THE WEB, CHAT AND LAPTOPS: IT PRACTICES & SKILLS OF TRANSITION STUDENTS (1999)

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Abstract

Transition students come to universities with a need to be information competent but can lack basic information literacy skills through variable practices at secondary schools. This report analyses the information literacy and competency of transition students at VUT. Two definitions were used to categorise IT usage of students. General IT practices looked at the availability of IT to the students and specific IT skills refer to the use of business IT packages. Main findings show that home access to a computer has peaked, home internet usage is escalating, the gender gap in IT practices and skills is closing and there is a dramatic increase in usage of the Internet, Email and CHAT.

Keywords

University transition, computer literacy, survey research

Introduction

In 1998 the Department of Information Systems at Victoria University entered into an educational partnership with SAP[1] Australia to provide final year students with the SAP platform for ABAP[2] and SAP related course material. At the same time vigorous debate commenced concerning offering students Microsoft and Novell certification programs. These situations show that the Department has expended considerable resources to provide enhanced vocational opportunities to students as they prepare to enter the workforce. At the same time the introductory information systems subject has remained stagnant with word processing, introductory spreadsheet and introductory database skills delivered within a typical introductory computer course. Several questions are raised by these issues, are Information System departments receptive to students vocational outcomes in accepting industry based courses and is the debate and focus on vocational based courses diverting attention away from curriculum development within the department? Are the IT (Information Technology) 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.

This paper seeks to add to the dialogue by presenting the latest results in a five-year longitudinal study looking at the changing Information Technology (IT) skills of transition students.

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[1] SAP. Worlds Largest Enterprise Software Vendor, VUT has partnership agreement with SAP Australia.
[2] ABAP. Programming language used to program into SAP.

Information technology, education & vocational skills

The Department of Education, Employment and Training (DEET) Workforce reports (1991, 1995) both chart the projected employment growth and changes expected as we near the year 2000. The NBEET report (1995b) identified the convergence of communications and computers as giving rise to a plethora of new job skills. Warner (1999) in an address titled "IT, Employment and Regional Australia", reported:

> impending substantial job losses as IT systems replaced existing labour intensive systems...IT was not seen as a fundamental life skill by many Australian Employees, some educators and most students.

This pessimistic view is contrasted by the DEETYA (1997) job forecast which saw computing and business/information professionals as two categories with above average employment growth for the 1995-2005 period. The NBEET report went further and highlighted new skills in the emerging communications industries. These included, understanding of organisational information requirements, understanding client/server architectures, knowledge of international telecommunication standards, document management in a paperless environment and translation of business cases into information technology design.

A 1997 US based study conducted by the Olsten Corporation (Davis, 1997) showed that the computer literacy requirements for all job types increased rapidly in the early nineties. 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?

An extensive study by Sherwood (1993) found that wide variations exist between computer use and access within secondary schools across Australia. The major impediment to computer use was "too few computers for students needing access". This shortage is supported by Jones (1998) when reporting the findings of a study of secondary schools conducted by the Australian Council of Educational Research. Yetton (1997) reported on the importance of the introduction of technology in the delivery of higher education programs across Australia. The Australian Computer Society together with the Australian Council for Computers in Education recognised the importance of IT in the transition to higher education in point four of their discussion paper (ACS, 1996):

> Articulation into vocational and academic tertiary sectors is being restructured. Students' skills with information technology are being emphasised as part of this process.

The term *information competency* (NBEET 1995a) 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 competency. Information literacy is one component of information competency and is defined as the ability:

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

To be able to best meet the student's needs university departments must first recognise the need for computer literacy and second be able to measure the information competency of the transition student. Many studies (Russell 1996, Sherwood 1993, Oliver 1993, McCormick 1992, Birnbaum 1990, Andersen 1991, Martinez 1986, Atweh 1989) 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.

Research questions

This study is a longitudinal project which tracks the changes in the IT profile of transition business students3 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.

1.   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 competency.

2.   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 students. More specific research questions were:

- RQ1. Are transition student IT practice's changing with time, gender & geography?

- RQ2. Are transition student IT skills changing with time, gender & geography?

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, 585 students completed the survey with 529 useable surveys giving a response rate of 53%.

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.

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4.   Transition students are students at the Year12/University interface. They may also include TAFE aritculators

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 competency and keyboard skills, VCE Information Technology based subjects undertaken, previous experience in the use of computers and IT packages. 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 thus avoided asking for the students self-perception of their knowledge of packages which may not be objective. 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 and then analysed by cross-tabulation frequency and Pearson's measure of correlation.

Results

Assumption testing

The large sample size (N=529) gave support to the assumption that the distribution was a normal one. Investigation by Histogram, Boxplot, Normal Probability Plots and Detrended Normal Plots further supported the assumption of normality.

