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Education Quarterly Review

2003, Vol. 9, no. 1

- Understanding the rural-urban reading gap
- Unions and training
- Relative earnings of British Columbia university graduates

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Statistics Canada
Culture, Tourism and the Centre for Education Statistics

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From the Editor-in-Chief

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.

Following the release of **Adult Training in Canada: Snapshots from the nineties** (Hum and Simpson, 2002, EQR, vol. 8 no 2), we received inquiries about an apparent discrepancy between results published in this article and those reported in a previous joint publication by Human Resources Development Canada and Statistics Canada (*A Report on Adult Education and Training in Canada: Learning A Living*, Statistics Canada, 2001, catalogue number 81-586-XPE). The EQR article **Adult Training in Canada: Snapshots from the nineties** reported a decline in mean hours of adult training from 1992 to 1994 and 1994 to 1998, while *A report on Adult Education and Training in Canada* reported an increase in mean hours of adult training from 1992 to 1994 and 1994 to 1998. This difference in findings is attributable to differences in the population used in each study.

A Report on Adult Education and Training in Canada excluded full-time students[1] based on a series of AETS questions. On the other hand, **Adult Training in Canada: Snapshots from the nineties** excluded full-time and part-time students based on direct questions from the Labour Force Survey[2]. Due to these definitional differences, 1,691 of the 2,565 (66%) full and part-time students excluded from the **Adult Training in Canada: Snapshots from the nineties** report are included in *A Report on Adult Education and Training in Canada*. Most of these students (78%) participated in programs.

While *A Report on Adult Education and Training in Canada* reported an increase in mean training hours, the trend varied by type of training: mean hours for programs increased while mean hours for courses decreased (Table 1[3]). Because

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this report included a higher percentage of people participating in programs, the overall net effect was an increase in mean hours. However, since by definition **Adult Training in Canada: Snapshots from the nineties** excluded a high percentage of program participants, its overall finding of a decrease in mean hours is more consistent with the trend with respect to courses (Table 1).

Table 1
Change in mean training hours by capita by type of training. 1994 and 1998 AETS*

Type of activity	Per capita mean hours- 1994	Per capita mean hours-1998	Change	% Change
Employer-sponsored programs	7.9	13.6	5.7	42.2
Non–employer–sponsored programs	28.7	33.6	4.8	14.4
Employer–sponsored courses	5.6	5.0	-0.6	-11.8
Non–employer-sponsored courses	4.9	3.9	-1.0	-25.3
All types of activities	**50.1**	**58.0**	**7.9**	**13.6**

* *These figures are based on the same population definitions used in A Report on Adult Education and Training in Canada.*

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. EQR

Footnotes

1. Full-time students were defined at those aged 17-24 except: full-time students subsidized by employers; full-time students over 19 enrolled in elementary or secondary programs; and full-time students over 24 years of age enrolled in postsecondary programs. This selection represented 3.3% of the AETS base population.
2. This exclusion consisted of 8% of the AETS base population.
3. Table 1 focuses on the changes observed between 1994 and 1998, while the data is not shown, the same pattern was observed for changes between and 1992 and 1994.

Highlights

Understanding the rural-urban reading gap

- In Canada, students from urban schools performed significantly better in reading than students from rural schools, according to the Programme for International Student Assessment. The rural–urban difference was particularly large in Newfoundland and Labrador, Prince Edward Island, New Brunswick and Alberta.
- Students in rural schools in Alberta, while not performing as well as their urban counterparts, had reading scores above the national average and higher than urban students in some other provinces.
- Rural students were more likely than urban students to come from families with lower socio-economic backgrounds. The parents of rural students tended to be less educated and less likely to be employed in professional occupations—such as doctors, lawyers or bankers.
- The differences in socio-economic backgrounds did not, however, explain the difference in reading performance between rural and urban students. Even if one were to compare rural and urban students whose parents had the same level of education and the same occupation, the reading difference would still remain.
- The rural–urban gap cannot be explained by differences in rural and urban schools. For the most part, rural and urban schools are much the same.
- The difference between rural and urban reading performance is most strongly related to community differences—in particular, to differences in the nature of work and levels of adult education. Relative to the urban communities, the rural communities were characterized by lower levels of education, fewer jobs and jobs that had, on average, lower earnings and were less likely to require a university degree.

Unions and training

- Union effects on training incidence are typically small and negative, although generally not statistically significant. Similar results are obtained for men and women. It appears that most of the difference in the raw union effects across

subgroups can actually be accounted for by differences between unionized and non-unionized workers in other characteristics.

- For women, unionization has, if anything, a negative impact on the proportion of training spells in which firms help in the funding. As in the case of men, the most robust finding is that employer involvement in funding training increases with tenure, while the opposite is true for workers' involvement in funding their own training.

Relative earnings of British Columbia University graduates

- Median postgraduate annual earnings varied significantly across fields of study, with graduates in applied fields such as engineering, commerce and medical sciences typically earning more than graduates from other fields. However, differences in median earnings by field of study tend to decrease as graduates gain more experience.
- Most graduates do not earn the average earnings associated with the field they choose, and a successful graduate in a field associated with lower earnings may earn substantially more than a less successful graduate in a field where earnings tend to be higher.
- Although engineers earn more than economics or political science graduates at the median, at the 15-year milestone a political science or economics graduate was more likely than an engineering graduate to be found in the top 10% of earners. Engineers are also unlikely to achieve the top 2% of earners, while graduates from fields with lower average earnings, such as economics, political science and biology, are more likely to be in the top 2%. EQR

Articles

Understanding the rural–urban reading gap

Introduction

Driven by rapid technological change and the globalization of markets, the 21st century affords incredible opportunity to Canada. Policy makers at all levels are interested in ensuring that all Canadians—including those living in rural areas—possess the skills and knowledge to capitalize on this opportunity and acquire the flexibility to adapt to change. Schools in rural areas play a key role in generating these required skills and knowledge—including the foundation skills that support and enable efficient learning in adulthood.

This study uses data from the Youth in Transition Survey (YITS) and the Programme for International Assessment (PISA) to measure the differences in reading performance between students in rural and urban schools in each province and to identify factors that may help to explain rural–urban differences.

The data

This study uses data from the Programme for International Student Assessment (PISA) and the Youth in Transition Survey (YITS). In the spring of 2000, a broad sample of Canadian 15-year-olds participated in PISA. It is a project developed by the Organisation for Economic Co-operation and Development (OECD) as a way to measure the skill levels of students in member countries and to understand what characteristics of students and schools influence the level and distribution of reading, mathematics and science skills among youth. In Canada, PISA was carried out in conjunction with the YITS, which collected information from students and parents about student characteristics and experience. PISA is administered in Canada through a partnership of the Council of Ministers of Education, Canada; Human Resource Development Canada; and Statistics Canada.

This article was adapted from the report *Understanding the rural-urban reading gap* and is available free-of-charge on Statistics Canada's website (www.statcan.ca). From the *Our products and services* page, under *Browse our Internet publications*, choose *Free*, then *Education.*

What are rural or urban schools?

Rural schools are those located in rural and small town areas (RSTs).[1] An RST refers to the population living outside the commuting zone of larger urban centres (LUCs)—specifically, outside census metropolitan areas (CMAs) and census agglomerations (CAs). RSTs include all municipalities with urban populations of 1,000 to 9,999 and rural areas, where less than 50% of the employed individuals commute to the urban core of a CMA or CA.

Urban schools are located in CMAs and CAs and are thus located in urban cores, together with adjacent rural and urban areas that have a high degree of economic and social integration with that urban area. A CMA has an urban core of 100,000 or over and includes all neighbouring municipalities where 50% or more of the labour force commutes to the urban core. A CA has an urban core of 10,000 to 99,999 and abides by the same commuting rule as a CMA.

This definition was chosen as the best representation of the urban or rural nature of the community to which 15-year-olds are exposed. Since this definition is based on actual commuting patterns, it reflects the degree to which 15-year-olds are likely to have access to an urban centre as well as the facilities, educational institutions and labour market opportunities that it may provide.

The analysis

The analysis of rural–urban differences in reading performance was carried out in phases. The first phase involved looking to see if there were any other differences between rural and urban students that might help to explain the reading difference. Rural and urban students were compared across a variety of individual, family, school and community characteristics to identify significant and systematic differences that may help to explain the lower performance of rural students.

The second phase of analysis used hierarchical (multilevel) regression modelling to determine which of the characteristics showing consistent differences best explain the rural–urban reading difference. The actual reading averages of rural students in each province were compared with the averages they were expected to have attained if there were no rural–urban difference in a variety of important individual, family, school and community factors.

The analysis examined a variety of variables related to family background (socio-economic status) of students, as well as the characteristics of the communities where their schools were located. Variables describing the socio-economic background of students' families were the highest occupational status and the highest level of education of students' parents. The occupational status of parents was derived using the International Socio-economic Index of Occupational Status.

As measures of the community environment of students, the analysis examined average occupational and educational status of the parents of 15-year-olds in the school, average income, employment rates, unemployment rates, the proportion of adults with postsecondary education—specifically, those with university education—and the proportion of adults working in jobs that generally require university qualifications ('white collar' jobs).

1. The location of schools rather than students' homes was used for this analysis because one important aspect of this study is to identify whether differences in the schools themselves are important factors in urban–rural differences. While it is also important to understand the location of students' homes, this information was not available for this analysis.

Rural–urban reading performance

Urban students outperformed rural students in reading

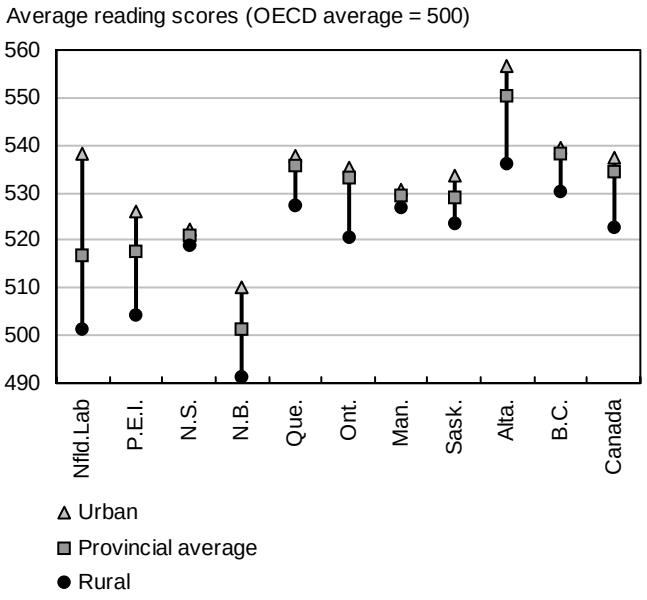
In the PISA 2000 study, Canadian students performed very well by international standards. Canada scored near the top in reading performance. Only students in Finland performed significantly better than Canadian students in reading. Other countries that performed as well as Canada were New Zealand, Australia, Ireland and Japan.[1] Students in all Canadian provinces performed well in reading literacy. In fact, all ten provinces performed above the OECD average of 500.

At the national level, students from urban schools significantly outperformed students from rural schools in reading. In all provinces—except Nova Scotia and Manitoba—there were differences in the reading performance of rural and urban students. In only four of these provinces—Newfoundland and Labrador, Prince Edward Island, New Brunswick and Alberta—were the differences significant.[2] However, rural students in Alberta still performed well—exceeding the Canadian national average—and scored better than urban students in some other provinces (Table 1).

The existence of rural–urban differences in reading performance in some provinces raises important questions: Are there other differences between rural and urban students, schools and communities that can help to explain these lower results? If so, which of these differences are most strongly related to lower reading performance? To answer the first of these questions, rural and urban students were compared across a variety of individual, family, school and community characteristics to identify significant and systematic differences that might help explain the reading difference.

Characteristics of rural and urban students

Graph 1
Mean reading scores for students in urban and rural schools compared to provincial averages



Note: *Predicted rural achievement is the expected average performance of students in rural schools when we control for family background as well as a combination of community variables related to average employment rates, occupational status, and educational attainment. For a comparison of the effects of individual SES and community factors see Table 4.*

Source: *Programme for International Student Assessment; Statistics Canada, Youth in Transition Survey and 1996 Census of Population.*

There were generally no rural–urban differences in individual student behaviours…

Generally, there were no systematic rural–urban differences in personal behaviours and relationships, such as reading behaviours and social interaction with parents (Table 2). Enjoyment of reading, which is strongly related to reading performance according to initial results from PISA 2000, was the same for rural and urban students in most provinces, with two notable exceptions. In Newfoundland and Labrador and Alberta, rural students reported levels of reading enjoyment significantly lower than those of urban students.

…or in relationships with parents and teachers…

For the most part, rural and urban students reported the same levels of social interaction with their parents. In addition, there was generally no difference in rural and urban student reports of the disciplinary environment of the school, the level of teacher support or student–teacher relationships.

…or in reading performance

Rural students in most provinces reported spending more time travelling to school than urban students. The only exceptions were in Newfoundland and Labrador, Quebec and Alberta, where there were no significant differences in the proportion of students with long commutes. Overall, there was no consistent pattern between the differences in average transportation times and average reading performance for rural and urban jurisdictions.

Rural students were less likely to have access to computers and the Internet at home…

Urban students were more likely than rural students to have a computer at home. The rural–urban difference was larger in terms of home access to the Internet. The only provinces without large rural–urban differences in home Internet access were Nova Scotia and Ontario.

…but they spent more time using a computer or the Internet at school

While rural students were less likely to have access to computers and the Internet at home, they actually made greater use of computers at school. A higher proportion of rural students than urban students used computers more than once a month at school. In Nova Scotia, Quebec and Ontario, this difference was not statistically significant. In Prince Edward Island, New Brunswick, Manitoba, Saskatchewan and Alberta, rural students used the Internet at school significantly more often than urban students.

Urban students were more likely to aspire to a university education …

The percentage of students who aspired to a postsecondary education was very high for both rural and urban students in all provinces—85% or more. However, when it came to the decision to aim for a university rather than a college education, there were notable rural–urban differences with urban students being more likely to choose university over college. Only in Prince Edward Island were postsecondary preferences the same for both rural and urban students. The largest differences in university intentions were in Quebec and Alberta.

… and had higher career expectations

The rural–urban difference in the type of postsecondary education expected was also reflected in the career aspirations of students, as measured by the occupational status of the job they expect to have when they would be 30 years old. In all provinces, urban students had significantly higher career aspirations than rural students.

Rural students were more likely to come from lower socio-economic backgrounds

There were significant rural–urban differences across several family characteristics. In all provinces, the parents of rural students had jobs with lower occupational status, on average, than did the parents of urban students.[3] The parents of rural students also had significantly lower levels of educational attainment than the parents of urban students, except in Ontario, Alberta and British Columbia.

According to early results from PISA 2000, students' reading performance generally benefits from parents with whom they can discuss books, television shows and political or social issues (parental academic interest). This is noteworthy, as urban students reported higher levels of this kind of interaction with parents in Newfoundland and Labrador, Prince Edward Island, Quebec, Manitoba and Alberta.

