Catalogue no. 81-003-XIE

Education Quarterly Review

2002, Vol. 8, no. 2

- Learning computer skills
- Liberal arts degrees
- Adult training in Canada

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	Single issue	Annual subscription
United States	CDN $6.00	CDN $24.00
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Statistics Canada
Culture, Tourism and the Centre for Education Statistics

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Published by authority of the Minister responsible for Statistics Canada

March 2002

Catalogue no. 81-003-XPB, Vol. 8, no. 2
ISSN 1195-2261

Catalogue no. 81-003-XIE, Vol. 8, no. 2
ISSN 1209-0859

Frequency: Quarterly

Ottawa

Note of appreciation

Canada owes the success of its statistical system to a long-standing partnership between Statistics Canada, the citizens of Canada, its businesses, governments and other institutions. Accurate and timely statistical information could not be produced without their continued co-operation and good will.

Acknowledgments

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Mission

Education Quarterly Review analyses and reports on current issues and trends in education using information from a variety of statistical sources. It serves as a focal point for education statistics and provides a forum for communication with stakeholders and the public. Our goal is to present information and analysis that are relevant, authoritative, timely and accessible.

The central theme of the three research papers presented in this issue is 'human capital'—the knowledge and skills that employees bring to the labour market. Few would deny the benefits to workplace productivity of investment in 'physical capital' such as the upgrading of computers, software, office equipment and facilities. However, the contribution of human capital—workers' education, training and retraining—to the productivity equation is not as well understood and has not been as thoroughly researched.

Community colleges and universities are the main suppliers of labour in information technology and related occupations—the 'high-skill' jobs. Canadian colleges annually issue a total of more than 130,000 diplomas and certificates; universities present undergraduate and graduate degrees and diplomas to another 150,000 students. An important issue for employers, employees, education institutions and all levels of government is how well these college and university programs are preparing graduates for the challenges ahead:

- Do graduates of computer science (CS) programs, for example, meet the requirements for the jobs they hold and meet the labour market demand for CS graduates?
- If there is a discrepancy between supply and demand in the labour market, how significant is its impact on the workplace and on productivity?
- Do graduates from the social sciences bring to information technology jobs added value that CS graduates lack as a result of their highly specialized education and training?
- Are there differences in how training and retraining in Canada are offered and taken in large versus small firms, and in the public versus the private sector?

In this issue of *EQR*, the analytical articles on the education and training of both seekers and holders of jobs add considerably to our understanding of the role and current condition of human capital in the marketplace.

In addition to these papers, please refer to the **Cumulative index** at the back of the report, where we list by title all articles that have appeared in *EQR* since 1994. These articles are grouped under 12 categories, including 'Enrolment,' 'Flows and transition' and 'Training.' These categories are based on education policy issues that were identified in the Centre for Education Statistics' *Strategic Plan*, which reviews the Centre's statistical program and identifies objectives and priorities required to strengthen the program to better address information needs. The *Strategic Plan* is available free of charge at www.statcan.ca/cgi-bin/downpub/freepub.cgi on the Internet.

Highlights

Learning computer skills

- The representation of women in university computer science programs in Canada decreased from more than one in four students enrolled in 1982–1983 to about one in five in 1998–1999. Statistics Canada census data also show that women working in the computer professions made up less than one-third of all workers in these occupations in 1990 and 1995.

- In 2000, when asked to indicate all the methods they had used to learn computer skills, 96% of all the surveyed computer users reported teaching themselves computer skills through trial and error, and 78% had had informal help from a friend or family member. Formal training was less common and web-based training on the Internet was the least common way of learning computer skills, with an estimated 30% of all computer users training this way.

- Female computer professionals were less likely than their male counterparts to have taken formal computer training at an education institution but more likely to have taken employer-sponsored courses.

Liberal arts degrees

- Almost one-quarter of the jobs held by graduates in humanities and social sciences were in educational services, more than double the concentration in trade, the next largest industry of employment.

- By occupation, 30% of jobs held by the humanities and social sciences group were classified as social science, education, government service and religion.

- Graduates of humanities and social sciences programs appeared to have a more difficult transition into the labour market than their applied programs counterparts. Generally speaking, humanities and social sciences programs do not offer a direct connection to a well-identified occupation so graduates may spend more time experimenting with jobs—and facing the consequent periods of unemployment in between.

- The higher proportion of job separations among both groups of women—the result of child care and other family responsibilities—accords with expectation. The job separations of women were also less likely to be job-related quits—a category that includes separations initiated by the employee.

Adult training in Canada

- Training for adults who are not in school declined slightly between 1992 and 1998. Men's participation in all types of training declined from 28.3% in 1992 to 25.7% in 1998, and the duration of their training decreased on average from 41.8 hours per year to 34.6 hours for men as a whole. For women, the story is similar. Participation fell from 28.6% to 26.3% and duration dropped from 38.4 to 32.6 hours for women as a whole.
- There is more training activity in large firms, in the public sector, and among workers in professional and managerial occupations, once other factors are taken into account. For example, a postsecondary education, a large employer and professional/managerial employment appear to have reinforcing effects on training activity. *EQR*

Articles

Learning computer skills

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Introduction

Information technology (IT) has a distinctly male face. The representation of women in university computer science (CS) programs in Canada decreased from more than one in four students enrolled in 1982–1983 to about one in five in 1998–1999 (Dryburgh 2000). In addition, Statistics Canada census data show that women working in the computer professions made up less than one-third of all workers in these occupations in 1990 and 1995:

- they accounted for 29% of all computer systems analysts in both years;
- as computer engineers, their share increased from 10% in 1990 to 13% in 1995; and
- as computer programmers, their share declined from 28% in 1990 to 24% in 1995.

Government and educators continue to be interested in the reasons why men and women often end up segregated into somewhat distinct fields of study and subsequent paid work. One explanation is that women may be choosing to learn computing in different ways from men (Wright 1997). Formal education has generally been a prerequisite for computer professions, which also require ongoing learning to keep pace with changing technology. However, when the demand for workers is high, many are entering these occupations without formal CS or engineering education (Office of Technology Policy 1998). Some preliminary evidence (Dryburgh 2000) indicates that women may be taking alternative routes to computer-related work, making choices that may limit their entry into some types of computer-related employment. These alternative routes include short courses at private colleges, employer-sponsored training, and on-the-job training. In light of these findings, this article explores whether women and men are learning their computing skills in different ways. Data from the 2000 General Social Survey (GSS) provide estimates of the number of Canadians experiencing each of nine different kinds of computer training, allowing us to test that preliminary evidence and examine how men and women in all occupations have gained their computing skills.

Some have suggested that the education system reinforces segregation through curriculum design and socialization factors such as role models and the expectations of teachers and guidance counsellors (Sutton 1991). The curriculum design of CS programs has been found to favour individual work, long hours in computer labs, and little application to subject matter areas or problems. In addition, perceptions of CS influence students' decisions whether to enter CS programs or not. For example, eligible female students who were asked why they did not pursue CS education described perceptions and stereotypes of CS that had discouraged or deterred them. They commonly perceived CS programs to be male domains, requiring long hours of trial-and-error programming, with most of that time spent alone at the computer. In addition, they widely believed that what is taught is not relevant to future work because it focusses on abstract theory without linking the computer to its practical applications (Geenans and Rao 1992; Durndell and Lightbody 1993).

Some preliminary evidence shows that men and women prefer to learn computing differently. Qualitative and case studies have found that men have demonstrated greater interest in learning on their own by trial and error—a quality found to be most highly rewarded by CS professors (Rasmussen and Hapnes 1991). Research shows that peer support and mentoring have a positive influence on women's computer education choices and experiences (Busch 1996; Corston and Colman 1996). However, women who have taken CS courses report that they found the experience isolating and the computer labs and masculine computing culture intimidating or hostile (Rasmussen and Hapnes 1991; Grundy 1994).

This article also explores whether male and female workers who have experienced similar training rate the effectiveness of that training differently. In particular, it examines the education and training methods that computer professionals reported as most effective for learning computing skills. Knowledge of computer education and training preferences may help in restructuring CS education, both to counter negative perceptions and to attract more women.

The GSS data can provide important information on computer training experience and effectiveness. This article uses these data to compare male and female computer users in their computer training experiences and in the way they rate the effectiveness of various computer training methods.

Training defined

The nine methods of training used in this article are analysed separately and are also grouped into three general categories of training methods—formal, semiformal and informal.

Formal training/education includes

- taking a course at an education institution (such as a school, college or institute) for which the person has registered and/or paid; and
- taking an employer-sponsored course or training program that is held in a classroom or training facility on or off the work site.

Semiformal training includes

- self-paced, employer-sponsored training that uses videos, CD-ROMs, training handbooks or computers;
- employer-sponsored on-the-job training;
- manuals and online tutorials provided by a computer or software manufacturer; and
- web-based training on the Internet.

Informal training includes

- informal help from a co-worker;
- informal help from a friend or family member; and
- self-teaching through trial and error.

For ease of reading, all methods will be referred to as 'training methods,' although formal methods might more accurately be termed 'education,' given the greater theoretical emphasis in those cases.

What you should know about this study

This article is based on Cycle 14 of the General Social Survey (GSS), "Access to and Use of Information Communication Technology," which was conducted in 2000. The GSS, an annual telephone sample survey covering the non-institutionalized Canadian population aged 15 and over, focusses on a different topic each year. The use and impact of computer and Internet technology on Canadians was the focus of Cycle 14: Canadians were surveyed about their personal use of computers and the Internet and their development of computer skills, as well as the impact of technology on privacy, access to information and the social cohesion of families and communities. The sample of 25,090 respondents represents a survey response rate of 80.8%. The following categories of information provided data for this article:

Self-rated ability— Respondents were asked, "Compared to other people your age, how would you describe your ability to use a computer? Is it excellent, very good, good, fair, or poor?"

Internet use— Respondents were asked, "Have you used the Internet in the past 12 months?"

Access to computer— Respondents were asked whether they had access to a computer at home, work, school or other location.

General technology use— For this index of general technology use, respondents scored one point for their use of each of the following: fax machine, cellular telephone, automated teller machine (ATM), telephone answering machine or service, pager, cable television, satellite dish, and digital video disc (DVD). Possible scores range from 0 to 8, with high scores indicating high technology use and low scores reflecting low technology use.

Occupation— This analysis used three occupation groups: computer professionals (computer programmers, systems analysts and computer engineers); occupations where workers are not computer professionals but perform work requiring a high level of computer skill (analysing data, writing computer programs, using graphics, and doing desktop publishing); and all other occupations.

Table 1
Estimated number of men and women in occupation groups, Canada, 2000

	Men	Women	Total	Share of women
		thousands		%
Computer professionals	293	104	397	26.1
Other occupations requiring high-skill computer work	4,039	3,137	7,176	43.7
All other occupations	4,494	4,059	8,553	47.5
Total	**8,826**	**7,300**	**16,126**	**45.3**

Note: *This table shows the counts for paid workers, employed or self-employed at the time of the survey.*
Source: *Statistics Canada, General Social Survey, Cycle 14, 2000.*

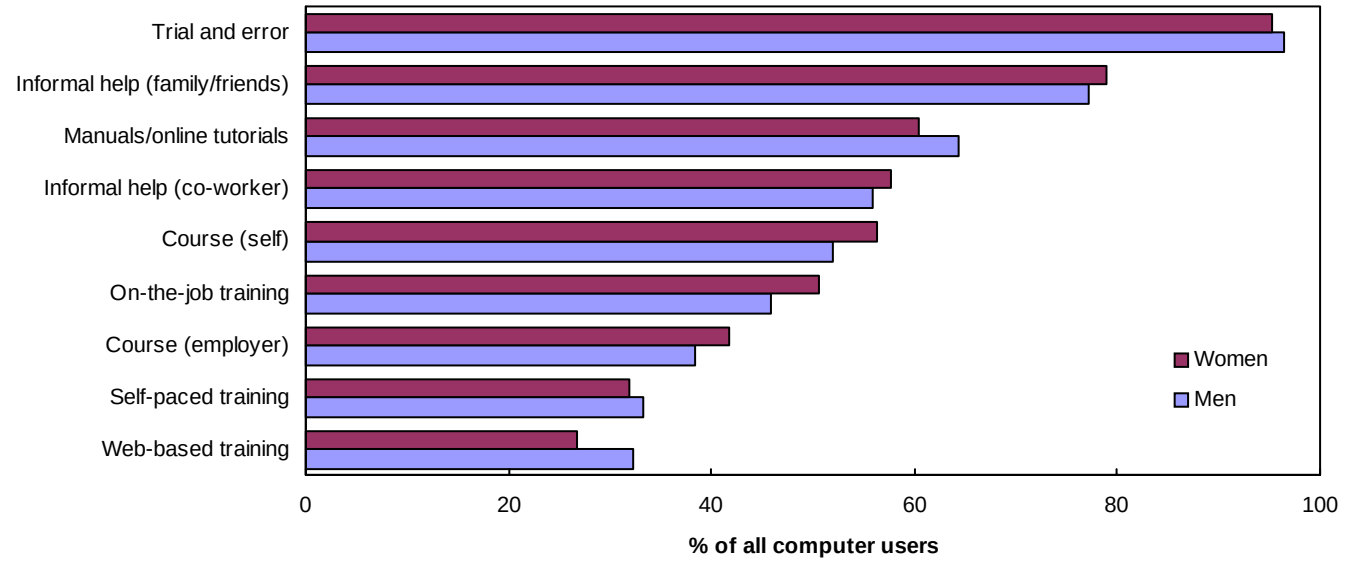
Most learn computer skills by trial and error or with help from friends or family

In 2000, when asked to indicate all the methods they had used to learn computer skills, 96% of all the surveyed computer users reported teaching themselves computer skills through trial and error, and 78% had had informal help from a friend or family member. Formal training —such as a course at an education institution (54%) or an employer-sponsored course or training program (40%)— was less common. Web-based training on the Internet was the least common way of learning computer skills, with an estimated 30% of all computer users training this way.

