum has received considerable attention. Some of this research indicates that IT skills may be a factor in the results, some discuss the general nature of IT skills within the context of the programme of study or accounting education (e.g. Sangster, 1992).

It is the last of the areas identified in the Bhaskar *et seq.* debate that is most relevant to this paper. The use of business support tools, especially spreadsheets, and electronic communications (e-mail, the WWW, etc.) and possibly even word-processing. All are now so prevalent that their use has come to be considered by many as part of a collection of generic IT skills, a trend reinforced by the importation into HE of the notion of 'transferable' or 'enterprise' skills during the late 1980s and 1990s.

The need to ensure accounting graduates posses transferable IT skills is now largely taken for granted. There also appears to be a general consensus that IT skills 'training' should, at least ideally, be integrated within the accounting curriculum (Gazely & Pybus -1997, Nicholson -1997, Crawford & Barr - 1998) and indeed that integration of any learning technology should be fully integrated within relevant courses (Stoner -1996b, 1997). There appears to be few who have explicitly investigated the IT skills of students either at entry to HE or during their studies. The exceptions (so far found) in accounting in the UK are:

- Gazely & Pybus (1997) and Pybus (1997), who are interested in the general integration of IT skills in the curriculum and the development of higher level IT skills.
- Marriott (1997, and with others in earlier papers) who has shown a special interest in the IT skills acquisition in relation to the use of spreadsheets and in student's attitudes to IT.
- Stoner & Nisbet (1989) who looked at attitudes to computers and IT skills.

Of these only Marriott seems to have presented quantitative assessments of IT skills, measured using short objective tests. In related fields studies include: Brudney *et al* (1993), investigating the IT skills of graduate students in public administration; and Rees (1994) who has looked at the IT skills of both graduate MBA and undergraduate business studies students.

Oliver (1993) found, albeit in relation to Australian school pupils six years ago, that despite evidence suggesting support for the contention that IT skills levels are improving, the evidence also suggested a wide diversity of IT skills levels - including many students who "... lacked [even] a basic knowledge of computers and technology." (p.61). Similar observations on the heterogeneity of entrant students' IT skills are used in the ALT-C 97 conference papers / abstracts of Fayter & Martin (1997) and Williams & Rastall (1997) to justify the continued provision, and indeed development, of basic IT skills courses to all or most entrant students.

The desire to integrate IT skills within the accounting curriculum and the changing levels of students' IT skills on entry, suggest that a tailored rather than general approach to IT skills training might be appropriate. Producing an integration that takes into account the nature of our students and the degree subject specificity of accounting courses provides a further justification for this research.

The research of which this paper is a part attempts to fill a gap: What IT skills do accounting students possess on entry and how do these skills develop through time?

Context and Background

This study took part within a department, of a Scottish University, where the main undergraduate course (BAcc) has for many years been a specialised degree in accounting and finance. In recent years new variants (effectively joint/minor subjects) have been introduced and the formal structures and regulations of the degree altered to adopt a more 'modular' structure. However, the underlying structure of the degree remains unchanged.

The basic structure of the course is based on the study of core courses in both financial & management accounting in years 1 & 2 together with related compulsory courses, including (* indicates courses taught by members of the Department) quantitative methods*, economics, law, business finance* ,information & computer systems*, taxation and management. The third and fourth years of study depend on whether students elect to take an ordinary or honours degree and on the subjects taken.

The teaching of IT skills within the curriculum has changed through time. Currently the basic IT skills are taught to first year students through a compulsory but non-assessed "Basic Information Technology Skills" course (BITS), a series of six 2-hour computer laboratory sessions complemented by self-study material. The BITS curriculum is designed to bring students up to the University's IT Baseline, including use of Windows, competence in using and transferring data between standard applications (electronic mail, word processing, and Web browsers) and using the Internet and University networks as sources of information. In addition to the BITS course the Department offers students additional non-assessed instruction in the use of spreadsheet packages, develops IT skills via the integration of IT into courses and provides additional specialist IT skills training in specific courses.

Annual intake to the BAcc degree is between 100 and 110 students. Answers to the questions raised in the introduction to this paper will be affected by recent changes in the shape of HE within the UK, especially the increase in participation rates and the increasing numbers of 'mature' students. However, within the Department there have been only minimal changes in the profile of the student intake over the last few years. Almost all students entering the Department are direct entries from school, mainly from Scotland with passes in at least 4 or 5 SCE 'highers' with good grades. The gender split has remained relatively constant, females representing 49% and 51% of the intake in 1996 and 1997 respectively.

Data collection

The data used in this paper was collected from first and second year students during the 1996/97 and 1997/98 academic years. Students were surveyed at the beginning and end of each year. The start-of-year surveys were completed in the first meeting of the main first year class, before teaching commenced. The end of year survey was carried out at the last lecture for one of the compulsory classes for that year group. Because there is no 'formal' allocation of modules to years, this survey method is bound to miss some students in any cohort. However, the more serious data collection problem relates to the poorer attendance at lectures towards the end of a course - a problem which is, it seems, endemic - see for example Marriott (1997).

The questionnaire

A single page questionnaire was developed. The questionnaire was designed to elicit information about the IT skills that the members of the Department thought to be important to students studying accounting and finance, based on prior experience and the IT skills content of the syllabuses of the accounting profession. The seven IT skills areas surveyed are detailed in Table 1.

Table 1: The IT skills areas covered by the questionnaire

Skill area	additional explanation	(package)	Variable name indicator (Table 3)	
Use of Windows	- to access / run applications and to store / retrieve / print data / files and cut & paste between applications.		**w**	**w**indows
Building and using spreadsheet models	- to analysis problems and create reports	(Excel)	**s**	**s**pread-sheet
Using a Word processing Package	- to create & edit essays / reports / letters	(Word)	**t**	**t**yping
Using e-mail	- to receive and send messages	(Pegasus)	**e**	**e**-mail
Using the World Wide Web	- accessing and searching for information	(Netscape)	**3**	**3**W, WWW
Using statistical packages to analyse data		(SPSS)	**a**	stat's **a**nalysis
Using a database package	- to create a data resource & to store, retrieve & relate data	(Access)	**d**	**d**atabase

For each skill area, students were asked to score themselves on a 5 point scale for each of the three questions shown in Table 2.