Urban students in most provinces reported significantly higher levels of home cultural possessions—such as classical literature, books of poetry and works of art—and educational resources—such as a dictionary, a quiet place to study, a desk, textbooks and calculators. The exceptions were Nova Scotia and British Columbia. In Ontario, there was no significant difference in the presence of cultural possessions in the home, and in Prince Edward Island there was no difference in levels of home educational resources.

Rural students were less likely to participate in cultural activities, such as going to museums and attending concerts, likely because of lack of access to cultural facilities. In most provinces, however, rural students were just as likely as urban students to participate in extracurricular activities at school and outside of school.[4]

Rural and urban schools are much the same when it comes to resources and learning environments

As part of the PISA assessment, principals were asked to report on the qualifications of teachers and to report on the extent to which teacher shortages and the adequacy of material and instructional resources hindered student learning.[5] In terms of the percentage of mathematics, science and language arts teachers who have university-level qualifications in their subject matter, in Newfoundland and Labrador, Manitoba, Saskatchewan and Alberta, urban school principals reported significantly higher levels of teacher specialization than rural principals. Only in Prince Edward Island were rural principals more likely to report that teacher shortages hindered student learning.

For the most part, there were no reported differences between the adequacy of resources in rural and urban schools. Principals were also asked their perceptions of teacher morale and commitment and the degree to which they thought that negative teacher behaviour affected student learning. Although there was a great deal of variation in these measures among provinces, there was no clear trend with respect to urban–rural differences (Table 3).

While there were some differences between rural and urban schools, they were not consistent with the rural–urban reading differences. For example, reports of the proportion of teachers working in their area of specialisation differed significantly between rural and urban schools in some provinces with large reading differences and in some with small or no reading differences.

Compared with their urban counterparts, adults in rural communities were less likely to have a job…

In order to look at rural–urban community differences, variables were taken from the 1996 Census and PISA 2000. This information was used to describe the communities where the schools in the PISA study were located. Although information from the 1996 Census does not reflect the conditions in the community at the time of the PISA assessment, it does provide an indication of the community that these students had likely been exposed to during their schooling. The analysis assumes that the community had not changed significantly in the four years between the 1996 Census and PISA 2000, and that the students had been exposed to that community in the interim. It also assumes that the aggregate characteristics of the parents of the 15-year-olds in the school were indicative of the community environment of the students.

There were notable differences in the employment rates of communities where rural and urban schools were located. Employment rates indicate the percentage of adults with jobs. They therefore account not only for differences in the number of adults looking for work—unemployed—but also those who are not participating in the labour force at all. In all provinces, except Prince Edward Island, Alberta and British Columbia, adults in rural communities in the study were less likely to have a job than those in urban communities.

The differences in economic conditions of rural and urban communities were also indicated by the average individual and family incomes of the communities in the study. In most provinces, average individual income and average family incomes were higher in the communities where urban schools were located.[6]

…and fewer rural adults had jobs requiring a university degree

The urban communities where schools were located had higher proportions of postsecondary-educated adults—specifically, university-educated adults. There were also differences in the proportion of jobs in the communities that typically required university education. Between 40% and 50% of the workforce in the urban communities was in these white-collar jobs. In all provinces, by contrast, less than 40% of jobs in the rural communities required university training. Only in Quebec was there no rural–urban difference in this white-collar employment rate.

Characteristics most strongly related to rural–urban reading performance

There are significant, consistent rural–urban differences across several variables that may help us to better understand the lower reading performance of rural students—particularly, family socio-economic status and community variables.

The rural–urban reading difference is not related to differences in the schools, which are few…

The first temptation when comparing student performance from different regions is to look to the schools to find out what it is about the education system that can explain differing results. The preceding analysis of rural–urban differences has shown that there are few differences between rural and urban schools. Where there are differences, they are not consistent with the difference in reading performance.

…and individual and family characteristics explain only a small part of the difference

Moreover, individual and family characteristics explain only a small part of the rural–urban reading difference. When the differences in individual and family factors are taken into account, there remains a large, systematic difference between rural and urban students' reading performance. That is, after accounting for the family background of individual students, rural students still show lower reading scores (Table 4). In other words, urban students would still be expected to perform better than rural students, even if their parents were to have the same education and similar jobs.

The difference between rural and urban reading performance is most strongly related to community differences

The rest of the analysis looks at the relationship between a variety of community factors and the remaining rural–urban difference. A model has been developed that looks at the individual and combined effects of a variety of important community variables, such as community employment rates, the average educational attainment of the adult population and the average education and occupational status of all the parents of the 15-year-olds in the school.

In all provinces, the relative impact of these variables is considerable. Community factors far outweigh individual student socio-economic status in explaining the difference in rural and urban reading performance. For example, in Alberta, there was an initial difference of 21 points in rural and urban reading performance. That difference drops to17 points, after taking into account individual socio-economic status, and then to only 5 points, when accounting for the combination of community variables (Table 4, Graph 2).

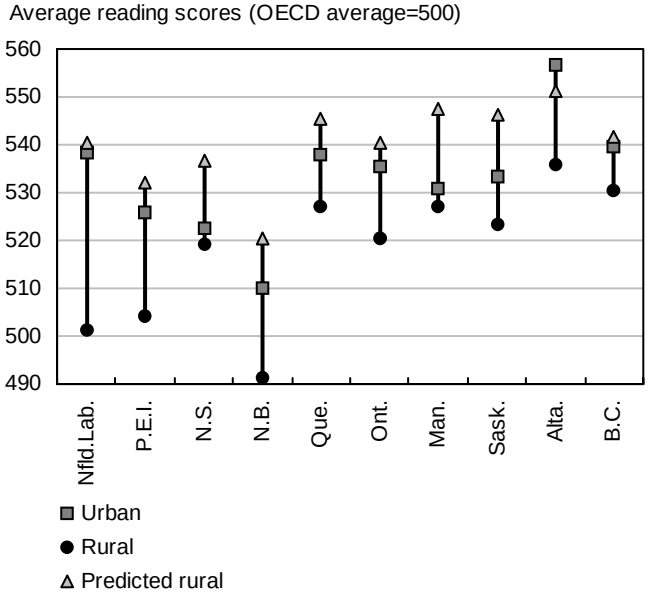
The average occupational status of the parents is the factor among the community variables which has the strongest relationship with the rural–urban difference in reading performance (Table 4). In all provinces, when just aggregate parental occupational status is controlled for, rural students perform about as well as—or better than—urban students.

Other important community characteristics that contribute to the rural–urban difference are

- the average educational attainment of adults
- the proportion of adults with postsecondary education—more specifically, university education
- the proportion of workers whose jobs require university training.

In general, these variables are all related to the education-level of jobs in the community. Community average employment rates and average income have smaller or larger effects, depending on the province.

Graph 2
Controlling for the difference in family and community background, students in rural schools would actually outperform their urban counterparts in most provinces



Note: *Predicted rural achievement is the expected average performance of students in rural schools when we control for family background as well as a combination of community variables related to average employment rates, occupational status, and educational attainment. For a comparison of the effects of individual SES and community factors see Table 4.*

Source: *Programme for International Student Assessment; Statistics Canada, Youth in Transition Survey and 1996 Census of Population.*

Conclusion

Rural students did not perform as well as their urban counterparts nationally, particularly in Newfoundland and Labrador, Prince Edward Island, New Brunswick and Alberta. These rural–urban differences were primarily related to differences between rural and urban communities—in particular

- the average educational attainment of adults in the community
- community employment rates
- the educational requirements and earning capacity of jobs in the community.

Further analysis is required for a full understanding of the relationship between these community characteristics and student performance. While it is unlikely that any of these community variables directly cause lower student achievement, they may be indicators of the environment in which these students learned and looked for support for their learning.

Many questions remain unanswered:

- To what extent do education levels of adults in the community reflect the availability of role models who demonstrate the value of education?
- To what extent do they reflect the availability of career options that require further education?

How the community context actually has an impact on student performance is a question for further analysis.

EQR

Table 1
Student performance in reading for rural and urban schools

	Reading Performance		
	Urban schools	Rural schools	Provincial average
Newfoundland and Labrador	**538**	**501**	517
Prince Edward Island	**526**	**504**	517
Nova Scotia	522	519	521
New Brunswick	**510**	**491**	501
Quebec	538	527	536
Ontario	535	520	533
Manitoba	531	527	529
Saskatchewan	533	523	529
Alberta	**557**	**536**	550
British Columbia	539	530	538
Canada	**538**	**523**	534

Note: *Scores are standardized with an OECD mean of 500, and a standard deviation of 100.*
Where rural–urban differences in average scores are statistically significant with a 99% level of confidence, scores appear in boldface.
Source: *Programme for International Student Assessment; Statistics Canada, Youth in Transition Survey and 1996 Census of Population.*

Table 2
Overview of significant differences between students in rural and urban schools

	Nfld.Lab.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.	**Canada**
Reading achievement	**XXX**	**XXX**	.	**XXX**	.	.	.	.	**XXX**	.	**XXX**
Mathematics achievement	**XXX**	.	.	.	.	.	.	.	.	.	.
Science achievement	**XXX**	.	.	**XXX**	.	.	.	.	**XXX**	.	**XXX**
Student cultural activities	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**	.	**XXX**	**XXX**	.	**XXX**	**XXX**
Reading enjoyment	**XXX**	.	.	.	.	.	.	.	**XXX**	.	**XXX**
Homework - students doing 4 or more hours per week (%)	.	.	.	**XXX**	.	**XXX**	.	**XXX**	**XXX**	**XXX**	**XXX**
Career expectations	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**	.	**XXX**
Students who expect to get postsecondary education (%)	.	**XXX**	.	.	**XXX**	.	**XXX**	.	.	.	**XXX**
Students who expect to get university rather than college (%)	**XXX**	.	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**
Student with 30 minutes or more transportation time (%)	.	**XXX**	**XXX**	**XXX**	.	**XXX**	**XXX**	**XXX**	.	**XXX**	**XXX**
Students participating in school extracurricular activities (%)	**XXX**	.	.	.	.	.	**XXX**	**XXX**	.	.	.
Students participating in non-school extracurricular activities (%)	.	.	.	**XXX**	**XXX**	.	.	.	.	.	.
Using computer at school at least several times per month (%)	**XXX**	**XXX**	.	**XXX**	.	.	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**
Using internet at school at least several times per month (%)	.	**XXX**	.	**XXX**	.	.	**XXX**	**XXX**	**XXX**	.	**XXX**
Family characteristics											
Family socio-economic status	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**
Highest educational attainment of parent	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**	.	**XXX**	**XXX**	.	.	**XXX**
Students with 100 or more books at home (%)	**XXX**	.	.	**XXX**	**XXX**	.	.	.	.	.	.
Parental academic interest	**XXX**	**XXX**	.	.	**XXX**	.	**XXX**	.	**XXX**	.	**XXX**
Parental social interest	.	**XXX**	**XXX**	.	.	.	.	.	.	.	.
Home cultural possessions	**XXX**	**XXX**	.	**XXX**	**XXX**	.	**XXX**	**XXX**	**XXX**	.	**XXX**
Home educational resources	**XXX**	.	.	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**	.	**XXX**
Computer at home (%)											
Internet access at home (%)											
Student's school experience											
Disciplinary climate	.	.	.	.	.	.	.	.	.	.	.
Teacher–student relations	.	.	.	.	.	.	**XXX**	.	.	.	.
Teacher support	.	.	.	.	.	.	.	.	.	.	.

Note: ***XXX*** *identifies characteristics where the difference between urban and rural schools is statistically significant with a 99% level of confidence.*

Source: *Programme for International Student Assessment; Statistics Canada, Youth in Transition Survey and 1996 Census of Population.*

Table 3
Overview of significant differences in school and community characteristics for urban and rural schools

	Nfld.Lab.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.	**Canada**
Schools offering extracurricular activities (%)	.	.	.	.	.	.	.	.	.	.	.
Number of 15-year-olds	**XXX**	.	**XXX**	**XXX**	.	.	**XXX**	**XXX**	.	.	**XXX**
K to 12 schools (%)	**XXX**	.	.	.	.	.	**XXX**	**XXX**	**XXX**	.	**XXX**
Negative teacher behaviours	.	.	.	.	.	.	.	.	.	.	.
Negative student behaviours	.	.	.	.	.	.	.	.	.	.	.
Teacher morale	.	.	.	.	.	.	.	**XXX**	.	.	.
Student–teacher ratio	**XXX**	.	.	**XXX**	.	.	.	**XXX**	.	.	.
Inadequacy of instructional resources	.	.	.	.	.	.	.	**XXX**	.	.	**XXX**
Shortage of teachers	.	**XXX**	.	.	.	.	.	.	.	.	**XXX**
Professional development (%)	.	**XXX**	.	.	.	.	.	.	.	**XXX**	.
Inadequacy of material resources	.	.	.	.	**XXX**	.	.	.	.	.	.
Computer availability	.	.	.	.	.	**XXX**	.	.	.	.	**XXX**
Teacher specialization (%)	**XXX**	.	.	.	.	.	**XXX**	**XXX**	**XXX**	.	**XXX**
School autonomy	.	.	.	.	.	.	.	.	.	.	.
Teacher participation to decision making	.	.	.	.	**XXX**	.	.	.	.	.	.
Community characteristics											
Population density	**XXX**	**XXX**	**XXX**	.	.	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**
Adult unemployment rate	**XXX**	**XXX**	**XXX**	**XXX**	.	.	**XXX**	.	.	.	**XXX**
Adult employment rate	**XXX**	.	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**	.	.	**XXX**
White collar employment	**XXX**	**XXX**	**XXX**	**XXX**	.	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**
Postsecondary enrollment	.	.	.	.	**XXX**	**XXX**	**XXX**	.	**XXX**	**XXX**	**XXX**
Postsecondary education	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**
University education	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**
Average income ($)	**XXX**	**XXX**	**XXX**	.	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**	.	**XXX**
Average family income ($)	**XXX**	**XXX**	**XXX**	.	.	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**

Note: *XXX identitifies characteristics where the difference between urban and rural schools is statistically significant with approximately 99% confidence.*

Source: *Programme for International Student Assessment; Statistics Canada, Youth in Transition Survey and 1996 Census of Population.*

Table 4
Difference between reading performance of students in rural and urban schools: actual difference and differences remaining after controlling for socio-economic status and community variables

