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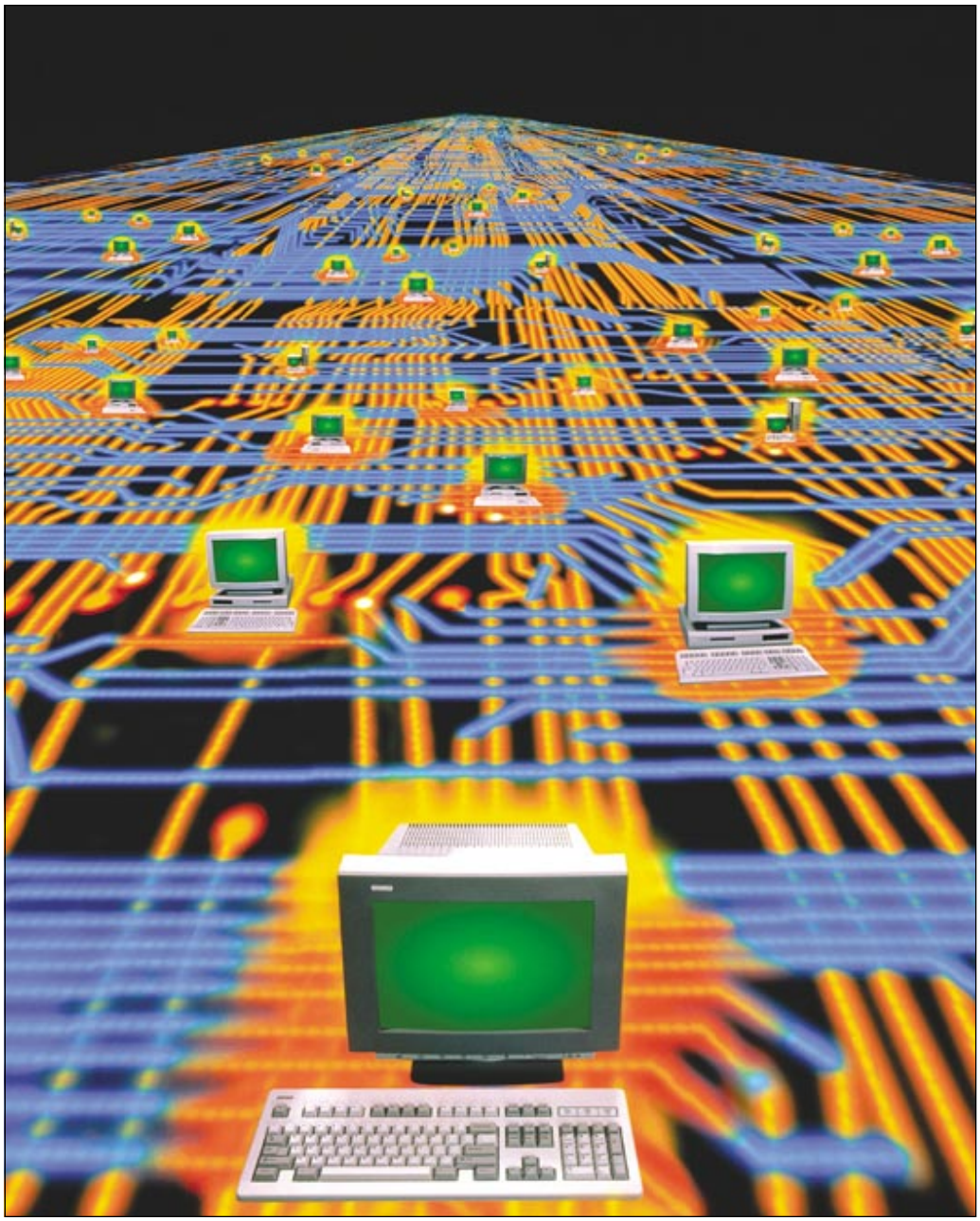
■ WORKING WITH COMPUTERS



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Highlights

In this issue

Working with computers

- Almost 6 in 10 workers used a computer at their job in 2000, with the majority (78%) using one daily. A decade earlier only 3 in 10 workers were using computers.

- Workers were significantly more likely to use a computer at work if they were under 55, had a high level of education or income, were an employee, worked full-time, or worked in a "high skill" or a clerical occupation.

