

Applied Research

BULLETIN

Special Edition

Summer 2001



Table of contents

The National Graduates Surveys	2
The graduates	3
The nature of the transition between school and work	7
Which fields of study have the highest earnings?	9
A liberal or vocational education?	11
The gap in earnings between male and female graduates	13
Graduates in non-standard employment	15
Trade/vocational graduates	17
Employment-equity groups	19
Science and technology: jobs for the future?... ..	20
The quality of the education-job match	23
The pathways to a post-secondary degree	25
Financial considerations in post-secondary education	28
Interprovincial and international mobility of graduates	30
Concluding remarks	32
Bibliography	34

The School-to-Work Transition of Post-secondary Graduates in Canada:

Research Findings Based on the National Graduates Surveys

The Applied Research Branch is pleased to issue this special edition of the *Bulletin*, which investigates the transition between school and work of post-secondary graduates. This body of research draws from almost two decades of National Graduates Surveys (NGS) and Follow-up Graduates Surveys.

Canada invests substantially in post-secondary education and Canadians have among the highest rates of post-secondary graduation in the world. How well do these investments in post-secondary education prepare graduates for making their transition into a rapidly changing economy? The primary objective of the research using the National Graduates Surveys is to investigate the transition between school and work of post secondary graduates and the returns on their investments in education. The survey data have been constructed to explore the relationship between the labour market experiences of graduates, the education and training they received, and their socio-economic characteristics. Four cohorts of graduates have been surveyed, allowing researchers to identify trends in education choices and labour market outcomes over the past twenty years. The rich and varied databases identify the labour market experiences of members of target groups



such as women, visible minorities, native people, the disabled and those in need of financial assistance. The NGS data also indicate how well jobs match the skills levels of recent graduates and whether there are demand-supply imbalances in certain fields. Interviews of graduates were conducted two and five years after graduation, and this longitudinal aspect of the NGS permits researchers to track the school-work transition and assess how the early career-building experiences contribute to longer-term labour market outcomes. Most of the research conducted on the NGS focuses on graduates from the Bachelor's level because the sample sizes for this group are large enough to allow for detailed and robust econometric analysis.

In many ways this retrospective of NGS research tells a "good news" story. Graduates have very good labour market outcomes and their prospects improve dramatically when they gain experience. The research also raises some flags about the importance of continued access to education, improved labour market signals between institutions and employers, and better use of graduates' skills in the labour market.

The Applied Research Branch would like to acknowledge the many authors who conducted the NGS research on behalf of HRDC. Special thanks go to Ross Finnie for his important contribution.

The National Graduates Surveys

The National Graduates Surveys (NGS), sponsored by Human Resources Development Canada and conducted by Statistics Canada, are designed to obtain information on the relationship between education/training and labour market experiences of post-secondary graduates. The NGS focus on people who obtained a degree, diploma or certificate from a trade/vocational school, a career/technical college (or CEGEP) or a university, and who were still living in Canada at the time of the survey. To assess the extent of

the "brain drain" for post-secondary graduates, the 2000 Follow-up Survey of the 1995 Graduates also interviewed those who graduated in 1995 but who were living in the United States in June 2000.

The graduates responded in telephone interviews to questions about their socio-economic background, education choices, financial and loan situations, employment, earnings, occupation, and additional training and education after graduation. The NGS files are representative of the underlying graduate population in Canada.

Since 1982, the school-work transition of four cohorts of graduates has been tracked in an initial survey two years after graduation and then in a follow-up survey five years after graduation. The earlier surveys provide similar information to more recent surveys, allowing for comparisons among the four cohorts of their school-work transitions.

The NGS are based on a stratified systematic random sample design. In each province, the graduate population of five education levels were surveyed: (1) skilled trades at trade/vocational schools, (2) career/technical colleges, (3) Bachelor's, (4) Master's and (5) Doctorate level university graduates. The sample was further stratified into fields of study, ten for university programs, ten for trade/vocational programs and nine for college graduates, based on Statistics Canada's University Student Information System (USIS) and Community College Student Information System (CCSIS) codes. The sample allocation to the strata was made to assure acceptable levels of detail and therefore acceptable data reliability for the provinces, education levels and fields of study.

A sample was selected for every cohort of graduates. Interviewers attempted to contact all graduates in the sample, initially using the telephone numbers provided by their institution. For every cohort, over 70 percent of the individuals in the sample initially selected were contacted for the first interview. The same individuals were contacted again for the follow-up interview.