Demography

The majority of students (84%) were located on the two main campuses of the University. The proportion of female students (48%) is slightly lower than the proportion of females in the first year undergraduate population as a whole (50%). Students born overseas accounted for 30% of the cohort with higher proportions coming from families whose parents were overseas born (mother) 66% and (father) 68%. These figures have been consistent over the last four surveys. These figures should be considered together with the number of students who speak a language other than English at home (56%). Students who completed Year 12 in 1998 accounted for 74% of the cohort with 7% being ex-TAFE. Students who have University qualified parents account for 32% of the cohort. Students with siblings who have studied at University account for 43%. These "University family" figures are important as Victoria University would be identified as being populated by first generation university students. Students emanating from the immediate geographic area (Western Suburbs) account for 35% of the cohort.

Student IT practices: computer access

The PC home market has boomed and a high proportion of the student cohort (94%) had access to a home PC and this was slightly more than the 1998 result of 89% (Stein

et al, 1998). The personal computer evolves every six months with new models issuing increased functionality. Tracking the model in use in homes showed that 38% of students had Windows 98 on their home computer compared with 69% (Win95) in 1998. Home access to the Internet was 45% compared with 33% in 1998.

Student IT practices: computer competency & confidence

Of the cohort, 28% indicated they felt they were of low competency, 43% average competency and 30% having high levels of competency4. This result when compared to previous studies by Stein (1998, 1997, 1996a, 1996b) and Oliver (1991) showed the expected increasing levels of competency with a plateau effect. The cohort indicated that 23% felt they had low confidence with 36% of average confidence and 41% having high levels of confidence. When compared with previous surveys there is a moderate increase over the two years with a plateau effect from last year.

Table 1: Computer Competency & Confidence % (N=529)

	1999	1998	1997	1996	1995 cohort5	Oliver 19916
Low Competency	27	22	26	49	48	45
Average	43	47	50	37	30	40
High Competency	30	31	24	14	22	15
Low Confidence	23	20	24	na	na	na
Average	36	40	40	na	na	na
High Confidence	41	40	31	na	na	na

Table 2: Computer Competency by Gender % (N=529)

	1999	1999		1998		1997	
		M	F	M	F	M	F
Low Competency	27	28	27	21	24	22	30
Average	43	36	50	44	52	46	52
High Competency	30	36	23	35	24	32	18

Table 3: Computer Competency by Westernality % (N=529)

	1999	1999		1998		1997	
		W	O	W	O	W	O
Low Competency	27	28	28	25	22	28	25

[4.] The five elements of the competency & confidence scale were combined into three levels; low competency, average competency, and high competency.
[5.] Converted from 7 point Likert to 5 point Likert. (Stein et al, 1996a)
[6.] Averaged from Oliver's 4 measures of computer competence.

Average	43	39	44	47	48	50	50
High Competency	30	33	28	32	30	22	25

There was no significant gender (R=-.035) or geographic (R==.044) bias in the student's self-perception of computer competency from 1998 to 1999. The figures seem to indicate a plateau has been reached in these elements.

Table 4: Computer Confidence by Gender % (N=529)

	1999	1999		1998		1997	
		M	F	M	F	M	F
Low Confidence	23	21	25	17	22	19	29
Average	36	34	38	37	44	37	43
High Confidence	41	45	37	46	34	44	28

Table 5: Computer Confidence by Westernality % (N=529)

	1999	1999		1998		1997	
		W	O	W	O	W	O
Low Confidence	22	22	23	20	20	23	24
Average	36	33	37	41	40	41	40
High Confidence	42	45	40	39	40	36	36

There is a moderate gender bias (R=-.150) showing an increase in the overall self-perception of confidence in the female cohort with little change among the male cohort. There is no significant geographic difference (R=-.001) in the student self-perception of computer confidence.

Student IT practices: computer background

The students were asked to rate their use of a computer in secondary school, place of employment and home.

Table 6: Computer Background % (N=529)

Background Subject Taken/Computer Use	1999	1998	1997	1999 Male	1999 Female	1998 Male	1998 Female	1997 Male	1997 Female
VCE Inf Technology Yr11	41	49	38	42	40	46	53	35	41
VCE Inf Proc & Man Yr12	30	25	19	31	28	20	30	18	20
VCE Inf Systems Yr12	12	10	8	13	10	12	7	13	4
VCE Inf Tech in Society Yr 12	2	3	4	3	2	3	3	4	3
School Laptop program	8								
Own Laptop	14								
Computer at home	94	89	86	93	95	89	89	86	87

Home use of Internet	45	33	23	48	43	40	26	26	19
WIN95 at home(pentium)	38	70 win95	52 win95	40	36	71	67	53	48

The use of the home computer at 89% contrasted to Oliver (1991) where 56% of students replied use of home computers and 32% reported use of school computers. The trend showed that students are indicating high levels of computer use both at home and at school. This would be in line with expectations. Internet usage at home increased significantly for both gender groups. However, there was a gender gap (male 48%, female 43%) for home use of the Internet. Laptop ownership figures will provide baseline data for future surveys.

