IT Haves and Have Nots:
IT Practices & Skills of Australian Transition University Students (2000)

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ABSTRACT

This paper looks at the changing patterns of technology use that transition students are bringing to University. Are transition students coming to University with technologically advanced skills? Are University departments and schools able to adapt to this changing pattern of use? This report is the latest in a six-year longitudinal study analysing the information literacy and knowledge trends of transition students at VUT. General Information Technology (IT) practices looked at the availability of IT to the students and specific IT skills refers to the use of business IT packages. Main findings are that home access to a computer has peaked, home Internet usage is escalating, computer knowledge and confidence is falling and a gap in IT skills is opening between dot.com transition students and other students.

IT HAVES AND HAVE-NOTS

A recent comprehensive report (Meredith, 1999) reported on the IT skills of year 6 & 10 students in Australian schools. This report found a developing divide is being created between IT "have" and "have-nots". The report recommends that students should be encouraged to develop IT skills and presents a compelling picture of the impact of change:

"Students will need the ability to cope with change and accept innovation, and their skills in using information technology will be inseparable from their analytical abilities and their capacity for creativity, teamwork, problem solving and communication."

Meredith (1999) points to the issues of access and equity and proposes that an IT divide exists in gender, economic status, disability and Indigenous groupings. Worldwide the International Adult Literacy Survey (as reported in ISR 122, 1999) has studied the literacy patterns of the OECD countries in 1994 and 1995. The 1995 reports comments:

"While most people can read, the real question is whether their reading and writing skills meet the challenge of living and working in today's information-rich and knowledge intensive society and economy."

The IALS (IALS, 1996) report identified gaps in the "knowledge society" where re-skilling the workforce tends to narrow the pool of highly skilled workers rather than increasing the spread of skilled workers. The term information competency (NBEET 1995) seeks to name the skills needed to operate within the business world of today. It covers the technology competence, information research skills and the development of higher order thinking skills. The computer is a major tool in developing this knowledge and that when technology is incorporated in the framework of information literacy students achieve more (Todd, 1995). Information literacy is one component of information knowledge and is defined (NBEET 1995) as the ability:

"To use information and information technologies effectively to find, select, and use information to create knowledge and insight"

A Cornell study (Davis, 1997) reported the IT skills that employees required from college graduates. The skills in greatest demand included advanced email, advanced numeric spreadsheet skills and Internet searching skills. This raises the question to what extent are transition students entering university with these skills in place and are Universities repeating or enhancing these skill sets? To be able to best meet the transitions student's needs university departments must first recognise the need for computer literacy and second be able to measure the information knowledge of the transition student. Many studies (NCES 1999-011, ILSSL 1997, NCES 1999-017, Wenglinsky 1998, Russell 1996, Oliver 1993) both in Australia and overseas have charted the IT skills of transition students. These studies all yielded results that showed that IT skills of transition students had increased significantly in preceding years and anticipated that the IT skills of students would always be escalating, matching the general trend within society. So is there an emerging IT elite, IT "Haves" or Dot.Com generation that are entering Universities? We define the term Dot.Com generation as transition students who have emerged from K-12 schooling with enhanced computer and convergent digital technology skills and the ability to adapt to emerging technological trends. This emerging generation raise many questions for University schools and departments. Are IT skills taught and used in university subjects becoming vocationally obsolete? Are transition students entering university with enhanced IT skills and are these students leading the IT curriculum within University courses. How will the Dot.Com generation be accommodated in curriculums with review processes that last 2 to 5 years? This paper seeks to add to the dialogue by presenting the latest results in a six-year longitudinal study looking at the changing Information Technology (IT) skills of transition students.

Research Questions

This study is a longitudinal project which tracks the changes in the IT profile of transition business students within the Victoria University of Technology. The information relating to IT skills will enable staff to plan where to commence information technology teaching. This will enable students to build upon their existing skill base. Two definitions of information technology usage are proposed. General IT practices look at the availability of IT to the student. These included home access, usage at home, previous information systems courses studied and computer knowledge. Specific IT applications referred to the use of business information technology. This included the familiar word processing, spreadsheet and database as well as the emerging Internet, chat, email and multimedia packages. The general research question for this study involves ascertaining the IT skills/practices of transition stu-

dents. More specific research questions were:

RQ 1. Are transition students IT practices & skills changing with time?