				Controlling for individual SES AND:						
	Actual urban–rural gap in reading achievement	Controlling for individual socio-economic status (SES)	Controlling for individual SES and community factors	... average parental occupational status of school	... average income	... Employment rates	... adult university attainment	... average post-secondary attainment	... % of jobs requiring university	... average educational attainment
Newfoundland and Labrador	-37	-27.8	2.1	1	-20	-17.7	-19.1	-11.9	-15.7	-6.2
Prince Edward Island	-21.9	-14.5	6.3	6.7	-10.4	-13	-5.9	0.4	-2.6	6.3
Nova Scotia	-3.3	1.1	14.3	14.1	5.5	5.5	6.5	8.5	8.1	13.7
New Brunswick	-18.1	-11.4	10.3	10	-5.5	-7.7	-5.1	-2.3	-4.2	4
Quebec	-10.5	-5.5	7.4	9.6	-2.8	-5	1.6	5.3	3.8	7.7
Ontario	-14.8	-9.7	5.3	10.7	-2.2	-5.9	-0.7	2.2	-1.3	-5.5
Manitoba	-3.8	1.4	16.6	17.5	6.2	4.4	9.9	15.8	9.8	14
Saskatchewan	-10.1	-4.4	12.9	15.7	2.3	-0.3	2.8	8.4	4.5	5.3
Alberta	-20.9	-16.9	-5.4	-1.1	-12.8	-15	-9.5	-5.7	-9.9	-12.6
British Columbia	-9.2	-6	2.2	7.1	-3	-3.4	-0.5	-0.2	-0.1	-3.7

Source: *Programme for International Student Assessment; Statistics Canada, Youth in Transition Survey and 1996 Census of Population.*

Endnotes

1. The PISA 2000 assessment tested students in reading, mathematics and science literacy. However, only a subsample of students was tested in mathematics and science. As a result, a full analysis of mathematics and science literacy in rural and urban student populations was not possible due to restrictions of sample size. For example, partly as a result of sample size, differences in the mathematics and science performance of rural and urban students were not statistically significant in most provinces. In mathematics, only in Newfoundland and Labrador was there a significant difference between the performance of rural and urban students. In science, rural–urban differences were significant only in Newfoundland and Labrador, New Brunswick and Alberta.
2. In Newfoundland and Labrador, Prince Edward Island, New Brunswick and Alberta, the difference in reading performance of rural and urban students was statistically significant with a 99% level of confidence. In Ontario, the rural–urban difference was significant with a 95% level of confidence.
3. Family socio-economic background was derived from student responses regarding parental occupation using the International Socio-economic Index of Occupational Status (see Appendix B for definition). This scale was also used to derive occupational status for student career aspirations.
4. In Alberta and Ontario, the rural–urban difference in cultural activities is significant with a 95% level of confidence, but not at the 99% level generally used to measure statistical significance in this paper.
5. This analysis is restricted to the schools that participated in the PISA study and the communities in which PISA participants went to school. The information on schools presented in this section was collected from questionnaires completed by the principals in the PISA sample of schools, that is, in schools attended by 15-year-olds. Community information was gathered from the census for the communities where these schools were located. Because the PISA sample was developed to be representative of the population of 15-year-olds, the school information cannot be interpreted as representative of all schools or all high schools, urban or rural. Nor is it representative of all rural and urban communities. This analysis describes, rather, the schools attended by the students in the study and their communities, and these characteristics are included primarily as possible factors influencing student performance, not as characteristics of urban or rural schools and communities overall.
6. In British Columbia, the average income of individuals was higher in the urban communities, but this was not a statistically significant difference.

EQR

Unions and training: A study based on the Adult Education and Training Survey

Introduction

The development of human capital[1] plays a central role in the economic model currently being proposed for Canada. According to this model, the best path for Canada's future economic growth is to move toward becoming an economy centred upon advanced skills. If one agrees with that model, the key question becomes how to move the economy in that direction. However, the skills needed in the future are not necessarily the same as those most in demand today. Therefore, it would be beneficial to find a flexible mechanism for change. The best procedure would be to encourage and support mechanisms already operating in the market place.

In many instances, this is interpreted as providing incentives, support and information to firms. However, as the investments being proposed are in workers, involving workers is essential. Furthermore, incentives to investment in training that focus solely on the firm may create problems in terms of equity: firms are likely to support and implement mechanisms that demand that workers assume the majority of the risk. For these reasons, finding ways to involve workers in ongoing investment in training is crucial. As they represent the interest of workers, unions are also concerned with issues relating to equity towards workers. Therefore, unions could act both as a conduit for future training policy and as a source of information on how workers would like this process to develop.

A first step in understanding what role unions might play in the future is to examine the role they currently play in training in the Canadian economy. Unfortunately, there is little direct evidence on this for Canada. In this paper, the Adult Education and Training Survey (AETS) is used to answer basic questions about the relationship of unionization to training incidence and the sources of payment for training. This is done first by using simple tabulations and then by using econometric techniques to control for the impacts of other worker characteristics.

The article was prepared by Lucie Gilbert based on the analysis in Green and Lemieux (2001). This report can be accessed from the Human Resources Development Canada web site at www.hrdc-drhc.gc.ca/sp-ps/arb-dgra/publications/research/2001docs/R-01-9-1/R-01-9-1_E_abs.shtml

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Theoretical implications

General and specific human capital

Any examination of the impact of unions on training must start with the key distinction between general and firm-specific human capital. As outlined in the 'Union effects' section of this paper, there are good theoretical reasons to believe that unionization will impact differently on the development of these two types of human capital. General human capital is productive not only in the individual's current firm, but also in other firms in the industry and in the economy in general. Firm-specific human capital is productive only within the individual's current firm. These two types of human capital differ sharply in who pays for the training leading to its acquisition and who reaps the reward, as well as having different implications for job stability. Firms will not invest in general human capital because they cannot be assured of obtaining returns on their investment. In order to obtain those returns, the investing firm will need to pay workers a wage below their marginal product[2] after the investment is completed. The difference between the worker's marginal product and the wage is the return on the investment.

However, since the human capital acquired from this investment in training increases the worker's productivity at other firms as well, the trained worker may be lured away by a non-investing firm offering the worker a higher wage than he or she could earn at the investing firm—a feasible action for the non-investing firm because it does not have an investment to recoup. As a result, standard human capital theory states that workers (or perhaps the government) will invest in general human capital, but firms will not. Workers may pay for the investment by accepting lower wages during the training spell, when their productivity is reduced because they are taking time out to train. Their return is a wage higher than what they would have earned had they not trained—a wage equal to their now higher marginal product. In addition, there is nothing in this investment to tie individuals to a specific firm, and so no implication that job tenure will be either longer or shorter for those who invest in general human capital than for those who do not.

In contrast, firm-specific human capital is valuable only at a particular firm. This implies that firms can invest in this type of human capital without fear of trained workers being lured away by another firm. For example, the firm could pay workers the same wage irrespective of their job tenure, but invest in them early in their working lives. Workers' marginal product would be below their wage in the early part of their career (this is part of the way the firm invests in training) but above their wage later on. Because the skills acquired would not be useful anywhere else, there would be no danger of another firm offering a slightly higher wage later in life in order to capture the returns of the investment. Of course, if all the investment is done by the firm, then workers have no particular stake in the investment: their wage is the same as what they would earn outside the firm. As a result, workers might leave the firm—effectively walking off with the firm's investment—at any time. Thus, it is often argued that firms will optimally share the investment and the returns to investing with their workers in order to give them a stake in the investment (Becker 1964).

However, Hashimoto (1981) argues that as long as the turnover rate is known, a firm will still invest optimally, even if the worker has no stake in the investment. The firm's investment decision will just incorporate the probability of separation. Barron et al. (1999), in an investigation of starting wages and productivity profiles, find that in situations where there is investment in training, productivity increases but starting wages are similar to situations without training. They conclude that firms carry the full burden of specific human capital investment but also reap the full reward. If this is true, then wage profiles will be much flatter under firm-specific human capital investment than under general human capital investment. Further, because firms have a stake in maintaining the employment relationship so they can gain the returns on their investment, one would expect greater job stability under firm-specific human capital investment than under general human capital investment.

Kuhn and Sweetman (1999) suggest an extension to the general/specific human capital framework, arguing that it may be fruitful to divide general human capital into general human capital which is useful both inside the current firm and in other firms, and general human capital which is useful only in other firms. The latter category is one that is not typically considered, though it makes some sense. Individuals may initially invest in skills of various types before they know the firm or industry where they will work. Once they join a particular firm, they will likely invest further in pertinent skills,

letting atrophy skills irrelevant to the current firm. Kuhn and Sweetman suggest that, in order to keep their options open, workers in firms with a high rate of turnover will be more likely to invest in general human capital that is not directly relevant at the current firm.

Union effects

The investigation of unions' impact on human capital investment points to several hypotheses that can be explored:

1. We would expect unionized workers to have more investment in firm-specific human capital because of unions' positive effects on workers' tenure. Earlier empirical results suggest that most of this investment is borne by the firm (Barron et al. 1999).
2. Predictions about levels of general human capital investment and who pays for it depend on assumptions about the wage contract negotiated by unions.[3]

- Under the assumption that unions institute wage floors for all workers, with higher[4] floors under new entrant wages than under the wages of workers with greater tenure, unionization does not change the amount of general human capital investment. However, since unionized workers have no way of investing in general human capital because they are prevented from offering to lower their wages during their training spell, the unionized firms will realize all of the returns to any investment and will be willing to invest alone in general human capital; in non-unionized firms, this investment will be carried out by the workers.
- If unions place a high wage floor under entry wages but not under the wages of workers with greater tenure, then there will be very little investment in general human capital in the union sector: workers cannot offer to take lower initial wages to fund the investment and firms have no way of ensuring they will receive the returns on any investment.
- If unions place a wage floor under more senior workers but not under junior workers, then unionized workers will again have the same general human capital investment as non-unionized workers, but it will be paid for by the firm.
- If there are no (or very low) wage floors in the union sector, then this sector should look the same as the non-union sector, with similar levels of general human capital investment paid for by the workers.

  Furthermore, by strengthening the attachment of workers to firms, unions should also be associated with more investment in general human capital under scenarios where firms undertake such investment.

3. Under the additional assumption that there is general human capital that is valuable only outside the current firm and that depreciates if no further investment takes place, investment in general human capital by workers will exist in unionized firms. However, it will occur at a lower level and decline faster with tenure in unionized firms than in non-unionized firms.

The net effect of unions on general human capital investment is, therefore, uncertain. The greater stability of union employment will lead to more investment in situations where the firm is paying but less investment where the workers are paying. Since the models presented above sometimes lead to opposite theoretical implications for unions' impact on training, an empirical investigation is necessary to assess unions' effects on training.

Data source and definitions

This analysis is based on data from the 1998 Adult Education and Training Survey (AETS) and focuses on training and education related to work after individuals have finished their main formal schooling. Individuals who were full-time students, aged over 65 or did not work during the sample year are excluded. The self-employed are also excluded from the analysis, since union status affects investments in and by employees.

The analysis covers two types of training spells:

- programs, which consist of training or education spells aimed at obtaining a formal certificate, diploma or degree; and
- courses, which encompass a variety of training activities such as workshops, seminars and employer-organized training.

Included are only those programs and courses for which respondents indicated the main reason for taking the training was their current or future job.[5]

The empirical investigation presented in this paper distinguishes between general and firm-specific training, since there are good theoretical reasons for anticipating different impacts of unions on these two types of training. Here, this distinction is based on observability—whether investments in human capital are easily observed by other employers or not. This distinction is somewhat different from the traditional technologically driven distinction between skills that are useful only with the current firm's technology versus skills that are useful in the production functions of other firms.

With the distinction based on observability in mind, different schemes for classifying training spells into general and firm-specific training are explored. Programs are clearly related to general human capital, since they lead to the acquisition of formal qualifications easily observable by all employers. Indeed, the point of this type of education is often to prepare individuals for productive work in general, not for work at a specific firm. Thus, all the schemes explored classify program spells as general human capital. This means that the definitional issue comes down to classifying course spells.

The simplest classification scheme used is to define all course spells as being related to firm-specific human capital. In the end, this broad definition of firm-specific human capital is found to be the most robust approach for portraying the direction, if not the magnitude, of the relationship between unionization and the different types of human capital. As a check on the robustness of the results, an alternative classification[6] of general and firm-specific human capital is used. This classification is based on a more restricted definition of firm-specific training. It focuses on who actually provides the training and assumes that training provided by the employer is specific to the current firm and is not easily observable by alternative firms. As a result, courses not provided by the employer and all programs are classified as general training.

Simple tabulations

Training incidence

Table 1 provides basic tabulations of training incidence. The first two columns reveal that overall, unionized workers are 4 percentage points more likely than non-unionized workers to train. However, this hides noticeable differences among subgroups: while unionized and non-unionized men are equally likely to train, the proportion of unionized women who train is 8 percentage points higher than for non-unionized women.

Table 1
Training rates of unionized and non-unionized workers, by sex, 1997

	All		Men		Women	
Type of training	Non-union	Union	Non-union	Union	Non-union	Union
	Percentage					
All training	28	32	28	29	28	36
Program training	10	8	10	7	10	9
Course training	20	26	20	23	20	30
General training	22	21	22	19	23	25
Firm-specific training	6	11	6	11	6	12

Note: *Participation rates in programs (or general training) and courses (or firm specific training) do not sum to the overall participation rate because individuals could participate in more than one type of training.*

Source: *Adult Education and Training Survey 1998.*

Differences between unionized and non-unionized workers are much sharper when one distinguishes between general and specific training. For both sexes pooled together, the proportion of unionized workers who get program training is 2 percentage points lower than the same proportion of non-unionized workers, but the proportion of unionized workers who get course training is 6 percentage points higher. The direction of these differences holds up for both sexes, with women showing the largest difference in course training. These patterns fit with a model in which unionized firms are willing to invest more in specific human capital because of added worker stability, but this is partially offset by reduced investment in general human capital.

Using the alternative definition of general and specific training, the last two rows of Table 1 also show that unionized workers get more specific training than their non-unionized counterparts. However, this time unionized women are more likely than their non-unionized counterparts to take general training, while the opposite still holds for men. The patterns for women now paint a different picture from

that obtained using the first definition: unionized and non-unionized women receive a similar amount of general training, but unionized workers still get more firm-specific training.

Sources of payment for training

Table 2 presents a breakdown of the source of payment by training type, again separated by union status and sex. Overall, the majority of the payment for program training is made by some combination of individuals and the government. This fits with the traditional view that general human capital investment should be made by either workers or society. However, evidence of substantial investment by employers is also found. Employers are more likely to take part in funding program training in the union sector, whereas workers themselves are investing less in general training in the union sector than in the non-union sector. The alternative definition of general training yields somewhat similar results. Together, these observations fit well with a model in which higher job stability in the union sector encourages more investment in training by firms, but less investment by workers.

Following Kuhn and Sweetman's distinction between general human capital useful in the firm and capital useful outside the current firm (alternative capital), the workers' investment in general training useful within the firm could be defined as the investment they share with the firm. By that measure, unionized workers invest more in this type of general human capital than do non-unionized workers. Also, non-unionized workers are more likely than unionized workers to finance their training without their employer's involvement.[7] If we assume such funding reflects investment in alternative human capital, this could correspond with unionized workers investing less in alternative human capital because of greater perceived job stability.