- Almost all workers used their computer for word processing (83%). Four other common purposes were data entry (72%), record keeping (69%), spreadsheets (63%), and the Internet (54%). Only 16% of workers reported using their computer for programming.

- Women were more likely than men to use a computer at work, 60% compared with 54%. However, except for word processing, women were less likely to have performed all types of computer-related work.

- The most common methods used by workers to acquire their computer skills were informal: trial and error (97%), help from co-workers (76%) and help from friends or family (76%).

- Public employees used more methods to learn their computer skills (5.1) than private-sector employees (4.7) or the self-employed (4.0). Employer-sponsored classroom training was particularly common for public employees (68%) compared with those in the private sector (53%) or the self-employed (36%).

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Working with computers

Katherine Marshall

Long gone, but still remembered by many, are typewriters, typing pools, carbon copies, adding machines and physical mail boxes. The ubiquitous personal computer has changed all this and revolutionized the workplace. Furthermore, most workers today go well beyond using their computer as a mere typewriter or calculator.

As intriguing as this computer-use revolution may be, embracing information and communication technology (ICT) is viewed as an essential ingredient for both businesses and individuals to remain competitive in today's knowledge-based economy. "[A]ccess to and development of information, communication and e-commerce resources are increasingly viewed as crucial for economic and social development." (OECD, 2001). It is argued that access to and use of ICTs can increase productivity and efficiency, enhance knowledge and skill levels, and improve the quality of work life (ILO, 2000).

Concerns have been raised, however, over the uneven use of ICTs—the "digital divide"—between and within countries. For example, only 6% of the world's population has ever logged onto the Internet, and close to 90% of them are from industrialized countries (ILO, 2000). Digital divides have been documented within industrialized countries as well—among individuals, households, businesses and geographic regions.

This paper examines the extent of computer use by Canadian workers (see *Data source and definitions*): which workers are most likely to use a computer at their job, how often they use it, what they use it for, and how they learned their computing skills.

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Computer use soars

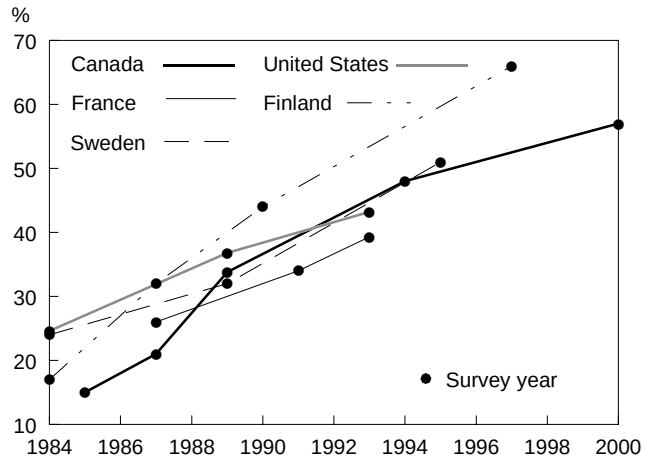
In a mere decade, the proportion of workers using a computer at their main job has risen from 33% in 1989 to 57% in 2000—with almost 80% of users now working at their computer every day (Chart A, Table 1). The same trend can also be seen in other industrialized countries (see *International comparisons*).

As found in past studies, a higher proportion of employed women in 2000 used a computer at work than men, 60% compared with 54%. In 1989, the comparable figures were 38% and 32%.

International comparisons

As was the case in Canada, as little as 15 years ago (mid-1980s) less than one-third of the employed in other industrialized countries were using a computer at their job (OECD, 1998). Since then, growth in the use of computers at work has been steady and constant—with still no indication of a levelling in the trend.

Computer use at work rising in industrialized countries.



Sources: General Social Survey; Organisation for Economic Co-operation and Development
Note: Differing definitions and methodologies limit comparability.

Data source and definitions

The main theme for the 2000 **General Social Survey (GSS)** was access to and use of information and communication technology, specifically computers and the Internet. From January to December, approximately 25,000 respondents 15 or older were asked details of their personal use of computers and the Internet. Topics covered included the use of computer technology in the workplace and the development of computer skills. Both the 1989 and 1994 GSS asked a limited number of questions on technology use. For more information on the 2000 cycle of the GSS, contact Kathryn Stevenson at (613) 951-4178.

Employed: persons who reported spending any time working at a job or business in the month previous to the interview.

Uses a computer at work: employed persons who used a computer at their main job during the preceding 12 months.

