A SELF-ASSESSMENT OF ENTRY-LEVEL PC SKILLS BY NEWLY QUALIFIED IRISH CHARTERED ACCOUNTANTS

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Abstract

This article examines the extent to which Irish university accounting curricula provide the PC skills necessary to prepare graduates for a career in accountancy. The entry-level self-perceived PC skills of accounting/commerce (relevant) degree holders are compared with the entry-level self-perceived PC skills of those holding other qualifications for all newly qualified members of the Institute of Chartered Accountants in Ireland admitted in one year. Significant differences were found between the two groups in almost all of the PC skills identified. The findings revealed that relevant degree-holders were much more PC literate when they commenced professional training than those holding other qualifications. No significant difference in entry-level self-perceived PC skills was discovered between male and female Irish chartered accountants. When the gender analysis was extended to include entrance qualification, the difference between relevant degree holders and those holding other qualifications, discovered in the main analysis, was confirmed within the gender groupings.

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1.   Introduction

Developments in IT, especially in recent years, have had a significant impact on the nature of accountants' work. The computer has progressed from being a mere computational tool (CTT) (Bhaskar, 1982) to become a productivity tool which forms an integral part of the accountant's working environment. Developments in computerisation are continually opening up new horizons to accountants as well as creating new challenges for them (Elliott, 1992). Accountants, for their part, are making effective use of technology such as Electronic Data Interchange and the World Wide Web to provide solutions to the challenges and problems of today's business environment. The importance of incorporating technology into accounting work practices has been addressed by accounting educators. In particular, emphasis has been placed on narrowing the gap between academia and practice by reflecting new technologies in accounting curricula (Elliott, 1992; Sangster, 1995; Goldsworthy, 1996; Sangster and Mulligan, 1997; Soriano, 1997).

However, before amending accounting curricula to take account of developments in IT, it is imperative that students' knowledge of basic PC skills, still considered vital in carrying out the accountant's role, is not neglected. For instance spreadsheets remain at the forefront of accounting work practices and are used on a daily basis by most accountants (Chandler and Marriott, 1994; Heagy and Gallun, 1994a; Marriott and Mellett, 1994; Goldsworthy, 1996). Familiarity with at least one integrated accounting package in terms of data input, processing and report generation is also a must for today's financial accountant. Knowledge of a word processing package is invaluable to the accountant when preparing documentation or writing reports. Likewise database creation and manipulation feature prominently as skills which assist the accountant in retrieving and analysing information. As a consequence, universities around the world include these basic PC skills, to varying degrees, as part of their accounting degree programmes.

The main objective of the study is to examine the extent to which university accounting curricula throughout Ireland[1] are providing these basic PC skills. This was achieved by surveying all newly qualified members of the Institute of Chartered Accountants in Ireland (ICAI) admitted in one year and asking them to assess their level of expertise in basic PC

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[1] This includes the whole island of Ireland, i.e. Northern Ireland (part of the UK) and the Republic of Ireland because the Institute of Chartered Accountants in Ireland, the professional body to which most Irish accounting graduates seek to belong, is an all Ireland body founded in 1888 and attracts membership almost exclusively from both jurisdictions.

skills upon completion of their prerequisite qualification prior to commencing professional training with the ICAI. The responses of those holding undergraduate and postgraduate accounting degrees that are accredited by the ICAI (hereafter referred to as relevant degree holders) were compared with those holding non-accounting degrees and other prerequisite qualifications (other qualification holders). The findings revealed significant differences between the two groups of respondents with respect to most of the basic PC skills identified. Those who entered professional training holding a relevant degree (RD) perceived themselves to be significantly better skilled in the use of operating systems, spreadsheets, databases, integrated accounting packages and word processing packages than those holding other qualifications (OQ).

The analysis was extended to consider the impact of gender on the self-perceived PC skills. No significant difference between male and female perception was revealed. When a combined examination of qualification type and gender grouping was carried out it revealed a number of significant differences which confirmed the findings of the main study.