The National Graduates Surveys

Year of graduation	Total sample selected	First interview	Follow-up interview	Usable sample in first interview (response rate %)
1982	49,150	1984	1987	35,717 (73%)
1986	53,136	1988	1991	40,814 (77%)
1990	51,111	1992	1995	36,280 (71%)
1995	61,759	1997	2000	43,040 (70%)

The graduates

The most recent of the NGS, conducted in 1997, estimates that 300,000 students graduated from Canadian post-secondary institutions in 1995. The share of graduates at each level of post-secondary education has remained about the same since the first survey of the class of 1982: just over one-half (53%) graduated from university, 28 percent from a community college and 20 percent from a trade/vocational institution.

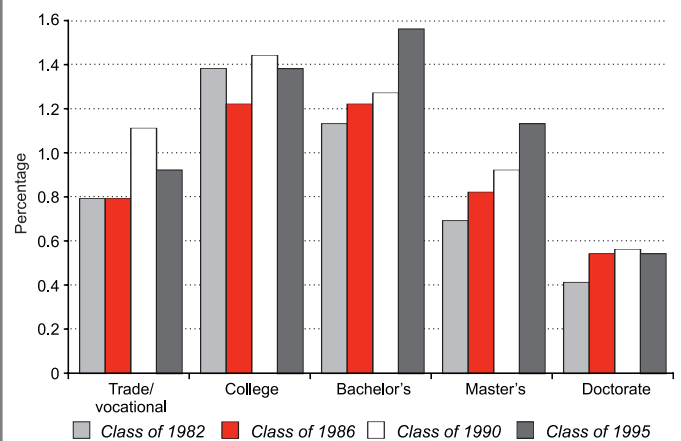
University graduates are most likely to choose social sciences, commerce, education and humanities as fields of study: these four fields account for 70 percent of all Bachelor's and Master's degrees. The lion's share of college graduates (71%) and trade/vocational graduates (48%) choose fields in business and engineering and applied sciences.

Women outnumber men.

Women post-secondary graduates have steadily increased their representation between 1982 and 1995, particularly at the Bachelor and Master's levels. By 1995 women outnumbered men 57 percent to 43 percent. Men exceeded women only at the trade/vocational (52% to 48%) and the Doctorate (65% to 35%) levels. Women pursue considerably different fields of study than men. Most graduates in

Ratio of women/men among post-secondary graduates

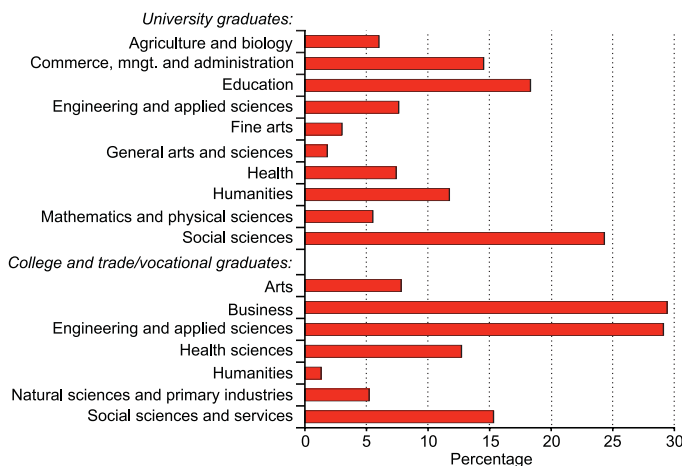
By year of graduation and level of study



Note: A ratio of 1.0 indicates equal numbers of men and women. Values above 1.0 indicate more women than men, and values below 1.0 indicate more men than women.
Source: National Graduates Surveys and *The Class of '95* (1999), Chart 3