Income: total annual personal income, before deductions, from all sources. It comprises earnings from paid or self-employment, government transfer payments, and income from pension plans or other sources.

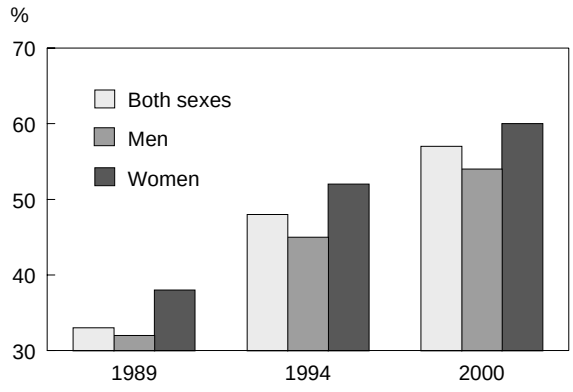
Public/private sector employment: a standard Labour Force Survey (LFS) variable, created after data collection based on National Accounts definitions. The public sector consists of employees in public administration at all levels of government, crown corporations, liquor control boards and other government institutions such as schools, hospitals and public libraries. The private sector is all remaining employees plus self-employed owners of businesses. All 4-digit industries from the LFS with 50% or more public sector employees were deemed to be public sector industries for the GSS, and all remaining industries, private sector. Using this proxy method, 17% of the employed in the GSS in 2000 were public sector, compared with 19% from the LFS.

Education and income key factors

Professional occupations[1] often require a highly developed set of skills that, as the data confirm, often includes using a computer. Those with such jobs had the highest rate for computer use at work (86%) (Table 1). Most managerial jobs also involved computer use (78%). Although clerical jobs may not be considered "high skill", they had the second highest rate of computer use (84%). However, as shown later, persons in this line of work use a computer quite differently than do professionals or managers. Since higher level jobs usually require higher levels of education and can command higher earnings, it is not surprising to see these characteristics linked with computer use too. For example, while only 41% of workers with a high school education sat, at least occasionally, at a keyboard for their job, fully 85% of those with a university degree did so. And whereas only 36% of workers with an annual income less than $20,000 used a computer at work, 80% of those with $60,000 or more did so.

Younger (15 to 24) and older (55 and over) workers were both less likely to use a computer at work than were core-age (25 to 54) workers, about 40% compared with 62%. Also, full-time workers were more likely than part-time workers to use a computer at work (60% versus 39%), and employees more than the self-employed (57% versus 52%). However, the self-employed were more likely to use the Internet for their job than employees (69% versus 52%), confirming that, increasingly, the Internet is being used by the self-employed as a tool to conduct business (data not shown).

Chart A : More than half the employed now use a computer at work.



Source: General Social Survey

Table 1: Computer use and frequency of use among the employed, by selected characteristics

	Uses a computer	Uses daily*	Odds ratios†	
			Total	Daily*
	'000			
Total	**8,338**	**6,413**		
	%			
Both sexes	**57**	**78**		
Men	54	79	1.0	1.0
Women	60	77	1.1††	0.8††
Age				
15 to 24	41	67	1.0	1.0
25 to 54	62	80	0.9††	1.1††
55 and over	44	78	0.4	1.1††
Education				
High school or less	41	74	1.0	1.0
Postsecondary certificate or diploma	62	79	1.7	1.2††
University degree	85	81	3.0	1.0††
Residence**				
Urban	59	79	1.0	1.0
Rural	48	72	0.8††	0.8††
Income (individual)				
Less than $20,000	36	63	1.0	1.0
$20,000 to 39,999	58	77	1.9	1.3††
$40,000 to 59,999	71	80	3.7	1.6
$60,000 and over	80	86	6.2	2.8
Class of worker				
Employee	57	80	1.0	1.0
Self-employed	52	65	0.8††	0.4
Work status				
Full-time	60	81	1.0	1.0
Part-time	39	52	0.6	0.3
Occupation				
Management	78	85	1.0	1.0
Professional	86	80	1.4††	0.7††
Technical	71	75	0.7††	0.6††
Clerical	84	87	2.1	1.8
Sales and service	39	70	0.3	0.5
Trades, transport and equipment operators	32	62	0.1	0.2
Primary	24	43	0.1	0.2
Processing, manufacturing and utilities	29	79	0.1	0.5††