This article presents the findings in some detail and discusses their significance in terms of tertiary accounting programmes. As a background to the analysis, the importance of computer literacy in tertiary accounting curricula is reviewed and discussed. A brief explanation of the various routes into professional training with the ICAI is then provided. The main body of the paper presents the statement of research hypothesis, the survey design and methodology and a discussion of the main findings. The issue of gender is then discussed. Conclusions are presented in the final section.

2.   The Importance of Computer Literacy in Tertiary Accounting Curricula

The research examining the impact of computerisation on tertiary accounting curricula confirms the importance which employers of accounting graduates, professional associations and accreditation requirements place on the extent to which computer skills have been included in academic accounting syllabi. Helmi (1986), identifies the widespread use of computers in the business community and accounting accreditation guidelines as two factors which have had an impact on integrating the computer into accounting education in the United States. Borthick and Clarke (1987), also referring to the US, emphasise the impact which computing skills have on graduates' ability to succeed in securing employment in

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accounting practice. Studies carried out by Waller and Gallun (1985), Bean and Medewitz (1987), Heagy and McMickle (1988) and Heagy and Gallun (1994b) confirm this relationship by suggesting that university accounting curricula should be tailored to meet the demands of employers with respect to computer literacy. Bromson *et al.* (1994), referring to the work of Benmergui-Perez (1986) carried out among Canadian employers, draw similar conclusions with respect to Australian and Hong Kong employers who expect a certain level of computer literacy among newly qualified accountants.

In the UK, despite Bhaskar's early work (1982; 1983) emphasising the impact that the growing use of computers in industry would have on the content of academic accounting curricula, little research has been carried out into the relationship between graduate employment opportunities and the content of academic accounting curricula as is the case in the US. However, recent studies in the area, while not necessarily agreeing the detail, have generally confirmed Bhaskar's 1982 prophecy, and cited prospective employment opportunity as a factor influencing the level of PC skills taught in accounting courses at UK universities (Chandler and Marriott, 1994; Marriott and Mellett, 1994).

The influence of accounting accreditation requirements on academic accounting curricula in the UK is self-evident. The Board of Accreditation of Accountancy Educational Courses (BAAEC), which "assesses whether students should be granted exemptions from some of the examinations of the UK professional bodies on the basis of the course which they complete at college or university" (Sangster, 1992, p.14), requires that PC skills, i.e. hands-on exposure to IT, should be integrated into all accounting modules, particularly management accounting, taxation, and financial accounting with spreadsheets being the category of software they would most expect to see integrated. There should also be hands-on use of a general accounting package.

Er and Ng (1989), do not directly confirm that graduate employment opportunities influence the content of tertiary accounting curricula in Ireland, but time spent by the authors in Irish universities *inter alia*, led them to accept the view expressed by Waller and Gallun (1985) that undergraduate accounting courses should reflect PC skills required by employers. A survey carried out among Irish chartered accountants in 1989/90 into the skills and knowledge areas regarded as important for accountants working in industry and practice revealed that a knowledge of computer information systems was considered important, (Clarke, 1990). Furthermore, research has shown that accounting practices in Ireland, the

foremost employers of Irish accounting graduates, make extensive use of computers in the work environment (McCourt and Moan, 1997) and by implication would welcome new recruits possessing PC skills.

With respect to the influence of professional associations on undergraduate accounting courses in Ireland, the ICAI offers accreditation for theoretical computer knowledge only and not for hands-on skills. However, universities and colleges offering theoretical computer courses to gain exemption from professional examinations would probably include a PC skills element as well. Furthermore, several Irish universities seek accreditation from the BAAEC and must therefore take its requirements into account. Consequently, it seems reasonable to assume that the content of tertiary accounting courses in Ireland is also influenced by prospective employment opportunities and professional accreditation.