Table 2
Payment sources by training type for unionized and non-unionized workers, by sex, 1997

	All		Men		Women	
Payment sources	Non-union	Union	Non-union	Union	Non-union	Union
	Percentage					
Programme training						
Employer	42	48	50	56	34	41
Self	67	65	60	56	73	73
Government	12	13	11	12	11	14
Union	1	3	1	3	0.3	3
Shared	18	22	21	20	15	25
Course training						
Employer	88	90	87	93	88	88
Self	16	16	17	9	15	22
Government	4	8	4	8	5	7
Union	3	5	3	5	2	4
Shared	8	9	7	5	8	13
General training						
Employer	67	73	69	76	64	70
Self	40	36	38	28	42	43
Government	8	10	8	11	8	9
Union	2	5	2	6	2	5
Shared	13	15	14	11	12	18
Firm-specific training						
Employer	99	97	99	99	98	95
Self	5	8	4	4	5	11
Government	2	8	3	5	2	10
Union	2	2	3	3	0.3	2
Shared	4	7	4	4	4	10

Note: *The "Shared" category consists of training jointly funded by the employer and the worker. The numbers presented correspond to the proportion of trainees of a particular type, by sources of funding. As respondents could list multiple sources totals may not sum to 100.*

Source: *Adult Education and Training Survey 1998.*

Looking at both firm-specific training definitions, the majority of the funding is carried out in whole or in part by employers. Individuals take only a limited role in financing firm-specific training, with much of that limited involvement shared with firms. The results show no sizable differences between employers' and workers' involvement in the union and non-union sectors. The theory does not provide direct implications for differences in funding sources between the union and non-union sectors for firm-specific training. The results are consistent with these ambiguous predictions.

Table 2 also allows us to look at differences between men and women in training funding. For general training, by either measure, the patterns are generally similar for men and women. The main distinction is that the difference between the union and non-union sectors in the proportion of training in which workers take a direct role is smaller for women than for men. Employers also play a smaller role and workers a larger role in investing in general human capital for women than for men. This could fit with lower job attachment for women, possibly stemming from child-care responsibilities. This implies that firms are less ready to invest in their training and that female workers must pick up more of the responsibility for investing themselves. For firm-specific training, female workers again usually play a larger role in investment than do their male counterparts, and this is more the case in the union sector. As before, theory provides little guidance for interpreting this result.

Finally, the results presented in Table 2 reveal that unions play a very small direct funding role, investing in a proportion of at most 6% of training spells of any type.

Table 3 reveals that there are substantial differences between unionized and non-unionized workers in many dimensions. Unionized workers are less likely to have a level of education below or equal to a high school degree and are more likely to have completed postsecondary education. The fact that the public sector is highly unionized is reflected in the proportion of approximately 41% of unionized workers that are employed in the public sector, compared with only 7% of non-unionized workers. Unionized workers are much less likely than their non-unionized counterparts to be employed in firms with fewer than 20 employees and much more likely to be employed in firms with over 500 employees, though this may in part just reflect the public/private sector difference. Unionized workers are also more likely to be men and tend to be older, with 30% of unionized workers being from 45 to 54 years of age, compared with only 19% of non-unionized workers. This reflects recent declines in access to unionization among new cohorts of labour market entrants (Beaudry, Green and Townsend 2001). Finally, the average job tenure is substantially higher for unionized workers, reflecting the higher job stability in the union sector that is at the heart of some of the theoretical claims about how unions affect training.

Table 3
Personal and firm characteristics by union status, 1997

Characteristics	Non-union	Union
	Percentage	
Education		
Elementary or some high school	17	15
High school graduate	24	18
Some postsecondary	9	8
Completed postsecondary	33	37
University	17	22
Public sector	**7**	**41**
Firm size		
Fewer than 20 employees	34	6
20 to 99 employees	21	12
100 to 199 employees	7	8
200 to 499 employees	8	11
500 or more employees	31	64
Women	**49**	**45**
Age		
17 to 19	3	1
20 to 24	12	5
25 to 34	31	24
35 to 44	29	32
45 to 54	19	30
55 to 64	8	10
Average job tenure (years)	**5.6**	**10.1**

Source: *Adult Education and Training Survey 1998.*

Probit analysis

Training incidence

Given these substantial differences in observable characteristics, it is necessary to examine union impacts while controlling for other covariates to be sure that what is being observed in Table 1 is a true union impact. To do this, a Probit estimator is used to control for various combinations of observable

individual and firm characteristics. Because the results to this point indicate substantial differences by sex, all of the results are presented separately for men and women. Rather than present the estimated Probit coefficients, which do not have an interpretable magnitude, the following tables contain the derivatives of the probability of obtaining training with respect to the specified covariates along with their standard errors. For dummy variable covariates, the table entries show the impact on the probability of training from the covariate switching values from 0 to 1. For continuous variables, the entries show the effect of a marginal change in the covariate on the probability. In both cases, the effects are evaluated at the mean value of the other characteristics (and at the mean value of the variable of interest in the continuous case).

The first column in Table A1[8] presents results for men in which the dependent variable is a dummy variable corresponding to overall training—either program or course training related to current or future employment. The estimates indicate that more educated workers obtain substantially more training than those whose highest level of education is high school graduation (the base group), who in turn obtain more training than less educated workers. This fits either with formal schooling and further training being complements in production and/or with formal schooling reducing the cost of further training, perhaps because those with more schooling have become more efficient learners.

The age variables reveal a strong pattern in which younger individuals have much higher training rates than older individuals, as one would predict in models of rational investment in training. The estimated coefficients also indicate that male workers with managerial or supervisory responsibilities are substantially more likely to obtain training than those without.

Firm-size variables are included because of results in earlier work (Green 1993) showing a correlation between firm size and training incidence, and because of the strong correlation shown in Table 3 between firm size and union status. The public sector variable is included to control for the possibility that training is done differently in the public and private sectors and to allow for purer estimates of the firm-size effect. The results indicate that male public-sector workers are more likely than their private-sector counterparts to obtain training. The estimated firm-size effects reveal a clear pattern: training increases with firm size. This fits with results from earlier research.

The 'years of tenure' variable is introduced to capture two potential effects. The first effect is that training is expected to take place early on the job for the standard reasons given by human capital theory—to maximize the number of spells for which the training will be productive. This effect is consistent with wage studies showing that the effect of tenure is larger early in the job (concave effect of tenure on wages), suggesting that most productive training takes place early on. The other potential effect is that in the case of specific human capital, a firm may prefer to invest in more senior workers who are less likely than workers who have just joined the firm to leave it. Since these two effects go in opposite directions, the effect of tenure on training is ambiguous. According to the results shown in Table A1, the effect of tenure is not statistically significant, indicating that the two effects discussed above may indeed be offsetting each other.

In the remaining columns of Table A1, the specification from column 1 is re-estimated for men for four different dependent training-status variables. The second column contains the results obtained using program training as the dependent variable. The estimates again indicate some positive relationship between education and program training, though that relationship is not monotonic. In particular, male postsecondary graduates and university graduates do less training of this type than do those with some (but not completed) postsecondary education. Since program training really corresponds with going back to school, this result is not surprising: individuals with a university education need to get less new education because they already have a high level. The age variables again indicate a strong negative relationship between age and training, and a positive impact of being in the public sector is observed.

There is no clear relationship between firm size and program training. This may fit with the claim that program training is true general training that occurs off the firm site: there is no reason to believe that larger firms have a comparative advantage in providing such training. Nonetheless, this result is somewhat surprising because in models in which firms help pay for general human capital investment, increased job stability should lead to higher investment in this type of training, and larger firms tend to have more job stability.

Years of tenure have a negative and significant (though decreasing) effect on training; this is consistent with standard human capital theory. Including all of these covariates dramatically reduces the size of the union impact on program training. The results from column 2 indicate that training rates are essentially the same for unionized and non-unionized men, once one controls for other characteristics. By contrast, Table 1 shows that unionized workers' participation in program training was 3 percentage points lower than that of non-unionized workers. Thus, the evidence that unions lead to a reduction in general human capital investment is not strong.

In column 3, the results from the same specification are presented with course training as the dependent variable. It was argued earlier that course training could be viewed as providing a relatively broad definition of firm-specific training. For training of this type, education again has a strong and positive effect on training for men. Interestingly, the effects of age are no longer as clear, with all age groups below age 55 having quite similar training rates. This appears to indicate that as long as there are at least 10 years of an individual's working life left, firms and workers believe it is worthwhile continuing to invest in this type of training. While this is a reasonable use of training, the fact that it does not decline at all in age groups below 55 years is surprising.

In contrast to program training, firm size shows a strong positive relationship to course training. The positive and decreasing effect of tenure on course training does not fit well with standard human capital theory, but it does fit with the idea that firms may wait to be sure the worker will stay before investing. The impact of adding these controls is quite dramatic. The union effect on course training goes from +3 percentage points in Table 1 to –3 percentage points in this table.

Column 4 contains results using the second definition of general human capital, which includes both program training and any course training not provided by the employer. The results using this definition are quite similar to those presented in column 2, except for the effect of tenure, which is now positive but not significant. The union impact estimated with the second definition of general training is negative and larger in absolute value than that estimated with the first definition, though still not very substantial.

Finally, column 5 contains estimates using the more restricted definition of firm-specific training: course training that is directly provided by the employer. The patterns again indicate positive education effects but, as in column 3, there is no clear age pattern. Again, the firm-size pattern is relatively clear, while the tenure effect is weaker. The union impact is both economically insubstantial and statistically insignificant.

If column 2 is used as the most precise definition of general training and column 5 as the most precise definition of firm-specific training, then the conclusion from Table A1 is that unionization has essentially no impact on either general or firm-specific human capital investment for men, once one controls for other covariates. Further investigation indicates that the sizable reduction in the union impact on program training, witnessed in Table A1 relative to Table 1, arises primarily because of the introduction of controls for age, which has negative effects on training and is positively related to union status. In contrast, the reduction in the impact of unionization on firm-specific training stems mainly from the introduction of firm-size variables.

Results from the same exercises for women are presented in Table A2. In column 1, introducing the covariates reduces the impact of unionization on overall training from 8 percentage points to –3.6 percentage points. The latter estimate is very similar to that found for men, suggesting that the large differences between men and women in the first row of Table 1 arise from differences in the distributions of observable covariates between these two groups. The patterns in training relative to the other observed characteristics are quite similar to those found for men: both education and firm size have positive effects on training, whereas age has a negative impact.

Columns 2 through 5 present the results of Probits estimated with different definitions of general and firm-specific training as the dependent variables for women. As for men, the union impact is small and negative (but not statistically significant) for both program and course training. The alternative human capital investment measures also yield similar conclusions for men and women. In particular, the impact of unionization on general training is negative and statistically significant, whereas the impact of unionization on firm-specific training is not statistically significant.[9]

Sources of payment for training

As with the study of the incidence of training, correlations between union status and other covariates raise questions of whether simple tabulations of union impacts on the sources of payment for training reflect true union impact. To verify this, the same specification used in Table A1 and Table A2 was run, but using two new dependent variables: a dummy variable corresponding to whether an employer helped pay for the training, and a dummy variable equal to 1 if the individual helped pay for the training and the employer did not. The first dependent variable is intended to capture any employer involvement in financing training. The second focuses on individual contributions, though in some cases there is also involvement from other agents, such as the government. The sources of payment for the first definition of general and specific human capital are examined.[10]

The first two columns in Table A3 contain estimated probability derivatives calculated using estimated coefficients from a Probit with the first dependent variable. The first column contains results based only on men who reported taking program training. Recall that the results in Table 2 indicate that unionized employers are more likely than non-unionized employers to pay for such training. This result appears to hold up once one controls for other covariates, although the union differential is both smaller than in Table 2 and not statistically significant. The other coefficients indicate that employers are more likely to help pay for program training when workers are older and when they have some managerial responsibility. Employers also seem to play less of a direct funding role in smaller firms, although the relationship between employer funding and firm size is not a simple, monotonic function. Tenure has a large and positive (but decreasing) effect; this is consistent with employers investing in more stable workers.

According to the course-based definition of firm-specific training, firms also play a greater funding role in this type of investment in the union versus the non-union sector (although this effect is not statistically significant). There is no evidence of a significant age effect on employer payment for this type of training. Tenure has a positive though smaller effect than in the case of program training.

The last two columns in Table A3 contain the derivatives of the probability that male workers alone (without the help of the firm) pay for the investment, with respect to the various covariates. In this case, for program training there is no evidence of a substantial relationship between union status and self-payment for training. In terms of other covariates, the results are just the opposite of those for employer contributions: older workers and managerial workers are both less likely to contribute to their own general training, while tenure has a negative effect. The same patterns hold true for investment in course training in column 4. Here, though, the union effect is negative and statistically significant.

Table A4 repeats the exercises of Table A3 for women. The estimates of employer contributions to training for women in columns 1 and 2 indicate union impacts that are smaller than those for men. For example, the raw difference of 7 percentage points in the proportion of general training financed by the employer between unionized and non-unionized women shown in Table 2 declines to a –0.8 percentage point difference after controlling for covariates. In terms of worker payment for training, the last two columns in Table A4 indicate that unionization leads to a small decline in such payment for general training but a statistically significant increase for specific training. Overall, the results of these exercises indicate that unions have little impact on the involvement of firms and workers in paying for both general and firm-specific training.

Once one controls for other covariates, the results then paint slightly different pictures for men and women. For both men and women, unionization is at most related to small decreases in either general or firm-specific human capital investment. The evidence is also weak that unions generate greater employer involvement in payment for both general and firm-specific human capital for men. Thus, unionization appears to shift the means of payment more than the amount of training for men. This fits with the kinds of models in which union pay structures lead to unionized firms taking a greater role in funding general human capital investment but do not necessarily change the amount of this type of training.

To explain the small declines in general human capital investment, one could then graft onto these types of models the type of distinction between

alternative human capital (useful only outside the firm) and general human capital (useful both inside and outside the current firm) proposed by Kuhn and Sweetman (1999). In that case, more stable union work arrangements could lead to lower participation of workers in training while firms play an expanded role in funding general human capital acquisition. The finding that tenure has a positive effect on whether employers pay for training is quite consistent with this view. In that case, one would also expect to see the proportion of non-specific training spells funded by workers alone decrease as firms expand their role, while workers invest less in alternative human capital. The negative effect of tenure on the probability of workers paying for training alone is consistent with this explanation.

For women, the results again indicate small and usually negative effects of unionization on both general and firm-specific human capital investment. Both of these effects are more or less comparable to similar estimated effects for men. In terms of payment, unionization appears to have little impact on the proportion of spells in which firms help in the funding but it does have negative (though not significant) effects on the proportion of general training invested in by workers alone. As in the case of men, the most robust result is that employer involvement in funding training increases with tenure while the opposite happens to worker involvement.

Conclusion

Union effects on training incidence are typically small and negative, although generally not statistically significant. Similar results are obtained for men and women. It appears that most of the difference in the raw union effects across subgroups can actually be accounted for by differences between unionized and non-unionized workers in other characteristics. Unionization does, to some extent, generate greater employer involvement in payment for training leading to the acquisition of both general and firm-specific human capital for men, though this effect is typically not significant. For women, unionization has, if anything, a negative impact on the proportion of training spells in which firms help in the funding. As in the case of men, the most robust finding is that employer involvement in funding training increases with tenure, while the opposite is true for workers' involvement in funding their own training. Although overall unions are found to have weak direct effects on training incidence and funding, to the extent that unions generate greater job stability, they will have, according to the results, a positive indirect effect on getting firms involved in paying for the training undertaken by workers.