Although the computer training experiences of men and women were similar, there were some differences. In general, men were more likely than women to use self-teaching methods such as manuals and online tutorials, self-paced training, and web-based training. On the other hand, women were more apt to have experienced formal and facilitated methods, such as on-the-job training and informal help from friends, family and co-workers.

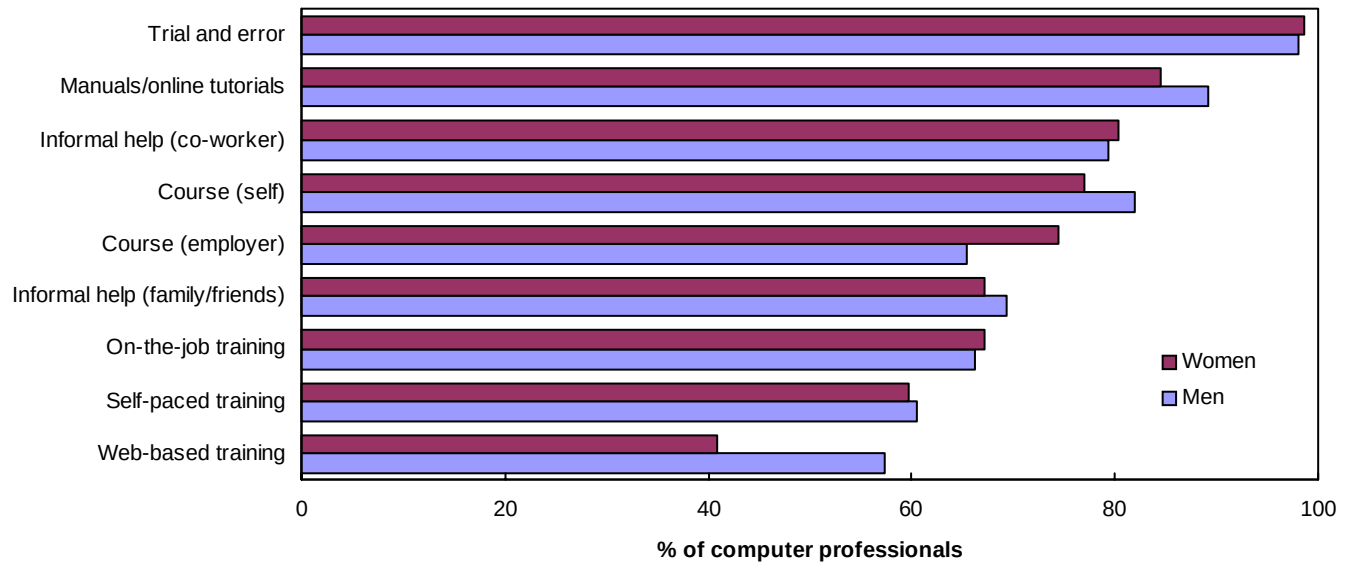
The majority of computer users surveyed had used several training methods to acquire their computer skills. Over half had received between two and five different kinds of training, while 11% had experienced all nine methods of training. Only 5% of all computer users had learned computer skills by one training method—in most cases this was trial and error, with a smaller proportion having taken a formal course.

Graph 1
Use of training methods among all computer users, by sex, 2000



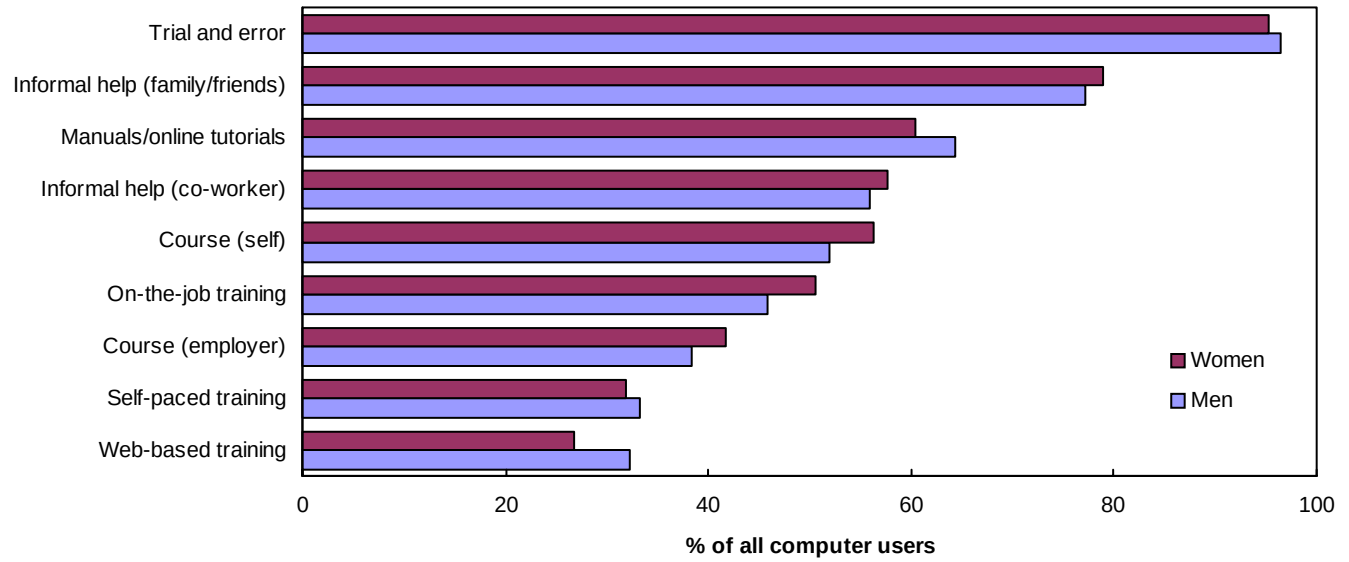
Source: *Statistics Canada, General Social Survey, Cycle 14, 2000.*

Graph 2
Use of training methods among computer professionals, by sex, 2000



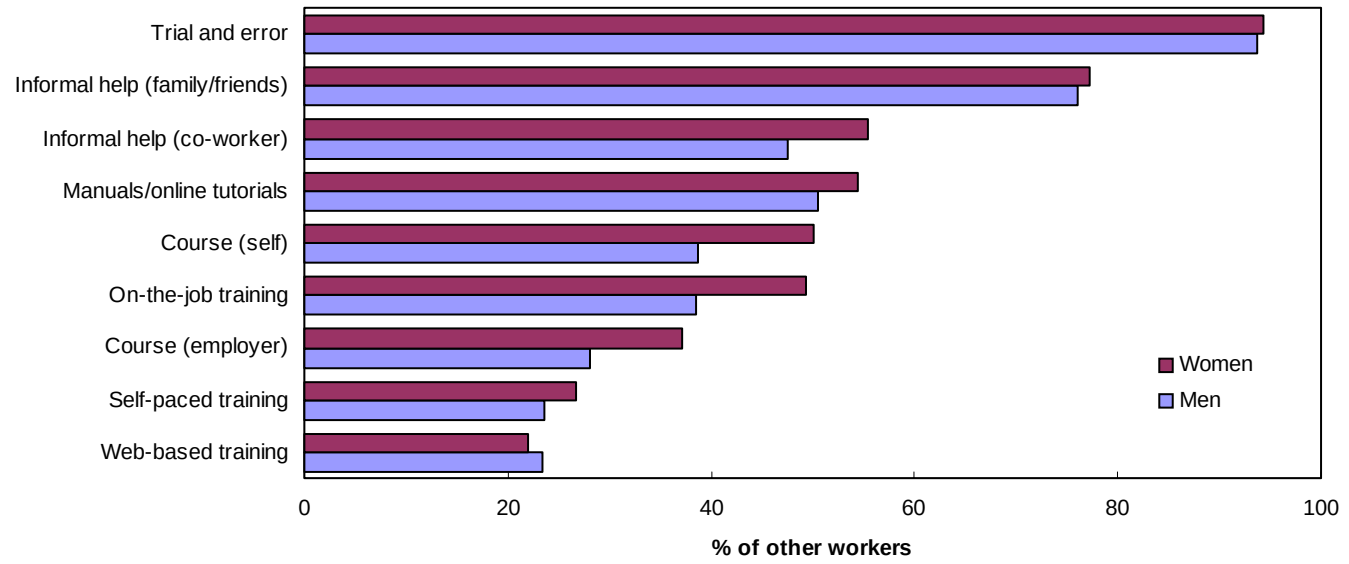
Source: *Statistics Canada, General Social Survey, Cycle 14, 2000.*

Graph 3
Use of training methods among high-skill computer workers, by sex, 2000



Source: *Statistics Canada, General Social Survey, Cycle 14, 2000.*

Graph 4
Use of training methods among all other occupations, by sex, 2000



Source: *Statistics Canada, General Social Survey, Cycle 14, 2000.*

The education and training patterns described above characterize all computer users. However, different patterns emerged for employees in the three occupation groups—computer professionals, high-skill computer workers, and all other occupations.

Women's training experience varied by occupation group and differed somewhat from men's experience within the same group. For example, although female computer professionals were significantly more likely than women in both other occupation groups to use web-based training, they were still significantly less likely than male computer professionals to do so.

Other than web-based training, the education and training experiences of male and female computer professionals were fairly similar. However, women appeared to pursue training regardless of the level of computer skill required for their job, whereas men reported they were more likely to experience training when the complexity of work demanded it.

Female computer professionals were less likely than their male counterparts to have taken formal computer training at an education institution but more likely to have taken employer-sponsored courses. These findings are consistent with enrolment data, but they also suggest that female computer professionals may be taking advantage of alternative routes to computing work through employer-sponsored education and training opportunities (Dryburgh 2000). In comparison, women in both high-skill computer occupations and all other occupations were more likely than men to have taken courses either at an education institution or through employer-sponsored formal training.

Informal training methods get largest proportions of high ratings

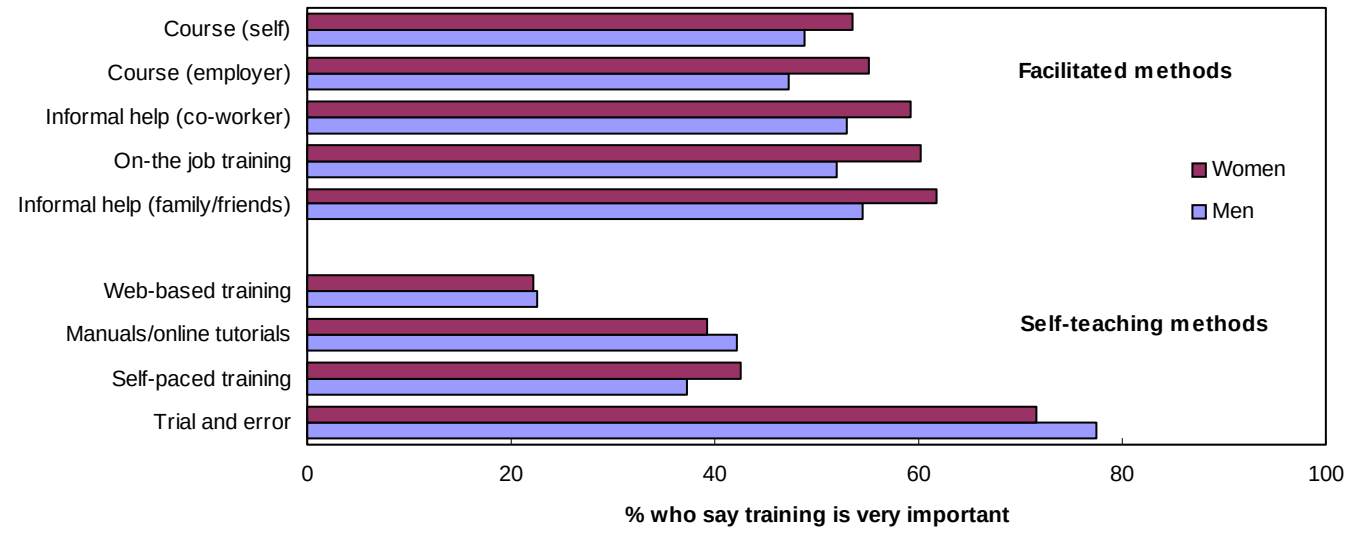
When asked to rate each training method they had experienced from very important to not at all important for learning computer skills, people in general rated informal methods as very important more often than they did formal or semiformal methods. The only exception was a high rating for on-the-job training. Men rated self-teaching methods—such as trial and error and using manuals and online tutorials—higher than women did. These two methods most closely represent the self-teaching ideal that is often associated with computer work and is found to be highly valued by CS professors (Rasmussen and Hapnes 1991).

Women rated facilitated methods—such as on-the-job training, informal help from a co-worker, family or friends, and self-paced learning—higher than men did. These results are consistent with other research that finds strong benefits for women experiencing social facilitation in learning computing (Busch 1996). Formal training also received higher ratings from women than from men.