The following "fundamental" PC "skills . . . are widely regarded as the minimum set of skills that all professional accountants must have prior to qualification:

- ability to use a word processing package
- ability to use a spreadsheet package
- ability to use a database package
- ability to use at least one basic accounting package" (IFAC, 1995, Sc.58).

Research analysing the relationship between the PC skills required by professional associations, accreditation bodies and employers on the one hand and the computing subjects included in university accounting curricula on the other, confirms that the PC skills listed above are those most often demanded by employers of accounting graduates. They should be incorporated into all tertiary accounting programmes as a basic requirement (Waller and Gallun, 1985; Borthick and Clark 1987; Seddon, 1987; Heagy and McMickle, 1988; Er and Ng, 1989; Bromson *et al*., 1994; Heagy and Gallun, 1994b). The overwhelming support for the inclusion of these skills in tertiary accounting curricula over the last thirteen years, has ensured that, to varying degrees, they have been included in academic accounting courses around the world. These are also the skills which the ICAI requires its students to have attained before being admitted to membership. Consequently, they are the PC skills in which Irish accounting graduates are assessed in this study.

3.   Route of Entry

There are six main routes of entry, identified in Table 1, Panel B below, into training with the ICAI. Those who enter via the Commencement Course route are school leavers who begin professional training immediately and have to pass four ICAI examinations, Professional I, Professional II (PII), Professional III (PIII) and the Final Admitting Examination to gain full admission to the Institute. However, route of entry at the commencement level now is becoming less popular because more school leavers are going on to study for relevant national qualifications which, if they pass with distinction or credit, gain them entrance at PII level[2]. Qualified accounting technicians who have obtained the requisite grades in their technicians' examinations can also commence professional training with the ICAI at PII level with three sets of professional examinations to complete. Those who enter at commencement level or as accounting technicians are non-graduates.

The remaining four routes of entry are for relevant and non-relevant graduates. The non-relevant graduates who enter the ICAI directly will begin their studies at the PII examination stage and those who go on to study a relevant postgraduate qualification will commence professional training at the PIII examination stage, thereby being from exempt PII. Relevant graduates who commence professional training immediately, do so at the PIII examination stage, having been exempt from PII. Those who receive both a relevant undergraduate degree and a relevant postgraduate diploma are exempt both PII and PIII examinations and commence professional training at the Final Admitting Examination stage.

4.   Hypotheses Statement

The purpose of this study is to identify the extent to which Irish university accounting curricula are providing the PC skills necessary to prepare graduates for a career in accountancy. Using data gathered by surveying all newly qualified members of the Institute of Chartered Accountants in Ireland, the self-perceived PC skills of relevant degree holders are compared with the self-perceived PC skills of those holding other qualifications when

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[2] Entry via relevant national qualification at PII level has only recently become available and was not directly addressed in the questionnaire options but would have been covered under option number 7 entitled "other". (see Table 1, Panel B).

both groups began professional training. A null hypothesis of no differences in PC skills is stated as follows:

H$_0$: There is no significant difference between the entry-level self-perceived PC skills of newly qualified members of the ICAI holding relevant degrees and the PC skills of those holding other qualifications.

5. Survey Design and Methodology

The data were gathered by means of a postal questionnaire sent to all newly qualified members admitted to the ICAI in 1997. The recipients were required, *inter alia*, to evaluate their PC skills competency as a result of their degree or other prerequisite programme when they first entered professional training three or four years previously. The self assessment was carried out retrospectively after the students had completed their professional studies and qualified as chartered accountants, by which time their experience in the profession should leave them better placed to judge the adequacy of the PC skills which they possessed on entering professional training. A retrospective analytical approach of this type was adopted by Bean and Medewitz (1987) and Heagy and McMickle (1988).