Source: General Social Survey, 2000

* *Of all computer users.*

** *Excludes Prince Edward Island; urban indicates population concentration of 1,000 or more and a population density of 400 or more per square kilometre.*

† *Odds ratios are generated from a logistic regression. They indicate whether certain levels of an explanatory variable, compared with the reference category (ratio = 1.0), increase or decrease the odds of a certain event occurring while controlling for all other explanatory variables in the model. In this case, separate models were used to look at the chances (odds) of using a computer at work, and using a computer at work daily.*

†† *Difference with reference category not significant at the <.001 level.*

Among those with access, 8 in 10 use computer daily

Of the 8.3 million workers who used a computer at work, 78% (6.4 million) did so daily. Compared with computer use overall, there was much less discrepancy among workers who used a computer daily. In other words, if a computer was used at work, no matter the occupation or the workplace, the use was likely intense—with a few exceptions. Workers falling at least 10 percentage points below the average in terms of daily computer use comprised those 15 to 24 (67%), the self-employed (65%), those with an income of less than $20,000 (63%), those in trades and transport and equipment operating (62%), part-time workers (52%) and those in primary occupations (43%).

Most differences significant

Logistic regression[2] was used to examine the relationship between computer use, intensity of use, and the above explanatory variables simultaneously. With only a few exceptions, all variables had a significant influence on the likelihood of using a computer at work (Table 1). The findings for age and residence were revealing. Even though younger workers were less likely to use a computer at work than core-age workers (41% compared with 62%), the difference was not significant when all other relevant variables, such as education and work status, were taken into account.

Many younger workers have not yet completed their schooling and perhaps work part time. Once this was taken into account, their

computer use was not significantly different from that of core-age workers. Similarly, controlling for occupation (which takes into account the higher proportion of jobs in primary occupations in rural areas) and other variables, urban and rural dwellers were not significantly different in their computer use. As expected, education and income were strong predictors of computer use at work. For example, workers with a university degree were 3.0 times more likely to use a computer at work than those with a high school education or less.

On the other hand, only a few significant differences were evident in the *daily* use of computers. For example, the self-employed were significantly less likely than employees to use a computer daily, as were part-time workers compared with full-time. Also, higher income significantly increased the chances of working with a computer every day

Proficiency notwithstanding—almost everyone has learned to type

Of those who used a computer at work, the vast majority had composed text with a word processing package (83%), and most reported using their computer for four other purposes as well: data entry (72%), record keeping (69%), spreadsheets (63%), and the Internet (54%) (Table 2).[3] Of a possible eight work-related computer tasks, workers did an average of 4.5. Less than half performed more technical tasks such as graphics generation (48%), data analysis (46%) and programming (16%).

Occupation is a key determining factor, not only for overall computer use at work (as shown above), but also for the type and number of computer applications used. For example, almost all professionals in natural and applied science used a computer at work (96%), and for the most purposes (6.3). This was also

Table 2: Computer use, by occupation and age

			Tasks performed*								
	Employment	Use computer	Word processing	Data entry	Record keeping	Spreadsheets	Internet	Graphics	Data analysis	Programming	Average tasks
						%					
All occupations	**100**	**57**	**83**	**72**	**69**	**63**	**54**	**48**	**46**	**16**	**4.5**
Management	9	78	87	79	80	74	69	55	60	16	5.2
Professional	17	86	93	75	73	71	73	58	56	25	5.2
Business and finance	3	95	94	85	81	87	71	51	76	14	5.6
Natural and applied science	4	96	96	79	77	89	87	73	73	55	6.3
Teaching	4	85	96	71	70	61	69	61	43	14	4.9
Technical	7	71	85	69	68	62	63	58	42	16	4.6
Clerical	15	84	86	81	73	67	48	41	45	10	4.5
Sales and service	26	39	77	65	58	51	38	42	34	10	3.8
Retail trade	3	46	72	58	44	50	22	44	24	13	3.3
Wholesale trade	4	83	82	79	75	63	63	48	53	8	4.7
Trades, transport and equipment operators	13	32	59	55	58	49	30	37	33	13	3.3
Primary	4	24	62	70	72	61	50	41	47	10	4.1
Processing, manufacturing and utilities	8	29	63	57	54	45	26	37	37	13	3.3
Age	**100**	**57**	**83**	**72**	**69**	**63**	**54**	**48**	**46**	**15**	**4.5**
15 to 24	16	41	89	72	54	67	43	56	41	23	4.5
25 to 54	74	62	83	73	71	64	56	48	48	15	4.6
55 and over	10	44	76	69	68	51	53	34	39	11	4.0