Table 2: The meanings attached to the 5-point scale responses (as detailed in the questionnaire)

How do you rate your skill?	**How much do you use this skill?**	**How confident are you in your skill?**
1 - **Non** – existant 2 - **Some**, but not at an adequate level 3 - **Adequate**, I can get by. 4 - **Good**, I can do most of what I want to do. 5 - **Excellent**, no problems that I cannot solve.	1 - **Never** 2 - **Sometimes**, but not regularly 3 - **Regularly**, at least once per week 4 - **Quite often**, several times a week 5 - **A lot**	1 - **No confidence** 2 - **Little confidence** 3 - **Some confidence** 4 - **Confident** 5 - **Very confident**
Variable name indicator: **r** (rate)	**u** (use)	**c**(confidence)

The response descriptors for the self-rating of skills were provided to guide students to consider their skill levels in relation to their needs, to put their answers in context. Questions on confidence were asked as students' confidence in their skills is believed to be related to the effectiveness of their use of those skills in their learning and to provide a relatively context free measure of skills. Self-ratings rather than skills tests are widely used as primary indicators of students' knowledge and skills, particularly in the form of confidence logs, see for example Draper *et al* (1996) and Creanor *et al* (1995). Questions on usage were asked to obtain relatively interpretation-free data on student's regularity of using their skills.

Students were also asked, in relation to each skill, if they thought they needed additional training (**n**), and if they would like to be provided with additional training (**p**). The names of the 35 variables are shown in Table 3.

Table 3: Variable Names

Question Skill / Application	How do you rate your skill?	How much do you use this skill?	How confident are you in your skill?	Do you need additional training in this skill?	Would you like us to provide sessions on this skill?
Use of Windows	**wr**	**wu**	**wc**	**wn**	**wp**
Building and using spreadsheet models	**sr**	**su**	**sc**	**sn**	**sp**
Using a Word processing Package	**tr**	**tu**	**tc**	**tn**	**tp**
Using e-mail	**er**	**eu**	**ec**	**en**	**ep**
Using the World Wide Web	**3r**	**3u**	**3c**	**3n**	**sp**
Using statistical packages to analyse data	**ar**	**au**	**ac**	**an**	**ap**
Using a database package	**dr**	**du**	**dc**	**dn**	**dp**

The questionnaire also asked students to identify themselves by name and matriculation number, to allow paired analysis of results and to facilitate more detailed analysis in comparison with other student records. Whilst recognising that non-anonymity may lead to biased responses, it was felt that such problems were minor compared to the potential advantages of identifying students. Further, the text on the questionnaire attempts to assure students that the answers provided on the questionnaire will not be used in any student's degree assessment. The questionnaire was informally piloted with a sample of colleagues and advice sought from a learning technology consultant prior to being administered to students. The questionnaire is available from the author on request.

Analysis and Results

The methods used in the analysis are described in the context of the results. Where feasible non-parametric as well as parametric test results are reported. The response scale type data that is used in this study is at best measured on an ordinal scale. Therefore the data does not meet the interval scale criteria strictly required of parametric tests (Siegal & Castallan, 1988). Despite this, the use of parametric techniques on this type of data are often justified (eg Marriott 1997) and preferred by some researchers, parametric results are therefore also reported here.

Results are reported here for two questions:

- Are the IT skills characteristics of students changing through time?
  In particular, was there any difference in IT skills (rating, confidence or use) at entrance between the 1996 and 1997 cohorts?
- Do students' IT skills change through time?
  Specifically, did the 1996 cohort of students appear to have improved their IT skills and confidence and increased their usage over their first year of study?

Detailed analysis of the first of these questions is presented together with results of a preliminary investigation into the second.

In order to simplify presentation all tables are labelled with the variable name codes - rather than fully descriptive labels. The codings are detailed in Table 3. In all tables the order of presentation of the surveyed skills start with the more 'basic' skills on the left (windows, spreadsheets and word processing) followed by generic Internet skills (e-mail and using WWW) and then the more specialist skills (statistical analysis and use of databases).

Differences between the 1996 & 1997 cohorts at entry

The basic question here is one of difference: was there any? In a formal sense we have a null hypothesis that there is no difference between the two groups of students. The full frequency distribution data for each of the questionnaire responses for sets 1 (1996 cohort on entry to first year) and set 5 (1997 cohort on entry to first year) are provided in Appendix 1. Consideration of this data, together with the means presented in Table 4 indicates that there are substantial differences between the cohorts, with the 1997 entrance reporting higher skill ratings, confidence and usage in all of the skills surveyed. The frequency data indicates that the differences seem to be general rather than caused by outliers.

To test whether the apparent differences are significant the following tests were used:

- F-test of difference in variance, mainly to decide whether to use the pooled / unpooled data for the t-test, and therefore not reported.
- t-test (non paired). The t value and significance are reported in Table 4.
- Wilcoxon rank sum (W) test (or Mann-Whitney-Wilcoxon test). Z-values and significance level are reported in Table 4.
- Kolmogorov - Smirnov test (based on the maximum difference between the cumulative distributions).

Of these tests the latter two, the non parametric tests, are preferred due to the nature of the underlying data. Of these non parametric tests the Wilcoxon test is normally considered preferable for larger samples, however the Kolmogorov - Smirnov test makes less restrictive assumptions about the distribution of the data (Siegal & Castallan, 1988). The size of the samples suggests that the Wilcoxon test is most appropriate in this case. The results of the Wilcoxon tests together with the commonly used parametric t-tests are detailed in Table 4.

Table 4: Response Means and tests of difference statistics for the 1996 & 1997 cohorts at entry.