Questions in the survey instrument identified a list of computing skills which are expected of newly qualified chartered accountants by the ICAI and are included in its PC skills training programme (NDEC, 1997, p.1). The content of the Institute's PC skills course, in turn, reflects the recommendations outlined in International Education Guideline, IEG11 (IFAC, 1995). Two further PC skills recommended by IEG11, i.e. e-mail and on-line database access, have not been included in the Institute's PC skills programme to date. However, they have been included in the list of computer skills identified in the questionnaire to reflect the growing importance of electronic communication in general to today's chartered accountant (Sangster, 1995, Goldsworthy, 1996; Sangster and Mulligan, 1997, Soriano, 1997).

Since the ICAI educates students to a standard which enables them to carry out their work as chartered accountants effectively within the business community, the PC skills requirements of the ICAI, together with the two additional skills identified, are also used as a proxy for the PC skills demanded by employers of accounting graduates in Ireland.

Questions designed with reference to ICAI course material and IEG11 requirements were supplemented by information gathered following discussions with course developers and a review of the issues raised in the literature.

5.1   Pilot Survey

The survey instrument was piloted on a sample of 30 recently qualified members whose names were selected at random from the Members' Directory (1996). The pilot survey was carried out to identify difficult or ambiguous questions and determine if any significant questions had been omitted. The questionnaire was revised as a result of responses received.

5.2   Main Survey

5.2.1   Data Collection

The revised questionnaire was mailed to all (557) of those who qualified as members of the ICAI in 1997. The Institute of Chartered Accountants in Ireland supplied the list of names and addresses. No sampling bias is envisaged since the sample is equal to the population. In total, 237 responses were received, three of which were unusable, resulting in an effective response rate of 42 per cent. This rate is considered satisfactory (Moser and Kalton, 1971; Frankfort-Nachmias and Nachmias, 1992). Sector (Panel A) and route of entry (Panel B) breakdown of respondents are presented in Table 1.

Early and late respondents[3] were compared to determine whether response bias exists between respondents and non-respondents[4]. A chi-square test of homogeneity revealed no statistically significant differences between the responses of the two sets of respondents.

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[3] A four week cut-off period was set for receipt of responses. Early responses (161) were those received in the first two weeks after the questionnaires were distributed while the late responses were those returned in the last two weeks.

[4] Late respondents were statistically adopted as surrogates for non-respondents (Wallace and Mellor, 1988).

Table 1
Analysis of Respondents

Panel A: By sector of employment						
	Female		**Male**		**Total**	
SECTOR	Count	%	Count	%	Count	
						%
Practice	56	56.6	65	48.1	121	51.7
Business	40	40.4	70	51.9	110	47.0
Not employed	3	3.0	-	-	3	1.3
Total	**99**	**100.0**	**135**	**100.0**	**234**	**100.0**

Panel B: By route of entry						
ENTRANCE ROUTE						
Commencement$^\alpha$	23	23.3	27	20.0	50	21.4
Technician$^\alpha$	4	4.0	10	7.4	14	6.0
Non relevant degree without diploma$^\alpha$	10	10.1	10	7.4	20	8.5
Non relevant degree with diploma$^\beta$	4	4.0	6	4.4	10	4.3
Relevant degree without diploma$^\beta$	34	34.4	44	32.6	78	33.3
Relevant degree with diploma$^\beta$	22	22.2	34	25.2	56	23.9
Other $^\chi$	2	2.0	4	3.0	6	2.6
Total	**99**	**100.0**	**135**	**100.0**	**234**	**100.0**

$^\alpha$ = OQ : Other Qualification

$^\beta$ = RD : Relevant Degree

$^\chi$ This category consists mainly of respondents who belonged to other professional bodies. They did
    not indicate whether they held a relevant degree and were therefore not included in the analysis

More than half (58%) of the respondents to the questionnaire were male. Fifty-two per cent of
all the respondents currently work in practice, while 47 per cent were based in the business
sector. Three respondents (all female) were unemployed. Among male respondents, slightly
more worked in business (52%) than in practice (48%). The reverse was true for females,
with 57% working in practice and 40% working in business. This sector breakdown among
newly qualified female Irish chartered accountants corresponds with the findings from an
earlier study in this area (McCourt and McDowell, 1995).