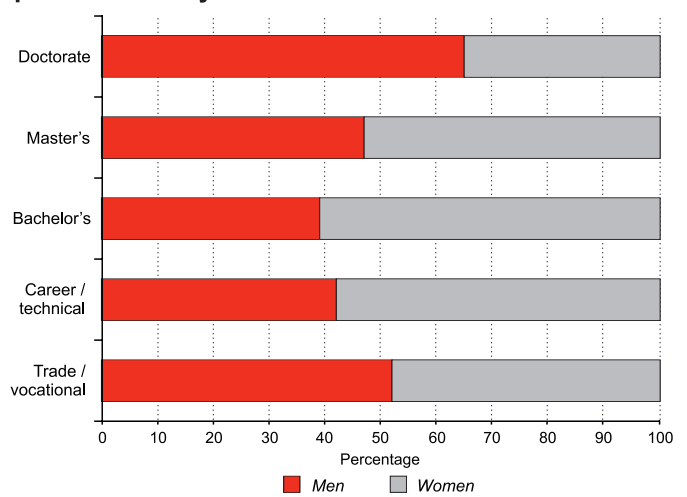
Distribution of 1995 graduates

By field of study



Source: *The Class of '95* (1999), Tables 2 and 3, Appendix 1

Share of women and men at each level of post-secondary education



Source: *The Class of '95* (1999), Appendix 1

Profile of 1995 university graduates by level and field of study

Field of study	Percentage		
	Bachelor's	Master's	Doctorate
<i>Agriculture and biology</i> (Agriculture; biochemistry; biology; biophysics; botany; fisheries and wildlife management; food and household science; toxicology; veterinary medicine and science; zoology)	6	4	12
<i>Commerce, management and administration</i> (Commerce, management and business administration; specialized administration)	14	21	2
<i>Education</i> (Elementary/secondary teacher training; non-teaching field; physical education, kinesiology, recreation; other teaching)	18	19	10
<i>Engineering and applied science</i> (Architecture; engineering; forestry; landscape architecture)	7	9	15
<i>Fine and applied arts</i> (Applied arts; fine arts; music; other performing arts)	3	2	—
<i>General arts and science</i> (General arts and science; general arts; general science; interdisciplinary studies)	2	0*	—
<i>Health</i> (Dental studies and research; medical studies and research; nursing; pharmacy; rehabilitation medicine; other health professions)	7	8	12
<i>Humanities</i> (Classics, classical and dead languages; English language and/or literature; French language and/or literature; other languages and/or literatures; history; library and records science; linguistics, translation and interpretation; mass media studies; philosophy; religious and theological studies)	12	12	12
<i>Mathematics and physical sciences</i> (Chemistry, computer science; geology and related; mathematics; physics; other physical sciences)	5	6	17
<i>Social sciences</i> (Anthropology; archaeology; Canadian and area studies; demography; economics; geography; law and jurisprudence; man/environmental studies; political science; psychology; secretarial studies; social work and social welfare; sociology and criminology; other social sciences)	25	18	19
Total	100	100	100

Note: An asterisk (*) indicates that estimates have a relatively high sampling variability. A long dash (—) indicates that the data are not reliable enough to release.

Due to differences in rounding, total percentages may not necessarily add up to 100.

Source: National Graduates Surveys

Profile of 1995 trade/vocational and college graduates by level and field of study

Field of study	Percentage	
	Trade/ vocational	Career/technical college
<i>Arts</i> (Commerce and promotional arts; creative and design arts; fine arts; graphic and audio-visual arts; mass communications; personal arts; other applied arts)	7	8
<i>Business</i> (Management and administration; merchandising and sales; secretarial science; service industry technologies)	33	26
<i>Engineering and applied sciences</i> (Chemical technologies; electrical/electronic engineering technologies; engineering technologies; mathematics and computer science; transportation technologies)	38	22
<i>Health sciences</i> (Diagnostic and treatment medical technologies; medical equipment and prosthetics nursing; other health related technologies)	9	15
<i>Humanities</i> (Journalism; languages; library science)	0	2
<i>Natural sciences and primary industries</i> (Environmental and conservation technologies; natural sciences; primary industries; resource processing technologies)	5	5
<i>Social sciences and services</i> (Educational and counseling services; personal development; protection and correction services; recreation and sport; social sciences; social services)	8	20
Total	100	100

Note: The nine college field of study strata and the ten trade/vocational field of study strata have been grouped into seven categories for comparability.

Due to differences in rounding, total percentages may not necessarily add up to 100.

Source: National Graduates Surveys

nursing, education and social sciences are women, while most graduates in engineering, mathematics and physical sciences are men.