RQ 2. Is there a dot.com (IT Have) elite emerging?

METHODOLOGY

Data was gathered through a survey to all first year commencing business undergraduate students on all five undergraduate campuses of the university. From a possible 1000 students, 486 students completed the survey with 444 useable surveys giving a response rate of 44%.

Students

Students were surveyed in either the orientation week or the first week of their first semester at VUT. Questionnaires were distributed and collected in lectures. Distribution through these early lectures was chosen to maximise the participation by students at the critical interface of their transition into tertiary studies.

The Questionnaire

The questionnaire comprised two sections. The first section gathered information concerning each student. This included campus, study mode, student/parent birthplace, languages spoken at home, family history of participation in higher education and course studied. The second section gathered information on IT issues and skill levels. This included home use of computer, student self-perception of computer knowledge and confidence, previous experience in the use of computers and IT packages. Karsten & Roth (1998) demonstrated the use of computer self-efficacy as a viable measure of student computer knowledge. The question relating to their use of IT packages required the student to select their weekly use of packages from None, < 2 hours and > 2 hours. This question sought a more quantifiable measure of student's use of technology. For each question students responded to either preselected options or a 5 point Likert scale together with an option for additional comment. Research questions were tested by time series comparative frequencies, means, standard deviation, cross-tabulation frequency and Pearson's measure of correlation.

Demography

The proportion of female students (49%) is slightly lower than the proportion of females in the first year undergraduate population as a whole (50%). Students born overseas accounted for 28% of the cohort with higher proportions coming from families whose parents were born overseas (mother) 66% and (father) 69%. These figures have been consistent over the last five surveys. These figures should be considered together with the number of students who speak a language other than English at home (52%). Students who completed Year 12 in 1999 accounted for 72% of the cohort with 8% being ex-TAFE. Students who have University qualified parents account for 37% of the cohort. Students with siblings who have studied at University account for 49%. These "University family" figures are important as Victoria University would be identified as being populated by first generation university students.

RESULTS

Student IT Practices: Computer Access, Computer Knowledge & Confidence

A high proportion (Table 3) of the student cohort (94%) had access to a home PC, this was consistent with the 1999 result (Stein, 1999). The personal computer evolves every six months with new models issuing increased functionality. Tracking the model in use in homes showed that 60% of students had Windows 98 on their home computer compared with 39% (Win98) in 1999. Home access to the Internet was 65% compared with 45% in 1999. The mean for computer knowledge (Table 1) was 2.94 with a tight standard deviation of 0.92, this showed a decline over the last three surveys periods. For the whole cohort 28% indicated they felt they were of low knowledge, 48% average knowledge and 24% having high levels of knowledge. The cohort indicated that 29% felt they had low confidence with 36% of average confidence and 35% having high levels of confidence. The mean value for computer confidence was slightly higher than knowledge at 3.08 with a standard deviation of 1.07. When compared with previous surveys there is a decrease in confidence for the whole cohort.

Table 1. Computer Knowledge & Confidence % (N=444)

	2000 Cohort N=444	1999 Cohort N=529	1998 Cohort N=751	Oliver 1993 Expertise
Low Knowledge	28	27	22	45
Avg Knowledge	48	43	47	40
High Knowledge	24	30	31	15
Knowledge - μ	2.94	2.98	3.03	na
Knowledge - σ	.92	.92	.94	na
Low Confidence	29	23	20	na
Average	36	36	40	na
High Confidence	35	41	40	na
Confidence - μ	3.08	3.23	3.25	na
Confidence - σ	1.07	1.07	1.05	na

Table 2. Computer Knowledge & Confidence by Dot.Com % (N=444)