A total of 144 (62%) of the respondents obtained a relevant degree (RD) prior to
commencing their professional training making this generally the most popular route of entry.
The popularity stems from the fact that the RD route provides the greatest level of

professional examination exemption. A gender breakdown between RD holders and OQ holders revealed that almost the same percentage of males (62%) and females (61%) use the RD route.

5.2.2   Data Analysis

Data was analysed to determine whether a self-perceived entry-level PC skills differential existed between newly qualified members of the ICAI who studied accountancy at university as part of an accredited degree programme and those who studied for another prerequisite qualification.

Since the data collected are either on a nominal or ordinal scale of measurement, nonparametric statistical tests were considered to be the most appropriate analytical tools for testing the hypothesis (Siegel and Castellan, 1988).

In relation to the null hypothesis, respondents were asked to rate their expertise in seven areas of PC knowledge upon completion of their prerequisite qualification before commencing professional training. Their responses were given on a Likert scale of 1 (no experience) through to 4 (expert). A Mann-Whitney U (M-W U) test of significant differences was employed to test H_0. The M-W U test is a nonparametric test that is applicable for tests of independence between two independent sample means. It requires input to be on an ordinal scale. Results of the test are presented in Table 2.

Table 2
M-W U Test of Differences in the Entry-Level Self-Perceived
PC Skills of RD and OQ Holders Among Newly Qualified Irish Chartered Accountants

	Mean rank		Corrected for ties	
Prior experience of:	**RD***	**OQ****	**Z**	**M-W sig. (p)**
Operating system	128.78	90.02	-4.7823	.0001[a]
Spreadsheets	139.53	71.60	-7.9733	.0001[a]
Databases	137.42	75.21	-7.6063	.0001[a]
Integrated Accounting Software	129.31	89.12	-5.3347	.0001[a]
Word processing	132.20	84.15	-5.6878	.0001[a]
Web browser	112.68[#]	114.89	-1.2593	.4416
E-mail	118.05[#]	105.81	-2.4565	.1400

*   Relevant Degree route of entry; unless otherwise stated, n = 144.
**   Other Qualification route of entry; unless otherwise stated, n = 84.
#   n = 142.
a   indicates that differences are significant at 1%.

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6. Discussion of Results

The hypothesis of no difference in self-perceived PC skills between the RD group and the OQ group is rejected in five areas of computer knowledge: operating systems, spreadsheets, databases, integrated accounting software and word processing. The differences between the two groups' self-perceived PC skills are all statistically significant at the 1% level. In all but one of the PC skills, i.e. web browser, relevant degree holders returned higher mean ranks, demonstrating that they perceive themselves to possess greater PC skills than those holding another qualification, although the difference with respect to e-mail is not statistically significant. To assess the implication of the findings, it is appropriate to examine each of the computer skills in turn.

First, the significantly higher level of self-perceived spreadsheet skills among relevant degree holders would appear to confirm that Irish universities support the view expressed in several studies (Waller and Gallun, 1985; Heagy and McMickle, 1988; Heagy and Gallun, 1994a; 1994b; Goldsworthy, 1996) that, in designing accounting curricula, particular emphasis should be placed on the inclusion of spreadsheets. Only 8% of those holding another qualification considered themselves to be relatively proficient or expert in the use of spreadsheets. Relevant degree holders, on the other hand, appeared to be very satisfied with their spreadsheet skills with 54% describing themselves as relatively proficient or expert. This contrasts with the findings in Bean and Medewitz's (1987) study where the majority of professional accountants surveyed believed their entry-level spreadsheet skills, as accounting graduates, were wholly inadequate. The ten years which have elapsed between these two studies may reflect the significant influence which employers of accounting graduates, professional associations and accreditation requirements have had on the extent to which spreadsheet skills have been included in academic accounting curricula.