Rate	***wr***	***sr***	***tr***	***er***	***3r***	***ar***	***dr***
Mean - set 1 (1996)	**2.72**	**2.28**	**3.25**	**1.25**	**1.45**	**1.15**	**2.03**
Mean - set 5 (1997)	**3.36**	**2.80**	**3.85**	**2.04**	**2.24**	**1.63**	**2.44**
Difference between means	**0.64**	**0.52**	**0.60**	**0.79**	**0.79**	**0.48**	**0.41**
Increase as %	23%	23%	18%	63%	54%	42%	20%
t-value	4.37	3.71	4.19	5.77	5.25	4.75	2.76
significance of t	**	**	**	**	**	**	**
Wilcoxon Z value	4.14	3.55	4.29	5.28	5.40	4.63	2.63
significance of Z	**	**	**	**	**	**	**

Use	***wu***	***su***	***tu***	***eu***	***3u***	***au***	***du***
Mean - set 1 (1996)	**2.02**	**1.56**	**2.33**	**1.21**	**1.32**	**1.10**	**1.61**
Mean - set 5 (1997)	**2.55**	**1.98**	**3.04**	**1.81**	**1.90**	**1.39**	**1.80**
Difference between means	**0.53**	**0.43**	**0.71**	**0.60**	**0.58**	**0.29**	**0.19**
Increase as %	26%	27%	30%	50%	44%	26%	12%
t-value	4.24	3.85	4.89	4.43	4.35	3.54	1.63
significance of t	**	**	**	**	**	**	-
Wilcoxon Z value	4.15	4.01	4.49	3.99	4.28	3.33	1.83
significance of Z	**	**	**	**	**	**	-

Confidence	***wc***	***sc***	***tc***	***ec***	***3c***	***ac***	***dc***
Mean - set 1 (1996)	**2.59**	**2.14**	**3.02**	**1.27**	**1.43**	**1.14**	**1.87**
Mean - set 5 (1997)	**3.15**	**2.54**	**3.68**	**2.02**	**2.13**	**1.59**	**2.27**
Difference between means	**0.56**	**0.40**	**0.65**	**0.76**	**0.70**	**0.45**	**0.40**
Increase as %	21%	19%	22%	60%	49%	39%	21%
t-value	3.85	2.85	4.63	5.39	4.76	4.73	2.63
significance of t	**	**	**	**	**	**	**
Wilcoxon Z value	3.60	2.76	4.47	4.89	4.85	4.76	2.76
significance of Z	**	**	**	**	**	**	**

*Note # Significance levels are shown as : - n/s at 95%, * sig at 95%, ** sig at 99%*
(Kolmogorov - Smirnov tests provide the same results on significance of differences for 15 of the 21 variables with an additional 4 showing significant differences but at the lower 95% significance level.)
n for 1996 = 86-88, n for 1997 = 120-123

The Wilcoxon and t-test results indicate that all but one of the differences are significant at the 99% level. The more important questions however are; how big is this difference and is this difference important to the teaching offered? The scaled (%) increase indicate that the largest differences are in the Internet related areas (E-mail and the WWW) where the 1996 cohort rated themselves lowest (under all three categories) followed by the more specialist statistical and database skills. Looking at the absolute differences and the distributional difference (Appendix 1) between 38 and 64% of the 1997 cohort rate themselves at least one level higher on each of the skills with respect to their skill rating, confidence and usage (the minimum being 51% if data on statistics and database applications is excluded). This seems to represent a real and important difference. However the distribution of the skills ratings etc still show that there is significant variability, even amongst the 1997 cohort.

Looking at the detail the following observations may be important:

- There appears to be little use of spreadsheets (a median of 2 indicating that, at best, most entrants only irregularly use them); and students only report moderate skill ratings and confidence. This is potentially important because of the prevalence of spreadsheet usage in accounting.
- Word-processing achieves high ratings usage and confidence scores. Possibly an unsurprising result, but it indicates that training in this area may soon be unnecessary, except perhaps package specific details.
- High ratings and confidence, with moderate usage, of windows skills. Possibly unsurprising given the market penetration of Microsoft in 'home computing', even if schools are relatively low Windows users. (In the past MACS have been the predominant platform in many schools in the University's main catchment area).

- Although confidence levels seem to be similar to skill rating scores, the mean confidence scores are lower with respect to almost all skills (e-mail for 1996 being the singular exception). Of course, these are measured on scales with different descriptions so this comparison may well be spurious.

Direct comparisons with the data reported in Rees (1994) is not possible as the questions were different. However, limited comparison with the undergraduate data reported can be made, recognising that Rees's data (from 1993) used a 10 point scale with 6 as moderate compared with this study's 5 point scale with 3 as adequate. Halving Rees's score gives the comparison in Table 5.

Table 5: A comparison of IT skills on entry against Rees 1994.

	Rees (1994)		**1996**		**1997**	
	Score	***Rank***	Score	***Rank***	Score	***Rank***
Using PC, Keyboard & mouse against Using Windows	3.13	**2**	2.72	**2**	3.36	**2**
Word processing	3.25	***1***	3.25	***1***	3.85	***1***
Spreadsheets	2.70	***3***	2.28	***3***	2.80	***3***
Database	2.35	***4***	2.03	***4***	2.44	***4***
e-mail	1.50	***5***	1.25	***5***	2.04	***5***
Mean score	*2.59*		*2.31*		*2.90*	

The means are difficult to compare for several reasons. Firstly, the Rees statistic matched against using Windows is an average of the 3 separate ratings and is not therefore a direct comparison, especially as this study includes file management skills, arguably a higher level skill than those in the Rees' survey. Secondly, it is problematic to equate 'adequate' and 'moderate'. Although these are similar terms they carry subtilly different meanings, 'adequate' indicating fitness for purpose which is not implied by 'moderate' - possibly interpreted by respondents as moderate relative to their peers. Thirdly, the use of a 10-point versus a 5-point scale may have forced responses away from the middle point on the scale.

