IT Skills of University First Year Undergraduate Students: Two 2001 Matriculation Cohorts

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Abstract

The use of computers is becoming more widespread in education and in the wider Australian community. This communication reports the results of surveys of two cohorts of first year undergraduate students at The University of Western Australia and Deakin University, conducted at the beginning of the 2001 academic year. The surveys confirm that general IT skills among students are increasing, but that the level of skill is variable. This is consistent with a similar survey at Deakin University which was conducted at the beginning of 2000 [Lim, K. F. and Lee, J. (2000) IT skills of university undergraduate students enrolled in a first year unit, Australian Journal of Educational Technology, 16, 215 http://cleo.murdoch.edu.au/ajet/ajet16/res/lim.html].

Introduction

This paper is the second in a series of investigations on the computer skills of undergraduate students at the start of university.1 The use of computers is becoming more widespread in education and in the wider Australian community.2-6 Increasingly, universities are depending more on information technology (IT) in their mainstream activities. Some examples of IT usage in Australian university teaching and learning include:7-11

- the requirement for typed (word processed) reports;
- electronic submission of assignments;
- dissemination of materials through the Web, email, bulletin boards, etc.;
- online assessment;
- collaborative and cooperative learning through discussion groups and computer-mediated communication.

University policy and the use of information technology (IT) in university teaching and learning are implicitly based on the assumption that university students are becoming more computer literate. Indeed, this assumption seems to be supported by a number of studies, including the study by Meredith et al. of Year 10 secondary students in 1998,12 the UniServe Science study of University of Sydney students in 2000,13 and a study of Deakin University (DU) students in 2000,1 the last of which forms Part 1 of the current study. Note that the cohort of Year 10 students studied by Meredith et al.12 would have formed the majority of the students who started university in 2000.

At the start of the 2000 academic year, we conducted a 'quick and dirty' survey of beginning university undergraduate students enrolled in first year chemistry at Deakin University in order to finalise our plan to use IT in aspects of our teaching.1 It was our expectation that most students would be proficient12 in the use of word processors, spreadsheets, electronic communication and the Web: we wished to identify the level of IT usage at which we should start. A secondary objective was to quantify the (expected) minority that lacked those skills in order that we could plan remedial assistance. Surprisingly, although most students had some reasonable computer skills at the start of their university studies, the level of skill was not uniformly high.1 For example, our 2000 survey showed that 99% of students knew how to use a word processing program, but a significant number (16%) did not have the requisite skill level to prepare acceptable typed (word processed) reports because they did not know how to use superscripts or subscripts. In fact, 4% had never heard of using superscripts/subscripts in a typed (word-processed) report, even though all the students in the survey had previously studied high school chemistry, in which superscripts and subscripts are routinely used in chemical formulae (names).1

After our original report was published,4 Winship, in a report commissioned by the Council of Australian University Directors of Information Technology, concluded (inter alia):14

Overall, ... IT Literacy does not appear to be in very good shape to achieve the vision of “The Way Forward”, except in a very few universities ... Overall, the IT Literacy of students appears to be very variable ... and pockets of non-users in all categories of students.

Although the Winship report is based on responses from university IT staff and academics involved in the use of IT for teaching and learning, rather than a direct survey of students, it confirms the findings of our original survey that students entering university in 2000 are not fully prepared to benefit from the universities' use of IT in teaching and learning.14 There is an urgent need for IT training for university students in order to achieve successful learning outcomes using IT and to satisfy the needs of future employers. All Australian universities should undertake yearly surveys to quantify the scope and level of IT knowledge and skill within their institutions in order to inform their strategic planning for both IT infrastructure and teaching and learning.