	2000 Cohort N=444	2000 Dot.Com N=369	2000 Other N=75	1999 Dot.Com N=389	1999 Other N=139	1998 Dot.Com N=521	1998 Other N=230
Low Knowledge	28	26	35	24	40	21	25
Average Knowledge	48	47	52	42	42	48	49
High Knowledge	24	27	13	34	18	31	26
Knowledge - μ	2.94	3.01	2.74	3.10	2.65	3.07	2.91
Knowledge - σ	.92	.94	.85	.97	.94	.92	.98
Low Confidence	29	27	38	19	33	19	22
Average Knowledge	36	35	40	35	39	40	43
High Confidence	24	38	23	46	28	41	34
Confidence - μ	3.09	3.13	2.94	3.34	2.92	3.30	3.12
Confidence - σ	1.08	1.08	1.04	1.05	1.06	1.05	1.06

Dot.com students (those students from K12 schools) reported greater knowledge (m = 3.01 versus m = 2.74) and (Table 2) confidence (m = 3.13 vs m = 2.94) over the "other" cohort. There was a moderate bias (R=-.095, s=.045) in the student's self-perception of computer knowledge and computer confidence (R=-1.08, s=.022). The figures seem to indicate a gap opening between the dot.com versus the other student.

Student IT Practices: Computer Background

The students were asked to rate their use of a computer (Table 3) in secondary school and home. The use of the home computer (94%), home use of the Internet (65%), modern technology (Win98 60%) all show increase. Use at school (33%) has decreased from last year. There was a significant difference between the dot.com students over other students in having a computer at home. Internet usage at home increased significantly for both the whole cohort (45% to 65%) and the Dot.Com cohort (45% to 66%).

Table 3. Computer Background %
(Whole Cohort, N=444; Dot.Com Cohort, N=369)

Background Computer Use	2000 dot.com Cohort N=369	2000 other Cohort N=75	2000 Whole Cohort N=444		1999 dot.com Cohort N=389	1999 Whole Cohort N=529		1998 dot.com Cohort N=483	1998 Whole Cohort N=751
Studied IT/IS Y12	39	7	33		52	45		42	38
School Laptop	12	3	10		9	8		na	Na
Own Laptop	14	19	15		14	14		na	Na
Computer at home	96	81	94		95	94		83	89
Home use of Internet	65	61	65		45	45		33	33
WIN98 at home(Pentium)	59 win98	60 win98	60 win98		37 win98	38 win98		71 win95	70 win95

Student IT Skills: IT Applications

Students were then asked to report use of common IT applications with the hours of use as reported in Table 4. The 1998 & 1999 survey cohorts are included along with results from Oliver (1993). The "big 4"applications showed variable results with word processing and windows being stable and spreadsheet and database decreasing in usage. The "Internet" applications; Internet (+15%), Chat (+9%) and Email (+13%), all showed a large increase in usage for the whole cohort. The "games" packages; Graphics (-11%), Games(-4%) and Multi-media(-8%), showed decreases in usage for the whole cohort.

Table 4. Use of IT (%) Applications (N=444)

	2000 0 hrs Whole Cohort	2000 <2&2+ Whole Cohort		1999 <2&2+ (Stein, 1998)	1998 <2&2+ (Stein, 1998)	1993 (Oliver 1993)
Word Proc	17	83		86	81	90
Spreadsheets	55	45		61	54	na
DataBase	70	30		44	38	55
Windows	22	78		80	77	na
Internet	30	71		56	34	na
Graphics	73	27		38	34	62
Chat	60	40		31	19	na
Email	34	66		53	29	23
Program'g	87	13		19	20	33
Laptops	85	15		15	18	na
Multi-media	65	35		43	40	17
Slide Shows	86	14		16	na	na
CompGames	59	41		45	55	na

Two trends are evident in Table 5. In 1998 the "Internet" applications were all used to a greater extent by the other or non dot.com students. By 2000 this had reversed with each of these applications being much more heavily used by dot.com students. Internet (dot.com = +38% vs other = +27%), Chat (dot.com = +23% vs other = +10%) and Email (dot.com = +44% vs other = +27%) show a potential gap opening between dot.com and other students over the three year period from 1998 to 2000. The "games" applications all showed decreases for both dot.com and other cohort.