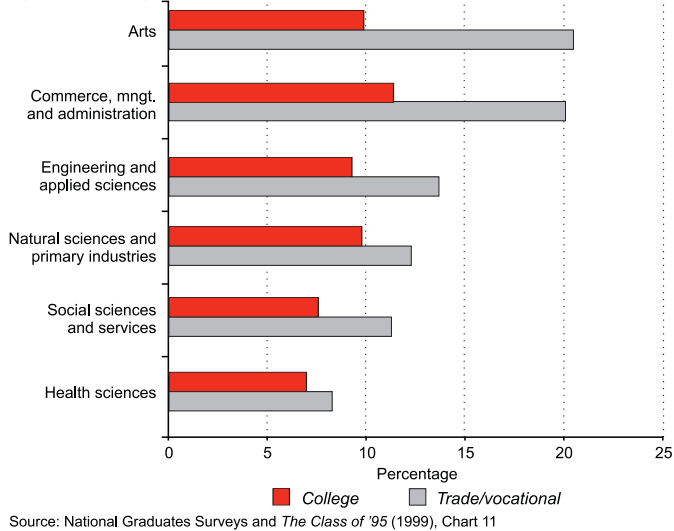
New graduates find jobs.

A high proportion of graduates from all the graduating classes find jobs. Two years after graduation, 82 percent of 1995 graduates found jobs, about the same ratio as 1990 graduates. Trade/vocational graduates had a somewhat lower percentage employed (79%) than other graduates, whereas Doctorate graduates had the highest percentage employed (87%).

Unemployment rates for 1995 university and college graduates were about 9 percent two years after graduation. Trade/vocational graduates had considerably higher unemployment rates (14 percent); previous NGS show that the unemployment rates for trade/vocational graduates fluctuated considerably more with changing labour market conditions than the rates for other graduates. At the college and trade/vocational levels, the most popular fields of study — health, social sciences and engineering – also had the lowest unemployment rates. At the university level, education, commerce, engineering and health fields had the lowest unemployment rates in 1997.

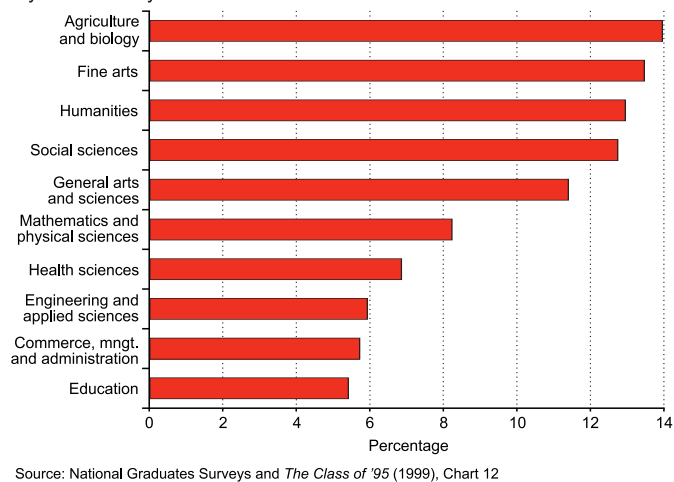
Unemployment rates in June 1997 for 1995 trade/vocational and college graduates

By field of study



Unemployment rates in June 1997 for 1995 university graduates

By field of study



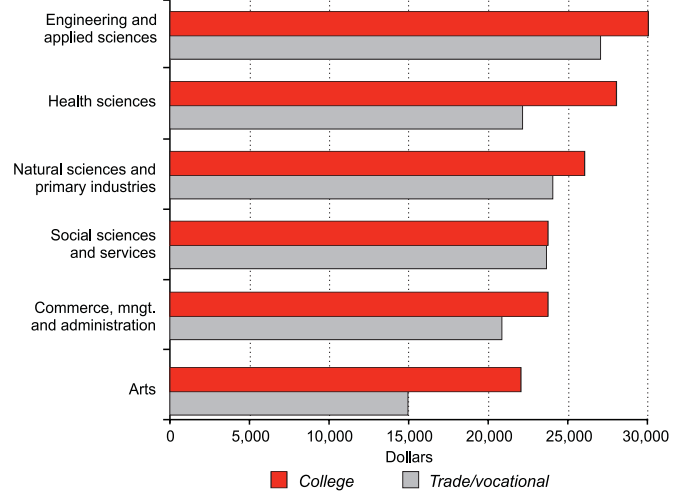
University graduates are the highest earners.

University graduates working full time had median earnings of \$33,800 in 1997 (current dollars), compared to \$25,700 for college graduates and \$23,400 for trade/vocational graduates. Master's and Doctoral graduates earned the most (\$47,000). The estimation of earnings changed in the 1995 survey and so comparisons with previous surveys are limited.