Source: General Social Survey, 2000

* *In the past 12 months, except for the Internet, which refers to the past month.*

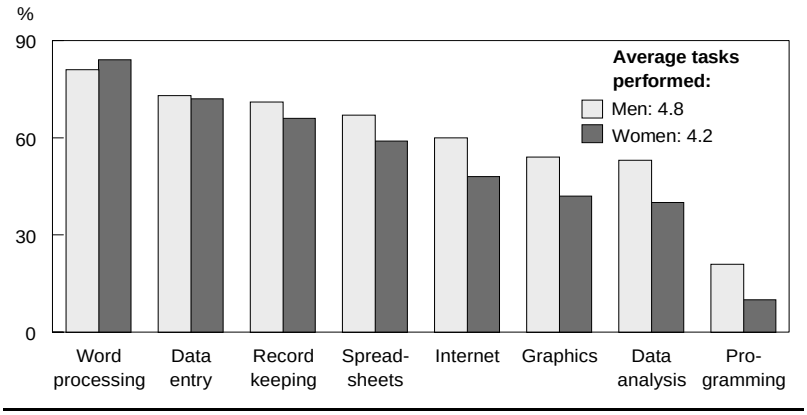
the only occupational group in which the majority did some computer programming at work (55%, compared with 16% overall). This group also had the highest average Internet use (87%, compared with 54% overall). Many in this field are considered knowledge workers, who generate and transmit ideas electronically and use the Internet to have "…access any time to unlimited amounts of the 'raw material' of knowledge creation" (ILO, 2000). At the other end of the spectrum are workers with jobs in trades and transport and equipment operation, primary occupations, or processing, manufacturing and utilities. Less than one-third of them used a computer at work, and those who did, used it for fewer purposes (3.3 to 4.1).

Computer users aged 15 to 24 used their machines for about the same number of purposes (4.5) as those 25 to 54 (4.6), but for more than workers 55 and over (4.0). Furthermore, compared with core-age workers, higher proportions of younger workers did word processing (89% versus 83%), programming (23% versus 15%), graphics generation (56% versus 48%), and spreadsheets (67% versus 64%). The high rate of computer programming among younger workers is consistent with the lower-than-average age profile of workers in computer programming and related occupations (Gower, 1998).

Computer tasks vary by sex

Although women were more likely than men to use a computer at work (60% versus 54%), they performed fewer tasks with their computer, 4.2 compared with 4.8 (Chart B). Furthermore, except for word processing, women were less likely than men to have done all computer-related types of work. The difference in computer work was particularly high for the Internet (48% for women versus 60% for men), graphics generation (42% versus 54%), data analysis (40% versus 53%), and programming (10% versus 21%). These differences can be explained largely by the varying occupations of women and men. For example, more men were employed in management (66%) and professional (53%) occupations—fields with higher-than-average use for all computer tasks. On the other hand, more women were employed in clerical (75%) and sales and service (52%) occupations—positions with below average rates for many of the different applications.

Chart B: Except for word processing, men are more likely to perform all types of computer work.