Training is more important for computer professionals than for other groups

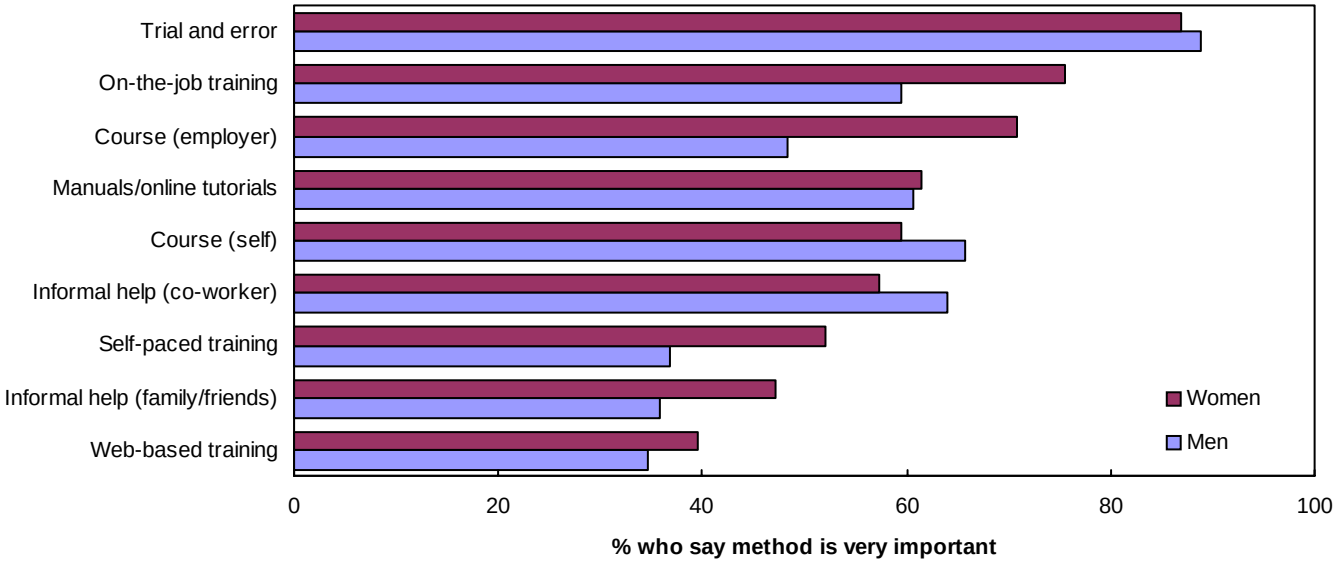
Graphs 2, 3 and 4 show some similarities and differences in ratings by occupation group. First, people in all three occupation groups rated trial and error as most important and web-based training as least important for learning computer skills. However, it is clear that computer professionals were more likely than those in the other occupation groups to experience training and to consider their training as very important.

Graph 5
Rating of training methods by all computer users, by sex, 2000



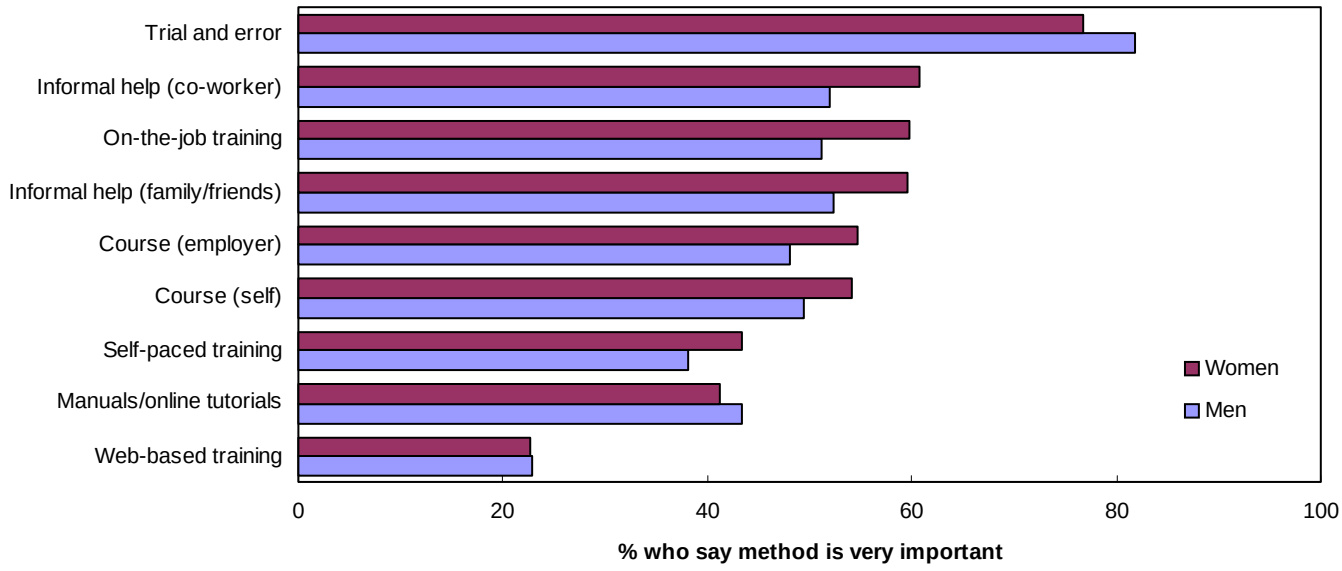
Source: *Statistics Canada, General Social Survey, Cycle 14, 2000.*

Graph 6
Rating of training methods by computer professionals, by sex, 2000



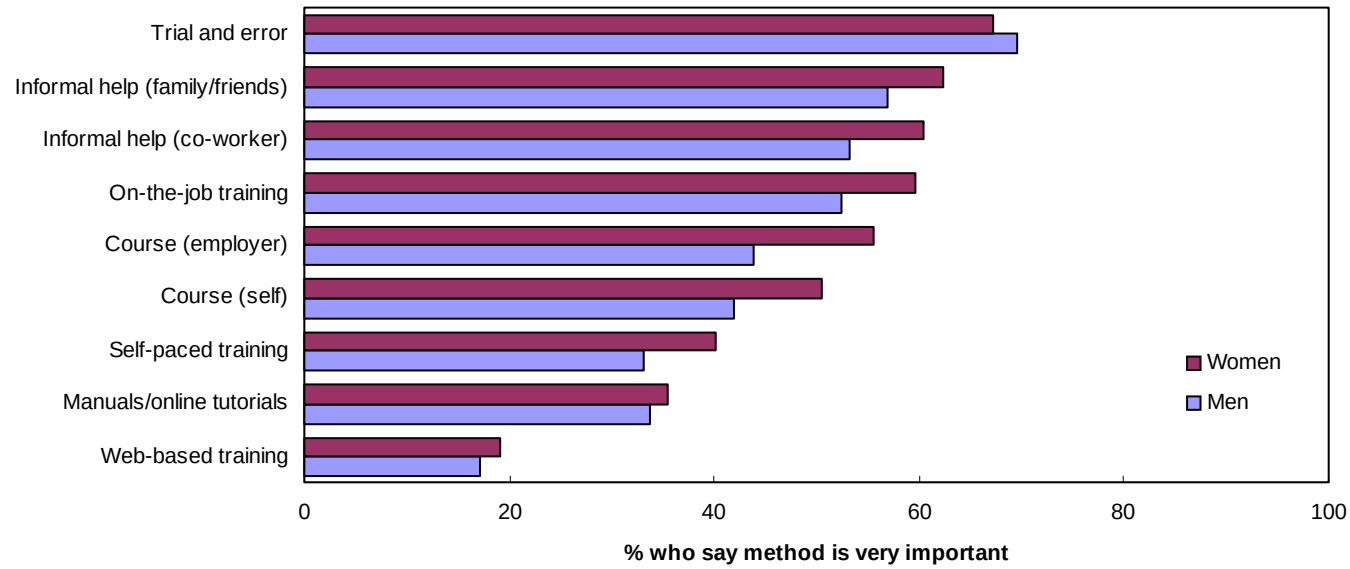
Note: *The coefficient of variation of 23.3 for female computer professionals, web-based training, is in the warning range. This number should be interpreted with caution.*
Source: *Statistics Canada, General Social Survey, Cycle 14, 2000.*

Graph 7
Rating of training methods by high-skill computer workers, by sex, 2000



Source: *Statistics Canada, General Social Survey, Cycle 14, 2000.*

Graph 8
Rating of training methods by all other occupations, by sex, 2000



Source: *Statistics Canada, General Social Survey, Cycle 14, 2000.*

In addition, there were definite occupation group differences in the remaining order of ratings.[1] Compared with workers in the other two occupation groups, computer professionals gave a higher rating to employer-sponsored courses and on-the-job training and a much higher rating to manuals and online tutorials.

Informal help from co-workers, family or friends was among the most highly rated learning methods for others; however, computer professionals rated help from family or friends fairly low and were divided on the importance of informal help from co-workers. Female computer professionals did not rate informal help from co-workers among their top four methods, whereas their male counterparts rated this method third most important for learning computer skills.

Differences between men's and women's assessments of training are greatest among computer professionals

Although there were differences within each occupation group in the way men and women rated training, the gender gap was largest for computer professionals. Female computer professionals experienced training similar[2] to that of men but did not rate its importance for learning computer skills as men did. The finding that considerably more women than men in computer professions gave high ratings to employer-sponsored methods—courses, on-the-job training and self-paced training—again suggests women may be entering careers in computer work via routes such as employer-sponsored training rather than by more traditional routes.

Preliminary research on computing culture suggests that many women feel isolated and hesitate to seek help in the male-dominated environment of computer education and work (Rasmussen and Hapnes 1991). Although male computer professionals were more likely than their female colleagues to highly rate informal help from a co-worker (64% of men versus 57% of women) and formal courses (66% versus 59%), these differences were not large enough to be statistically significant.[3]

Men have more experience with computers than women do

Differences between men and women in their rating of training methods may mask other important influences on those ratings. For example, research indicates that computer experience may have an impact on the kinds of training men and women find effective for learning computer skills (Fisher, Margolis and Miller 1997). Table 2 shows that women and men have different levels of computer-related experience on some measures. For example, among computer professionals and high-skill computer users, larger percentages of men than of women have home access to a computer, rate their computer skills as excellent, and score higher on a general technology use measure. While a larger percentage of men than of women in these two

groups have used the Internet in the past 12 months, the difference is not significant for computer professionals. By contrast, women who do not perform high-skill computer work report having more experience in computing than their male counterparts.

The type of work done and the kinds of skills required for that work may also influence people's assessments of methods for learning computing skills. Women were much more likely than men (47% versus 35%) to be engaged in computer activities requiring a moderate level of computer skill—doing word processing, entering data, keeping records, using a spread sheet program, playing games, and using CD-ROM encyclopedias or educational CD-ROMs. On the other hand, women were much less likely than men (53% versus 65%) to be performing activities requiring a high level of computer skill—analysing data, writing computer programs, using graphics, and doing desktop publishing (see also Marshall 2001).

We ran a multiple regression analysis to see if the sex differences in ratings held true after we had accounted for differences in experience and skill. This technique allowed us to look at the relationship between sex and ratings, while holding constant other important factors such as experience with computers, skill level, number of training methods experienced, education and occupation.

Men and women still rate computer training methods differently when controls are added

The regression analysis generally confirmed the findings shown in graphs 5 to 8. When experience variables, skill level of work, number of training methods experienced, education and occupation were held constant, women still rated employer-sponsored courses, self-paced training, on-the-job training, and informal help from friends or family significantly higher than men did. At the same time, men still rated trial and error higher than women did. However, ratings of manuals and online tutorials no longer differed significantly by sex.

The regression analysis also suggests that age is an important factor in ratings. Among the three occupation groups, interaction tests of men's and women's ratings of formal courses and informal help from a co-worker found differences only for formal courses. Women in high-skill computer jobs and other jobs still rated this method higher than did their male counterparts or female computer professionals. However, this did not hold true for workers under the age of 25. Such younger workers may currently still be taking formal courses in computing or have recently completed them. For that reason, they may rate the value of their training higher than those who completed formal training in the more distant past and who may find it is less relevant to their current work.

Table 2
Computer experience, by sex and occupation group, 2000

	All workers		Computer professionals		High-skill computer users		Other workers	
	Men	Women	Men	Women	Men	Women	Men	Women
Number surveyed	8,826	7,300	293	104	4,039	3,137	4,494	4,059
	%							
Experience variables								
Home access to computer								
Yes	51.2	49.0	86.9	76.9	70.2	62.1	31.7	38.1
Self-rated ability								
Excellent	15.7	8.8	71.1	55.9	21.3	12.7	2.7	3.5
Very good	19.4	24.0	22.2	32.6	26.5	34.7	9.4	13.1
Good	27.3	31.5	F	F	31.2	34.1	24.2	29.8
Fair	23.0	22.1	F	F	17.3	15.0	33.0	29.9
Poor	14.6	13.5	F	F	3.7	3.5	30.1	23.8
Internet use in past 12 months								
Yes	56.2	49.6	98.1	95.9	91.9	88.3	38.8	46.8
	index							
Technology use								
Average score[1]	4.2	4.2	5.0	4.7	4.8	4.7	3.7	3.8

Notes:
F Too unreliable to be published (represents estimates with a coefficient of variation greater than 33%).
1. See text box for explanation of technology scores.
Source: *Statistics Canada, General Social Survey, Cycle 14, 2000.*

Occupation group differences persist when controls are added

When all other factors (including sex) were taken into account, occupation group differences in ratings of training methods were still apparent. Computer professionals rated formal courses, employer-sponsored courses, on-the-job training, informal help from co-workers, manuals and online tutorials, and web-based training higher than high-skill computer workers did but lower than the other occupation group did. Computer professionals rated informal help from friends or family lower than high-skill computer workers did, reflecting the results of the simpler tests, which are shown in graphs 6 to 8. With controls added, two methods—self-paced training, and trial and error—were not significantly different for occupation groups.

Summary

As demonstrated by their higher ratings, computer professionals understand the importance of computer education and training for their occupations. Only one method—informal help from family and friends—was rated lower by computer professionals than by those in high-skill occupations.