These reasons may help to explain why the mean of Rees's scores is higher than the 1996 scores of this study. The use of skill rankings avoids many of the measurement problems and produces identical rankings in the 3 data sets. Therefore, despite the differences in measurement and context (both the degree subject and geographical location are different), the similarities are more striking than the differences, suggesting a degree of robustness in the measurement and or consistency across time and geography.

Considering perceived training needs. Answers to the questions as to whether students thought they needed additional training and thought that it should be provided are summarised in Table 6.

Table 6: Demand for additional training in IT skills

% = yes	***wn***	***wp***	***sn***	***sp***	***tn***	***tp***	***en***	***ep***	***3n***	***3p***	***an***	***ap***	***dn***	***dp***
Set 1 (1996)	78%	73%	80%	78%	51%	51%	92%	90%	84%	81%	98%	98%	81%	81%
Set 5 (1997)	49%	50%	75%	74%	31%	33%	83%	80%	80%	78%	93%	89%	76%	72%
Difference	**-30%**	**-22%**	-5%	-4%	**-20%**	**-18%**	**-9%**	**-10%**	-4%	-3%	-5%	-8%	-4%	**-9%**
Increase as %	**-38%**	**-31%**	-6%	-6%	**-40%**	**-35%**	**-10%**	**-11%**	-4%	-3%	-5%	-8%	-5%	**-11%**
significance of # t-test	**	**	-	-	**	**	*	*	-	-	-	**	-	-
Wilcoxon Z	*	*	-	-	*	*	-	*	-	-	-	*	-	-

*Note: # Significance levels are shown as : - n/s at 95%, * sig at 95%, ** sig at 99%)*
The largest increases (at least 10% change from 1996) are shown in bold

These results indicate:

- A significant and meaningful decrease in the demand for further training over one year with respect to word-processing (tn tp), windows (wn wp) and the use of e-mail (en ep).
- A real demand for further training in all skills from at least a minority of students and, for all but word-processing and use of windows, a demand from the vast majority of students.

- A higher demand for further training than would be expected given the proportion of students reporting adequate or better skills with reasonably high confidence, especially for windows skills.
- The low level of perceived need for further training in word-processing, at 31-33% in 1997.
- A reduction in the perceived need and demand for training in all identified IT skills (though for some variables the change is not significant).

Clusters: identifying diversity / groups within the cohorts

Having considered the overall skill levels of the two cohorts and demonstrated significant and substantive differences it is necessary to investigate the diversity of skills within the cohorts in order to see if it is likely that even with improved general skills and confidence levels there will be a need for top-up or 'remedial' training of some students. A look at the distribution data (Appendix 1) suggests that even the 1997 cohort displays considerable variation in skill levels. Table 7 sets out (for both cohorts) the percentage of students who responded with low assessed skills, or confidence in their skills.

Table 7: Comparison of students with low self assessments

(% selecting responses 1 or 2)

Rate (none / inadequate)	**wr**	**sr**	**tr**	**er**	**3r**	**ar**	**dr**
1996	37%	61%	19%	93%	84%	94%	66%
1997	20%	39%	11%	72%	65%	83%	56%
Decrease	**17%**	**22%**	**9%**	**21%**	**19%**	**11%**	**10%**
as % of 1996	*46%*	*36%*	*45%*	*23%*	*23%*	*12%*	*15%*

Confidence (none / little)	**wc**	**sc**	**tc**	**ec**	**3c**	**ac**	**dc**
1996	44%	62%	25%	92%	84%	94%	72%
1997	23%	49%	12%	70%	67%	84%	61%
Decrease	**21%**	**12%**	**13%**	**21%**	**17%**	**10%**	**11%**
as % of 1996	*47%*	*20%*	*51%*	*23%*	*21%*	*10%*	*15%*

Though the proportion of students reporting 'inadequate' skill levels and little or no confidence had decreased between 1996 and 1997 it is clear that even for the better rated basic skills (windows, w-p and spreadsheets) significant minorities of the students believed that they were in need of IT skills development.

Even if their skills were really adequate the lack of confidence has to be addressed if they are to attain the benefit of those skills. This is particularly pertinent in relation to spreadsheet skills where lack of confidence may exacerbate weak skills. For the Internet based skills, the need appears to be substantial - in excess of 65%. It appears that a lot of the improvement in skills in these areas arises from student rating levels improving from no skill to relatively moderate skills levels.

It is possible, perhaps highly likely, that students fall into different groups with different portfolios of skills at different levels and, therefore, that comprehensive IT skills training is required by one group of students whilst others could be provided with 'top-up' training, perhaps just in specific areas. It appears that this, in part, was the agenda behind the research reported in Rees (1994) and Fayter & Martin (1997).

In order to investigate this possibility, the aggregate (pooled) data on rating, use and confidence levels for all 7 skills for both cohorts was subjected to cluster analysis. The SPSS K-Means Cluster Analysis procedure was used which identified two clusters / groups. Table 8 contains the statistics that define the cluster centres of each group.

Table 8: Cluster data for all entrants in 1996 and 1997: Cluster centre data for all included variables

	Rate			Confidence			Use		
Skill area	Group 1	Group 2	*Difference*	Group 1	Group 2	*Difference*	Group 1	Group 2	*Difference*
Windows	2.88	3.91	*1.02*	2.66	3.84	*1.18*	2.08	3.16	*1.08*
Spreadsheets	2.40	3.26	*0.86*	2.14	3.16	*1.02*	1.61	2.40	*0.78*
Word-processing	3.46	4.16	*0.70*	3.22	4.09	*0.87*	2.53	3.56	*1.03*
e-mail	1.23	3.42	***2.19***	1.22	3.42	**2.20**	1.11	3.12	***2.01***
World Wide Web	1.43	3.65	***2.22***	1.36	3.56	**2.20**	1.23	3.16	***1.93***
Stat's packages	1.17	2.30	*1.13*	1.16	2.28	*1.12*	1.10	1.93	*0.83*
Databases	2.04	3.21	*1.17*	1.86	3.05	*1.18*	1.55	2.37	*0.82*
Mean	*2.09*	*3.42*	*1.33*	*1.95*	*3.34*	*1.40*	*1.60*	*2.81*	*1.21*

Table 8 shows that, of the two groups of students identified, those in Group 2 assessed themselves as having higher skills confidence and usage in all areas than those in Group 1. The greatest differences are in the Internet related areas (WWW and e-mail) for all three categories of responses (skill rating, confidence and usage). These two skill areas show cluster centre differences of about two levels, whereas all other variables show a difference of only about one response level. Further, although the differences between the differences are relatively small, the difference in confidence levels are bigger than both ratings and usage. The difference between the groups might therefore be characterised as being based on relative expertise and confidence. For convenience the groups are labelled 'novice' and 'proficient' on the grounds that for all skill ratings, bar the use of statistics packages, the cluster centres of group 2 are at least 'adequate'.