The significant difference between the two groups with respect to self-perceived integrated accounting software skills implies that Irish universities are aware of the importance of these skills with respect to the future employability and professional acceptance of their accounting graduates. This finding supports the view expressed by accounting graduates, (Bean and Medewitz, 1987) and by employers of accounting graduates, (Heagy and Gallun, 1994b; Goldsworthy, 1996) that training in the use of computerised accounting systems should be included in university accounting curricula.

The difference between the RD group and the OQ group with respect to self-perceived knowledge of database systems is also significant at the 1% level. This may be a more surprising result since database systems have a much broader application than spreadsheets and integrated accounting software which are directly associated with the work carried out by accountants. However, accounting academics have for some time appreciated the importance of incorporating database systems into their curricula since "this software is very useful for teaching systems concepts", (Heagy and Gallun, 1994a, p.27). Studying database systems provides accounting students with the opportunity to comprehend, amongst other things, file structure and information retrieval and analysis at a basic level. In the absence of dedicated programming courses in many accounting curricula, databases serve a very useful purpose. Indeed as far back as 1986 the AAA Committee on Contemporary Approaches to Teaching Accounting Information Systems recommended substantial coverage of database topics on AIS courses (AAA, 1986). The incorporation of basic database skills into university accounting curricula also reflects the demands made by employers (Waller and Gallun, 1985; Heagy and Gallun, 1994a). With 71% of relevant Irish graduates professing some knowledge in database systems it would appear that Irish Universities appreciate the importance of including database skills in their accounting curricula.

The difference between the two groups' self-perceived knowledge of operating systems is also very significant (1%). This is an interesting result given that some of those students in the OQ category may have studied computer–related subjects or had experience working in a computer environment before commencing professional training. This finding appears to support the view expressed in Waller and Gallun's (1985) study that employers prefer entry-level accountants to have studied operating systems. Incorporating operating systems into accounting curricula would have been more difficult 13 years ago because, for teaching purposes, many universities were still using mainframe and mini computers with proprietary operating systems. However, the increased use of more powerful, less expensive microcomputers and the accompanying move towards open systems means operating system skills are easier to incorporate into an academic accounting syllabus and more useful to the graduate accountant in practice (Heagy and Gallun, 1994a). This situation appears to be reflected in Irish academic accounting curricula.

The statistically significant difference between the self-perceived word processing skills of the two groups of newly qualified accountants is probably the most surprising result. Word processing packages have been widely available for some time and most students,

irrespective of their academic background, would use a word processing package for preparing essays, theses and so forth. Likewise, those who entered the profession from a working background, would have been expected to have had some experience in the use of word processing software. Notwithstanding this general awareness of word processing, it is important that accounting educators continue to include word processing skills in their accounting curricula to reflect the wide-spread use of this type of software in the accountant's working environment (Heagy and Gallun, 1994a). Consequently it is encouraging to discover that this area has not been neglected in Irish undergraduate and postgraduate accounting curricula.

Very few people in either group claimed even limited knowledge of e-mail or web browser software. Consequently, the lack of statistical difference between the two groups of newly qualified Irish chartered accountants is explained by the fact that neither group has had a great deal of exposure to these two types of software. However, accounting educators are becoming more aware of the importance of electronic communications in general to the accountant (Elliott, 1992; Sangster, 1995, Goldsworthy, 1996; Sangster and Mulligan, 1997). This increased awareness together with minimal transmission costs incurred by universities should ensure that the results of any future survey with respect to e-mail and web browser skills carried out among accounting graduates would provide a more encouraging result.