Table 7: Comparison of Computer Background by Year 12 Completion % (N=483)

Background	1998 Y12 Cohort N=389	1997 Year12 cohort n=483	1996 Year12 cohort N=345	1995 Year12 cohort n=491
VCE Inf Technology Yr11	49	56	38	39
VCE Inf Proc & Man Yr12	37	29	19	45
VCE Inf Systems Yr12	13	10	8	13
VCE Inf Tech in Society Yr12	2	3	4	4
Laptop at school	9			
Own Laptop	14			
Computer at home	95	83	86	80
Home use of internet	45	33	23	na
Win98 at home (pentium)	37	72(win95)	52(win95)	na

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 8. The 1995, 1996, 1997 & 1998 survey cohorts are included.

Table 8: Use of IT (%) Applications (N=529)

	0 hrs	<2 hrs	2+ hrs	1999 <2&2+	1998 <2&2+ (Stein, 1998)	1997 <2&2+ (Stein, 1997)	1996 <2&2+ (Stein, 1996b)	1995 <2&2+ (Stein, 1996a)	1993 (Sherwood, 1993)
Word Proc	14	43	43	**86**	81	78	74	87	90
Spreadsheets	37	44	17	**61**	54	48	52	68	na
DataBase	56	35	9	**44**	38	34	33	48	55
Windows	20	39	41	**80**	77	74	73	76	na
Internet	44	27	29	**56**	34	27	22	7	na
Graphics	62	25	13	**38**	34	33	33	na	62
Chat	69	16	15	**31**	19	na	na	na	na
Email	47	35	18	**53**	29	25	28	na	23
Program'g	81	15	4	**19**	20	20	19	13	33
Laptops	85	8	7	**15**	18	18	14	na	na

Multi-media	57	27	16	**43**	40	30	31	na	17
Slide Shows	83	13	4	**16**	na	na	na	na	na
CompGames	55	29	16	**45**	55	63	na	na	na

The "big 4"applications all showed increased usage with database being the least used. The Internet (+22%), Chat (+12%) and Email (+24%) all showed large increases in transition student usage.

Table 9: Use of IT (%) Applications by Gender (N=529)

	1999 Used IT Combined <2&2+ hrs		1998 Used IT by Gender <2 & 2+ hrs		1997 Used IT by Gender <2 & 2+ hrs	
	Male%	Female%	Male%	Female%	Male%	Female%
Word Proc	82	90	78	85	78	81
Spreadsheets	62	61	50	59	50	46
DataBase	42	42	37	38	37	31
Windows	79	81	78	79	75	73
Internet	58	53	40	28	32	20
Graphics	40	35	37	32	39	27
Chat	31	30	21	18	na	na
Email	54	52	33	25	27	21
Programming	21	17	21	19	22	15
Laptops	16	15	17	18	21	13
Multi-Media	51	34	50	29	37	22
Compgames	66	35	63	47	na	na
Slideshows	20	13	63	47	na	na

Discussion & conclusion

Research Question 1. Are student IT practice's changing with time, gender & geography?

Home access continues to climb indicating that the majority of transition students possess access to a computer away from University. This indicates students are updating home technology rapidly with recent additions based on pentium chipsets. This high level of home access gives rise to questions of expected standards of assignment and access to software for University based assignment load. At another level however, we see the gap closing between students who have home computers and those who do not, but a new gap opening up between those who have current versus obsolete technology. This gap has the potential to become significant when we consider the ramifications of the Internet and information access. This is important as University work requirements may require access to software that will not run on older machinery. There is no gender bias in home access, work access or technology adoption. The continuing rapid growth of the Internet and Web technology is evident in the home access to the Internet. This figure has increased 22% over the 1997-1999 period from 23% to 45%. The growth in home internet usage outstrips the 19% of homes that have internet access in the wider Australian population (ABS, 1999). Home use of the Internet has increased and while there is a gender bias it is closing

rapidly. Analysis of gender results show that the female transition student lags the male transition student by about one year in the uptake of home internet usage. The increase from 1998 to 1999 is greater for females (+17%) than males (+8%) and this is a reverse of previous surveys. University policies within VUT restrict the level of access to the Internet and additionally proposed cost recovery policies threaten unfettered student use of this technology. Students with home access may be able to claim some advantage over students who do not have home access and this could impact upon University departments when this technology is used to deliver course work.

Research Question 2. Are student IT skills changing with time, gender & geography?

The "big 4" applications all showed increases when compared with the 1998 and 1997 surveys. Spreadsheets are now used by over half of incoming students whilst programming is used by about 20% of students. 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 14% of word processing non-users. Increasingly, enabling courses for spreadsheet, database and multimedia/Internet tools may become necessary. WEB enabled packages -Internet, Chat and Email- show dramatic changes in usage with students developing the "*Electronic Nomad*" communication style as described by Russell and Holmes (1997). The increase in female student's usage of Email (+27%) and Chat (+12%) showed that the gender gap in the use of these packages is closing. This reflects the trend from prior surveys. 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. Games play among the cohort show a large gap between males and females.

Further research

Information technology is having an impact both upon our transition students and the subjects and courses we present. Access to the Internet and multimedia developments need to be studied and charted. It is proposed that the study that formed the basis of this paper will be continued in 2000 with revised questionnaire and possible extension into other Universities.

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