In order to establish whether the proportion of IT proficient students is increasing, the data set was divided into the two cohorts and a chi^2 test was performed. The results are displayed in Table 9, which indicates that the cohort compositions are significantly different. The proportion of 'proficient' users rising from 7% to 32% is significantly different at the 99% level.

Table 9: Cohort membership of the two clusters and chi^2 test of independence,

		1996	1997	sum
Actual				
	Proficient	6	37	43
	Novice	78	77	155
		84	114	198
Expected		1996	1997	sum
	Proficient	18.24	24.76	43
	Novice	65.76	89.24	155
		84	114	198
Chi^2	(with continuity correction)			16.7698
				Significant at >99%

This is clearly a tentative finding, not least because of the potential problems associated with using a parametric clustering technique with data of the nature available and the potential problems associated with interpreting the cluster centre statistics. However, performing the cluster analysis on different subsets of the 21 variables produces similar results with similar cluster groupings. This suggests that the observation that there appear to be two groups of students whom it might be relevant to treat differently with respect to IT skills training, appears robust. Turning this type of analysis into a way of discriminating among students on entrance to a program of study is, however, a problem of a different scale.

The progress of the 1996 cohort

Given the structure of the BAcc degree, the inclusion of basic IT skills training in the BITS course, and the use of the SPSS statistical package in the quantitative methods course, it would be hoped that students' end of year ratings of their skill and confidence levels would have improved over their start of year levels. The means of the responses and paired difference test statistics, for the null hypothesis that there has been no change, are shown in Table 10.

Table 10 1996 Cohort - Comparison of beginnings of year 1 to end of year 1

Rate	***wr***	***sr***	***tr***	***er***	***3r***	***ar***	***dr***
Mean - set 1 (beginning)	**2.70**	**2.43**	**3.44**	**1.21**	**1.43**	**1.10**	**2.06**
Mean - set 2 (end)	**3.69**	**2.87**	**4.00**	**4.00**	**3.45**	**3.14**	**2.56**
Difference between means	**0.99**	**0.43**	**0.59**	**2.79**	**2.01**	**2.04**	**0.50**
Increase as %	36%	18%	17%	232%	140%	186%	24%
t-value	8.00	3.53	5.19	25.40	17.39	18.24	3.64
significance of t	**	**	**	**	**	**	**
Wilcoxon Z value	5.76	3.29	4.40	7.27	7.12	7.24	3.29
significance of Z	**	**	**	**	**	**	**
Use	***wu***	***su***	***tu***	***eu***	***3u***	***au***	***du***
Mean - set 1	**2.00**	**1.60**	**2.35**	**1.15**	**1.30**	**1.07**	**1.61**
Mean - set 2	**3.48**	**2.15**	**3.75**	**3.85**	**2.77**	**2.59**	**2.02**
Difference between means	**1.48**	**0.55**	**1.40**	**2.70**	**1.46**	**1.52**	**0.41**
Increase as %	74%	35%	59%	235%	112%	142%	25%
t-value	12.41	3.99	12.15	18.93	11.13	12.71	2.89
significance of t	**	**	**	**	**	**	**
Wilcoxon Z value	6.65	3.59	6.66	7.03	6.63	6.81	2.94
significance of Z	**	**	**	**	**	**	**
Confidence	***wc***	***sc***	***tc***	***ec***	***3c***	***ac***	***dc***
Mean - set 1	**2.53**	**2.28**	**3.12**	**1.20**	**1.41**	**1.09**	**1.89**
Mean - set 2	**3.58**	**2.58**	**3.91**	**3.83**	**3.33**	**2.86**	**2.43**
Difference between means	**1.05**	**0.30**	**0.79**	**2.63**	**1.93**	**1.77**	**0.54**
Increase as %	41%	13%	25%	219%	137%	162%	29%
t-value	8.65	2.28	7.35	22.85	15.71	16.17	3.56
significance of t	**	**	**	**	**	**	**
Wilcoxon Z value	5.84	2.15	5.46	7.09	7.04	7.01	3.04
significance of Z	**	**	**	**	**	**	**

Wilcoxon Z values from the Wilcoxon (paired) signed rank test.
*# Significance levels are shown as : - n/s at 95%, * sig at 95%, ** sig at 99%*
n for pairs between 65 & 69 (n for set 1 = 86-88; n for set 2 = 79-85)

Clearly by using the potentially more powerful and more relevant paired test design there has been a degree of data loss. As a check for representativeness the paired means of the start of year values were compared to the means of all the start of year data. The differences are all small (all less than 7%, most within 0-5%) and the direction of differences are in different directions. It therefore seems reasonable to assume that paired data is not a biased subset of the data. Tests of difference were also carried out on the unpaired data, with identical results.

The tests confirm that the students believed they were improving all the identified IT skills over their first year of study, as did Marriott (1997) with respect to general IT and spreadsheet skills in both first and second years of study. Further, the tests confirm that students' confidence in using these skills was also improving, improvements that, in part, are bound to be related to the increased use that students are making of IT. Despite the statistical significance of these improvements, however, it is the magnitudes of the changes that are most important. Table 10 suggests that:

- Reported usage of IT skills increased in all of the identified skills areas. Usage increasing by over one response level for all skills bar databases and spreadsheets.
- The largest increases all relate to e-mail, mean skills rising from inadequate to good and confidence from near none to confident.