The influence of BAAEC requirements especially with respect to spreadsheet and integrated accounting skills may also be reflected in these results. However, this influence should be treated with some caution since less than 50% of Irish universities currently seek accreditation. Furthermore, this percentage may not have been a constant over the last few years.

7.   The Impact of Gender on Perceived PC Skills

An important area of study with respect to student performance is gender difference. Consequently, the impact of gender on PC skills perception was considered as a sub-theme to the main investigation. All responses were classified according to gender and a M-W *U* test of significant differences was applied to the data. The results are presented in Table 3.

Table 3
M-W _U_ test of differences in the entry-level self-perceived PC skills
of male and female newly qualified Irish chartered accountants

	Mean rank		Corrected for ties	
Prior experience of:	Female*	Male*	Z	M-W sig. (p)
Operating system	113.01	120.79	-.9703	.3319
Spreadsheets	111.74	121.72	-1.1841	.2364
Databases	110.55	122.60	-1.4846	.1376
Integrated Accounting Software	115.81	118.74	-.3906	.6961
Word-processing	115.17	119.21	-.4832	.6289
Web browser	114.39[#]	118.01	-1.2123	.2254
E-mail	112.93[#]	119.06	-1.2332	.2175

* Unless otherwise stated, n (female) = 99 and n (male) = 135
#   n = 97.

No significant differences were found in the self-perceived skills of male and female respondents in the seven areas of computer knowledge under consideration. A certain degree of divergence is noticeable in the mean ranking of the two groups. However, these differences are not statistically significant at even the 10% level. Therefore it would be appropriate to state, with 90% confidence, that the self-perceived entry-level PC skills knowledge of both male and female newly qualified Irish chartered accountants was identical. Keef and Roush (1997) reported a similar finding when they tested for gender differences in self-concept in management accounting among second-level accounting students. However, Carpenter _et al_. (1993) reported a gender difference in grade expectation among introductory accounting students at the start of their course. A study carried out by Sangster and McCombie (1993) into perceived and actual performance between genders also discovered that, among second year undergraduate accounting students, males had a significantly higher estimation of their ability than females. Whilst the findings of the current study appear to contradict those of Carpenter _et al._ (1993) and of Sangster and McCombie (1993), a definite conclusion cannot be reached in the absence of actual performance data in respect of the Irish chartered accountants surveyed. Unfortunately, however, it would be practically impossible to collect actual performance data for this group given the vast diversity of sources.

Studies carried out into actual performance among male and female students have not lead to a consensus view either. Mutchler _et al._ (1987) and Tyson (1989) found that female students significantly outperform their male counterparts in differing academic settings while Hanks and Shivaswamy (1985) and Lipe (1989) found no such evidence. Doran _et al._ (1991), on the other hand, reported that male students outperformed their female colleagues.

8. Route of Entry Qualification and Gender

The gender dimension was further developed to combine the effect of gender and route of entry qualification on the self-perceived PC skills of newly qualified members of the ICAI. The four groups identified are set out in Figure 1 below.
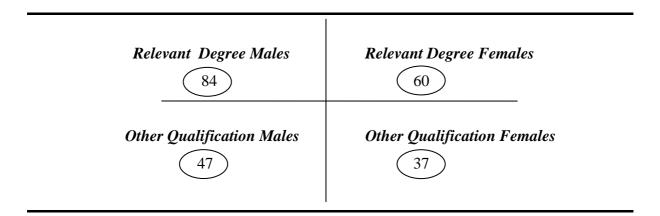
Relevant Degree Males	Relevant Degree Females
84	60
Other Qualification Males	**Other Qualification Females**
47	37

Figure 1
Route of Entry/Gender Classification Points

The objective of this exercise was to discover whether inclusion in any of these four groups had a statistically significant impact on the self-perceived entry-level PC skills of newly qualified members. The Kruskal-Wallis test was employed to test the hypothesis of independence of the four groups. The K-W test of independent samples is the nonparametric alternative to the one-way analysis of variance. It is used to compare the distribution of a variable between two or more groups. Like all distribution-free tests, it is free from the restrictive assumptions of parametric testing and can be applied to data measured on an ordinal scale. Results of the test are presented in Table 4.