Differences in the computer education and training preferences of male and female computer professionals may shed some light on the issue of women's under-representation in computer science programs and the computer professions. For example, among computer professionals, the five most highly rated methods were not the same for men as for women (Graph 6). Both sexes rated trial and error highest and manuals and online tutorials in fourth place. However, where men rated formal courses and informal help from co-workers as their second and third most important methods, women rated on-the-job training second and employer-sponsored courses third. These findings indicate the importance of employer-sponsored training to CS career paths for women.

Some studies have suggested that CS education could be more attractive to women if the curriculum included more application to concrete human endeavours or problems (Estrin 1996). The data presented here support that suggestion. These findings indicate that women learn computing best when they see a relationship between their learning and their work, whereas men find the formal education process effective as it is. Educators may help make CS programs more attractive to women by combining formal theoretical training with applied problem solving within a broad range of subject areas. EQR

Notes

1. Ratings are presented here in order of women's ratings.

2. The survey question was asked as follows for each training method: Was on the job training provided by your employer or a former employer: a) Very important?; b) Somewhat important?; c) Not at all important method in learning computer skills?; d) Did not use this method; e) Refused to answer.

3. Statistical significance tests show whether observed differences are real differences, or whether they may be occurring by chance.

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Liberal arts degrees and the labour market

This article was adapted from the Autumn 2001 issue of Perspectives on Labour and Income *(Statistics Canada catalogue 75-001, Vol. 13, No. 3). For more information on this publication, please visit the Statistics Canada website at* www.statcan.ca/english/indepth/75-001/pehome.htm

The perception of technology as a principal driver in economic change and widely publicized reports of skill shortages in the information technology sector have focused attention on the ability of the post-secondary sector to produce graduates in advanced technology fields. Within this context, a debate has emerged about the labour market value of the traditional liberal arts and science programming that has been a mainstay of universities.

In one view, future economic growth is jeopardized by the failure of Canadian universities to supply sufficient numbers of technically skilled graduates. Typically, the argument is not that university enrolment is too low but, rather, that the program balance is incorrect. In 1998, approximately 39% of university degrees granted were in social sciences while only 7% were in engineering and applied sciences. Twice as many degrees were granted in humanities (12%) as in mathematics and physical sciences (6%).

In the alternative view, postsecondary education should not be judged solely on its ability to prepare students for the labour market—but even if it is, graduates in humanities and social sciences possess the problem-solving, interpersonal, communications and learning skills that employers claim are needed in the emerging economy.

Because universities are a primary source of highly skilled labour, graduating almost 150,000 people annually, the match between their enrolment patterns and the needs of the labour market is important—not only for the economy, but also for the graduates. With $12.1 billion spent in 1997–1998 in the university system, a mismatch between labour market requirements and enrolment patterns may result in a significant efficiency loss. By the same token, a similar loss may occur if universities respond to the increasing use of program-specific funding incentives by provinces and alter a program mix that is already wellmatched to labour market needs.

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Surprisingly little empirical evidence is available on the relative labour market performance of university graduates from different programs. One study, which compared unemployment rates and annual incomes of university graduates in humanities and social sciences to those of their counterparts in more applied streams, found the labour market performance of the graduates to be roughly similar (Allen 1998). This result was confirmed by another study, which found that in 1992, two years after graduation, the unemployment rate for bachelor's graduates in humanities and social sciences was the same as the rate for engineering graduates and 4 percentage points lower than for applied sciences graduates (Lavoie and Finnie 1999). Their mean annual earnings exceeded the earnings of pure and applied science graduates. An examination of rates of return by field of study found considerable variation within each field, as well as between the six fields used (Appleby et al.). These variations make generalizations difficult, but median rates of return appear to be lowest for arts and humanities and highest for health-related fields of study. Rates for administration and social sciences appear quite similar to those for chemistry and physical and natural sciences, but both fall below architecture and engineering.

This article used the Survey of Labour and Income Dynamics (SLID) to look at the labour market experiences of graduates of bachelor's-level programs. SLID offers rich detail on the labour market experiences of individuals from the beginning of 1993, and its longitudinal design is ideally suited for tracking changes over time (see *Data source and definitions* below). Some undergraduate programs are vocational in nature, with a close association between skills taught and skill sets required in identifiable occupations, and prepare students for immediate entry into these occupations upon graduation. Humanities and social sciences, on the other hand, focus more on the development of generic skills such as communications and analytical reasoning than on occupational preparation. Such skills, however, may permit a greater degree of mobility between labour market sectors. One would then expect to see differences in occupational mobility, wage growth, and human capital acquisition between the two groups of graduates, particularly for more recent labour market entrants.

Several dimensions of labour market experience were examined. Graduates at the bachelor's level in the more vocationally oriented educational fields enjoyed an hourly wage premium over their humanities and social sciences counterparts. For women in the former group, however, this premium may be offset by longer and more frequent periods of unemployment. And the skills of the humanities and social sciences group appeared to allow a greater ability to move across industries and occupations.

Data source and definitions

The **Survey of Labour and Income Dynamics**, a longitudinal household survey, began in January 1993. Every three years, approximately 15,000 households enter the survey. Over a six-year period, each household completes two detailed questionnaires annually, one on labour market activity and another on income. The data used in this article are for five years, 1993 to 1997.

The study was limited to bachelor's-level graduates who had obtained their degree by January 1, 1993. Of the 1,446 individuals, 59% were from humanities and social sciences and the rest were from more applied programs. The two groups are similar in a number of important labour market variables, including age and years of work experience (measured in full-year, full-time equivalents). They differ sharply, however, in their proportions of men and women, which have to be taken into account in making labour market comparisons.

Information was collected on all jobs held during any year, to a maximum of three jobs in 1993, and six in each of the following years. In cases where jobs overlapped, a main job was identified based on hours worked. In order to focus on job transitions, the analysis was restricted to main jobs for each of the 60 months. This yielded 1,174 jobs for the liberal arts and sciences group and 856 jobs for the applied programs group.

Field of study for undergraduate degree uses Statistics Canada's standard classification. *Humanities and social sciences* comprises studies in education, recreation and counselling services; fine and applied arts; humanities and related fields; and social science and related fields. The *applied programs* group includes commerce, management and business administration; agriculture and biological sciences and technology; engineering and applied sciences; engineering and applied science technologies and trades; health professions, science and technology; and mathematics and physical sciences.

Reasons for job separation

Personal: Own illness or disability (work- or non-work-related), caring for own children or elder relatives, other personal or family responsibilities, school, retirement.

Job-related: Found new job, poor pay, not enough or too many hours, poor physical conditions, sexual harassment, personnel conflict, work too stressful, to concentrate on other job.

Involuntary: Company moved or went out of business, seasonal nature of job, layoff/business non-seasonal slowdown, labour dispute, dismissal by employer, temporary job/contract ended.

Other: Other, don't know.

Characteristics of graduates and their jobs

Almost one-quarter of the jobs held by graduates in humanities and social sciences were in educational services, more than double the concentration in trade, the next largest industry of employment (Table 1). The single largest concentration of jobs held by graduates in applied programs was in professional, scientific and technical services, but the concentration was much lower (17% versus 23%). For this group, three other industries stood out: public administration; health care and social assistance; and finance, insurance, real estate and leasing.[1]

Table 1
Personal and job characteristics

	Humanities and social sciences	Applied programs
Personal characteristics		
Sample size	847	599
Mean age at January 1, 1993	37.3	38.4
Mean years of full-year, full-time equivalent work experience	12.2	12.7
Proportion of women (%)	56.8	40.5
Job characteristics		
Number of jobs in sample	1,174	856
Industry		**%**
Educational services	23.4	6.8
Public administration	9.6	12.2
Trade	10.4	9.4
Professional, scientific and technical services	9.2	16.6
Health care and social assistance	7.0	11.6
Information, culture and recreation	7.7	0.0
Finance, insurance, real estate and leasing	10.1	11.6
Manufacturing	0.0	10.7
Other	22.6	21.2
Occupation		
Management	14.3	17.8
Business, finance and administrative	23.6	19.9
Natural and applied sciences and related	0.0	25.2
Health	0.0	11.8
Social science, education, government and religion	30.1	0.0
Art, culture, recreation and sport	7.8	0.0
Sales and service	14.8	10.8
Other	9.5	14.5

Source: *Statistics Canada, Survey of Labour and Income Dynamics, 1993 to 1997.*

By occupation, 30% of jobs held by the humanities and social sciences group were classified as social science, education, government service and religion. In fact, 19% of humanities and social sciences graduates were teachers and professors. Once occupations in business, finance and administration are included, over 50% of the jobs held by the humanities and social sciences group were accounted for. The applied programs group shows a broadly similar representation in management and in business, finance, and administrative occupations. The difference in occupational distributions between humanities and social sciences graduates and applied programs graduates is due primarily to educational and government service, natural and applied science, and health occupations.

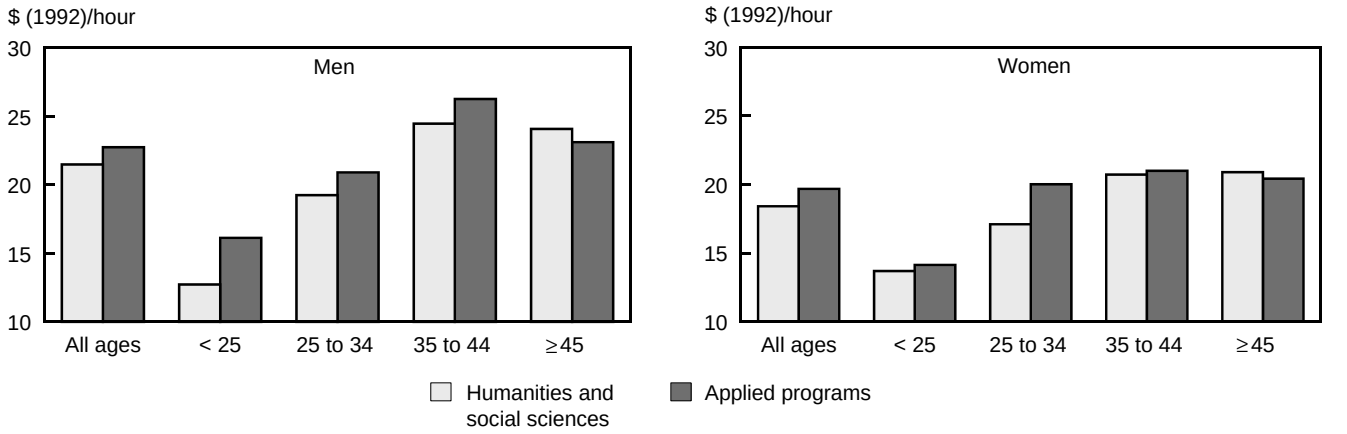
How do wage rates compare?

While both groups received substantial average hourly wages, wage rates for applied programs graduates were about 6% higher for both men and women (Graph 1).[2] Since the sample was restricted to individuals whose highest educational attainment was at the bachelor's level, the wage difference cannot be attributed to medical professionals in the applied programs group. However, a simple comparison of means may be misleading. With significant variation in wages across individuals, many humanities and social sciences graduates earned a wage rate higher than the mean in the applied programs group.

The wage advantage enjoyed by the applied programs graduates declined with age and actually reversed for those 45 and older, a pattern also found by Allen (1998) in his analysis of annual earnings. This is consistent with the hypothesis that skills acquired in humanities and social sciences programs allow a relatively greater accumulation of human capital after formal schooling. It may also be that, with a less direct connection between humanities and social sciences programs and occupational skill needs, graduates of these programs took longer to find their career path.

To provide an overall sense of wage differentials, the natural logarithm of available hourly wage observations was regressed against a categorical variable set to 1 for humanities and social sciences graduates and to 0 for others. Controls for sex, years of full-year, full-time experience, job tenure, marital status, and province of residence were added (Table 2). The resulting coefficients can be interpreted as the proportional effect of a unit change in the explanatory variable. Thus, each year of experience increased the hourly wage by an average of 0.87% (equation 1). Humanities and social sciences wage rates were lower than applied programs rates by an average of 9.5% once controls for sex, experience, tenure, marital status and province were used. To obtain an estimate of the male–female wage gap within each group, separate wage regressions were run for each educational category with a dummy variable (0 = male, 1 = female). The male–female wage gap was larger in the applied programs group, where women's hourly wage rates averaged almost 16% less than men's (equation 3), compared with 7.5% in the humanities and social sciences group (equation 2).

Graph 1
The wage advantage for applied programs graduates reversed for persons 45 and older



Source: *Statistics Canada, Survey of Labour and Income Dynamics, 1993 to 1997.*

Table 2
Wage equation estimates

Dependent variable: *ln(wage)*	Equation 1 All programs	Equation 2 Liberal arts	Equation 3 Applied programs
Constant	2.84	2.70	2.96
	(0.030)	(0.040)	(0.044)
Humanities and social sciences	-0.095		
	(0.012)		
Sex	-0.115	-0.075	-0.156
	(0.012)	(0.015)	(0.018)
Experience	0.0087	0.007	0.010
	(0.001)	(0.001)	(0.001)
Job tenure	0.0008	0.001	0.0007
	(0.0001)	(0.0001)	(0.0001)
R^2	0.17	0.16	0.16

Note: *Estimates for provincial dummy variables not reported. (Standard errors in parentheses).*
Source: *Statistics Canada, Survey of Labour and Income Dynamics, 1993 to 1997.*

How do unemployment experiences compare?