To the best of our knowledge, our 2000 survey is the only survey that investigates specific IT skills of university students (as opposed to general IT skills). Given the lack of hard data on specific IT skills, the current communication is an extension of our previous work.4

Sample student demographics and administration

Two cohorts of university students were surveyed at the start of the 2001 academic year. In each case, every student enrolled in a particular university unit (subject) was required to complete the survey.
The University of Western Australia (UWA) cohort was comprised of all students in the first year of the medical degree (MBBS) program. The total sample size was 130 with 53% female and 47% male. Approximately 23% had had prior university education, but the survey did not identify these students. The survey was administered online through the locally developed FlyingFish courseware, and students were required to complete the survey immediately after logging in for the first time. Students were able to complete the survey independently if they felt able, and others were given assistance to login and begin the survey at an introductory training session early in semester. As students were required to access learning materials through the FlyingFish, all students completed the survey.

The Deakin University (DU) cohort was comprised of all students in the first year unit (subject) SBC111 (Chemistry A) within the School of Biological and Chemical Sciences at Deakin University (Geelong campus). The total sample size was 84. The survey was printed on the front and back of a single sheet of paper: 3 students failed to respond to the questions on the back of the sheet, which included information on the student demographics. Hence analysis of the data used either 81 or 84 students as the sample size, as appropriate. The majority of students (82%) were enrolled in various degree programs (BSc, BForensicSc) within the Faculty of Science and Technology, 18% were enrolled in double-degree programs (BSc/BE, BSc/BA, BSc/BCom, BSc/BTeach, BSc/LLB), while 4% did not declare their enrolment details. 78% of students had no previous tertiary education, 5% had one or more years of non-university tertiary education, 10% had one or more years of university education, while 4% did not provide their educational background. 62% of the class were female and 38% were male.

Other researchers have noted that for voluntary surveys, there is a higher response rate from females. However, since the surveys in this paper were conducted in class time, the predominance of females in both the DU and UWA cohorts reflects actual enrolment numbers.

The survey design

The surveys used in this study were based on the previous design and intended to investigate the level of students' knowledge in the usage of IT. Survey-response options covered the range from no awareness to varying levels of expertise (see Reference):

- a. No awareness or knowledge;
- b. Awareness but no knowledge of usage;
- c. Knowledge to use the technology;
- d. Expert knowledge to use the technology;
- e. Sufficient expert knowledge to teach others to use the technology.

Responses (a) and (b) indicate that the student has no ability with the skill in question, while responses (c), (d) and (e) indicate varying levels of skill.

This study addressed the following general IT skills:

- Use of the World Wide Web;
- Use of electronic mail (email);
- Use of word processing programs; and
- Use of spreadsheets to analyse and plot numerical data.

The use of databases, the use of spreadsheets apart from analysing and plotting numerical data, the use of (multimedia) presentation packages (e.g. PowerPoint), the ability to create web pages, and other general skills were not addressed.

In addition to the general skills, the survey addressed several specific IT skills such as the use of keyword searches on the Web, or the use of superscripts and subscripts within word processing programs. The version of the survey used at The University of Western Australia examined a smaller range of specific IT skills, than the Deakin University survey. (Copies of both the UWA and DU versions are available on request from the authors.)

Discussion

General IT skills

The proportion of first year university students who have a general IT skill is listed in Table I. It is clear that the percentage of university students who have knowledge of core IT skills in the areas of Web, email, and word processing usage has increased. Since the results for Sciences and Technology students at The University of Sydney were consistently 3-6% higher than the university average (see Table I), we can expect approximately 90% or more of the overall university population in 2001 to have knowledge of these IT skills.

The extent of knowledge of spreadsheets is significantly lower than for the other general skills. This may be due to the use of spreadsheets being less integrated into most high school curricula than Web, email, and word processing usage.

There is a high correlation in the pattern of IT skills (see Table I). Over 90% of students are multi-skilled. Of the 10% or less of students at UWA and DU who only have one or two general computer skills, with one exception, all know at least one of Web browsing or word processing. This suggests that student computer training can be designed to build on assumed knowledge in one or the other of these skill areas. Of the 298 students in the 2000 and 2001 surveys at DU and UWA, only 2 had no computer skills.

Generally, males have a greater extent of computer skills, but this is not true in every instance (see Table I and Table II). The percentage of male students who have all four general skills is higher than females at both Deakin University and The University of Western Australia (see Table II). The only skill where male students have a significant advantage over females, in all the tabulated data, is in the use of spreadsheets (see Table I). These observations are consistent with anecdotal evidence and with the results of earlier surveys.