- Similarly, the increased skill and confidence levels in use of the Web are real and significant, rising approximately two response levels in each case.
- The specialist skill of using a statistical package is the third great improvement area. This is probably largely due to the very low entry skills here together with the fact that this is the only IT skill taught within a course that is part of the (assessed) curriculum.
- Database skills have not improved dramatically, rising approximately half a response grade from a low / moderate entry level in all three scores. This is not surprising as this skill area is deliberately delayed until the second year, as part of the Information and Computer Systems course.
- Word-processing skills which were high on entry, have improved further, and by the year end are used nearly as much and with as much skill and confidence as students use e-mail.
- Reported Windows usage is lower than both w-p and e-mail. This is interesting given the sole use of the Windows platform in our Faculty, presumably students use few of the windows facilities rather than use windows less than other applications (anecdotal evidence suggests that most students with 'home' computers use PCs).
- Reported spreadsheet skills (both rating and confidence) start at moderately low levels - at least compared to use of windows and word-processing. Although these skills improve over the year the mean rise is by less than half a response grade, from moderately inadequate to barely adequate. This is perhaps disappointing given the importance of this essential 'toolbox' skill to accountants and financial analysts.

Given the generally higher reported skills and confidence levels of 1997 entrants over 1996 entrants and the positive learning effect of a years study, it is interesting to compare the end of year 1 1996 cohort responses with those on entry for 1997. Though not formally presented here, under all scoring categories the taught 1996 cohort responses are higher than those given by 1997 entrants. The differences appear to be quite small for both skills rating and confidence levels for the basic IT skills (windows, spreadsheets & word-processing) and equally low for databases. However, the differences are large for e-mail, using the WWW and for statistical packages. The last of these is unsurprising due to the specialist nature of the skills. The disappointing aspect of this comparison is that reported skills and confidence in using spreadsheet packages is so small - reinforcing the concern that these essential skills are not sufficiently enhanced by the first year classes. These are, however, skills that the curriculum develops via integration within second year projects and courses.

Discussion, conclusions and ways forward.

This research started with the idea of investigating students IT skills upon entry to HE, so that it might be better known where to start IT training, and how students' IT skills developed as they progressed though their studies, so that it might be learnt if what is provided seems to work.

Before comparing the data on students starting their degree in 1996 and 1997 it was hoped that there would be some significant differences. However, the extent of the significant differences found was unexpected. Not only are these differences statistically significant, some of them are substantial and suggest that some of the time and resource that is spent on teaching IT skills could be better used elsewhere, as the data indicates that the long assumed 'myth' of the IT / computer literate youth is indeed becoming a reality. If this is so there are likely to be significant implications for teaching - and not only with regard to attempts to develop basic IT skills.

Yet, even within the context of the possible realisation of the long thought mythical IT literate youth, the evidence suggests that there are still a large number of students who start their studies without the IT skills they are likely to need if they are to reach their full potential. Provision must, therefore, be made for both ends of the spectrum - and in a way that motivates and avoids alienation. It is this twist which is likely to prove the most difficult to meet.

Clearly, within the data reported here there are lessons at different levels. The meta effects are at one extreme. At the other, are lessons which are specific to the Department / degree programme. For example, the striking lack of development of spreadsheet skills within the first year. At the very least, care must be taken to ensure that these skills are developed in the second and subsequent years. Also, at an intermediate, institutional level it may soon become important to ask if the centrally funded (but not free) mass IT skills courses are an efficient way of ensuring baseline IT competence.

It is important to recognise the limitations of this study. Firstly, the data analysed only relates to students' IT skills over a two year period. The data cannot therefore be relied upon to identify the long term trends which have to be established before major changes are made to course content with confidence. However, whilst it is possible that either the 1996 or 1997 cohort of students were 'abnormal', the data is supportive of the commonly held view that youths' IT skills are improving through time.

Despite this problem of generalisability, the skill levels reported here, the variability within cohorts and the changes between the two cohorts investigated, are all important indicators of what at least may be happening to entrant student skills. Given the inertia built into the HE system in terms of the time required for curriculum changes, the time required to train staff and the problems of changing staff attitudes, these results are at least important early indicators with a potential for prompting action before it is too late. Monitoring of students' entrant IT skills is continuing in order to further investigate trends.

Secondly, the study is clearly parochial, but should this Department's (accounting) students be expected to be significantly different from (accounting) students elsewhere?

Thirdly, the data is all self-assessed (and self-reported). As Gazely & Pybus (1997) point out, it is all too possible that inappropriate integration of IT skills training may lead students to believe that they have skills that they don't possess (p8). In an ideal world it might be good to be able to repeat this type of analysis with objective data on skill levels as well as subjective confidence data. But this is non-trivial problem as, in order to assess skills, it is necessary not only to test knowledge but also to consider whether they can put that knowledge into action (Gazely & Pybus, 1997, p3). Further, it seems that confidence is at least as important as the technical skills. All too often students fail to thrive in computer-based work, not because of a lack of skills but, because a lack of confidence in the skills they have.

Recognising the limitations of this work there are implications, not the least of which is that serious consideration should be given to the way that IT skills development is integrated within courses, ensuring that it is integrated in a way that allows for the variety of skills that students bring with them to university. Those with higher level skills must be motivated to develop them further whilst avoiding alienating those with lower skills and, in particular, without eroding the latter's confidence. If the correct balance can be found, it may well be possible to move towards improving not just the teaching of IT skills but also the teaching of the accounting, finance and business skills that are the core of our discipline, including the way that IT is changing its very nature (Collier *et al*, 1990, Spaul & Williams, 1991).

A number of other interesting questions are raised by these results, including: are these IT skills ratings related to student performance? Are there gender, social background or prior educational attainment effects either in entrant skills or skills development? How important is access to computers at home? How stable are these results through time? These are all part of ongoing research.