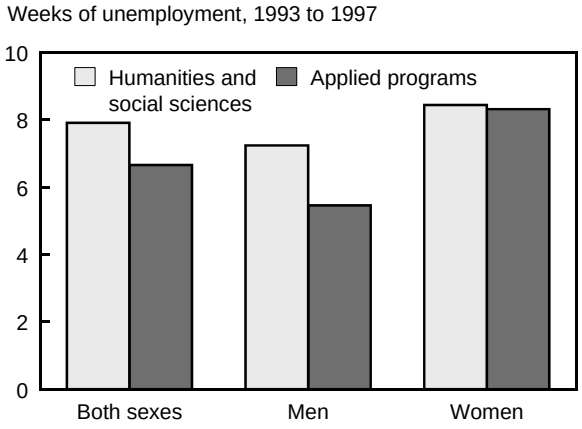
Although the wage rates of older humanities and social sciences graduates matched or exceeded those of their applied programs counterparts, the return on their education was likely lower. How then can the continued popularity of the former programs be reconciled with models of rational economic decision-making? One answer may be to invoke the portfolio-choice paradigm of financial investment, which postulates that a lower expected return on investment is willingly accepted for reduced risk. If the generic skills acquired in humanities and social sciences programs carry a wider currency in the labour market, they may permit a greater degree of mobility between employers and between occupations or industries, lessening unemployment risk. Depending on personal attitudes towards risk, an individual may well regard a lower return as a price to be willingly paid to avoid the risk of investing in occupation-specific skills that could be rendered obsolete by future trade or technology shocks.

To examine this issue, the unemployment experiences of the two groups were compared. This addresses more directly the 'employability' debate over the relevance of an education in the humanities and social sciences.

SLID provides a number of different perspectives on unemployment, including total weeks of unemployment during the survey period. Over the 260 weeks from January 1993 to December 1997, the humanities and social sciences group averaged over one week more of unemployment than the applied programs graduates did (Graph 2). The difference was almost entirely due to higher unemployment among humanities and social sciences men.

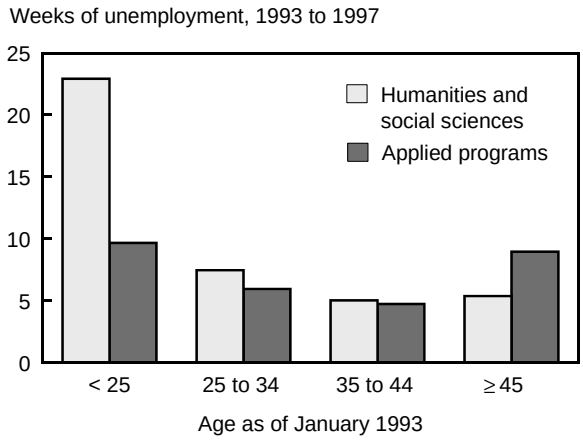
The unemployment difference was particularly striking among young workers (Graph 3). Graduates of humanities and social sciences programs appeared to have a more difficult transition into the labour market than their applied programs counterparts. Generally speaking, humanities and social sciences programs do not offer a direct connection to a well-identified occupation so graduates may spend more time experimenting with jobs—and facing the consequent periods of unemployment in between. Once they were established in the labour market, however, their unemployment experience compared

Graph 2
Men from the humanities tended to be unemployed longer than their applied programs counterparts



Source: *Statistics Canada, Survey of Labour and Income Dynamics, 1993 to 1997.*

Graph 3
Young humanities graduates were unemployed far longer



Source: *Statistics Canada, Survey of Labour and Income Dynamics, 1993 to 1997.*

favourably. Indeed, after age 45 humanities and social sciences graduates faced fewer average weeks of unemployment than did members of the applied programs group, a pattern that reinforces the suggestion of labour market advantages to humanities and social sciences programs in the longer term.

Table 3
Incidence and duration of unemployment

	Humanities and social sciences		Applied programs	
	Men	Women	Men	Women
	number			
Incidence				
Spells per person	0.42	0.57	0.34	0.57
	%			
Proportion affected	22.1	32.4	20.1	29.8
0 spells	77.9	67.6	79.9	70.2
1 spell	11.3	18.6	11.2	18.4
2 spells	5.8	7.8	5.9	6.8
3 or more spells	5.0	6.0	2.9	4.6
	weeks			
Duration				
Mean	16.3	15.3	15.4	21.9
	%			
Less than...				
8 weeks	39.8	47.1	51.3	46.2
16 weeks	69.4	68.6	70.9	63.1
26 weeks	85.0	80.9	84.1	71.0
52 weeks	95.6	93.0	94.4	87.4

Source: *Statistics Canada, Survey of Labour and Income Dynamics, 1993 to 1997.*

Were the weeks of unemployment generated by recurring short spells or by infrequent long spells?[3] The number of periods of unemployment per person was identical for both groups of women, but considerably higher for humanities and social sciences men than for applied programs men (Table 3). The difference in the percentage of men affected by unemployment was not as dramatic, indicating a higher incidence of multiple periods of unemployment among humanities and social sciences men. The mean duration of a spell was almost a week longer for humanities and social sciences men. This, together with a higher incidence, was consistent with their greater number of weeks of unemployment (7.2 weeks, compared with 5.5 weeks).

For women, however, the story was quite different. Applied programs women faced substantially longer spells of unemployment than did humanities and social sciences women or applied programs men. Humanities and social sciences women, on the other hand, had shorter spells than the men in their education group. The higher rates of unemployment among humanities and social sciences women compared with their male counterparts were attributable to a greater incidence of unemployment, whereas the same phenomenon among applied programs women and men was attributable to both a higher incidence and a longer duration.

The relative ability of humanities and social sciences graduates to avoid unemployment or to find work once unemployed presents a somewhat mixed message. Women in the two groups became unemployed at the same rate, but humanities and social sciences women exited significantly more quickly. Male humanities and social sciences

graduates experienced unemployment more frequently and took longer to find employment than applied programs men, although the difference in mean lengths was less than one week (16.3 versus 15.4).

Job mobility differs

If the human capital acquired by humanities graduates is more general, then they should have a greater ability to move between sectors of employment. Moreover, with a greater transferability of skills they should also be more willing to change sectors since attendant wage losses (if any) would be smaller. High rates of mobility could be regarded as either negative (job instability) or positive (opportunity for mobility). Looking at 'voluntary' job movements involving a change in occupation captures transitions that are more likely to test the transferability of skills, since a change in industry need not imply a change in the type of work done. (Transitions refer to any movement from one main job to another, with or without an intervening spell of unemployment. For an individual returning to a job after a period of employment in another, only one transition is recorded.)

The average numbers of job transitions of the groups during the five-year period were comparable, with the humanities and social sciences group recording slightly higher overall transition rates for both sexes (Table 4). The higher rate among young humanities and social sciences men indicates a difficult labour market transition, perhaps caused by the lack of a clear and direct link between their educational program and eventual vocation. By the middle age category (25 to 34), the transition probability for humanities and social sciences individuals was dramatically lower and below that for the applied programs group. However, this trend was reversed for the oldest of the age categories.

The higher proportion of job separations among both groups of women—the result of child care and other family responsibilities—accords with expectation. The job separations of women were also less likely to be job-related quits—a category that includes separations initiated by the employee (although these may not be entirely voluntary, involving as they do factors such as sexual harassment, poor working conditions or undesirable hours of work). Job transitions among humanities and social sciences men were less likely to be job-related and more likely to be involuntary than among applied programs men. Humanities and social sciences women also showed a greater likelihood of having involuntary separations, but unlike their male counterparts, their proportion of job-related transitions was also higher. The high proportion of transitions taking place without a reported reason makes it difficult to draw firm conclusions about the relative ability of individuals in the two groups to choose to move between jobs.

The proportion of job changes taking place across industry or occupational sectors is more accurately measured and, for both sexes, humanities and social sciences individuals had significantly higher incidences of sector changes. This may reflect an enhanced ability on their part to transfer human capital across those sectors. The rates of change appear extraordinarily high, but these percentages apply only to job transitions, not to the entire sample of individuals. In fact, the majority of both groups remained in the same industry and occupation during the five years.

Table 4
Job mobility

	Humanities and social sciences		Applied programs	
	Men	Women	Men	Women
Number of job transitions per person				
All ages	**0.76**	**0.68**	**0.70**	**0.65**
Under 25 years	2.24	1.16	1.15	1.33
25 to 34 years	0.84	0.79	0.98	0.85
35 years and older	0.57	0.46	0.45	0.31
			%	
Reason for job ending				
Personal	4.2	10.3	4.1	8.0
Job-related	25.4	18.3	30.8	12.5
Involuntary	22.9	23.1	17.3	11.9
Other	13.2	11.1	7.6	19.5
Not reported	34.3	37.2	40.2	48.1
Change in...				
Industry	64.6	61.9	55.6	52.6
Occupation	64.6	60.5	55.4	51.6

Source: *Statistics Canada, Survey of Labour and Income Dynamics, 1993 to 1997.*

Conclusion

Graduates of university programs in the humanities and social sciences acquire skills that are different from those obtained in more vocationally oriented programs—as is evident from the different industries and occupations in which they find jobs. And, as a group, humanities and social sciences graduates receive lower wage rates. Furthermore, male graduates of these programs experience higher unemployment.

These aggregate comparisons, however, mask important long-term dimensions of labour market experiences that may be attributable to the nature of the skill sets these graduates have obtained. The wage disadvantage, for example, was caused by very significant wage differences

among young workers of both sexes. By the age of 45, wage rates among humanities and social sciences graduates were above those of their applied programs counterparts. Similarly, higher relative unemployment was attributable to very drastic differences among young workers since older humanities and social sciences workers faced fewer weeks of unemployment.

The picture that emerges is one in which individuals graduating from programs in the humanities and social sciences had considerably more difficulty with the school-to-work transition, as might be expected given the lack of a clear connection between their programs of study and occupations. But once that transition was made, they appeared to benefit because the skills they acquired have a greater longevity and are complementary to continued, lifelong learning in the face of labour market changes. The shorter unemployment durations for humanities and social sciences women and the higher occupational and industrial mobility among both sexes in this group reinforces the interpretation that their skills were more portable, thus providing them with broader re-employment opportunities.

What is the appropriate balance between investments in general skills and in technical or vocational skills? While income levels or unemployment rates from cross-sectional data can provide some insights, a more complete understanding of the labour market returns to these different skill sets requires observations of individual career dynamics of the sort afforded by SLID. While the data are extremely complex and the analysis in this report permits only tentative conclusions, the initial findings suggest considerable promise for future, more structured approaches. EQR

Notes

1. These relative concentrations are sensitive to the classification used to distinguish the humanities and social sciences group. For example, their relative underrepresentation in the public administration and finance sectors is at least partly because commerce, management and business administration was included in the applied programs group.

2. The survey design complicates wage rate comparisons since rates may be available for different jobs for an individual and/or at different times for the same job. SLID records hourly wage rates (either reported directly by respondents or imputed using income and hours of work information) at the beginning of each calendar year for jobs in progress at that time. End-of-year rates are also available for jobs in progress at the end of the year. Finally, the last wage rate received in any job ending during the calendar year is reported. A job begun during the year does not trigger a wage observation, so the starting wage is not explicitly recorded. However, SLID indicates whether or not wages change during the year, so that starting wages are implicitly available for those jobs for which wages do not change before December 31.

3. The weekly labour force status attached to each personal record in SLID can be used to determine the incidence and duration of periods of unemployment. Spells beginning before January 1993 or continuing past December 1997 are truncated, so their average duration will be underestimated. Given the five-year span, this underestimation will likely be small and biases in comparisons across educational categories smaller still. Of 657 spells, 71 overlapped the beginning or the end of the survey period. Dropping these because their true length is unknown would introduce new biases, since longer spells are more likely to be observed at the beginning and the end of the period.

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Adult training in Canada: Snapshots from the Nineties[1]

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Introduction

Canada's standard of living is determined by the productivity of its economy, which depends in part on the skills possessed by its labour force. Many of these skills must be acquired through education or work-related training. What factors determine whether or not a person will decide to take training? And how much training will an individual undertake in a period of time? A widely accepted framework for examining these questions is the 'human capital' approach. The notion of human capital—the knowledge, skills and abilities for which people are valued as workers—invites a parallel with the more familiar 'physical capital'—such as machinery, structures or computers—which is used in combination with labour to produce something of economic value. The stock and quality of physical capital can be augmented through investment activities, such as installing additional equipment or upgrading existing facilities with technical improvements. Similarly, training activities, which result in additional knowledge or specialized skills for individuals, represent an investment in human capital. Thus, participation in training activities can lead to higher labour earnings and higher productivity for firms.

The reasons why adults decide to undertake further education or training are many and varied. Some individuals may be motivated by career development opportunities, or a desire to retrain after a job change. Others may simply wish to upgrade rusty skills after an absence from the job market. Unlike formal schooling, which tends to be concentrated among the young, participation in training activity occurs at all ages through the entire life cycle. But what factors affect the incidence and duration of training? Does participation in training vary with respect to age? Is the duration of training a consideration in deciding whether or not to pursue it? And how is training affected by having a full-time job, by household responsibilities, by union status, and by geographical location?[2]

The Adult Education and Training Survey (AETS)

The main objective of the AETS is to measure participation rates for learning and training among adults aged 17 or over, that is, the percentage of adults who undertake some form of training after ceasing formal schooling. This survey captures information on adult participation in education and training over the previous 12 months. It covers programs as well as courses, and learning that is job-related as well as for personal interest, full-time as well as part-time, and employer-sponsored as well as self-financed. The survey covers training offered in universities and colleges, in private and commercial institutions, on-site at the workplace, and distance learning, such as over the Internet.

The most recent AETS survey (1998) is the sixth in a series of similar surveys designed to measure adult participation in learning and training. Although the contents of the six AETS survey instruments are not identical, the three cross-sections spanning the 1990s (AETS 1992, 1994 and 1998) are comparable for our purposes.