Specific IT skills

The cross tabulations (‘correlations’) between responses for different questions/statements yield much more useful information. Table III - Table VII present cross tabulation data where a specific skill (e.g. use of superscripts/subscripts) is cross tabulated with the general skill...
Specific IT skills in Internet usage

In 2000, a significant number of students who claimed knowledge of how to use the Web, did not know how to use Web addresses (URLs). Table III shows that in 2001, the gap between the general and the specific skills has narrowed with only 7% of the total DU sample claiming the general Web skill but lacking the specific URL skill. (The UWA sample was not surveyed for this specific skill). Female students have significantly better skill level, with 92% of the total female sample having both the general and the specific skill, compared with 81% of the total male sample. At the same time, more males overestimated their skill, with 13% of the total male sample claiming the general skill while lacking the specific skill, compared with 4% of females.

Table IV shows that a significant number of students who know how to use the Web do not know how to download files. These students represent 26% of the total DU sample and 22% of the total UWA sample: this is a slight improvement over the 2000 DU results. A larger proportion of females (UWA: 33%; DU: 38%) have the general skill while lacking the specific skill, compared with males (8% and 10%).

Table V shows that most students (UWA: 50%; DU: 68%) do not know how to read 'portable document format' (PDF) files. Once again there is a significant gender difference, with more males (UWA: 78%; DU: 48%) having this skill while most females (UWA: 70%; DU: 78%) are unable to read PDF files.

Even if we focus only on students who are able to download files, there is a significant number who are still unable to read PDF files. Table VI shows that 24% of the total UWA sample and 38% of the total DU sample can download files but cannot read PDF files. Again, of those who have the more general skill, more males (UWA: 72%; DU: 45%) have the more specific skill, than do females (UWA: 28%; DU: 22%).

Table VII shows that of the students (UWA: 93%; DU: 92% of total samples) who know how to use email, a significant number (UWA: 29%; DU: 35% of total samples) do not know how to use email attachments. More females (UWA: 43%; DU: 40% of total samples) have the more general skill but lack the specific skill, than do males (UWA: 13%; DU: 26%).

Taken together, Table III - Table VII indicate that most students (UWA: 96%; DU: 98%) know how to use at least one or both of the WWW and email. However, a significant number (UWA: 20%; DU: 25% of total samples) do not possess all three of the specific skills of how to download files, use email attachments and read PDF files. The clear implication is that a significant number of students will require training before academic staff can distribute teaching and learning materials (i.e. electronic files) via electronic media. Furthermore, since it is common practice to put electronic documents on the Web in portable document format (PDF), even if students could download the information or could extract the file from an attachment, most will not be able to read the file! Given the increasing use of web-based and electronic teaching resources (References 4,7-11,15-26 are a minute sample) there is an urgent need for IT training on use of the Web and use of email for university students. Email, computer conferencing and instructional management systems are major innovations in flexible learning. (Also note that 70% of students did not know how to use computer conferencing: a decrease from the 2000 numbers.) These technologies also have the capacity for rapid submission of work and dissemination of feedback to students in distance education. However, the realization of this promise depends on the ability to send attached documents. This survey shows that a significant number of students in the sample do not have the requisite skill level to make full use of email and computer conferencing for electronic submission of work.

These results, which suggest that a full implementation of online teaching and learning is not appropriate for current students, also consistent with the UWA cohort having a preference for written rather than online tests and assessments (see Table VIII), with negligible gender-based differences.

Specific IT skills in word processing

The current survey indicates that in 2001 almost all students (>95%: see Table I) are able to use word processing software. The University of Sydney - 2000 data indicates that 83% of students felt that they had 'fair' to 'expert' keyboarding skills. Our study indicates that UWA students can type at the same speed as they can write, with a small but significant number expressing a preference to type rather than write: see Table IX. (This typing skill was not assessed in the DU survey.) Both The University of Sydney and UWA surveys show negligible gender-based differences.