Bibliography

Bhaskar, K.N. (1982) Use of computers in accounting courses. *Accounting and Business Research* **13**(Winter: 49), 3-10.

Bhaskar, K.N. (1983) Computers and the choice for accountancy syllabuses. *Accounting and Business Research* **13**(Spring: 50), 83-93.

Bhaskar, K.N. & Kaye, G.R. (1985) Use of computers in accounting courses: A reply to Collins. *Accounting and Business Research* **15**(Summer: 59), 239-240.

Brudney, J.L. Hy, R.J. & Waugh, W.L. (1993) Building microcomputing skills in public administration graduate education - an assessment of MPA programs. *Administration and Society*, Aug 1993 25 (2), 183-203.

CIMA (1996) Examination Syllabus (revised). London: The Chartered Institute of Management Accountants.

Cole, G, (1996) Essential Learning. *Accountancy,* Feb, 118(2), 64-66.

Collier, P.A., Kaye, G.R., Spaul, B.J. & Williams, B.C. (1990) The use of computers in accounting courses: A new perspective - A comment. *Accounting and Business Research* 20 (80), 353-354.

Collins, R. (1983) Use of computers in accounting courses: A comment. *Accounting and Business Research* **13**(Autimn: 52), 313-315

Crawford, M. & Barr, S (1998) Integrating IT skills: Are Green Men the Answer? Paper presented at the 9th CTI-AFM conference April 1998, York.

Creanor, L, Durndell, H, Henderson, F P, Primrose, C, Brown, M I., Draper, S W and McAteer, E (1995) "A Hypertext Approach to Information Skills: Development and Evaluation" TILT Report no 4, University of Glasgow (contents & extracts at http://www.elec.gla.ac.uk/TILT/report4.html)

Draper, S W, Brown, M I, Henderson, F P, McAteer, E (1996) "Integrative Evaluation: An emerging role for classroom studies of CAL" Computers & Education, Vol. 26 no. 1-3 pp. 17-32. (also at http://www.psy.gla.ac.uk/#steve/IE.html)

Er, M.C. & Ng, A.C. (1989) The use of computers in accounting courses: A new perspective. *Accounting and Business Research* 19 (79), 319-326.

Fayter, D. & Martin, A. (1997) IT programmes and their implications for policy makers. Presentation at ALT-C 1997, the annual conference of the Association for Learning Technology, Wolverhampton, 15-17 September 1997.

Gazely, A. & Pybus, L (1997) Beyond the basic IT skills. Paper presented at the 8th CTI-AFM conference, April 1997, Newport Gwent. In *Selected proceedings 8th Annual CTI-AFM Conference, Newport* , 52-58

Harris, D. (1997) The IT Pathway in the CIMA Syllabus. *Account* (CTI-AFM) **9** (1), 15-17.

ICAEW (1989) Examination Syllabuses - consultative paper. London: The Institute of Chartered Accountants in England & Wales.

ICAEW (1996) Education and training: Survey of members (Research study conducted for ICAEW May - August 1996), Accountancy, October, **118**(10), 122-124

ICAEW (1997a) Examination syllabus. London: The Institute of Chartered Accountants in England & Wales.

ICAEW (1997b) *Succeeding with information technology: The impact of IT on Chartered Accountant in small and medium-sized enterprises*. London: The Institute of Chartered Accountants in England & Wales.

Marriott, N. (1997) A longitudinal study of student attitudes towards, and ability to use, computers in higher education. Paper presented at the 8th CTI-AFM conference, April 1997, Newport Gwent. In *Selected proceedings 8th Annual CTI-AFM Conference, Newport*.

Nicholson, A.H.S. (1997) IT TQA & Dearing. *Account* (CTI-AFM) 9 (3), 11-16.

Oliver, R (1993) A comparison of students' information technology skills in 1985 and 1991. B*ritish journal of educational technology : journal of the Council for Educational Technology*. 24 (1), 52-62.

Pybus, L (1997) Accelerating IT skills some reflections on the motivation of student learning. *Proceedings of the 5th Annual conference of the Nottingham Business School Teaching & Learning Group*. Nottingham, 19 September 1997.

Rees, O (1994) Self-perception of PC skill levels among MBA and business studies users of computer based learning. Paper presented at the 5th CTI-AFM conference. In *Selected proceedings from the 5th annual CTI conference 1994,* 31-43. 28-29 March 1994: Coventry. Norwich: Computers in Teaching Initiative - Centre for accounting Finance and Management, University of East Anglia.

Sangster, A. (1992) Computer-based instruction in accounting education *Accounting Education* Vol 1 (1), 13-32.

Siegel, S and N J Castellan (1988) *Nonparametric Statistics for the Behavioural Sciences.* New York, McGraw-Hill.

Spaul, B.J. & Williams, B.C. (eds) (1991) *Accounting and IT: The Impact of Information Technology*, London, Chapman Hall.

Stoner, G. (editor) (1996a) *Implementing Learning Technology.* LTDI: the Learning Technology Implementation Initiative, ICBL, Heriot-Watt University. (URL: http://www.icbl.hw.ac.uk/ltdi/implementing-it/cont.htm).

Stoner, G (1996b) A conceptual framework for the integration of learning technology. In *Implementing Learning Technology* Stoner (1996a).

Stoner, G. (1997) Implementation Issues: Leaning Towards Learning. *Account*. (CTI-AFM), **9**(2) 13-23 (Also Plenary paper published in the *Selected Proceedings from the 8th Annual CTI-AFM Conference*)

Stoner G N and Nisbet M J (1989) Computers rule OK: A study of student attitudes to computers. Paper presented at the *Scottish Meeting of the BAA, Edinburgh, September 1989*. Revised version presented at *BAA 1990 annual conference*, Dundee

Togo, D.F. & McNamee, A.H. (1995) Computer integration into the accounting curriculum: learning benefits, problems, and guidelines, *Journal of Accounting Education,* Vol 13 No 2 pp. 149-158.