The AETS is administered as a supplement to the Labour Force Survey (LFS), a household survey whose sample is representative of the civilian, non-institutionalized population 15 years of age and older in the 10 provinces. Excluded are residents of Nunavut, the Yukon and the Northwest Territories, people living on Indian reserves, full-time members of the Armed Forces, and inmates of institutions. These groups represent approximately 2% of the population aged 15 and older. The LFS data are collected from some 52,000 occupied dwellings or about 102,000 people. The AETS is administered to only one randomly selected individual aged 17 or over in each household.

Non-response to the LFS is very low (usually less than 5%); non-response to the AETS is about 15%. The sample size for the AETS is generally 30,000 to 40,000 individuals. Since the LFS and AETS are administered together, it is possible to associate patterns of participation in adult learning with individual socio-economic and demographic characteristics. In sum, the AETS provides valuable information on adult learning patterns in Canada with respect to such topics as incidence, frequency, volume, type of training and self-reported motivations. Information on training history is not included in any AETS survey.

For more details on the AETS, see Statistics Canada (1999).

This paper describes the incidence of training activity and the duration of training episodes during the 1990s among adult Canadians who were not full time or part time students in an education program[3]. It also summarizes our research, which was based on a core model of human capital accumulation over the life cycle. This model includes variables—age, job tenure, hours worked, and past accumulated human capital (educational attainment)—that determine training participation and duration. A wide variety of other variables—such as sex, family circumstances, region of residence, and firm size—are included as controls. We then make estimates using multivariate statistical techniques (probit and tobit regression models) to analyse data, separately and pooled, from the 1992, 1994 and 1998 Adult Education and Training Surveys (AETS).

Methodology

Our examination of the incidence and duration of training episodes employs the three surveys conducted during the 1990s. We focus on all training taken by adults who were not enrolled in formal schooling, that is, adults who were neither full-time nor part-time students during the reference year of a given AETS. As indicated in Table 1, the variables measured by the three surveys were not identical; in particular, the list of variables was expanded for each subsequent survey. For example, the specific category

Table 1
Content of the Adult Education and Training Surveys, 1992, 1994 and 1998

Variable	1992	1994	1998
Training in reference year			
All training	X	X	X
Work-related training		X	X
Core economic variables[1]			
Education (highest level attained),[2] age, hours worked, job tenure	X	X	X
Worker characteristics	X	X	X
Region of residence, urban/rural, marital status, preschool children	X	X	X
Language, ethnic origin, disability status		X	X
Immigration status			X
Job characteristics			
Employment status, self-employment, union coverage, firm size, blue/white collar, public/private sector, industrial category (SIC)	X	X	X
Professional/managerial, goods/services sector		X	X
Full-time work, permanent job, changed jobs during year, supervisor			X

Notes:
X Variable present in survey.
1. For a full discussion of the core variables and their impact, see Hum and Simpson (2001).
2. Graduate and undergraduate university degrees are distinguished only in 1998.
Source: *Statistics Canada, Adult Education and Training Surveys, 1992, 1994 and 1998.*

'work-related training' is available only for 1994 and 1998. Thus, our comparison of training activity from 1992 to 1998 must rely on all training activity, including a portion that may not be work-related.

The AETS questions on our core economic variables (age, job tenure, hours worked, and educational attainment) and many basic demographic and employment characteristics (including sex, region of residence, family circumstances, self-employment, union coverage, firm size, and industry of employment) are roughly, but not exactly, consistent across surveys. For example, age and years of job tenure are available as categorical data from all three surveys, but the non-categorical data are only available for 1994 and 1998. Similarly, questions on language, ethnic origin, disability status, and professional/managerial status were asked in 1994 and 1998 but not in 1992. Only the 1998 survey obtained data on immigration status and on whether or not a respondent had been permanently employed, had changed jobs, and had worked in a supervisory position in the previous year.

The inclusion of additional variables available only for some surveys could have affected our assessment of the determinants of training incidence and duration. Therefore our strategy was to compare estimates of training incidence (based on a probit regression model) and estimates of training duration (based on a tobit regression model) for the following three sets of variables constructed from all the available variables indicated in Table 1:

- the 1998 data set of all variables captured in the 1998 AETS;
- the smaller data set consisting of only those variables common to the 1994 and 1998 surveys; and
- the smallest data set, consisting of only those variables common to all three surveys—1992, 1994 and 1998.

With this approach, we examined how the additional variables available in 1998 affected the explanation of training incidence and training duration. We give full details of the probit and tobit specifications, as well as complete estimation results, in Hum and Simpson (2001).

Table 2
Incidence and duration of adult training, by sex, Canada, 1992, 1994 and 1998[1]

	1992	1994	1998
All training			
Total			
Incidence (%)	28.4	28.1	26.0
Mean annual duration (hours)	40.1	37.5	33.6
Men			
Incidence (%)	28.3	27.4	25.7
Mean annual duration (hours)	41.8	36.6	34.6
Women			
Incidence (%)	28.6	28.7	26.3
Mean annual duration (hours)	38.4	38.3	32.6
Work-related training[2]			
Total			
Incidence (%)	..	20.5	19.6
Mean annual duration (hours)	..	27.8	27.5
Men			
Incidence (%)	..	22.0	20.8
Mean annual duration (hours)	..	27.9	28.6
Women			
Incidence (%)	..	19.1	18.5
Mean annual duration (hours)	..	27.6	26.4
Sample size[3]			
Men (number)	19,764	17,827	12,423
Women (number)	22,323	20,844	15,706
Total (number)	42,087	38,671	28,129

Notes:
.. Not available for a specific reference period.
1. Training refers to previous year (i.e., 1991 reference year for 1992 AETS).
2. Training question for 1992 differs from 1994 and 1998. The 1992 AETS asked "During the past 12 months, did you receive any training or education?",whereas the 1994 and 1998 surveys asked "At any time during [the reference year], did you receive any training or education including courses, private lessons, correspondence courses, workshops, apprenticeship training, arts, crafts, recreation courses, or any other training or education?" Therefore no figures are available for work-related training in 1992.
3. Full-time and part-time students are excluded from the sample, based on direct questions in all years about student status.
All results are weighted to reflect the Canadian adult population aged 17 and older, excluding full-time and part-time students.
Sample sizes for duration are slightly smaller; for details see Hum and Simpson (2001).
Source: *Statistics Canada, Adult Education and Training Surveys, 1992, 1994 and 1998, and calculations by the authors.*

Findings

Our major findings are summarized in tables 2 and 3. Table 2 reports estimated mean training incidence and mean duration of training statistics for the three AETS surveys. Table 3 gives a more comprehensive set of descriptive statistics for men and women separately.

Training for adults who are not in school declined slightly between 1992 and 1998[4] (Table 2). Men's participation in all types of training declined from 28.3% in 1992 to 25.7% in 1998, and the duration of their training decreased on average from 41.8 hours per year to 34.6 hours for men as a whole. For those men who participated in training the average hours of training in 1998 was 134.6 hours[5], down from 147.7 hours in 1992. For women, the story is similar. Participation fell from 28.6% to 26.3% and duration dropped from 38.4 to 32.6 hours for women as a whole. Average hours of training for women who took training dropped to 124.0 hours in 1998 from 134.3 hours in 1992.

Table 3
Distribution of the Canadian population along selected AETS variables, by sex, 1992, 1994 and 1998[1,2]

Variables	Men			Women		
	1992	1994	1998	1992	1994	1998
	% of population					
Highest level of educational attainment						
Some high school	35.1	31.3	15.2	35.4	31.5	15.0
High school degree	27.6	27.3	26.0	31.8	31.2	28.4
Postsecondary diploma	23.5	26.4	29.7	22.7	25.1	30.1
University	13.8	15.0	14.5	10.1	12.2	21.2
Bachelor's degree	..	..	11.9	..	..	18.6
Graduate degree	..	..	2.6	..	..	2.6
Age						
17 to 19 years	1.7	1.6	1.2	1.6	1.5	1.0
20 to 24 years	7.9	7.0	5.4	7.1	6.7	5.0
25 to 34 years	23.9	23.0	20.9	22.8	21.9	19.3
35 to 44 years	22.9	23.5	24.4	21.9	22.2	23.3
45 to 54 years	16.5	17.7	19.8	15.6	16.7	18.8
55 to 64 years	12.9	12.7	12.4	12.7	12.6	12.4
65 years and older	14.2	14.6	15.8	18.1	18.4	20.2
Job tenure						
<0.5 years	39.1	39.6	32.7	54.8	54.5	47.9
0.5 to <1 year	3.7	3.8	5.2	3.2	3.3	4.3
1 to <5 years	19.3	17.7	23.9	18.5	16.7	19.8
5 to <10 years	11.3	12.7	13.0	9.3	10.8	12.6
10 to <20 years	16.3	14.8	12.8	10.2	10.8	9.3
>20 years	10.3	11.4	12.4	3.9	4.0	6.1
Region of residence						
Atlantic	8.6	8.5	7.2	8.7	8.5	7.9
Quebec	25.7	25.2	24.7	25.7	25.7	24.8
Ontario	36.8	37.3	38.3	37.2	37.1	38.3
Prairies	7.3	7.1	7.0	7.4	7.2	7.0
Alberta	9.2	9.2	9.6	8.9	8.8	9.0
British Columbia	12.4	12.6	13.2	12.2	12.7	12.9
Urban	79.8	80.3	84.0	83.4	83.3	84.0
Married or common law	73.2	72.5	71.9	66.7	66.0	65.8
Preschool children	16.4	17.2	14.5	16.9	16.4	15.6
Employed	68.0	67.8	74.7	52.9	52.4	58.4
Self-employed	9.7	16.0	14.5	4.7	6.4	6.8
Union coverage	27.5	26.0	23.7	18.5	20.0	18.7
Firm size						
<20 employees	49.5	56.0	51.9	59.9	65.1	61.1
20 to 99 employees	10.3	11.2	11.5	7.1	7.0	8.3
100 to 199 employees	8.6	3.8	4.6	7.4	3.2	3.4
200 to 499 employees	26.5	4.8	5.3	20.7	3.8	4.7
500 or more employees	5.1	24.2	26.7	4.9	20.9	22.5
Blue collar	42.2	41.2	32.9	8.0	7.2	6.6
Public sector	13.7	12.8	12.4	12.7	13.5	20.8
	number					
Average number of hours worked per week[3]	28.1	28.2	30.7	17.7	17.7	19.5

Notes:
.. Not available for a specific reference period.
1. Results are weighted to reflect Canadian population estimates.
2. Full-time and part-time students are excluded from the sample in all years, based on a direct question about full-time or part-time student status.
3. Excludes cases where number of valid hours worked (zero or positive) is not reported.
Source: *Statistics Canada, Adult Education and Training Surveys, 1992, 1994 and 1998, and calculations by the authors.*

Economic activity in Canada was uneven during the 1990s. The decade began with a brief recession in 1991, after which output and employment expanded throughout the rest of our study period. There were, of course, counterbalancing economic incentives to train as labour market conditions improved toward the late 1990s: training is influenced by the 'business cycle.' On the one hand, increased hiring and business activity may spur training as employers add to their staff and provide necessary training. On the other hand, the 'opportunity costs' of training staff—the foregone output—are higher in a robust economy, and this might lead to less training. Accordingly, these counterbalancing influences make any simple causal statement relating the business cycle to training virtually impossible. This is clearly an area that requires further study when additional data are available, and calls for a much wider sweep in terms of examining the entire workings of the Canadian economy—an undertaking beyond the scope of this paper. For now, we simply ask whether the factors identified in the AETS instruments provide a consistent explanation of training incidence and duration for Canadian men and women during the 1990s.

Many changes occurred between 1992 and 1998. Education levels have risen, particularly the number of women receiving a university degree (Table 3). According to the human capital model, this should increase training. The population is also aging and this should reduce training. The upswing in economic activity and employment between 1994 and 1998—more workers have between six months' and five years' job tenure—should increase training activity as well. But, as Table 3 illustrates, various other factors are also changing: the overall population is becoming more urban, less likely to be married or to have young children, more likely to be self-employed (especially men), less likely to be unionized (male workers), much more likely to be in a large firm (500 or more employees), and less likely to be in blue-collar occupations. Men are less likely, but women are more likely, to be in the public sector. All these changes make any simple statement focusing on a single explanatory factor unwise, and consequently call for a multivariate approach, which takes many factors into account.

In results reported in detail in Hum and Simpson (2001), we estimate probit models of training incidence for the three surveys in the 1990s. Our results support the idea that many factors affect training decisions and that a multivariate statistical approach is useful. Among our core economic variables (age, job tenure, hours worked, and educational attainment), we found that training participation declined sharply with age over the life cycle and that higher levels of educational attainment were associated with more current training for both men and women. But there was a considerable amount of heterogeneity in training activity in the sense that a number of other worker and employment characteristics were significant in addition to these core economic variables. For example, the patterns of training activity for men and women differed: training activity declined more rapidly with age for men than for women, and the effect of postsecondary education on training was greater for women than for men. Unionized workers and workers in smaller firms participated significantly less in training, as has been found in other studies, such as Hum and Simpson (1996). Public-sector workers participated more in training, even after we adjusted for other job and personal characteristics, than their private-sector counterparts.

Some of the new variables introduced in the 1998 survey (Hum and Simpson 2001) appeared to be important:

- respondents who responded to the survey in French were significantly less likely to participate in training than those who responded in English;
- adults who had immigrated to Canada were less likely to train than either the native born or those who had immigrated as children (aged 18 and younger);
- people with a disability were less likely to train than people without a disability; and
- workers in supervisory or professional/managerial positions were more likely to receive training than other workers.