Table 4

**Kruskal-Wallis Test of Differences in the Entry-Level Self-Perceived
PC Skills of Newly Qualified Irish Chartered Accountants: A Route-Gender
Comparison**

Prior experience of:	Mean rank				Corrected for ties	
	RD-FM[*]	RD-ML[*]	OQ-FM[*]	OQ-ML[*]	χ^2	M-W sig. (p)
Operating system	127.07	130.00	82.97	95.57	23.9000	.0000[a]
Spreadsheets	134.02	143.46	66.03	75.98	64.9175	.0000[a]
Databases	129.58	143.01	71.62	78.04	59.8752	.0000[a]
Integrated Accounting Software	129.32	129.30	86.51	91.17	28.6087	.0000[a]
Word-processing	137.28	128.58	71.85	93.83	35.6925	.0000[a]
Web browser	113.39[#]	112.18	109.50	119.14	5.0953	.1649
E-mail	116.66[#]	119.01	100.50	109.99	7.6024	.0500[b]

RD-FM = Relevant Degree Female
RD-ML = Relevant Degree Male
OQ-FM = Other Qualification Female
OQ-ML = Other Qualification Male.
* Unless otherwise stated, n(RD-FM) = 60; n(RD-ML) = 84; n(OQ-FM) = 37 and n(OQ-ML) = 47
# n = 58.
a and **b** indicate that differences are significant at 1% and 5% levels respectively.

The results reveal that when classified by degree type and gender, newly qualified ICAI members display significant differences in self–perceived entry-level PC skills with respect to five areas of knowledge: operating systems, spreadsheets, databases, integrated accounting software and word processing. The results support the main findings of the study set out in Table 2. Male RD-holders perceive themselves to be most skilful in the area of spreadsheets and databases, while their female counterparts perceive themselves most skilled in the area of integrated accounting software. Female OQ-holders are the least skilled group in all areas of self-perceived PC knowledge. This finding coincides with the conclusions of Sangster and McCombie (1993) and Carpenter *et al*. (1993) concerning perceived abilities.

9.   Conclusion

The findings of this research reveal that Irish universities appear to be including PC skills in their curricula which reflect the demands of the workplace. Newly qualified members of the Institute of Chartered Accountants in Ireland who had studied accountancy at university, as part of an undergraduate or postgraduate degree programme, considered themselves to be significantly more PC literate on entering professional training than their colleagues who had studied another entrance qualification. Apart from the fact that it is encouraging to see that

universities are responding to the demands of professional accounting in this way, the findings could impact on two distinct aspects of PC training. First, given that accountancy graduates appear to have gained significant knowledge in operating systems, spreadsheets, databases, integrated accounting software and word processing it may be appropriate to extend the computer content of tertiary accounting curricula to include new technologies. Secondly, when developing its own PC skills programme, the Institute of Chartered Accountants in Ireland, could consider differentiating between relevant degree-holders and other qualification-holders to ensure that resources are not squandered teaching students skills which they already possess.

A sub-analysis carried out in respect of gender difference revealed that among all newly qualified members of the ICAI, females and males had an almost equal perception of their PC skills. When the gender analysis was extended to include route of entry, the findings confirmed those of the main study and revealed significant differences in knowledge of operating systems, spreadsheets, databases, integrated accounting software and word processing between relevant degree-holders and other qualification holders within the gender groups.

Finally, it should be pointed out that the data used in this study did not record actual performance and as such may include an element of over or under estimation of ability on the part of the respondents. An interesting area for further research would be a comparison of actual marks attained by newly qualified Irish chartered accountants in the ICAI PC skills examination with their perceived performance in that examination to determine any under or over estimation of their PC skills.

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