Williams, B.C. (1991) The impact of basic accounting concepts and education: an overview. In Spaul, B.J. & Williams, B.C. (1991), 1-16.

Williams, P. & Rastall, P. (1997) Courses for Horses: matching provision to changing needs in an IT entitlement for first year students. Presentation at ALT-C 1997, the annual conference of the Association for Learning Technology, Wolverhampton, 15-17 September 1997.

Wildey, E.M. (1990 / 1991) Computers in accounting & education: how the changing role of accountants could be reflected in courses. In Spaul, B.J. & Williams, B.C. (1991), 445-466. Also published by CIMA in 1990.

Appendix 1: Frequency of responses: Sets 1 & 5

Set 1 - 1996 cohort on entry: Set 5 - 1997 Cohort on entry

Set 1	Responses (without missing)	wr	wu	wc	wn	wp	sr	su	sc	sn	sp	tr	tu	tc	tn	tp	er	eu	ec	en	ep	3r	3u	3c	3n	3p	ar	au	ac	an	ap	dr	du	dc	dn
	No.	87	86	86	88	88	87	86	86	88	88	88	87	87	88	88	88	87	86	88	88	88	87	87	88	88	88	87	86	88	88	88	87	86	88
	1	13	22	15	69	64	22	46	31	70	69	11	16	10	45	45	74	76	72	81	79	68	70	69	74	71	80	80	79	86	86	35	49	44	71
	2	19	46	23			31	34	22			6	38	12			8	6	7			6	9	4			3	5	2			23	25	18	
	3	36	13	31			22	4	23			24	21	32			4	3	6			9	5	9			5	2	5			22	11	15	
	4	17	4	16			12	2	10			44	12	32			2	2	0			4	3	5			0	0	0			8	2	9	
	5	2	1	1			0	0	0			3	0	1			0	0	1			1	0	0			0	0	0			0	0	0	
	0				19	24				18	19				43	43				7	9				14	17				2	2				17
	As Percentages	wr	wu	wc	wn	wp	sr	su	sc	sn	sp	tr	tu	tc	tn	tp	er	eu	ec	en	ep	3r	3u	3c	3n	3p	ar	au	ac	an	ap	dr	du	dc	dn
	No.	87	86	86	88	88	87	86	86	88	88	88	87	87	88	88	88	87	86	88	88	88	87	87	88	88	88	87	86	88	88	88	87	86	88
	1	15%	26%	17%	78%	73%	25%	53%	36%	80%	78%	13%	18%	11%	51%	51%	84%	87%	84%	92%	90%	77%	80%	79%	84%	81%	91%	92%	92%	98%	98%	40%	56%	51%	81%
	2	22%	53%	27%			36%	40%	26%			7%	44%	14%			9%	7%	8%			7%	10%	5%			3%	6%	2%			26%	29%	21%	
	3	41%	15%	36%			25%	5%	27%			27%	24%	37%			5%	3%	7%			10%	6%	10%			6%	2%	6%			25%	13%	17%	
	4	20%	5%	19%			14%	2%	12%			50%	14%	37%			2%	2%	0%			5%	3%	6%			0%	0%	0%			9%	2%	10%	
	5	2%	1%	1%			0%	0%	0%			3%	0%	1%			0%	0%	1%			1%	0%	0%			0%	0%	0%			0%	0%	0%	
Set 5	Responses (without missing)	wr	wu	wc	wn	wp	sr	su	sc	sn	sp	tr	tu	tc	tn	tp	er	eu	ec	en	ep	3r	3u	3c	3n	3p	ar	au	ac	an	ap	dr	du	dc	dn
	No.	121	121	120	123	123	123	122	122	123	123	123	123	121	123	123	122	122	122	123	123	123	123	123	123	123	123	122	121	123	123	122	122	123	123
	1	6	12	8	60	62	13	33	18	92	91	4	6	4	38	41	60	77	63	102	98	45	63	53	99	96	76	90	74	114	110	26	51	36	94
	2	18	54	20			35	67	42			9	39	11			28	22	23			35	32	29			26	22	28			42	49	39	
	3	40	34	49			42	15	42			18	36	29			13	3	16			18	12	20			14	5	15			33	19	30	
	4	40	18	32			30	5	18			63	28	53			11	9	10			18	9	14			5	4	3			16	2	15	
	5	17	3	11			3	2	2			29	14	24			10	11	10			7	7	7			2	1	1			5	1	3	
	0				63	61				31	32				85	82				21	25				24	27				9	13				29
	As Percentages	wr	wu	wc	wn	wp	sr	su	sc	sn	sp	tr	tu	tc	tn	tp	er	eu	ec	en	ep	3r	3u	3c	3n	3p	ar	au	ac	an	ap	dr	du	dc	dn
	No.	121	121	120	123	123	123	122	122	123	123	123	123	121	123	123	122	122	122	123	123	123	123	123	123	123	123	122	121	123	123	122	122	123	123
	1	5%	10%	7%	49%	50%	11%	27%	15%	75%	74%	3%	5%	3%	31%	33%	49%	63%	52%	83%	80%	37%	51%	43%	80%	78%	62%	74%	61%	93%	89%	21%	42%	29%	76%
	2	15%	45%	17%			28%	55%	34%			7%	32%	9%			23%	18%	19%			28%	26%	24%			21%	18%	23%			34%	40%	32%	
	3	33%	28%	41%			34%	12%	34%			15%	29%	24%			11%	2%	13%			15%	10%	16%			11%	4%	12%			27%	16%	24%	
	4	33%	15%	27%			24%	4%	15%			51%	23%	44%			9%	7%	8%			15%	7%	11%			4%	3%	2%			13%	2%	12%	
	5	14%	2%	9%			2%	2%	2%			24%	11%	20%			8%	9%	8%			6%	6%	6%			2%	1%	1%			4%	1%	2%	

Variable names / codes are detailed in Table 3.
For the n & p variables; "yes" responses are coded "1" and "no" as "0".

[NB on some printers this table is truncated – the last col. is often missing.]