When we estimated tobit models of training duration, we found similar results (Hum and Simpson 2001). An important difference, however, is that among our core economic variables, job tenure significantly affected duration (but not participation) and did so in a U-shaped pattern: training declined up to five years of job tenure and increased thereafter, particularly for men. This suggests that new workers train more but training activity declines when workers stay in their jobs for longer periods, as we would expect on economic grounds. However, a somewhat puzzling increase in training for workers with more than five years' job tenure requires further investigation.

In summary, our statistical exploration supports a multivariate approach to understand training participation and incidence. Analysis must focus on a variety of economic factors, including not only the strong effect of age but also the influence of job tenure and past education. But it cannot ignore important differences in personal and employment circumstances that affect training. This evidence of diversity and heterogeneity of behaviour is now a well-documented finding in analyses of microdata (Heckman 2001), and training is no exception.

Did economic conditions and training behaviour really change during the 1990s, or were the observed differences merely the result of conducting three separate AETS surveys? To study this question, we pooled the data from all three surveys and included simple dummy variables representing different survey years to measure the 'survey effect.[6] Our findings indicate a statistically significant survey effect in every case, indicating that, other factors considered, training participation and duration were significantly lower in 1998 than in 1994 and 1992. In other words, the decline in training activity is not due solely to the fact that separate surveys might give slightly lower results by pure chance.

We estimate the mean annual magnitude of the reduction at six to eight hours of training. We also test the stability of our estimated coefficients across the surveys, finding strong formal statistical evidence of parameter instability across the 1994 and 1998 surveys, and across the 1992, 1994 and 1998 surveys for both the probit model of training participation and the tobit model of training duration. Whether this instability is a result of the variation in the survey instrument over time, inherent instability in training behaviour, or missing crucial variables is not clear.

Conclusions

The life cycle model of human capital accumulation argues that education and training are lifetime activities related to the working career. We examined the AETS master files for 1992, 1994 and 1998, employing probit regression to study training incidence and tobit regression to examine training duration for adults not in school.

We specified a model of training acquisition with age, hours worked, job tenure and past human capital (educational attainment) as core variables. Our empirical results suggest that educational attainment and age have statistically significant effects on participation for men and women across all data sets but that hours worked and job tenure do not. A university degree raises participation in training for both men and women, although the effect appears to be stronger for women.

Despite a formal rejection of parameter stability, we do obtain a number of qualitatively similar results across the surveys. For example, we find that the core variables of our model of human capital accumulation over the life cycle provide a significant set of determinants of training activity. In particular, training incidence and duration decline sharply with age; education (particularly post-secondary education) raises training activity; and there is a distinct U-shaped relationship between training duration and job tenure. The patterns of training activity for men and women differ; in particular, training activity declines more rapidly with age for men, and the effect of post-secondary education on training is larger for women.

We also find considerable heterogeneity in training activity in the sense that other worker and employment characteristics are significant in addition to the core variables. Notably, there is more training activity in large firms, in the public sector, and among workers in professional and managerial occupations, once other factors are taken into account. For example, a postsecondary education, a large employer and professional/managerial employment appear to have reinforcing effects on training activity. Also, among the new variables introduced in the 1998 survey, we find some interesting indications that suggest male immigrants and people with disabilities train less. These findings constitute avenues for further research and study. EQR

Notes

1. For the full report, see Hum and Simpson (2001).

2. Canadian literature on the determinants of individual training is very sparse. One exception is Betcherman, McMullen and Davidson (1998), which used the 1994 Adult Education and Training Survey (AETS). The most recent work (Statistics Canada and Human Resources Development Canada 2001) examined the 1998 AETS. However, neither report employed multivariate statistical analysis or controlled for a wide variety of variables. Hence their findings should be treated with some caution.

3. A "program" is a selection of courses taken for credit towards a degree, diploma or certificate.

4. Our results differ from other publications (e.g., Statistics Canada and Human Resources Development Canada 2001) because we exclude students, both full-time and part-time, from our study. We are concerned only with training activity beyond formal schooling.

5. We arrived at this figure by dividing the average duration of training (34.6 hours for men in Table 2) by the proportion of men engaged in training (25.7% in table 2) for 1998. We arrived at the other figures by using the corresponding figures in Table 2 for men in 1992 and women in 1998 and 1992.

6. See Hum and Simpson (2001) for statistical details.

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Statistics Canada and Human Resources Development Canada. 2001. *A Report on Adult Education and Training in Canada: Learning a Living*. Statistics Canada Catalogue no. 81-586-XPE. Ottawa.

Data availability

announcements

Data releases

In the section "Data releases" we provide the titles of data released by the Centre for Education Statistics since the publication of the previous issue of Education Quarterly Review. *Details on each release can be accessed free-of-charge from Statistics Canada's website www.statcan.ca. Click on "The Daily" and "Previous issues".*

- Literacy skills, occupational assignment and the returns to over- and under-education, 1994–1998 (released January 25, 2002)
- At a crossroads: First results for the 18- to 20-year-old cohort of the Youth in Transition Survey, 2000 (released January 23, 2002)
- School board revenues and expenditures, 1998 (released January 3, 2002) EQR

Current data

Data series	Most recent data: Final[1]	Most recent data: Preliminary or estimate[2]
A. Elementary/secondary		
Enrolment in public schools	1998–1999	1999–2000[e] 2000–2001[e]
Enrolment in private schools	1998–1999	1999–2000[e]
Enrolment in minority and second language education programs	1998–1999	
Secondary school graduation	1998–1999	
Educators in public schools	1998–1999	1999–2000[e] 2000–2001[e]
Educators in private schools	1997–1998	1998–1999[e] 1999–2000[e]
Elementary/secondary school characteristics	1998–1999	1999–2000[e]
Financial statistics of school boards	1998	
Financial statistics of private academic schools	1997–1998	1998–1999[e] 1999–2000[e] 2000–2001[e]
Federal government expenditures on elementary/secondary education	1998–1999	1999–2000[p] 2000–2001[e]
Consolidated expenditures on elementary/secondary education	1998–1999	1999–2000[p] 2000–2001[e]
Education Price Index	1999	
B. Postsecondary		
University enrolments	1999–2000	discontinued
University degrees granted	1998	discontinued
University continuing education enrolment	1996–1997	discontinued
Educators in universities	1998–1999	1999–2000[e]
Salaries and salary scales of full-time teaching staff at Canadian universities	1999–2000	
Tuition and living accommodation costs at Canadian universities	2001–2002	
University finance	1998–1999	1999–2000[p]
College finance	1998–1999	1999–2000[p]
Federal government expenditures on postsecondary education	1998–1999	1999–2000[p] 2000–2001[e]
Consolidated expenditures on postsecondary education	1997–1998	1998–1999[p] 1999–2000[e]
Community colleges and related institutions: enrolment and graduates	1998–1999	1999–2000[e]
Trade/vocational enrolment	1998–1999	1999–2000[e]
College/trade teaching staff	1997–1998	1998–1999[p]
International student participation in Canadian universities	1998–1999	

See notes at end of this table.

Current data (concluded)

Data series

C. Publications[3]

Education in Canada (2000)

South of the Border: Graduates from the class of '95 who moved to the United States (1999)

After High School, the First Years (1996)

Participation in postsecondary education and family income (1998)

A report on adult education and training in Canada: Learning a living (1998)

International student participation in Canadian education (1993–1995)

Education Price Index – methodological report

Handbook of education terminology: elementary and secondary level (1994)

Guide to data on elementary secondary education in Canada (1995)

A Guide to Statistics Canada Information and Data Sources on Adult Education and Training (1996)

A Statistical Portrait of Elementary and Secondary Education in Canada – Third edition (1996)

A Statistical Portrait of Education at the University Level in Canada – First edition (1996)

The Class of '90: A compendium of findings (1996)

The Class of '90 Revisited (1997)

The Class of '95: Report of the 1997 National Survey of 1995 Graduates (1999)

Education indicators in Canada: Report of the Pan–Canadian Indicators Program (1999)

Education at a Glance: OECD Indicators (2000)

In Pursuit of Equity in Education: Using International Indicators to Compare Equity Policies (2001)

Literacy, Economy and Society (1995)

Literacy Skills for the Knowledge Society (1997)

Literacy in the Information Age (2000)

International Adult Literacy Survey Monograph Series

Benchmarking Adult Literacy in North America: An International Comparative Study (2001)

Measuring up: The performance of Canada's youth in reading, mathematics and science (2000)

Growing Up in Canada: National Longitudinal Survey of Children and Youth (1996)

Children and youth at risk: Symposium report

At a crossroads: First results for the 18- to 20-year-old cohort of the Youth in Transition Survey (2000)

Notes:

1. *Indicates the most recent calendar year (e.g., 1993) or academic/fiscal year (e.g., 1993–1994) for which final data are available for all provinces and territories.*
2. *Indicates the most recent calendar year (e.g., 1995) or academic/fiscal year (e.g., 1996–1997) for which any data are available. The data may be preliminary (e.g., 1995[p]), estimated (e.g., 1995[e]) or partial (e.g., data not available for all provinces and territories).*
3. *The year indicated in parentheses denotes the year of publication. Some of these publications are prepared in co-operation with other departments or organizations. For information on acquiring copies of these reports, please contact Client Services, Culture, Tourism and the Centre for Education Statistics. Telephone: (613) 951-7608, toll free 1 800 307-3382; Fax: (613) 951-9040) or E-mail: educationstats@statcan.ca.*

Education at a glance

This section provides a series of social, economic and education indicators for Canada and the provinces/territories. Included are key statistics on the characteristics of the student and staff populations, educational attainment, public expenditures on education, labour force employed in education, and educational outcomes.

Table 1
Education indicators, Canada, 1986 to 2001

Indicator[1]	1986	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
	thousands											
Social context												
Population aged 0–3	1,475.0	1,573.4	1,601.7	1,610.6	1,596.1	1,595.1	1,578.6	1,560.7	1,550.7	1,453.9	1,390.6	1,366.8
Population aged 4–17	5,204.7	5,395.4	5,437.7	5,484.7	5,536.4	5,620.7	5,691.4	5,754.0	5,795.7	5,725.6	5,723.7	5,723.2
Population aged 18–24	3,286.3	2,886.1	2,869.2	2,869.6	2,852.0	2,823.4	2,816.8	2,833.0	2,865.4	2,895.9	2,921.2	2,948.7
Total population	26,203.8	28,120.1	28,542.2	28,940.6	29,248.1	29,562.5	29,963.7	30,358.5	30,747.0	30,553.8	30,769.6	31,081.9
Youth immigration[r]	25.9	61.2	61.2	73.1	68.3	65.9	66.3	70.4	61.2	..	..	..
	%											
Lone-parent families	18.8	15.3	14.4	14.8	14.9	15.1	14.8	14.9	15.4	15.7	..	..
Economic context												
GDP: Real annual percentage change	3.1	-1.8	-0.6	2.2	4.1	2.3	1.5	..	..	..	..	..
CPI: Annual percentage change	4.2	5.6	1.5	1.8	0.2	2.2	1.7	1.7	1.0	1.9	..	..
Employment rate	59.6	59.7	58.4	58.0	58.4	58.8	58.5	59.0	59.7	60.6	..	..
Unemployment rate	9.7	10.3	11.2	11.4	10.4	9.4	9.7	9.1	8.3	7.6	6.8	7.2
Student employment rate	34.4	38.0	35.1	34.0	34.2	33.3	34.8	32.5[2]	..	..	..	..
Families below low income cut-offs:												
Two-parent families	10.9	10.8	10.6	12.2	11.5	12.8	11.8	12.0	..	..	..	..
Lone-parent families	52.5	55.4	52.3	55.0	53.0	53.0	56.8	51.1	..	..	..	..
Enrolments	thousands											
Elementary/secondary schools	4,938.0	5,218.2	5,284.1	5,327.8	5,362.8	5,441.4	5,414.6	5,386.3	5,483.9[e]	5,524.9[e]	..	..
	%											
Percentage in private schools	4.6	4.7	4.9	5.0	5.1	5.1	5.2	5.3	5.3[e]	..	..	..
	thousands											
College/trade/vocational, full-time[3]	238.1	275.9	266.7	306.5	298.5	269.1	266.4[e]	264.5[e]	..	..	..	..
College/postsecondary, full-time	321.5	349.1	364.6	369.2[r]	380.0[r]	391.3[r]	397.3[r]	398.6	403.5[r]	409.4[e]	..	..
College/postsecondary, part-time[4]	96.4[e]	125.7[e]	106.6[e]	98.4	90.8	87.7	87.1	91.6	91.4	..	..	..

See notes at end of this table.