Of the 1995 trade/vocational and college graduates, engineers earned the most two years after graduation. Health science and natural science fields were close to the top in earnings at the college level. At the university level, health graduates earned the most two years after graduation, followed by engineering, mathematics and education fields.

Median earnings for 1995 trade/vocational and college graduates working full-time in 1997

By field of study

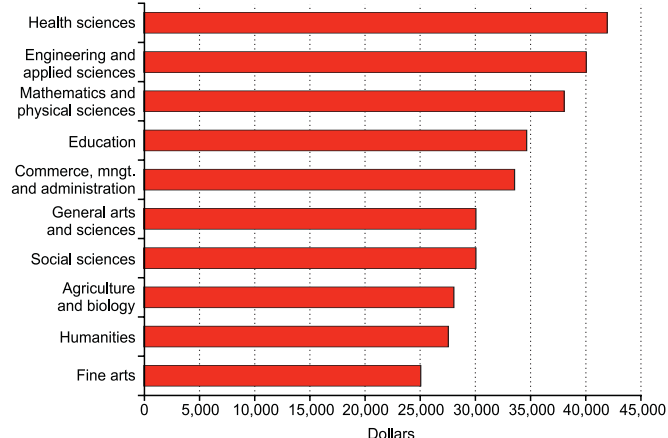


A high percentage of graduates pursue further education and training.

Within two years of graduating, 43 percent of university graduates pursued further qualifications in the 1995 survey, slightly lower than in previous surveys. The percentages were similar for men and women. About one-third of college graduates and one-fifth of trade/vocational graduates also pursued further qualifications. Graduates chose to obtain further qualifications to get a better job, self-improve or earn more money.

Median earnings for 1995 university graduates working full-time in 1997

By field of study



Source: National Graduates Surveys and *The Class of '95* (1999), Chart 14

The nature of the transition between school and work

During the transition between school and work, graduates undergo the process of integration into the labour market. A number of indicators might suggest that the school-work transition has been successful, such as full-time, permanent employment, a high level of job satisfaction and earnings commensurate with the knowledge and skills of graduates. The success of the transition depends on whether the knowledge and skills of graduates dovetail with the jobs available in the labour market, whether employers recognize and utilize these skills, and the extent to which graduates take the opportunity to improve their skills by gaining experience in the workplace.

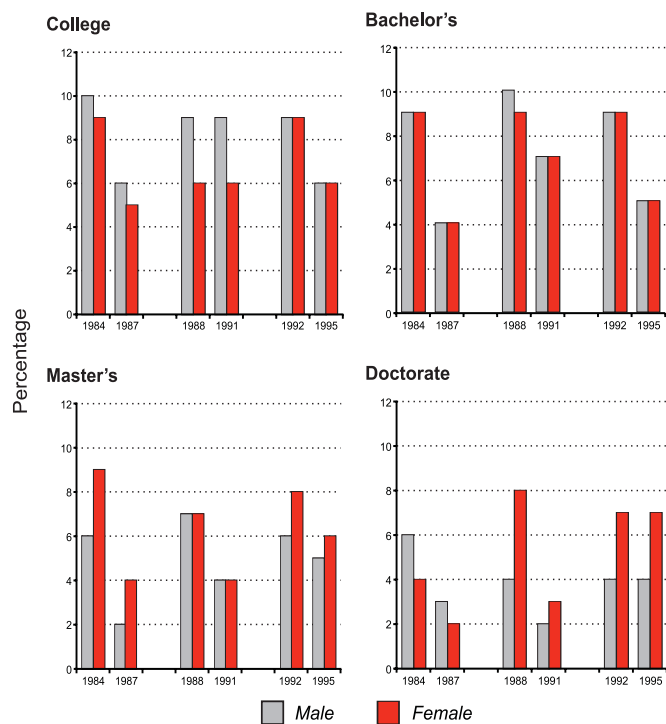
Silver, Lavallée and Pereboom (2000) and Finnie (1999a) compare the transition of post-secondary graduates from the classes of 1982, 1986 and 1990. They track the graduates' outcomes two and five years after graduation and assess the relative importance of the characteristics that graduates initially bring to the job, such as field of study or level of education, and the experience gained on the job. Silver et al study the trajectories of earnings to determine whether a successful transition depends on the

skills graduates bring to a job or the experience they gain on the job. Finnie groups graduates according to their characteristics and labour market status and compares their earnings levels and job satisfaction.