The overall level of specific skills associated with word processing is not uniformly high, which is consistent with our 2000 results. However and most surprisingly, these skill levels consistently showed an across-the-board decrease between 2000 and 2001: see Table X. The ability to use superscripts and subscripts (DU: 62%) has dramatically decreased from 2000 figures (84%). The ability to use (insert) special characters and symbols (mathematical symbols and Greek letters) (75%) shows a slight decrease from 2000 (78%) while the ability to use (insert) equations (44%) has also shown a significant decrease from 2000 (30%). Likewise, the ability to use (insert) chemical structure (diagrams) into word processing documents has shown a significant decrease (2000: 20%; 2001: 7%).

Even more surprisingly, 11% of the students claimed 'I have not heard about putting superscripts and subscripts in documents'. This claim is all the more surprising when one considers the educational background of the survey sample - all the students have previously studied chemistry - and realise that superscripts and subscripts are part of the everyday language of chemistry: eg, O$_2$, N$_2$, SO$_4$$^{2-}$ and PO$_4$$^{3-}$ for oxygen and nitrogen molecules, and sulfate and phosphate ions respectively. This complete ignorance of superscripts and subscripts is an increase from the previous year (4%). This is part of a consistent across-the-board increase in ignorance and decrease in knowledge: see Table X.

While some disciplines may not require the use of superscripts/subscripts, special characters/symbols, equations and/or technical diagrams in their written work, but some or all of these features are required in the scientific and technologically-based disciplines. Thus Table I, Table IX and Table X indicate that students are becoming more capable of producing word processed submissions, they are becoming less capable of producing acceptable scientific submissions.

Specific IT skills in spreadsheet usage

Our 2000 survey indicated a satisfactory ability of students to use spreadsheets to analyze and plot numerical data (88% had the ability). However, more comprehensive data from The University of Sydney in 2000, as well as more recent data from UWA and DU by the...
current study indicates that the ability to use spreadsheets is much lower (50%, 62% and 77% respectively; see Table I), with males having slightly higher (9-14% points) ability than females.

It is unclear why the ability to use spreadsheets is so low, when the need to analyse and plot numerical data is an integral part of most scientific disciplines. We speculate that this trend may be due in part to the increasing use of programmable and graphics calculators in high school. Nevertheless, since spreadsheet programs are more powerful and versatile than advanced calculators, this trend indicates that students enrolled in scientific disciplines lack IT skills particularly helpful for their studies.

**IT skills of school leavers and students with some tertiary education**

In our survey, the DU students were identified as belonging to one of five groups:

a. first year of university education in 2001, direct from high school in 2000: for simplicity, this group (76% of the DU sample) will be termed 'direct school leavers';

b. first year of university education, with one or two years between high school and university, but no other tertiary education;

c. first year of university education, with more than two years between high school and university, but no other tertiary education;

d. one or more years of non-university tertiary education; and

e. one or more years of university education.

The statistics associated with groups (b) and (c) - students who have one or more years away from formal study after secondary school but no tertiary education - are not very reliable and so they have been removed from the analyses of this section. Groups (d) and (e) form another clear group: students who have some tertiary education.

In Table XI, we compare the IT skills of direct school leavers with those of students who have some tertiary education. For most skills there is less than a ten-percentage-point difference between the abilities of direct school leavers and those with some tertiary education. Given the small number of students in groups (d) and (e), this slight difference is not statistically significant.

There are four skills for which students with some tertiary education have much more ability than direct school leavers: see Table XI. The first three are specific skills associated with word processing that are required in the production of scientific reports, namely use of superscripts/subscripts, special characters/symbols, and equations: these were the specific skills that were lacking in the survey sample as a whole (see above subsection on "Specific IT skills in word processing"). The other skill with a very large difference in the abilities of the two groups is the use of computer conferencing software (e.g. FirstClass). Such software is used for collaborative learning, for online asynchronous discussion, for distribution of electronic teaching and learning materials and, to a small extent, for flexible learning. Clearly, very few students have experience with this type of learning environment in secondary school, but a significant number will experience it at university (or at least at Deakin University).