Source: General Social Survey, 2000

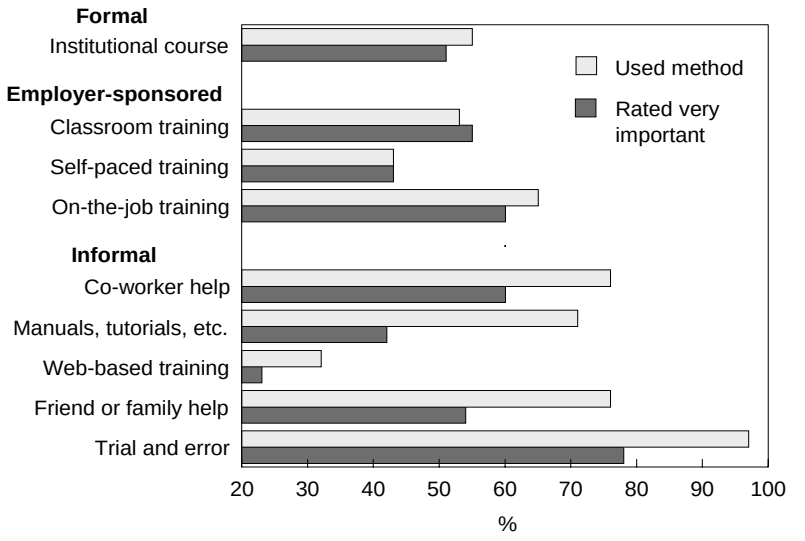
Multiple methods used to acquire skills

Although more than half of computer users had taken at least one computer-related course from an institution, most workers used less formal methods to learn their computer skills (Chart C). Not surprisingly, almost all computer users (97%) enhanced their skills through trial and error, and 78% rated it a very important method. Three-quarters of those who used a computer at work reported learning from co-workers and friends or family as well, and more than half also rated these as very important. Most also reported learning from manuals or tutorials (71%), but these were rated as very important by only 42%. The most common employer-related learning method was on-the-job training (65%), which, after trial and error, had the second highest rating (along with co-worker assistance) as a very important method (60%).

Classroom training prominent in public sector

In acquiring computing skills, public-sector employees[4] were considerably more likely than those in the private sector to use all three types of employer-related training methods (classroom, self-paced

Chart C: On-the-job training is the most common employer-sponsored computer-skills learning method.



Source: General Social Survey, 2000

and on-the-job). On-the-job training was the most common method for both public (74%) and private (68%) employees, and it was rated as very important by 6 in 10 that had such training. The largest difference occurred with classroom training—68% of public employees had it, compared with only 53% of private employees (Table 3).

Table 3: Methods used to learn computer skills*

	Used method			Rated very important		
	Employees			Employees		
	Public	Private	Self-employed	Public	Private	Self-employed
	%					
Formal						
Institutional course	54	57	52	50	52	47
Employer-sponsored						
Classroom training	68	53	36	60	55	45
Self-paced training	49	44	33	44	44	36
On-the-job training	74	68	41	61	61	49
Informal						
Co-worker help	84	78	57	63	59	55
Manuals, tutorials, etc.	73	70	76	40	42	47
Friend or family help	77	74	81	57	51	60
Web-based training	30	33	33	21	23	22
Average methods used	5.1	4.7	4.0			

Source: General Social Survey, 2000

* *Refers to training ever taken. Excludes trial and error, which almost everyone has tried.*

Just over one-third of the self-employed experienced each of the three forms of employer-sponsored training, either in a previous paid job, or possibly with their own company if it had employees and offered such training. The low employer-related training rates are reflected in the overall number of computer learning methods used by the self-employed (4.0 of a possible 8). The number of computer training methods used by both public and private employees was higher, 5.1 and 4.7, respectively. Compared with employees, the self-employed were most likely to rely on friends or family (81%) and manuals or tutorials (76%) to learn to use their computer, with the former perceived as very important by the most people (60%).

Summary

Information and communication technology in the workplace has risen dramatically, with almost 6 in 10 workers in 2000 using a computer for their job, double the 3 in 10 just a decade earlier. Furthermore, almost 80% of these workers used a computer every day. Most used their machine for at least four purposes—with word processing, data entry, record keeping and spreadsheets being the most common. Except for word processing, men were more likely than women to do all types of computer-related work.

However, access to and use of ICTs was not evenly dispersed across the workplace. Workers were significantly more likely to use a computer at work if they were under 55, had high levels of education or income, were an employee, worked full-time, or were in a high skill or a clerical occupation.

Society is in the midst of an emerging digital era. Without doubt, there will be further technological change with implications for the workplace. Hence, for most workers (re)training, be it formal, informal or employer-sponsored, will be an ongoing part of their work life.

Perspectives

Notes

1 Includes financial analysts, accountants, scientists, engineers, architects, computer programmers, physicians, dentists, lawyers, teachers, librarians and journalists.

2 This technique isolates each variable and reveals its relationship with the probability of using a computer at work while holding all other variables constant. Thus, it is possible to determine, for example, whether sex still influences computer use when occupation and other job and personal characteristics are held constant.

3 The GSS asked about several types of computing activities with the following question: "In the past 12 months, have you done any of the following on a computer…." Except for a specific question about Internet activity at work, the survey did not ask respondents whether they did the other activities at home or at work. However, given that the study population for this section was employed people who used computers at work, it can be assumed that the reported computer activities were most likely done at work.

4 Those employed in public administration, government institutions such as schools, hospitals and public libraries, crown corporations, and liquor control boards (See *Data source and definitions*).

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