The transition between school and work is an extended process.

Many labour market outcomes change dramatically between the two-year and five-year interviews of post-secondary graduates. Unemployment rates and the proportion of temporary jobs tend to fall steeply, and wages rise substantially. Not all graduates improve their prospects to the same extent: women tend to show less improvement in some outcomes than men, as will be shown below.

Unemployment rates of 1982, 1986 and 1990 graduates two and five years after graduation



Notes: The conventional definition of the unemployment rate is used in this figure. Samples exclude those who did not respond to the second interview, those who obtained a new diploma by the relevant interview, and those who worked part-time due to school.

Source: Finnie (1999a), Figure 2

Finnie observes that overall, graduates have been doing well in making the transition. Their unemployment rates lie far below rates for other young workers with less education. The unemployment rate of graduates averaged

less than ten percent two years after graduation and then fell by half by five years after graduation. By way of comparison, youth unemployment ranged from 10 to 20 percent over the 1980s and 1990s. Thus graduates cannot really be considered part of the “youth unemployment problem”; indeed their unemployment rates compare favorably to the adult population.

The employment transition has not changed very much over the three cohorts of graduates. Employment prospects improve consistently and at similar rates between two and five years after graduation. The 1986 graduates show slightly less improvement in their transition between 1988 and 1991, but they entered an extremely robust labour market, only to encounter a deep recession five years later. The graduates’ unemployment rates showed only a slight upward trend over the 1980s and 1990s, despite weak labour markets through a good part of the 1990s.

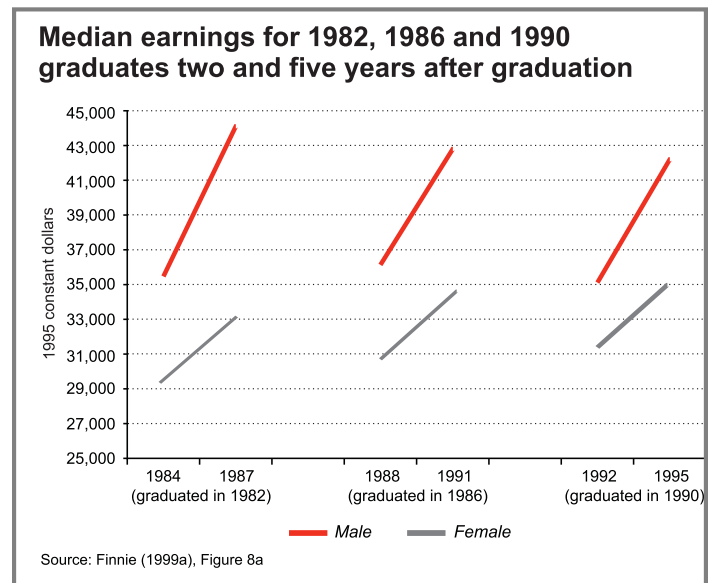
Concerns about chronic unemployment among graduates seem to be unfounded. Silver et al find that three quarters of 1990 university and college graduates were employed at both two and five years after graduation, indicating that a degree provides insulation from downturns in the economy. Those who were unemployed two years after graduation had a very high probability of having a job five years after graduation. Similarly most who were underemployed in part-time or temporary work subsequently found full-time work. Finnie observes that graduates continue to find and keep jobs despite the fact that there has been very little change in the distribution of graduates by field of study over the years of the NGS. Moreover, Finnie finds that about 80 percent of graduates have consistently reported they are satisfied with their jobs, and job satisfaction increases, the higher the level of education. Job satisfaction also increases from the class of 1982 to the class of 1990, confirming that post-secondary graduates have not experienced deterioration in their job prospects.

Silver et al find a substantial amount of labour churning takes place in the first five years after graduation and over one-third of graduates change employers during this transition period. High mobility tends to be associated with

fields with high employment rates, suggesting that within tight labour markets graduates are more mobile because they find it easier to search for and find jobs.

Men’s earnings increase with experience more than women’s earnings.