Table 5. Use of IT (%) Applications [Combined <2&2+ Hours]
by Dot.com

	2000 dot.com Cohort N=369 <2&2+	2000 Other Cohort N=75 <2&2+	1999 dot.com Cohort N=389	1999 Other Cohort N=139	1998 dot.com Cohort N=521	1998 Other Cohort N=230
Word Proc	83	73	90	77	84	73
Spreadsheets	46	42	64	56	60	36
DataBase	31	23	48	41	39	33
Windows	81	77	83	73	78	71
Internet	72	66	56	56	34	39
Graphics	29	18	40	31	36	32
Chat	42	31	34	24	19	21
Email	71	66	51	58	27	39
Programming	14	7	20	15	22	17
Laptops	15	14	17	13	16	18
Multi-Media	39	16	46	33	42	33
Slideshows	16	4	18	32	14	47
Compgames	44	25	50	12	47	10

DISCUSSION & CONCLUSION

There is considerable evidence to suggest that the IT practices and skills of transition students are continuing to change. Home access continues to climb indicating that the majority of transition students possess access to a computer away from University. The access rate to the internet of the dot.com student compares with the 77% rate for 18-24 year olds in the wider Australian community (ABS, 2000). Whilst the gap is closing between students who have home computers and those that do not a new gap is opening up between those that have Web versus non-Web technology. This gap has the potential to become significant when we consider the ramifications of the Internet and information access.

The continuing rapid growth of the Internet applications and Web technology is evident in the home access to the Internet. This figure has increased 32% over the 1998-2000 period from 33% to 65% for the whole cohort. The growth in home Internet usage outstrips the 28% of homes that have internet access in the wider Australian population (ABS, 2000). The rapid growth in the transition student's use of Internet applications is fortuitous given that many University schools and faculties are exploring Web delivery for subject material.

The Dot.Com cohort reported significantly higher measures of computer knowledge and confidence. The significant difference between dot.com and other students is reinforced when the usage figures for IT applications are compared. Every IT application is used to a greater extent by dot.com students. More significant is the change in the Internet applications. The dot.com student has reversed the usage figures over three years in each of Internet, Chat and Email applications and this seems to be supporting the "Electronic Nomad" student as described in Russel (1996) and reported in the comprehensive Real Time report (Meredith, 1999). With increasing emphasis being placed upon flexible course delivery based upon Internet platforms and electronic contact between student and teacher then there seems to be a need to monitor and address any gap that is opening between the dot.com and non dot.com student. The "big 4" applications showed variable results when comparing with previous surveys. A possible strategy to find the appropriate level of IT instruction for the commonly used packages would be to use refresher or enabling courses for the non dot.com student. Measures of Internet usage should also include the types and style of usage thus giving a fuller picture of how the Internet is affecting student communication patterns.

In 1998 the Victoria University School of Information Systems undertook to review both post-graduate and undergraduate information systems courses. The curriculum review process for just the post-graduate courses is still underway some 3 years later. The undergraduate review will commence after the post-graduate review and will need to take into account the changing nature of information systems in the commercial market place as well the changing nature of students. The whole role of E-business has changed the way information systems are viewed in many organisations. Any review process will need to look at end-points or how the subjects address the vocational options available to students. These end-points in the information systems field require students to have advanced skills in many disparate areas. The results above show that students entering courses in Universities are developing skills and techniques that must be taken into account when designing new courses. It is not enough to only consider end-points in course design. Transition students will possess three vital skills; skills in using information technology tools, skills in creating and using information and skills in adapting to systems being used for subject delivery. In order to carry out a viable course review four elements need to be addressed; short time frames for

review (6months), cyclical nature of review, ability to sample the skills and issues in the current marketplace and finally the ability to locate the skills of the incoming cohort of students. This paper seeks to address the last point and has presented findings that can be used to locate the IT practices and skills of transition students.

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