Appendix Tables

Table A1
Probit results for training status, men

Variable	All training		Program training		Course training		General training		Firm-specific training	
	Probability derivatives									
Union	-0.030	(0.013)*	-0.003	(0.0064)	-0.027	(0.011)*	-0.022	(0.011)*	-0.0054	(0.0067)
Education										
Elementary or some high school	-0.044	(0.017)*	-0.007	(0.009)	-0.040	(0.015)*	-0.024	(0.016)*	-0.017	(0.007)*
Some postsecondary	0.18	(0.024)*	0.094	(0.018)*	0.100	(0.022)*	0.172	(0.024)*	0.005	(0.011)
Completed postsecondary	0.14	(0.016)*	0.065	(0.010)*	0.085	(0.014)*	0.129	(0.015)*	0.015	(0.007)*
University	0.21	(0.020)*	0.075	(0.014)*	0.145	(0.018)*	0.189	(0.019)*	0.018	(0.009)*
Age										
17 to 19	0.32	(0.042)*	0.25	(0.039)*	0.015	(0.040)	0.287	(0.043)*	0.026	(0.027)*
20 to 24	0.12	(0.022)*	0.073	(0.013)*	0.025	(0.019)	0.122	(0.020)*	-0.013	(0.010)
35 to 44	-0.037	(0.013)*	-0.032	(0.006)*	0.0033	(0.012)	-0.035	(0.011)*	-0.0003	(0.006)
45 to 54	-0.075	(0.015)*	-0.063	(0.005)*	-0.0027	(0.014)	-0.072	(0.012)*	-0.002	(0.007)
55 to 64	-0.14	(0.016)*	-0.063	(0.004)*	-0.059	(0.016)*	-0.126	(0.012)*	-0.005	(0.009)
Managerial or supervisory responsibility	0.079	(0.012)*	-0.0004	(0.0058)	0.085	(0.011)*	0.048	(0.010)*	0.025	(0.006)*
Public sector	-0.030	(0.020)*	0.0066	(0.0108)	-0.021	(0.017)	-0.016	(0.018)	-0.010	(0.008)
Firm Size										
Fewer than 20 employees	-0.13	(0.013)*	0.010	(0.008)	-0.135	(0.010)*	-0.043	(0.013)*	-0.062	(0.005)*
20 to 99 employees	-0.069	(0.014)*	0.012	(0.008)	-0.073	(0.011)*	0.003	(0.013)	-0.045	(0.005)*
100 to 199 employees	-0.041	(0.019)*	0.007	(0.011)	-0.034	(0.015)*	0.015	(0.018)	-0.029	(0.006)*
200 to 499 employees	-0.031	(0.018)	0.025	(0.012)*	-0.048	(0.014)*	0.017	(0.017)	-0.028	(0.005)*
Job Tenure										
Tenure/10	0.044	(0.030)	-0.058	(0.016)*	0.107	(0.026)*	0.004	(0.026)	0.024	(0.014)+
Tenure^2/100	-0.010	(0.015)	0.029	(0.008)*	-0.042	(0.013)*	0.003	(0.013)	-0.009	(0.007)
Observed Probability	0.28		0.085		0.21		0.21		0.078	
Fitted Probability	0.26		0.067		0.18		0.18		0.051	
Pseudo R^2	0.109		0.058		0.12		0.21		0.13	
Number of observations	8,751		8,074		8,074		8,074		8,074	

Notes: *Standard errors are shown in parentheses. The table entries correspond to probability derivatives. For each dummy covariate, the table shows the change in the probability of being trained due to switching the covariate value from 0 to 1. The derivatives are calculated for the base person: a non-unionized, private sector, 25- to 34-year-old male worker with a high school diploma, who has no managerial responsibilities and who works in a firm with more than 500 employees in the manufacturing sector in Ontario. The fitted probability is also for this base person. Results for industry and province covariates are not presented here but are available upon request.*

**, + Mean effect is significantly different from 0 at the 5% and 10% significance levels, respectively.*

Source: *Adult Education and Training Survey 1998.*

Table A2
Probit results for training status, women

Variable	All training		Program training		Course training		General training		Firm-specific training	
	Probability derivatives									
Union	-0.036	(0.013)*	-0.006	(0.007)	-0.025	(0.011)	-0.044	(0.012)*	0.006	(0.006)
Education										
Elementary or some high school	-0.073	(0.019)*	-0.003	(0.012)	-0.068	(0.016)*	-0.053	(0.017)*	-0.020	(0.008)*
Some postsecondary	0.093	(0.022)*	0.075	(0.017)*	0.039	(0.019)*	0.081	(0.021)*	0.013	(0.010)
Completed postsecondary	0.140	(0.015)*	0.076	(0.010)*	0.076	(0.013)*	0.128	(0.014)*	0.009	(0.006)
University	0.193	(0.019)*	0.093	(0.015)*	0.123	(0.017)*	0.175	(0.018)*	0.012	(0.008)
Age										
17 to 19	0.235	(0.047)*	0.185	(0.040)*	0.033	(0.045)	0.223	(0.046)*	-0.024	(0.019)*
20 to 24	0.128	(0.023)*	0.117	(0.016)*	-0.052	(0.017)*	0.101	(0.020)*	0.008	(0.011)
35 to 44	-0.027	(0.013)*	-0.024	(0.006)*	0.007	(0.012)	-0.034	(0.011)*	0.009	(0.006)
45 to 54	-0.027	(0.015)+	-0.035	(0.007)*	0.012	(0.014)	-0.044	(0.013)*	0.013	(0.007)+
55 to 64	-0.124	(0.018)*	-0.062	(0.006)*	-0.052	(0.017)*	-0.113	(0.015)*	-0.0002	(0.010)
Managerial or supervisory responsibility	0.109	(0.013)*	0.002	(0.007)	0.110	(0.011)*	0.074	(0.011)*	0.023	(0.006)*
Public sector	0.051	(0.018)*	0.0005	(0.0090)*	0.042	(0.015)*	0.017	(0.015)*	0.021	(0.008)*
Firm size										
Fewer than 20 employees	-0.152	(0.013)*	-0.026	(0.007)*	-0.129	(0.010)*	-0.071	(0.012)*	-0.064	(0.005)*
20 to 99 employees	-0.058	(0.014)*	-0.010	(0.007)	-0.052	(0.012)*	-0.008	(0.013)	-0.028	(0.005)*
100 to 199 employees	-0.029	(0.020)	-0.015	(0.010)	-0.007	(0.017)	-0.009	(0.018)	-0.004	(0.005)
200 to 499 employees	-0.002	(0.018)	-0.011	(0.009)	0.013	(0.016)	0.006	(0.017)	-0.001	(0.007)
Job tenure										
Tenure/10	0.002	(0.029)	-0.078	(0.016)*	0.087	(0.025)*	-0.081	(0.026)*	0.048	(0.012)*
Tenure^2/100	0.001	(0.014)	0.024	(0.008)*	-0.032	(0.012)*	0.042	(0.013)*	-0.024	(0.006)*
Observed probability	0.28		0.095		0.233		0.23		0.081	
Fitted probability	0.28		0.067		0.193		0.21		0.048	
Pseudo R^2	0.116		0.126		0.137		0.088		0.137	
Number of observations	8,608		8,608		8,608		8,608		8,608	

Notes: *Standard errors are shown in parentheses. The table entries correspond to probability derivatives. For each dummy covariate, the table shows the change in the probability of being trained due to switching the covariate value from 0 to 1. The derivatives are calculated for the base person: a non-unionized, private sector, 25- to 34-year-old female worker with a high school diploma, who has no managerial responsibilities and who works in a firm with more than 500 employees in the manufacturing sector in Ontario. The fitted probability is also for this base person. Results for industry and province covariates are not presented here but are available upon request.*

**, + Mean effect is significantly different from 0 at the 5% and 10% significance level, respectively.*

Source: *Adult Education and Training Survey 1998.*

Table A3
Probit results for training payment, men

Variable	Employer paid				Worker paid alone			
	Program training		Course training		Program training		Course training	
	Probability derivatives							
Union	0.042	(0.062)	0.023	(0.015)	-0.056	(0.054)	-0.025	(0.011)*
Education								
Elementary or some high school	-0.310	(0.088)*	0.040	(0.014)*	0.142	(0.101)	-0.026	(0.011)
Some post-secondary	-0.235	(0.086)*	-0.011	(0.026)	0.227	(0.089)*	0.011	(0.021)
Completed post-secondary	-0.244	(0.080)*	0.001	(0.018)	0.233	(0.077)*	0.001	(0.014)
University	-0.303	(0.086)*	-0.001	(0.020)	0.349	(0.088)*	0.07	(0.016)*
Age								
17 to 19	0.045	(0.098)	0.021	(0.033)	-0.008	(0.088)	-0.012	(0.025)
20 to 24	-0.090	(0.067)	0.005	(0.021)	0.077	(0.062)	-0.007	(0.014)
35 to 44	0.077	(0.068)	-0.010	(0.015)	-0.088	(0.059)	0.002	(0.011)
45 to 54	0.033	(0.107)	-0.012	(0.019)	-0.103	(0.092)	-0.022	(0.012)+
55 to 64	0.383	(0.105)*	-0.007	(0.030)	-0.315	(0.051)*	-0.035	(0.009)*
Managerial or supervisory responsibility	0.287	(0.050)*	0.073	(0.025)*	-0.206	(0.045)*	-0.040	(0.009)*
Public sector	-0.046	(0.113)	-0.036	(0.028)	0.030	(0.106)	0.070	(0.029)*
Firm size								
Fewer than 20 employees	0.004	(0.070)	-0.065	(0.029)*	-0.041	(0.062)	0.021	(0.019)
20 to 99 employees	0.018	(0.069)	-0.019	(0.020)	-0.052	(0.061)	0.008	(0.014)
100 to 199 employees	-0.033	(0.111)	-0.028	(0.027)	-0.037	(0.093)	-0.0003	(0.017)
200 to 499 employees	0.194	(0.081)*	0.019	(0.020)	-0.148	(0.068)+	-0.015	(0.013)
Job tenure								
Tenure/10	0.882	(0.160)*	0.173	(0.035)*	-0.673	(0.148)*	-0.154	(0.029)*
Tenure^2/100	-0.319	(0.087)*	-0.058	(0.018)*	0.270	(0.081)*	0.058	(0.014)*
Observed probability	0.52		0.9		0.387		0.075	
Fitted probability	0.54		0.94		0.335		0.039	
Pseudo R^2	0.307		0.212		0.257		0.212	
Number of observation	633		1,765		633		1,765	

Notes: *Standard errors are shown in parentheses. The table entries correspond to probability derivatives. For each dummy variable covariate, the table shows the change in the probability for the training to be financed by the employer/worker due to switching the covariate value from 0 to 1. The derivatives and the fitted probabilities are calculated for the base person described at the bottom of Table A1. Results for industry and province covariates are not presented here but are available upon request.*

**, + Mean effect is significantly different from zero at the 5% and 10% significance level, respectively.*

Source: *Adult Education and Training Survey 1998.*

Table A4
Probit results for training payment, women

Variable	Employer paid				Worker paid alone			
	Program training		Course training		Program training		Course training	
	Probability derivatives							
Union	-0.008	(0.050)	-0.015	(0.016)	-0.071	(0.055)	0.027	(0.014)*
Education								
Elementary or some high school	-0.223	(0.082)*	-0.010	(0.037)	-0.025	(0.126)	-0.010	(0.024)
Some post-secondary	-0.136	(0.069)+	-0.068	(0.040)*	0.288	(0.066)*	0.037	(0.031)
Completed post-secondary	-0.013	(0.065)	-0.049	(0.022)*	0.152	(0.070)*	0.033	(0.018)+
University	-0.080	(0.069)	-0.054	(0.026)*	0.267	(0.070)*	0.034	(0.021)+
Age								
17 to 19	-0.232	(0.083)*	-0.062	(0.087)	0.175	(0.103)	0.026	(0.059)
20 to 24	-0.036	(0.056)	-0.003	(0.028)	0.054	(0.058)	0.006	(0.023)
35 to 44	0.076	(0.054)	-0.005	(0.016)	-0.096	(0.056)+	-0.009	(0.012)
45 to 54	-0.065	(0.063)	-0.031	(0.020)	0.052	(0.073)	-0.016	(0.013)
55 to 64	0.093	(0.176)	-0.014	(0.033)	-0.079	(0.169)	0.001	(0.023)
Managerial or supervisory responsibility	0.045	(0.048)	0.036	(0.012)*	-0.045	(0.051)	-0.025	(0.010)*
Public sector	0.030	(0.063)	-0.061	(0.021)*	-0.021	(0.068)	0.008	(0.014)
Firm size								
Fewer than 20 employees	-0.012	(0.057)	-0.069	(0.029)*	0.055	(0.059)	0.035	(0.022)+
20 to 99 employees	-0.048	(0.057)	-0.002	(0.019)	0.133	(0.058)*	-0.002	(0.015)
100 to 199 employees	-0.018	(0.083)	0.010	(0.022)	0.091	(0.087)	-0.010	(0.017)
200 to 499 employees	0.069	(0.075)	0.032	(0.016)*	-0.003	(0.078)	-0.014	(0.014)
Job tenure								
Tenure/10	0.579	(0.110)*	0.233	(0.034)*	-0.379	(0.125)*	-0.111	(0.027)*
Tenure^2/100	-0.202	(0.064)*	-0.091	(0.017)*	0.130	(0.071)+	0.046	(0.013)*
Observed probability	0.37		0.88		0.549		0.081	
Fitted probability	0.33		0.92		0.548		0.05	
Pseudo R^2	0.185		0.192		0.175		0.156	
Number of observation	760		2,002		760		2,002	

Notes: *Standard errors are shown in parentheses. The table entries correspond to probability derivatives. For each dummy variable covariate, the table shows the change in the probability for the training to be financed by the employer/worker due to switching the covariate value from 0 to 1. The derivatives and the fitted probabilities are calculated for the base person described at the bottom of Table A2. Results for industry and province covariates are not presented here but are available upon request.*

**, +* *Mean effect is significantly different from zero at the 5% and 10% significance level, respectively.*

Source: *Adult Education and Training Survey 1998.*

References

Beaudry, P., D.A. Green and J. Townsend. 2001. "An investigation of changes in wage outcomes across cohorts in Canada." Mimeo. University of British Columbia.

Barron, J.M., M.C. Berger and D.A. Black. 1999. "Do workers pay for on-the-job training?" *Journal of Human Resources*. Spring. 235–252.

Becker, G. 1964. *Human Capital*. Cambridge, Mass. National Bureau of Economic Research.

Green, D. and T. Lemieux. 2001. "The impact of unionization on the incidence and financing of training in Canada." Research paper R-01-9-1E. Ottawa. Human Resources Development Canada. Applied Research Branch.