Table 1
Education indicators, Canada, 1986 to 2001 (concluded)

Indicator[1]	1986	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
							thousands					
Full-time university	475.4	554.0	569.5	574.3	575.7	573.2	573.6	573.1 r	580.4	..	..	..
Part-time university	287.5	313.3	316.2	300.3	283.3	273.2	256.1	249.7	246.0	..	..	..
Adult education and training	..	5,504	..	5,842	..	..	..	6,069	..	..	..	..
							%					
Participation rate	..	27	..	28	..	..	..	26	..	..	..	..
Graduates							thousands					
Secondary schools[5]	..	260.7	272.9	281.4	280.4	295.3	300.2 r	296.4 r	300.8 e	..	..	..
College/trade/vocational[6]	145.0	159.7	158.8	163.9	151.1	144.2	141.5 e	138.7 e	..	..	..	..
College/postsecondary	82.4	85.9	92.5	95.2	97.2	100.9	105.0	105.9 e	..	..	..	..
University/Bachelor's	101.7	114.8	120.7	123.2	126.5	127.3	128.0	125.8	124.9	..	..	..
University/Master's	15.9	18.0	19.4	20.8	21.3	21.4	21.6	21.3	22.0	..	..	..
University/Doctorate	2.2	2.9	3.1	3.4 e	3.6	3.7	3.9	4.0	4.0	..	..	..
Full-time educators												
Elementary/secondary schools	269.9	302.6	301.8	295.4	295.7 e	298.7 e	294.4 e	296.8 e	295.9 e	295.9 e	..	..
College/postsecondary/trade/ vocational	30.6[7]	31.7[7]	31.8[7]	32.2[7]	31.0[7]	30.9 r	31.5 r	31.0 r	32.1 e	..	..	..
University	35.4	36.8	37.3	36.9	36.4	36.0	34.6	33.7	33.7 e	..	..	..
							ratio					
Elementary/secondary pupil–educator ratio	16.5	15.5	15.7 e	16.1 e	16.1 e	16.1 e	16.1 e	16.3 e	16.4 e	15.9 e	..	..
Education expenditures							$ millions					
Elementary/secondary	22,968.0	33,444.9	34,774.5	35,582.3	35,936.0	36,425.3 r	36,804.8 r	37,163.6 r	38,709.4 r	38,545.2 e	39,495.0 e	..
Vocational	3,275.1	4,573.8	5,380.9	5,631.2	6,559.0	6,185.2	5,301.8	7,953.4 r	8,946.2 r	8,787.4 e	8,669.9 e	..
College	2,999.0	3,870.7	4,075.3	4,105.9	4,207.1	4,531.8	4,477.9	4,689.5 r	4,781.7 r	5,100.9 e	4,923.2 e	..
University	7,368.7	11,254.8	11,569.8	11,736.8	11,857.9	11,802.0	11,600.7	12,220.3 r	12,863.2 r	13,662.9 e	13,168.3 e	..
Total education expenditures	36,610.8	53,144.2	55,800.5	57,056.2	58,560.0	58,944.3 r	58,185.2 r	62,026.7 r	65,300.4 r	66,096.5 e	66,256.4 e	..
							%					
As a percentage of GDP	7.3	7.9	8.0 r	7.9 r	7.7 r	7.3 r	7.0 r	7.1 r	7.1 r	..	..	..

Notes:
.. *Figures not available.*
r *Revised figures.*
e *Estimated figures.*
1. *See 'Definitions' following Table 2.*
2. *The figure is for April 1997.*
3. *The enrolments have all been reported as full-time based on a 'full-day' program, even though the duration of the programs varies from 1 to 48 weeks.*
4. *Excludes enrolments in continuing education courses, which had previously been included.*
5. *Source: Canadian Education Statistics Council. (Excludes adults for Quebec, Ontario and Alberta equivalencies.)*
6. *The majority of trade and vocational programs, unlike graduate diploma programs which are generally two or three years' duration, are short programs or single courses that may require only several weeks. A person successfully completing these short-duration programs or courses is considered a completer, not a graduate. These completers do not include persons in part-time programs.*
7. *Figures have been revised to include a complete count of staff in trade programs.*

Table 2
Education indicators, provinces and territories

Indicator[1]	Canada	Newfound-land and Labrador	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario
	%						
Social and economic context							
Educational attainment,[2] 2001:							
Less than secondary diploma	24.4	35.7	30.9	27.4	30.6	31.4	21.5
Graduated from high school	19.6	15.0	15.3	13.6	19.4	15.7	21.7
Some postsecondary	7.0	4.8	6.4	7.1	5.2	5.6	6.8
Postsecondary certificate, diploma or university degree	48.9	44.6	47.4	51.9	44.8	47.2	50.0
Labour force participation rates by educational attainment, 2001:							
Total	66.3	58.7	67.5	62.1	61.8	63.8	67.6
Less than secondary diploma	38.8	33.7	46.4	35.2	37.0	37.0	39.0
Graduated from high school	69.1	60.8	77.0	66.4	69.0	70.9	68.3
Some postsecondary	69.9	64.2	74.1	65.1	65.3	67.5	71.1
Postsecondary certificate, diploma or university degree	78.3	77.4	77.4	74.7	75.3	78.8	79.2
Unemployment rate, 2001	6.1	14.5	10.9	8.1	10.0	7.8	5.1
Costs							
Public and private expenditures on education as a percentage of GDP, 1994–1995	7.0	9.9	7.6	7.6	7.4	7.6	6.8
Public expenditures on education as a percentage of total public expenditures, 1994–1995	13.6	16.9	10.8	9.7	11.2	13.8	14.2
Elementary/secondary pupil–educator ratio, 1998–1999	15.9[e]	14.5	16.6	16.5	16.9	14.4	16.4
Educational outcomes							
Secondary school graduation rates, 1999	76.7	79.5	81.3	80.4	84.8	84.2[3,4]	77.3[5]
University graduation rate, 1998–1999	35.0	32.2	21.8	53.5	33.7	41.7	36.8
Unemployment rate by level of educational attainment, 2001							
Less than secondary diploma	10.1	27.6	20.0	11.7	19.6	13.0	6.9
Graduated from high school	5.8	14.3	13.1	8.1	9.6	7.5	5.2
Some postsecondary	6.7	14.4	11.6	8.7	9.2	9.5	5.6
Postsecondary certificate, diploma or university degree	5.1	10.0	6.6	7.1	7.0	6.1	4.7

See notes at end of this table.

Table 2
Education indicators, provinces and territories (concluded)

Indicator[1]	Manitoba	Saskatchewan	Alberta	British Columbia	Yukon	Northwest Territories
			%			
Social and economic context						
Educational attainment,[2] 2001:						
Less than secondary diploma	27.8	28.6	19.3	18.5	..	..
Graduated from high school	21.0	20.6	19.2	22.5	..	..
Some postsecondary	6.6	7.0	9.1	9.8	..	..
Postsecondary certificate, diploma or university degree	44.6	43.9	52.3	49.2	..	..
Labour force participation rates by educational attainment, 2001:						
Total	67.2	66.0	72.7	64.8	..	..
Less than secondary diploma	42.1	40.3	47.1	38.2	..	..
Graduated from high school	74.0	74.5	75.5	63.8	..	..
Some postsecondary	75.7	73.0	75.0	66.9	..	..
Postsecondary certificate, diploma or university degree	78.5	77.7	80.8	74.7	..	..
Unemployment rate, 2001	3.9	4.5	3.6	6.6	..	..
Costs						
Public and private expenditures on education as a percentage of GDP, 1994–1995	7.8	7.4	5.4	6.5	11.3	16.6
Public expenditures on education as a percentage of total public expenditures, 1994–1995	12.9	13.8	13.2	12.2	10.4	12.0
Elementary/secondary pupil–educator ratio, 1998–1999	15.6	16.2	16.8	16.9	12.7	13.5[e]
Educational outcomes						
Secondary school graduation rates, 1999	74.3	75.0	63.3	73.4	60.4	40.1[6]
University graduation rate, 1998–1999	31.5	33.1	25.2	24.6	..	..
Unemployment rate by level of educational attainment, 2001						
Less than secondary diploma	6.3	7.7	5.2	11.5	..	..
Graduated from high school	3.2	3.9	3.4	6.5	..	..
Some postsecondary	4.2	6.4	4.1	7.3	..	..
Postsecondary certificate, diploma or university degree	3.4	3.5	3.2	5.5	..	..

Notes:
.. *Figures not available.*
[r] *Revised figures.*
1. See 'Definitions' following Table 2.
2. Parts may not add up to 100% due to rounding.
3. Starting in 1995, Quebec graduate data for regular day programs include individuals over the age of 20 who graduated from regular day programs.
4. Excludes "Formation professionnelle."
5. Excludes night school and correspondence courses for Ontario adults.
6. Includes graduates from Nunavut.

Definitions

Education indicators, Canada

Table 1.
Year references are as follows: (1) *population* refers to July of the given year; (2) *enrolment* and *staff* refer to the academic year beginning in September of the given year; (3) *graduates* refers to number of persons graduating in the spring or summer of the given year; (4) *expenditures* refers to the fiscal year beginning in April of the given year.

1. **Youth immigration**
   The number of persons aged 0 to 19 who are, or have been, landed immigrants in Canada. A landed immigrant is a person who is not a Canadian citizen by birth, but who has been granted the right to live in Canada permanently by Canadian immigration authorities.

2. **Lone-parent families**
   The number of lone-parent families expressed as a percentage of the total number of families with children. A lone parent refers to a mother or a father, with no spouse or common-law partner present, living in a dwelling with one or more never-married sons and/or daughters. Sources: Statistics Canada, 1971 to 1986: *Lone-parent families in Canada*, Catalogue no. 89-522-XPE; 1991 to present: Small Area and Administrative Data Division.

3. **Gross domestic product**
   The unduplicated value of production originating within the boundaries of Canada, regardless of the ownership of the factors of production. GDP can be calculated three ways: as total incomes earned in current production; as total final sales of current production; or as total net values added in current production. It can be valued either at factor cost or at market prices. Source: Statistics Canada, Industry, Measures and Analysis Division.

4. **Consumer Price Index**
   The Consumer Price Index (CPI) is an indicator of changes in consumer prices. It is defined as a measure of price change obtained by comparing, over time, the cost of a specific basket of commodities. Figures are annual averages.

5. **Employment rate**
   The number of persons employed expressed as a percentage of the population 15 years of age and over, excluding institutional residents. Figures are annual averages.

6. **Unemployment rate**
   The number of unemployed persons expressed as a percentage of the labour force.

7. **Student employment rate**
   The number of persons aged 15 to 24 attending school on a full-time basis who were employed during the calendar year (excluding May through August), expressed as a percentage of the total number of full-time students 15 to 24 years of age.

8. **Families below low income cut-offs**
   Low income cut-offs are a relative measure of the income adequacy of families. A family that earns less than one-half of the median adjusted family unit income is considered to be in difficult circumstances. The set of low income cut-offs is adjusted for the size of the area of residence and for family size. Source: Statistics Canada, *Low Income Persons, 1980 to 1995*, December 1996, Catalogue no. 13-569-XPB/XIB.

9. **Adult education participation rate**
   The number of persons 17 years of age or over participating in adult education or training activities, expressed as a percentage of the total population 17 years of age or over. Excludes regular full-time students who are completing their initial schooling.

10. **Elementary/secondary pupil–educator ratio**
    Full-time equivalent enrolment (enrolment in grades 1 to 12 [including Ontario Academic Credits] and ungraded programs, pre-elementary enrolment in provinces where attendance is full time, and half of the pre-elementary enrolment in other provinces) divided by the full-time equivalent number of educators.

11. **Education expenditures**
    Includes expenditures of governments and of all institutions providing elementary/secondary and postsecondary education, and vocational training programs offered by public and private trade/vocational schools and community colleges.

Education indicators, provinces and territories

Table 2.
The methodologies used to derive the indicators in Table 2 may differ from those used in other statistical tables of this section.

12. Educational attainment and labour force participation rates
Refers to the population aged 25 and over. Source: Statistics Canada, Labour Statistics Division.

13. Secondary school graduation rate
Source: Statistics Canada, 2001, Centre for Education Statistics, *Education in Canada 2000,* Catalogue no. 81-229-XPB.

14. University graduation rate
Number of degrees awarded at the undergraduate level, as a percentage of the population aged 22.

15. Unemployment rate by level of educational attainment
The number unemployed with a given level of education expressed as a percentage of the labour force with the same education for the population aged 25 and over. Upper secondary includes the final grade of secondary school. EQR

In upcoming issues

The following articles are scheduled to appear in upcoming issues of *Education Quarterly Review:*

Family income and participation in postsecondary education

This analysis looks at family income and its impact on participation in postsecondary education. It suggests that parents' education has a stronger effect than income on the likelihood of children going on to postsecondary education. In addition to the involvement of parents in their children's education, other important factors include aspirations, values and motivations that facilitate educational attainment.

Setting up shop: Self-employment amongst Canadian college and university graduates

This article contributes to our understanding of the changing labour market in Canada, including the shift toward "non-standard" types of work: more part-time, part-year or other irregular work patterns, fewer permanent positions, more multiple job holdings and a rise in self-employment. Characteristics and activities of graduates in the first five years following graduation are studied using data from the National Graduates Surveys and the Follow-up Surveys.

Student loans: Borrowing, burdens and repayment

Using data from the Canadian Student Loan Program, this analysis addresses a number of concerns and questions relating to student borrowing and debt loads: What proportion of students borrow, and what is their accumulated debt? How do borrowing patterns relate to postsecondary earning levels? What are the typical rates of repayment, and how many graduates encounter problems repaying their loans? What trends emerge in borrowing and repayment rates, and do gender and education levels correlate with these rates?

Income prospects of British Columbia university graduates

Using tax and administrative records of British Columbia bachelor's graduates, income of graduates is examined with a focus on changes in income over time, as well as differences across major fields of study.

Female engineering graduates in Ontario: Success in the labour market

Using data from Statistics Canada's University Student Information System and the T-1 Family File, this article examines a series of questions of interest to students preparing to enter postsecondary studies, as well as to teachers, counselors and companies in the technology sector: What is the potential for earnings and growth in engineering? How has the proportion of female graduates in engineering changed over time? How do engineering incomes compare to incomes in other fields of study?

EQR

Cumulative index

This index lists, by major subject area, the analytical articles published in *Education Quarterly Review*. Included are descriptions of education and education-related surveys conducted by Statistics Canada, provincial governments and institutions.

Enrolment

Graduates

Teachers

Finance

Flows and transition

Accessibility

Achievement and literacy

Labour market

Training

Private, distance and home schooling

Indicators

Surveys and data sources