**Conclusions and summary**

**Generalisation to the Australian university sector**

Data from The University of Sydney suggests that the general computer skills of science students are consistently higher than the institutional average (see Table I). There is no published data comparing medical students with other university cohorts, but the data from this study suggests that medical and science students have comparable general computer skills. This is not surprising since medical students tend to be high academic achievers (and presumably this includes more-proficient-than-average IT skills). Similarly, science students are a self-selected group with interest in science and technology (and presumably this includes a higher-than-average interest in information technology). Hence the findings of this survey should either mirror or slightly overestimate the average abilities of the Australian student population at the start of university.

While the exact statistics would not reflect those of the overall Australian university sector, there is nothing that is a contraindication of the generalisation of our qualitative findings to the wider university community.

**Acknowledgments**

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a. The University of Sydney survey did not distinguish between the use of the Internet in general and email in particular.  
b. The survey by Meredyth et al. assessed this skill as the ability to create stories, poems, letters, etc. using a computer.  
c. The survey by Meredyth et al. assessed this skill as the ability to use graphs and diagrams, without specific reference to spreadsheets.

### Table I. Percentage of first year university students who have general IT skills

<table>
<thead>
<tr>
<th></th>
<th>2000 Deakin University Chemistry</th>
<th>2001 UWA Medicine</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>b</td>
<td>All</td>
</tr>
<tr>
<td>4 skills&lt;sup&gt;a&lt;/sup&gt;</td>
<td>75</td>
<td>69</td>
</tr>
<tr>
<td>3 skills</td>
<td>15</td>
<td>21</td>
</tr>
<tr>
<td>2 skills</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>1 skill</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>none</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

<sup>a</sup> The four skills in this Table are Web, email, word processing and spreadsheet usage.  
<sup>b</sup> The 2000 survey<sup>1</sup> did not include gender data.

### Table II. Percentage of first year university students who have a particular number of general IT skills<sup>a</sup>

<table>
<thead>
<tr>
<th>Knowledge of Web usage</th>
<th>Deakin University</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a</td>
</tr>
<tr>
<td>Knowledge of Web addresses (URLs)</td>
<td>1</td>
</tr>
</tbody>
</table>
| Responses: (a) No awareness or knowledge of usage; (b) Awareness but no knowledge; (c) Knowledge; (d-e) Expert knowledge

### Table III. Cross tabulation of percentage of students who have knowledge about Web addresses (URLs) and general Web usage for The University of Western Australia and Deakin University
### Table IV. Cross tabulation of percentage of students who have knowledge about downloading files and general Web usage

<table>
<thead>
<tr>
<th>Knowledge of downloading files</th>
<th>The University of Western Australia</th>
<th>Deakin University</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a</td>
<td>b</td>
</tr>
<tr>
<td>a</td>
<td>1</td>
<td>48</td>
</tr>
<tr>
<td>b</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>c</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>totals</td>
<td>0</td>
<td>7</td>
</tr>
</tbody>
</table>

Responses: (a) No awareness or knowledge of usage; (b) Awareness but no knowledge; (c) Knowledge; (d-e) Expert knowledge

### Table V. Cross tabulation of percentage of students who have knowledge about reading PDF files and general Web usage

<table>
<thead>
<tr>
<th>Knowledge of reading PDF files</th>
<th>The University of Western Australia</th>
<th>Deakin University</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a</td>
<td>b</td>
</tr>
<tr>
<td>a</td>
<td>6</td>
<td>23</td>
</tr>
<tr>
<td>b</td>
<td>18</td>
<td>1</td>
</tr>
<tr>
<td>c</td>
<td>1</td>
<td>30</td>
</tr>
<tr>
<td>d</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>e</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>totals</td>
<td>0</td>
<td>7</td>
</tr>
</tbody>
</table>

Responses: (a) No awareness or knowledge of usage; (b) Awareness but no knowledge; (c) Knowledge; (d-e) Expert knowledge

### Table VI. Cross tabulation of percentage of students who have knowledge about reading PDF files and downloading files from the Web