Green, F. 1993. "The impact of trade union membership on training in Britain." *Applied Economics*. 25. 1033–1043.

Hashimoto, M. 1981. "Firm-specific human capital as a shared investment." *American Economic Review*. 71, 3. 1070–1087.

Kuhn, P. and A. Sweetman. 1999. "Vulnerable seniors: Unions, tenure, and wages following permanent job loss." *Journal of Labor Economics*. 17, 4. 671–693.

Loewenstein, M.A. and J.R. Spletzer. 1998. "Dividing the costs and returns to general training." *Journal of Labor Economics*. 16, 1. 142–171.

Endnotes

1. Human capital is the stock of economically productive human capabilities. These capabilities are formed or produced by combining innate abilities with investments in human beings. Examples of such investments include expenditures on education, on-the-job training, and health and nutrition (Encyclopedia of Economics, McGraw-Hill, 1982).
2. The marginal product of labour is the extra output added by one extra unit of labour, while other production factors are held constant.
3. The following assumptions are based on a simplified version of a model presented in Loewenstein and Spletzer (1998).
4. Wage floors are high or low in relation to the wages that could be obtained in other firms.
5. For respondents with multiple training spells, only the spell with the longest duration was considered for the analysis. If a respondent took both programs and courses, the longest of each type of training spell was used.
6. Other classifications were also explored, but data limitations prevented the authors from using them in the analysis. For further details, see Green and Lemieux (2001).
7. Using the first definition of general human capital ('program training'), 49% of workers in the non-union sector invest in training without their employer's involvement, compared with 43% for workers in the union sector. The corresponding figures for the second definition (' general training') are 27% and 21%.
8. Tables A1 to A4 appear in the Appendix.
9. A specification in which the union status variable is interacted with all the other covariates was also estimated for men and women. Since no clear pattern in the union effect emerged from this analysis, those results are not discussed here, but they are presented in Green and Lemieux (2001).
10. The number of observations for specific human capital investment defined as training provided by the employer was too small to generate stable results. Results using the broader definition of general human capital are very similar to those obtained for program training and can be found in Green and Lemieux (2001).


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Relative earnings of British Columbia university graduates

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Introduction

Each year many university students across Canada must select their major field of study. In choosing among several possibilities that interest them, these students may take into consideration the earnings of past graduates of these fields.

Recent studies have uncovered important differences in average postgraduate earnings of graduates from different fields of study. However, measures of central tendency, such as the average or median, can mask as much information as they portray. Indeed, the average or median earnings of graduates from a particular field of study might not reflect the experience of most graduates if the variation of earnings is wide.

In this study I examine the distribution of annual earnings of British Columbia university graduates from the classes of 1974 through 1996, offering a view of the earnings of men and women 5, 10 and 15 years after graduation. I find that examining median postgraduate earnings reveals only a small part of the story on economic outcomes from different fields of study, whereas an examination of the variation in earnings substantially enriches the information available.

The empirical work in this paper is divided into three parts. I first investigate differences in median earnings at different levels of postgraduate experience. Many studies of relative earnings of university graduates do not go beyond this point. Then I examine points other than the centre of the earnings distribution for graduates from various fields of study. The purpose of this is to question whether the median earnings of graduates from a particular field of study provide a fair evaluation of the earnings received by the majority of graduates from that field. Finally, graduates from fields with high median earnings may not necessarily be those that rise to the top of the earnings distribution. Hence, I examine graduates who rise to

the top 10% and 2% of earners to help us to understand which fields of study the 'best and brightest' come from.

Data

The data set used in this study is a large sample of bachelor's graduates from the universities in British Columbia[1], drawn from two administrative data sources: information on B.C. graduates from 1974 to 1996 was obtained from the University Student Information System (USIS); annual earnings, defined as the sum of taxable earnings from employment and self-employment, were then added for all postgraduation years between 1982 and 1997 using tax information from the T1 Family File. Earnings were converted to real terms using the Consumer Price Index as a deflator (2001=100). These data sets were merged using the graduates' Social Insurance Number (SIN) as a matching key. The resulting data file is longitudinal, but in this analysis I have treated the data as a series of consecutive cross sections. From 1974 to 1996, the number of bachelor's degrees awarded annually in this sample rose from 4,884 to 10,330. I examined the earnings of men and women separately across 20 fields of study.

Excluded from this analysis are graduates with professional degrees in dentistry, medicine and law, and those from religious and theological studies, since these groups had low SIN reporting rates. Observations for men in the nursing and rehabilitation medicine fields were dropped because there were too few observations in these two groups to reliably estimate median earnings.

Data limitations dictate that one cannot be certain that the bachelor's degrees represented in these data are in fact the final degrees obtained by the students. This raises the important point that some graduates' earnings may derive from further studies in a different program from the one in which they earned the bachelor's degree. For example, a science graduate may later get a law degree. That graduate may earn a lawyer's salary, but I will have measured him or her as having a background in science. This is a pitfall inherent in the data, which cannot, for example, link some B.C. bachelor's graduates with their graduate studies outside British Columbia. Thus the results in this paper should be thought of as identifying students at a specific point in their 'human capital accumulation' and not as having necessarily completed their highest level of education.[2]

In the following analysis I examined only those graduates for whom earnings information was available—that is, graduates who were successfully linked to the T1 Family File data. For the final sample, only graduates who were between the ages of 21 and 25 in the year they graduated were selected. Two-thirds of linked graduates fell into this age range. The selection of this age group ensures that graduates in this study were all about the same age and had approximately the same work experience at the time of their graduation. Postgraduate years in which earnings were zero or negative were excluded.

1. The institutions included are the University of British Columbia, Simon Fraser University and University of Victoria.
2. Further information on the data set is available in Heisz (Forthcoming).

Differences in average and median postgraduate annual earnings

Table 1 shows the median earnings of graduates from 20 fields of study. The results in Table 1, as for all other tables, were obtained from a regression equation that is described in the technical appendix. The regression was designed to predict relative earnings for graduates from different fields of study. The results are expressed as median earnings in 2001 dollars for a 1980 graduate.

At this fine level of detail, it is difficult to group fields of study clearly into high- and low-earning fields at three points during the postgraduate period. However, several general conclusions can be drawn from these data.

First, for men, the applied degrees of engineering, medical sciences and commerce were always in the top four fields with respect to earnings, whereas music, fine and applied arts, english and other humanities degrees were always in the bottom four fields. For women, medical sciences and commerce were always in the top five fields with respect to earnings, while music and fine and applied arts were always in the bottom five.

Second, the ranking of fields across levels of postgraduate experience was not stable. Some fields that had relatively low ranking 5 years after graduation had higher ranking 10 and 15 years after. For example, the economics field, whose median earnings after 5 years had positioned it seventh among the 18 fields that I examined for men, rose to third place 15 years after graduation. In one extreme example, earnings for women with nursing degrees were in the top five (of 20 fields) after 5 years of experience but in the bottom five after 15 years.

Third, median earnings by field of study tend to become more equal as graduates gain more experience. This can be seen through examination of the coefficient of variation (CV), which is a measure of the level of inequality in earnings. If there was no inequality in earnings, the CV would be 0.00. For men, the CV fell from 0.231 at 5 years after graduation to 0.114 at the 15-year mark. For women, the CV fell from 0.220 to 0.138over the same period. One explanation for this is that graduates from fields of study associated with lower median earnings tended to catch up to graduates from fields with higher median earnings. Measured at 5 years after graduation, the median earnings of men in the three fields with the lowest earnings (other humanities; music and fine and applied arts; and english) were $26,800, whereas for men in the top four fields (teacher training; medical sciences; commerce; and engineering and applied science) they were $52,500—$25,700 (96%) more than for men in the lowest fields. After 15 years, the corresponding median earnings for the lowest fields were $51,700, and for the highest fields they were $70,600—$18,900 (only 37%) more.

The distribution of postgraduate annual earnings

The previous section showed that graduates with applied degrees in the commerce, medical sciences and engineering fields tended to have higher annual earnings 5, 10 and 15 years after graduation. In addition, graduates with some humanities and arts degrees tended to have lower earnings, but the relative difference tended to decline as graduates gained more experience. However, focusing exclusively on average or median earnings obscures the fact that many graduates from fields associated with lower earnings were paid substantially more than many other graduates from fields associated with higher earnings.

Table 2 and graphs 1a, 1b and 1c show annual earnings at the 25th, 50th and 75th percentiles for men from the 1980 cohort. The range of annual earnings between the 25th and 75th percentiles is usually quite substantial, often more than $20,000. Many graduates from fields with low median earning levels earn more than many other graduates from fields with higher median earnings. For example, 15 years after graduation, the 75th percentile of earnings for men with english degrees was $68,400. This was more than the annual earnings of half of the graduates from all other fields, except commerce and engineering, and more than what the lowest 25% in commerce and engineering earned. After 10 years of experience, the lowest-earning 25% of commerce graduates earned less than 50% of the highest-earning graduates in many other fields, including physical education, history, geography and biology.

Table 3 and Graphs 1a, 1b and 1c show similar results for women. For example, 10 years after graduation, the top 25% of women with english degrees earned more (at $48,400) than the bottom 50% in any other field except medical sciences. These results highlight the potential danger of placing too much emphasis on median earnings, since they obscure the fact that there are wide variations in earnings around measures of central tendency. While median outcomes tend to be consistently high for graduates from some fields, graduates are often better off having above-median earnings in a field where earnings are low than below-median in one where earnings are high.

Earners in the top 10% and 2% of the earnings distribution

In this section, in order to focus on the top of the earnings distribution and to determine which fields produce the highest-earning graduates, I examine the 90th percentile of earnings for each field. Table 4 shows earnings of graduates by field of study at the 90th percentile of earnings for the 1980 graduate cohort.

It is useful to observe which fields have the highest earnings at the 90th percentile. For men, five years after graduation, graduates from commerce, engineering, and the medical and physical sciences had the highest earnings at the 90th percentile. However, after 15 years, many of these fields were no longer in the top four; instead, earnings at the 90th percentile were highest among graduates of

commerce, political science, economics, and other biological sciences. The applied fields of engineering, medical sciences and physical sciences were no longer in the top four; other fields, such as economics and political sciences, that consistently had lower median earnings than engineering had higher earnings at the 90th percentile 15 years after graduation.

For women, commerce and physical sciences graduates were among the highest earners at the 90th percentile and ranked among the top five fields 5, 10 and 15 years after graduation. At the 15-year milestone, as was the case with the median results, women at the 90th percentile with economics degrees earned more than those with engineering degrees. Interestingly, biology graduates, who did not have particularly high median earnings, featured among the highest earners at the 90th percentile. This may reflect the fact that a bachelor's degree in biology is a common route to a medical degree.

Who rises to the top? That is, what fields are most likely to be represented among the top 10% and 2% of earners? Using odds ratios, Table 5 tells us the relative odds of a graduate from a particular field of study having earnings in the top 10% or 2%. If a field has an odds ratio of 1.0, this would signify that a graduate from that field has exactly an average chance of reaching the top of the earnings distribution. If such a field were to account for 5% of graduates, then it would also account for 5% of earners at the top of the distribution. An odds ratio of 2.0 for a field would indicate that a graduate from the field is twice as likely to reach the top of the earnings distribution and that this field would account for 10% of earners above the 90th percentile. An odds ratio of only 0.5 would indicate that a graduate from this field would be half as likely to reach the top of the distribution. I have focused on earnings 15 years after graduation, since this gives graduates sufficient time to advance in their careers and thus might best approximate long-term earnings from these groups.

Table 5 shows odds ratios for each field for 1980 graduates at the 15-year stage.[1] Fields with odds ratios greater than 1.0 have the highest likelihood of attaining the upper zone of the earnings distribution. Men in commerce, economics, political science, biology and other biological sciences, and engineering were all more likely than average to reach the top 10% of earners. Other fields were no more likely than average, or were less likely than average, to reach the top 10%. Men with commerce degrees were most likely to eventually earn in the top 10%, with 2.0 graduates in the top 10% for every commerce graduate. Men in the commerce, economics and other biological sciences fields had the highest odds of reaching the top 2% of earners in the distribution. It is interesting to note that the engineering and medical sciences fields, which had higher-than-average odds of reaching the top 10%, had significantly lower-than-average odds of reaching the top 2%. Men with such backgrounds did enjoy higher earnings but were less likely to reach the top echelon of earners.

For women, more varied fields had above-average odds of reaching the top 10%. Those in teacher training, who were very unlikely to achieve the top 10% or 2% of female earners, made up a large proportion of women graduates (16% per year on average), leaving lots of room in the top of the distribution for other fields. Women in commerce, economics, political science, engineering and physical sciences all had odds ratios of at least 2.0, indicating a high likelihood of reaching the top of the earnings distributions. Women in commerce had the highest likelihood—3.8 times more likely than women in other fields—of reaching the top 2% of the earnings distribution.

It is interesting to compare the graduates who are most likely to reach the top of the graduates' earnings distribution with the median results presented earlier. Several fields with median earnings in the middle of the pack, such as economics, biology and political science, have an equal or greater likelihood of producing top earners than other fields with higher median earnings, such as engineering or medical sciences. This echoes the conclusion made elsewhere in the paper that examining the centre of the earnings distribution tells only part of the story on graduate outcomes.

Conclusion

In this paper I have examined the annual earnings of British Columbia university graduates 5, 10 and 15 years after their graduation. I find that median postgraduate annual earnings varied significantly across fields of study, with graduates in applied fields such as engineering, commerce and medical sciences typically earning more than graduates from other fields. However, differences in median earnings by field of study tend to decrease as graduates gain more experience.

While these differences in median earnings are important, examination of other points in the distribution of earnings after graduation for graduates from various fields of study reveals that median outcomes misrepresent the earnings of a substantial proportion of graduates. For example, at the 15-year milestone, 25% of the highest-earning english graduates earned more than what 50% of the lowest-earning graduates from many other fields of study (including economics, physical sciences and teacher training, for example) and more than 25% of the lowest-earning graduates from engineering earned. And while commerce graduates fared well on average, the lowest-earning 25% of commerce graduates earned less than 50% of the top-earning graduates in many other fields earned. The message to take from these results is an obvious one that bears repeating: most graduates do not earn the average earnings associated with the field they choose, and a successful graduate in a field associated with lower earnings may earn substantially more than a less successful graduate in a field where earnings tend to be higher.

Focusing on which graduates rise to the top of the earnings distribution, I find that results at the top of the distribution also do not exactly mirror what one would expect from average outcomes. Although engineers earn more than economics or political science graduates at the median, at the 15-year milestone a political science or economics graduate was more likely than an engineering graduate to be found in the top 10% of earners. Engineers are also unlikely to achieve the top 2% of earners, while graduates from fields with lower average earnings, such as economics, political science and biology, are more likely to be in the top 2%. Taken together, these results indicate that examining points in the distribution other than the average or median leads to an enhanced understanding of graduate outcomes.