Men’s earnings exceed women’s earnings at all post-secondary education levels. However, as Finnie observes, the gap has narrowed over the three cohorts: women made gains in their earnings over the 1980s and 1990s, while men’s earnings drifted downward. Thus the starting salaries of women post-secondary graduates are moving closer to the starting salaries of men. All the same, men’s earnings grew faster than women’s earnings in the years following graduation: that is, the earnings gap widens in the years following graduation. Between the first and second NGS interviews, average earnings of men grew in the order of 20 percent in 1995 constant dollars compared to a more modest 11 percent for women. Finnie does not speculate on why this is so, but observes that this finding has important implications for the configuration of earnings gaps over the life cycle, taking into account the greater family responsibilities of women.



Early success leads to continued success.

Silver et al find a substantial path dependence of earnings, that is, high earnings two years after graduation predict high earnings five years after graduation. Within a given field, those who find a job soon after graduation are more

likely to remain with their initial employer and to have higher earnings five years after graduation. That is, stable early employment experiences are important determinants to successful career building. Those who get off to a rocky start, moving from job to job or interrupting their employment, tend to have lower earnings five years after graduation, all other things being equal. Thus, graduates who succeed in finding a job directly after graduation and holding onto it are more likely to have made progress in their transition by five years after graduation.

What puts certain graduates on the right track? Silver et al cannot definitively identify the determinants of early success. It is difficult to separate the effects of individual characteristics such as ability and motivation from the effects of choosing certain fields of study. Silver et al point out that the NGS are somewhat limited in providing answers because only two signposts – two years and five years after graduation – mark the transition path and because the survey does not ask detailed questions on employment and unemployment history.

Summary

Finnie (1999a) and Silver, Lavallée and Pereboom (2000) find that post-secondary graduates have for the most part made successful transitions from school to work, and that labour market outcomes have not deteriorated over the cohorts studied. The 1997 survey of 1995 graduates confirms this result: average unemployment rates for recent graduates (9 percent) compare favourably to those for earlier graduates. For the few post-secondary graduates who have difficulty in attaching to the labour market at the critical early point in their career, Finnie suggests that selective interventions might be in order.

It is not clear why those who start out with lower wages continue on a lower transitional path. Other NGS research presented below will demonstrate that there may be a mismatch between graduates' skills and jobs that persists in the years following graduation. Employers may not correctly read the labour market signals that identify graduates' skills and under-employ them.

Which fields of study have the highest earnings?

When considering fields of study prospective students compare earnings levels and other job characteristics. Policy makers look at earnings differences to monitor shifts in demand and emerging supply bottlenecks in certain fields. Boothby (2000a) draws from the NGS of 1982, 1986 and 1990 two years and five years after graduation to search for a precise and stable ranking of earnings for graduates at the undergraduate and Master's level. By a stable earnings structure, he means that the differences in mean earnings of graduates in fields of study are reasonably stable over time.

Graduates from professional programs have the highest earnings.

Boothby finds that the professions of medicine and dentistry hold the top ranking, usually followed by law and veterinary medicine. This comes as no surprise, given that these fields generally require considerably higher levels of education than a Bachelor's degree. Next comes pharmacy, engineering, computer science and mathematics, fields of study, followed by the female dominated health fields, education and social work, which rank similarly to commerce and economics. The lowest level includes a variety of fields in the arts, humanities, social sciences, biological sciences and physical sciences, in which the boundaries between the groups are not clear cut.

Graduates from other fields of study have no clear ranking of earnings.

Boothby finds that the ranking of earnings for fields of study falls into roughly similar positions over time, but the ranking becomes less precise the lower are the earnings. A broad group from the arts, humanities, social sciences and physical science occupy the lower level of earnings. Many in the bottom group have low earnings because they do not find work at the post-secondary skills level. Boothby's results resemble those found in Finnie (1999b) although in Finnie's analysis the field of study effects are smaller.

Ranking of earnings groups by field of study: Undergraduate level

I=highest earnings, V=lowest earnings

	<i>Field of study</i>
I	Medicine Dentistry
II	Law Veterinary Medicine
III	Pharmacy Chemical Engineering Electrical Engineering Other Engineering Computer Science Mechanical Engineering Civil Engineering Mathematics
IV	Nursing Rehabilitation Medicine Commerce Specialized Administration Economics Elementary/Secondary teaching Social work/Social welfare
V	History Political Science Chemistry Biological Sciences, except Agriculture/Biology Agriculture, except Animal/Plant Science Geology Forestry Physical Education Religion/Theology Sociology Food and Household Sciences Biology French Geography Teaching, except Elementary/Secondary Psychology English Fine and Performing Arts, except Music

Source: Boothby (2000a), Table 2

Earnings structures at the Master's level tend to be similar to those at the Bachelor's level, with a striking difference that commerce graduates move from a middle ranking to a top ranking when they attain a Master's degree.