<table>
<thead>
<tr>
<th>Knowledge of general email usage</th>
<th>The University of Western Australia</th>
<th>Deakin University</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a</td>
<td>b</td>
</tr>
<tr>
<td>a</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>b</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>c</td>
<td>32</td>
<td>8</td>
</tr>
<tr>
<td>d</td>
<td>1</td>
<td>7</td>
</tr>
</tbody>
</table>
Table VII. Cross tabulation of percentage of students who have knowledge of email attachments and general email usage

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>I would only want to complete a test as a written paper.</td>
<td>12</td>
<td>12</td>
<td>11</td>
</tr>
<tr>
<td>I could complete a test online, but would prefer to sit a test as a written paper.</td>
<td>37</td>
<td>39</td>
<td>34</td>
</tr>
<tr>
<td>I do not mind whether I complete a test online or as a written paper.</td>
<td>39</td>
<td>38</td>
<td>41</td>
</tr>
<tr>
<td>I could complete a test as a written paper, but would prefer to complete it online.</td>
<td>12</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>I would only want to complete a test online.</td>
<td>none</td>
<td>none</td>
<td>none</td>
</tr>
</tbody>
</table>

Table VII: Cross tabulation of percentage of students who have knowledge of email attachments and general email usage

Table VIII. Percentage of UWA students expressing preferences for online versus written tests

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>I have inadequate typing skills.</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>I can type more slowly than I can write on paper.</td>
<td>21</td>
<td>22</td>
<td>20</td>
</tr>
<tr>
<td>I can type at about the same speed as I can write on paper.</td>
<td>37</td>
<td>35</td>
<td>39</td>
</tr>
<tr>
<td>I can type faster than I can write on paper.</td>
<td>27</td>
<td>32</td>
<td>21</td>
</tr>
<tr>
<td>I can type much faster than I can write on paper and prefer to type wherever possible.</td>
<td>13</td>
<td>9</td>
<td>18</td>
</tr>
</tbody>
</table>

Table IX. Percentage of UWA students expressing preferences for online versus written tests

Table X. Percentage of DU students with various levels of skill for specific skills associated with word processing

<table>
<thead>
<tr>
<th></th>
<th>Use of superscripts and subscripts</th>
<th>Use of special characters and symbols</th>
<th>Use of equations</th>
<th>Use of chemical structures (diagrams)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I have not heard about [this skill].</td>
<td>4</td>
<td>11</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>I have heard about, but do not know how to use [this skill].</td>
<td>12</td>
<td>27</td>
<td>21</td>
<td>20</td>
</tr>
<tr>
<td>I know how to use [this skill].</td>
<td>56</td>
<td>44</td>
<td>48</td>
<td>68</td>
</tr>
<tr>
<td>I have expert knowledge on [this skill].</td>
<td>16</td>
<td>12</td>
<td>16</td>
<td>6</td>
</tr>
<tr>
<td>I have sufficient expert knowledge to teach [this skill].</td>
<td>12</td>
<td>6</td>
<td>14</td>
<td>1</td>
</tr>
</tbody>
</table>

Table X: Percentage of DU students with various levels of skill for specific skills associated with word processing
Use WWW 97 100
Use Web addresses (URLs) 90 100
Download files 72 67
Keyword searches on the WWW 93 83
Use electronic mail 92 100
Use electronic mail attachments 57 58
Use spreadsheets to analyse and plot numerical data 77 83
Use word processing programs 97 100
Know how to do superscripts and subscripts 57 83 26
Know how to do special letters and symbols 74 100 26
Put equations into word processing documents 26 50 24
Put chemical structures into word processing documents 8 0
Read PDF files 34 25
Use computer conferencing software 23 67 43

a. A ‘significant difference’ is one larger than ca. 10 percentage points, because of the small number of respondents in the category of ‘students with some (other) tertiary education’.

Table XI. Percentage of DU students who have various IT skills. Influence of educational background.

References


2 Australian Education Council (1990) A National Statement on Mathematics for Australian Schools, Curriculum Corporation (Australia), Carlton (Vic).


35 Consultancy and Development Unit (Faculty of Education) (1999) *Educational Technology Survey*, Deakin Centre for Academic Development, Deakin University.


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