Endnotes

1. Results are predicted as described in the technical appendix. Relative results for other graduate cohorts would not be different.

References

Heisz, Andrew. 2001. *Income Prospects of British Columbia University Graduates* Statistics Canada Research Paper Series, no. 170. Available at www.statcan.ca (follow “Studies by Statistics Canada” link)

Heisz, Andrew. Forthcoming. *Cohort Effects in Annual Earnings by Field of Study Among British Columbia University Graduates*. Statistics Canada Analytical Studies Branch Research Paper Series. Catalogue no. 11F0019MPE. Ottawa.

Technical Appendix

Results from tables 1 to 4 show predicted values from quantile regressions of the form

$$DV = b_0 + b_1C + b_2c^2 + b_3UR + S_{i=4-n+4}\, b_iF_i \qquad (1)$$

where DV is the log of annual earnings measured 5, 10 or 15 years after graduation; C indexes graduate cohorts (i.e., 1974=1, 1975=2, etc.); F represents one of 20 field dummy variables (18 for men); and UR is the detrended unemployment rate among 25- to 54-year-old men in British Columbia (included to capture business cycle effects). Equation (1) is estimated using quantile regression at the 25th, 50th, 75th or 90th percentiles. The number of graduate cohorts used in the regression differs depending upon the experience level chosen. Results for 5-year outcomes are from the 1978 to 1992 graduate cohorts; results for 10-year outcomes are from the 1974 to 1987 cohorts; and results for 15-year outcomes are from the 1974 to 1980 cohorts. The purpose of this regression is to establish the relative level of earnings for different fields of study (indicated by the value of b_i), abstracting from cohort and business cycle effects. To predict earnings, UR is set at its period average, and cohort dummies are set to their 1980 values. Results for other cohorts would be different in level, but the same in relative terms.

Results in Table 5 show predicted values from a logistic regression of the same form as equation (1), except DV is a dummy variable indicating presence in the top 10% or 2% of earners. Predicted values are generated as above, then converted to odds ratios. To add explanatory power, data from 13 to 17 years of experience are used to estimate the model. Predicted values are derived for the 1980 cohort at 15 years of experience.

For simplicity, (1) assumes that changes in earnings across cohorts are the same for all fields of study. In other work I show that field-specific effects are statistically identical when evaluated for average outcomes (Heisz Forthcoming).

Table 1
Annual earnings[1] 5, 10 and 15 years after graduation, 1980 cohort, by sex and field of study

	Men			Women		
	Years after graduation					
	5	10	15	5	10	15
	Earnings ($ 2001)					
All fields	**42,900**	**55,300**	**65,600**	**32,600**	**34,700**	**41,100**
Teacher training	47,600	56,400	64,300	37,100	33,300	38,700
Physical education	43,600	53,400	64,100	35,700	35,600	44,500
Kinesiology and recreation	39,400	51,700	63,600	30,200	33,700	37,300
Music, fine and applied arts	23,100	37,200	46,500	19,100	24,200	28,700
English	29,600	44,000	55,100	26,500	33,200	40,000
History	35,000	48,100	60,700	27,000	35,000	41,100
Other humanities	27,600	40,300	53,500	29,500	33,500	38,200
Commerce	49,800	62,700	72,000	39,600	42,600	51,800
Economics	40,300	54,900	67,800	32,900	35,900	49,000
Geography	39,000	49,300	60,300	29,700	31,500	38,500
Political science	34,800	50,700	62,300	29,600	37,600	50,000
Psychology	34,400	47,400	58,900	28,200	33,100	40,000
Other social sciences	40,300	49,500	56,100	29,300	30,700	38,400
Biology	34,600	51,500	61,900	28,500	35,200	42,300
Other biological sciences	34,500	51,600	62,500	30,600	35,400	40,800
Engineering, applied sciences	55,800	67,100	78,400	44,200	42,900	46,900
Medical sciences	56,700	62,900	67,500	49,600	48,900	50,300
Nursing	*	*	*	42,700	33,600	38,000
Rehabilitation medicine	*	*	*	41,600	29,100	38,500
Physical sciences	46,200	55,800	64,900	37,000	45,600	49,000
Coefficient of variation	0.231	0.146	0.114	0.220	0.162	0.138

1. Cell values represent the predicted values of quantile regressions as described in the technical appendix.
** Values could not be computed for these cells.*
***Source**: T1 Family File and University Student Information System.*

Table 2
Earnings[1] of male graduates at 25th, 50th and 75th percentiles of earnings, 1980 cohort, by field of study

	5 years after graduation			10 years after graduation			15 years after graduation		
	Percentile								
	25th	50th	75th	25th	50th	75th	25th	50th	75th
	Earnings ($ 2001)								
Teacher training	38,600	47,600	51,300	47,100	56,400	61,300	56,000	64,300	70,300
Physical education	28,300	43,600	48,600	43,400	53,400	59,000	52,900	64,100	71,500
Kinesiology and recreation	21,900	39,400	48,800	40,300	51,700	62,100	51,700	63,600	73,600
Music, fine and applied arts	10,600	23,100	39,100	20,300	37,200	52,000	26,000	46,500	63,500
English	14,200	29,600	43,400	26,100	44,000	57,200	37,600	55,100	68,400
History	19,600	35,000	45,300	31,400	48,100	58,900	42,500	60,700	74,200
Other humanities	12,500	27,600	42,100	21,700	40,300	54,800	32,900	53,500	68,900
Commerce	35,500	49,800	60,200	45,700	62,700	81,300	51,600	72,000	103,000
Economics	27,000	40,300	52,200	39,900	54,900	70,000	49,500	67,800	88,000
Geography	23,200	39,000	48,400	36,000	49,300	61,100	43,300	60,300	73,700
Political science	19,800	34,800	46,200	34,300	50,700	64,700	40,900	62,300	85,800
Psychology	17,900	34,400	45,700	33,000	47,400	59,800	42,100	58,900	76,700
Other social sciences	22,900	40,300	53,200	34,600	49,500	59,900	41,900	56,100	68,000
Biology	17,600	34,600	46,700	37,000	51,500	62,900	45,400	61,900	77,600
Other biological sciences	17,400	34,500	47,300	36,600	51,600	66,400	46,300	62,500	82,400
Engineering, applied sciences	42,600	55,800	64,300	54,500	67,100	77,900	64,100	78,400	95,200
Medical sciences	35,900	56,700	66,000	51,000	62,900	73,000	54,100	67,500	82,200
Nursing	*	*	*	*	*	*	*	*	*
Rehabilitation medicine	*	*	*	*	*	*	*	*	*
Physical sciences	26,600	46,200	56,000	41,800	55,800	67,700	48,900	64,900	79,000
Coefficient of variation	0.383	0.231	0.146	0.247	0.146	0.121	0.193	0.114	0.131

1. Cell values represent the predicted values of quantile regressions as described in the technical appendix.
** Values could not be computed for these cells.*

***Source**: T1 Family File and University Student Information System.*

Table 3
Earnings[1] of female graduates at 25th, 50th and 75th percentiles of earnings, 1980 cohort, by field of study

	5 years after graduation			10 years after graduation			15 years after graduation		
	Percentile								
	25th	50th	75th	25th	50th	75th	25th	50th	75th
	Earnings ($ 2001)								
Teacher training	21,200	37,100	45,200	16,300	33,300	49,700	22,300	38,700	57,500
Physical education	18,500	35,700	44,200	18,700	35,600	50,700	22,500	44,500	62,600
Kinesiology and recreation	17,000	30,200	41,500	15,600	33,700	46,900	16,900	37,300	55,200
Music, fine and applied arts	8,900	19,100	32,700	10,600	24,200	39,600	11,700	28,700	48,300
English	13,000	26,500	38,700	16,900	33,200	48,400	18,400	40,000	57,700
History	15,000	27,000	37,700	18,100	35,000	48,900	20,300	41,100	59,800
Other humanities	14,900	29,500	40,500	17,200	33,500	48,500	21,000	38,200	58,700
Commerce	27,200	39,600	51,600	24,900	42,600	61,400	27,900	51,800	77,100
Economics	21,700	32,900	44,200	20,400	35,900	54,300	25,900	49,000	71,700
Geography	16,700	29,700	40,800	16,300	31,500	47,400	22,200	38,500	58,700
Political science	17,600	29,600	40,300	22,500	37,600	56,400	27,800	50,000	71,300
Psychology	15,300	28,200	39,100	18,400	33,100	46,800	22,700	40,000	56,400
Other social sciences	15,300	29,300	41,600	14,400	30,700	46,400	20,900	38,400	54,900
Biology	14,400	28,500	41,300	18,200	35,200	50,300	21,300	42,300	59,900
Other biological sciences	16,700	30,600	42,900	19,900	35,400	51,400	22,700	40,800	60,800
Engineering, applied sciences	27,800	44,200	56,000	21,600	42,900	59,800	20,200	46,900	67,900
Medical sciences	32,900	49,600	59,400	27,800	48,900	60,600	34,400	50,300	63,700
Nursing	23,800	42,700	50,600	17,500	33,600	51,100	25,000	38,000	55,400
Rehabilitation medicine	25,100	41,600	48,400	17,800	29,100	50,900	22,900	38,500	57,600
Physical sciences	17,900	37,000	50,100	26,400	45,600	60,800	27,200	49,000	68,400
Coefficient of variation	0.307	0.220	0.148	0.218	0.162	0.112	0.207	0.138	0.114

1. *Cell values represent the predicted values of quantile regressions as described in the technical appendix.*
***Source**: T1 Family File and University Student Information System.*

Table 4
Earnings of graduates at 90th percentile of earnings, 1980 graduate cohort, by sex and field of study[1]

	Men			Women		
	Years after graduation					
	5	10	15	5	10	15
	Earnings ($ 2001)					
Teacher training	54,600	68,700	80,800	49,100	56,500	65,800
Physical education	53,000	67,200	86,500	47,900	57,100	69,600
Kinesiology and recreation	57,700	84,300	85,200	49,500	54,800	65,000
Music, fine and applied arts	47,200	60,600	71,800	44,200	52,700	63,800
English	51,600	75,200	85,700	46,000	58,800	70,200
History	53,700	73,400	97,400	45,800	59,300	71,800
Other humanities	51,800	74,100	86,400	46,400	58,500	71,500
Commerce	74,300	108,000	161,100	60,200	76,200	106,200
Economics	62,700	90,100	127,600	54,100	66,400	91,900
Geography	55,900	72,000	89,000	48,000	57,600	72,000
Political science	56,500	87,700	129,300	48,600	72,800	84,400
Psychology	54,700	78,200	110,700	46,800	57,800	72,700
Other social sciences	63,400	71,400	86,100	49,600	56,400	67,700
Biology	55,500	87,000	118,100	48,500	63,500	86,300
Other biological sciences	57,200	97,700	126,400	49,000	60,900	71,500
Engineering and applied sciences	71,500	91,300	116,000	63,600	70,400	83,100
Medical sciences	71,100	91,900	110,300	63,400	67,700	77,700
Nursing	*	*	*	54,700	57,700	65,600
Rehabilitation medicine	*	*	*	52,900	57,600	70,200
Physical sciences	64,700	82,600	99,900	59,400	71,200	85,800

1. Cell values represent the predicted values of quantile regressions as described in the technical appendix.
** indicates that values could not be computed for these cells.*
***Source**: T1 Family File and University Student Information System.*

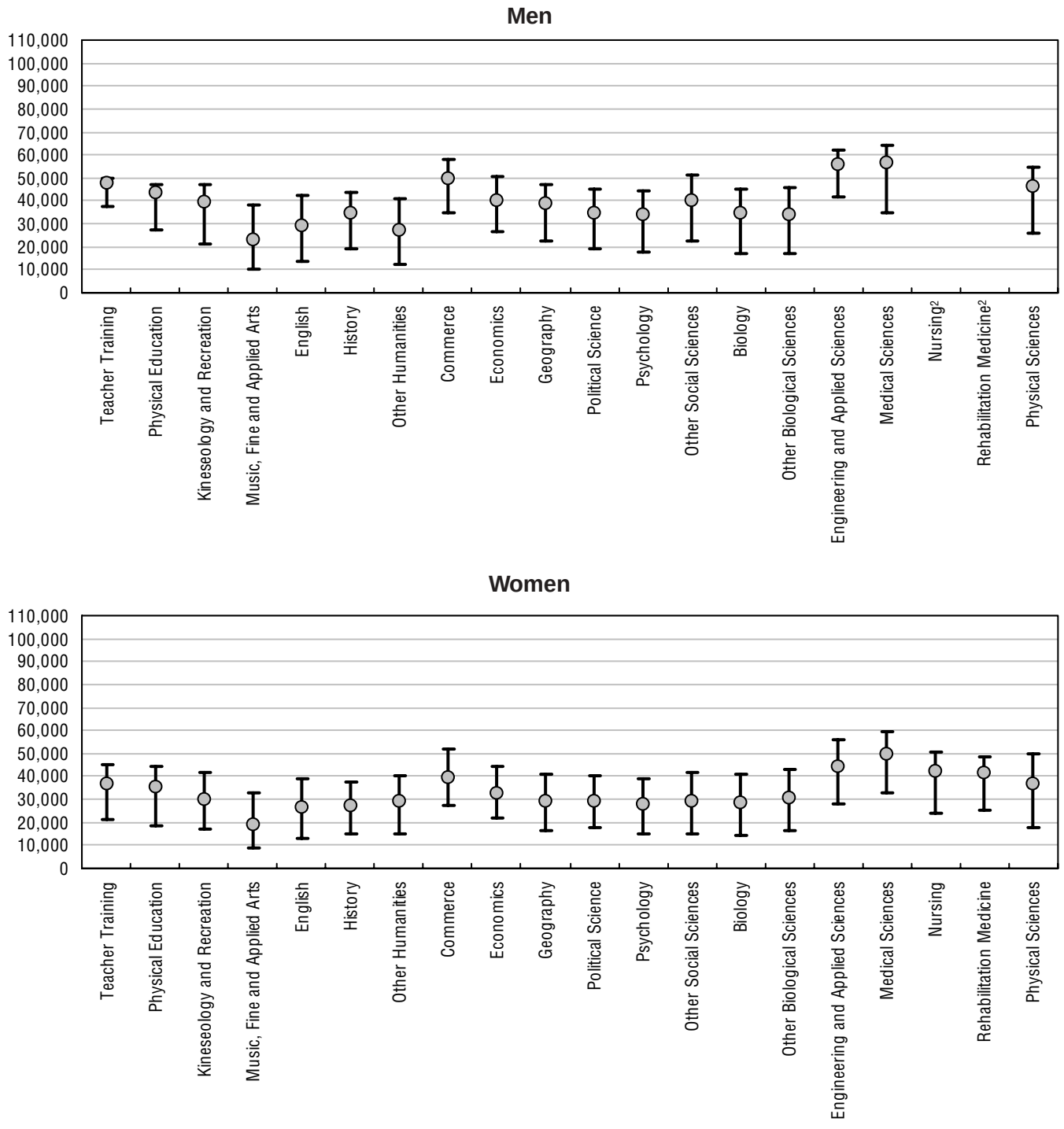
Table 5
Relative odds of graduates achieving top 10% and 2% of earnings, 1980 graduate cohort, 15 years after graduation, by sex and field of study[1]

	Men		Women	
	Top 10%	Top 2%	top 10%	Top 2%
	Relative odds			
Teacher training	0.2	0.3	0.5	0.1
Physical education	0.3	0.2	0.9	0.6
Kinesiology and recreation	0.6	0.4	0.7	0.7
Music, fine and applied arts	0.2	0.2	0.5	0.5
English	0.6	0.5	1.0	0.9
History	0.7	0.5	1.1	1.2
Other humanities	0.5	0.6	0.9	0.7
Commerce	2.0	2.6	2.5	3.8
Economics	1.2	1.3	2.1	1.7
Geography	0.5	0.5	0.8	0.7
Political science	1.2	0.9	2.3	2.1
Psychology	0.8	0.9	1.0	1.1
Other social sciences	0.4	0.6	0.7	0.6
Biology	1.0	1.0	1.4	2.2
Other biological sciences	1.3	1.2	1.0	1.6
Engineering and applied sciences	1.2	0.6	2.0	1.1
Medical sciences	1.0	0.8	1.6	1.1
Nursing	*	*	0.8	0.7
Rehabilitation medicine	*	*	1.1	0.9
Physical sciences	0.8	0.8	2.0	1.9

1. Cell values represent the predicted values of logistic regressions as described in the technical appendix.
** Indicates that values could not be computed for these cells.*
***Source**: T1 Family File and University Student Information System.*

Graph 1a

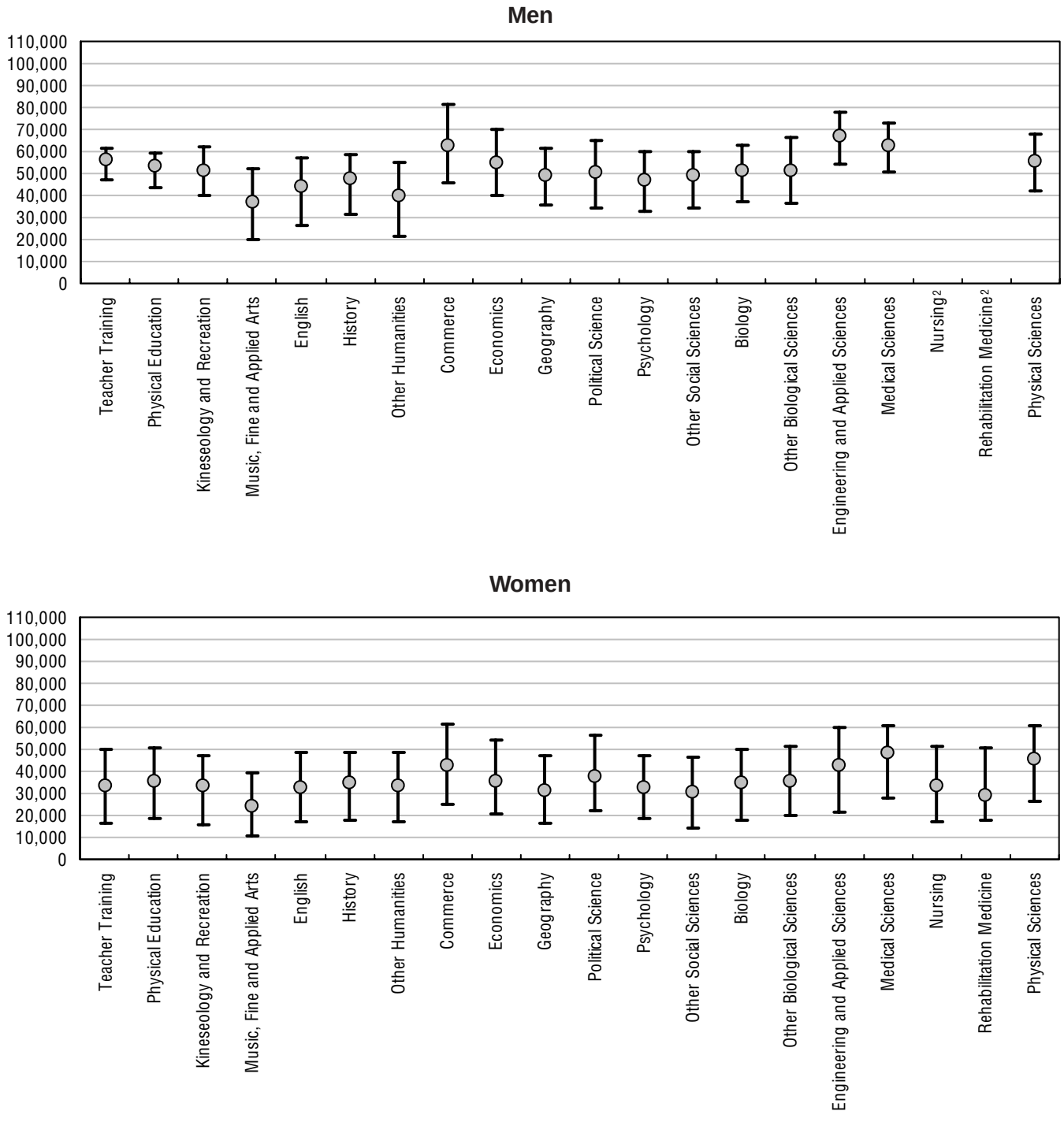
Annual earnings of graduates[1] at 25th, 50th and 75th percentiles of earnings five years after graduation, 1980 graduate cohort, by sex and field of study



1. Cell values represent the predicted values of logistic regressions as described in the technical appendix.
2. Values could not be computed for men in nursing or rehabilitation medicine.
***Source**: T1 Family File and University Student Information System.*

Graph 1b

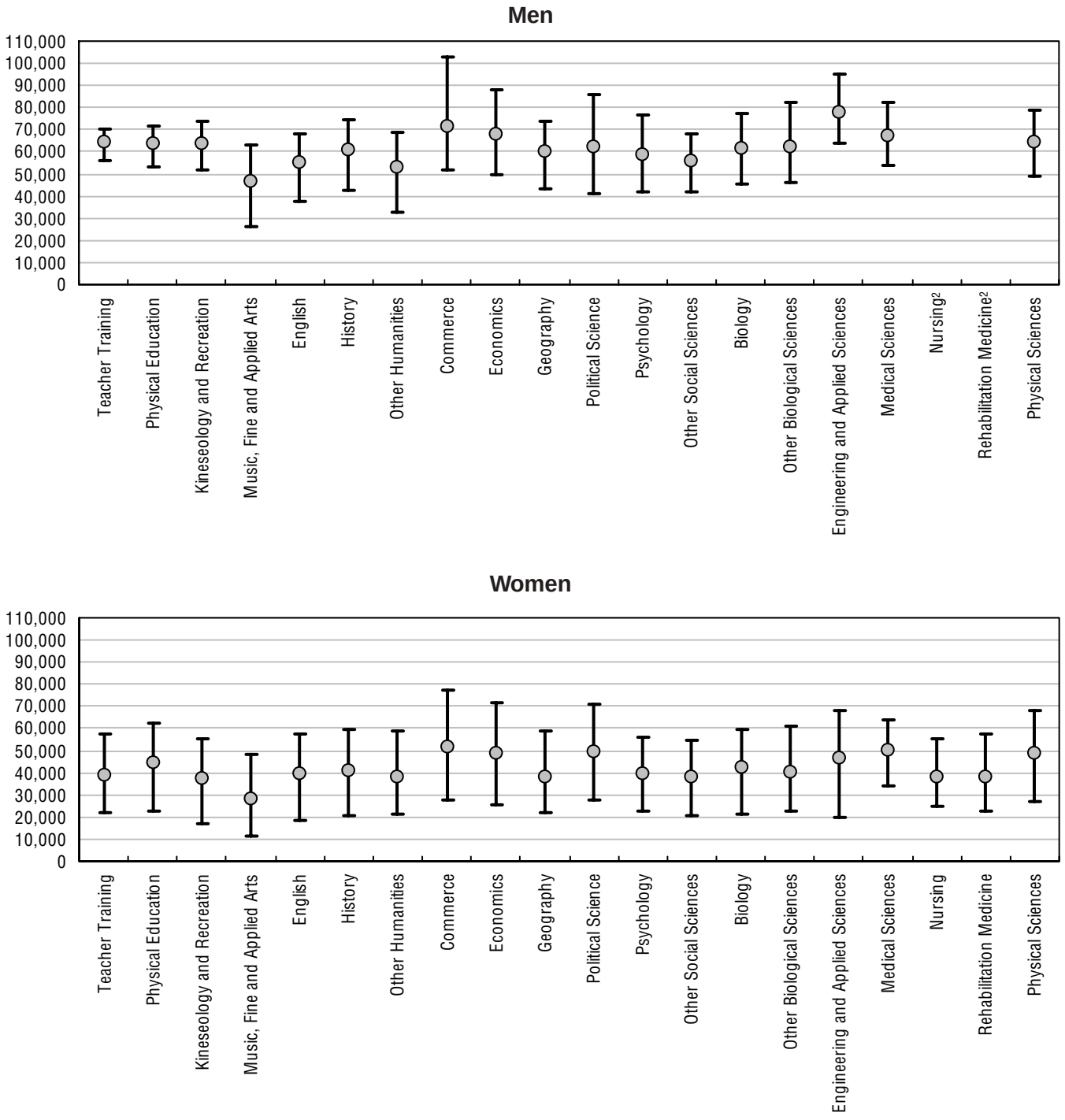
Earnings of graduates[1] at 25th, 50th and 75th percentile of earnings, 10 years after graduation, 1980 graduate cohort, by sex and field of study



1. Cell values represent the predicted values of logistic regressions as described in the technical appendix.
2. Values could not be computed for men in nursing or rehabilitation medicine.
***Source**: T1 Family File and University Student Information System.*

Graph 1c

Earnings of graduates[1] at 25th, 50th and 75th percentile of earnings 15 years after graduation, 1980 graduate cohort, by sex and field of study



1. Cell values represent the predicted values of logistic regressions as described in the technical appendix.
2. Values could not be computed for men in nursing or rehabilitation medicine.
***Source**: T1 Family File and University Student Information System.*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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".

- National Longitudinal Survey of Children and Youth: Childhood obesity 1994 to 1999
  (released October 18, 2002)
- Reading performance of students in rural and urban schools 2000
  (released November 25, 2002)
- Literacy and literacy training of francophones in Canada
  (released Dec 6, 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	1999–2000	2000–2001[e]
		2001–2002[e]
Enrolment in private schools	1999–2000	
Enrolment in minority and second language education programs	1999–2000	
Secondary school graduation	1999–2000	
Educators in public schools	1999–2000	2000–2001[e]
		2001–2002[e]
Educators in private schools	1999–2000	
Elementary/secondary school characteristics	1999–2000	
Financial statistics of school boards	1999	
Financial statistics of private academic schools	1998–1999	1999–2000[e]
		2000–2001[e]
		2001–2002[e]
Federal government expenditures on elementary/secondary education	1999–2000	2000–2001[e]
		2001–2002[e]
Consolidated expenditures on elementary/secondary education	1998–1999	1999–2000[p]
		2000–2001[e]
		2001–2002[e]
Education Price Index	2000	
B. Postsecondary		
University enrolments	1999–2000	discontinued
University degrees granted	1998	discontinued
University continuing education enrolment	1996–1997	discontinued
Educators in universities	1999–2000	
Salaries and salary scales of full-time teaching staff at Canadian universities	1999–2000	
Tuition and living accommodation costs at Canadian universities	2002–2003	
University finance	2000–2001	
College finance	1999–2000	2000–2001[e]
Federal government expenditures on postsecondary education	1999–2000	2000–2001[e]
Consolidated expenditures on postsecondary education	1999–2000	2000–2001[e]
Community colleges and related institutions: enrolment and graduates	1998–1999	1999–2001[e]
Trade/vocational enrolment	1998–1999	1999–2000[e]
College/trade teaching staff	1997–1998	1998–1999[p]
		1999–2000[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)

Current trends in teacher education and training: A symposium report (2001)

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.*


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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	5,430.8	5,414.6	5,386.3	5,369.7	5,397.1	5,389.3[e]	5,385.2[e]
							%					
Percentage in private schools	4.6	4.7	4.9	5.0	5.1	5.1	5.2	5.3	5.5	5.6	..	..
							thousands					
College/trade/vocational, full-time[3]	238.1	275.9	266.7	306.5	298.8	269.1	261.4	250.0	240.1	..	.. ..	

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											
College/postsecondary, full-time	321.5	349.1	364.6	369.2	380.0	391.3	397.3	398.6	403.5	407.0 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	91.4 e	..	..
Full-time university	475.4	554.0	569.5	574.3	575.7	573.2	573.6	573.1	580.4	590.7 e	..	..
Part-time university	287.5	313.3	316.2	300.3	283.3	273.2	256.1	249.7	246.0	257.5 e	..	..
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	301.7	304.5	307.8	310.6	317.0 r	..	..
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	83.8	85.9	92.5	95.3	97.2	101.0	105.0	113.1	..	..	..
University/Bachelor's	101.7	114.8	120.7	123.2	126.5	127.3	128.0	125.8	124.9	127.1 e	..	..
University/Master's	15.9	18.0	19.4	20.8	21.3	21.4	21.6	21.3	22.0	23.2 e	..	..
University/Doctorate	2.2	2.9	3.1	3.4 e	3.6	3.7	3.9	4.0	4.0	4.0 e	..	..
Full-time educators												
Elementary/secondary schools	269.9	302.6	301.8	295.4	295.7	298.7	294.4	296.9	300.3	303.0	304.2	305.7
College/postsecondary/trade/vocational	30.6 7	31.7 7	31.8 7	32.2 7	31.0 7	30.9 7	31.5	31.0	31.2	27.8	..	..
University	35.4	36.8	37.3	36.9	36.4	36.0	34.6	33.7	33.7	33.8	..	..
	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	15.9	..
Education expenditures	$ millions											
Elementary/secondary	22,968.0	33,444.9	34,774.5	35,582.3	35,936.0	36,425.3	36,804.8	37,163.6	38,709.4	39,321.7 p	39,738.9 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	8,946.2	8,391.9 p	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	4,781.7	5,498.5 p	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	12,863.2	14,549.0 p	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	58,185.2	62,026.7	65,300.4	67,761.1 p	66,500.2 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	Newfoundland 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.*
[e] *Estimated 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

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.

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In upcoming issues

The following article is scheduled to appear in upcoming issues of *Education Quarterly Review:*

Changing patterns of university finance

This study uses data from the Financial Information of Universities and Colleges survey to determine how universities responded to reductions in government funding. Have they increased private sources of revenue or have they altered their expenditure patterns? Changes in operating revenue and expenditures over the past 15 years are examined.


ELECTRONIC PUBLICATIONS AVAILABLE AT
www.statcan.ca

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