Boothby also finds that the ranking of earnings are similar for males and females. He observes some statistically significant differences in the earnings of women and men within fields. When women and men have fairly equal representation in a field, earnings tend to be more equal.

Graduates in lowest grouping less likely to work in jobs related to their field of study.

Boothby then explores the relationship between fields of study, occupations and skills levels using cluster analysis. At the undergraduate level, the small number who graduate from professional programs in health, engineering, law and education are more likely to find occupations directly related to their field of study and also more likely to have higher earnings. A general cluster of fields of study can also be identified in which a high proportion of graduates work in a wide variety of occupations that do not require a post-secondary education. Fields of study in the humanities, arts social sciences, commerce, physical sciences and biological sciences fall into this category, and this is also the group who tend to have lower than average earnings. Therefore, even though graduates who fall into this general cluster have gained the generic skills that would allow them to work in highly skilled jobs, many tend to be in occupations that do not require a level of skills comparable to a post-secondary education. Boothby surmises that employers may be downgrading undergraduate degrees to the level previously held by high school degrees, and considering a B.A. as certification of general levels of literacy and numeracy.

Summary

Boothby (2000a) does not find a stable, statistically significant difference in earnings at the level where students choose their fields of study. Those who graduate from professional programs and certain occupationally specific programs tend to have higher earnings, but the remaining fields show considerable overlap among earnings groups. Except in specific professions, the earnings potentials of many undergraduate fields of study are difficult to predict. Boothby argues that students might as well choose the field that interests

them the most rather than try to predict the field with the highest earnings stream.

Boothby finds out that those who graduate from the medium to lower-ranked fields tend to be working in jobs with skills levels not commensurate with a post-secondary education. He proceeds to raise two issues. First, occupations that traditionally do not require post-secondary education may be in the process of changing work practices and now require the generic skills that can be obtained with a post-secondary education. Therefore the skills requirements as determined in the past for certain occupations might no longer apply. Second, employers may follow work practices that do not allow their employees to work to their full productive potential, which has obvious implications for labour productivity in Canada.

A liberal or vocational education?

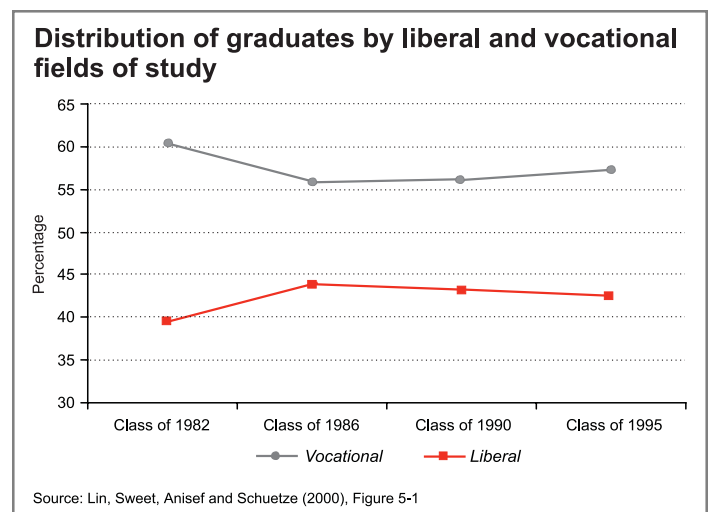
A student's choice of field of study can have important consequences in terms of employment prospects, income and job satisfaction. The choice takes on greater importance given that graduates face greater debt loads than they used to. Lin, Sweet, Anisef and Schuetze (2000) characterize the choice as between a liberal education, which is "broad, balanced, flexible and human-centered" and a vocational education, which furnishes "specific skills for certain professions". Proponents of a liberal education argue that broad-based education imparts the skills to deal with a complex global society. Proponents of a vocational education make the case that these graduates are better equipped to find challenging and satisfying jobs. Lin et al examine the labour market consequences for Bachelor's graduates of choosing a field of study and whether the employability skills differ between liberal and vocational graduates. They also look at how employers value and use the skills of liberal and vocational graduates.

Lin et al (2000) group Bachelor's graduates from 1982, 1986, 1990 and 1995 according to whether they studied in liberal or vocational fields. Liberal fields include liberal arts/social sciences and liberal sciences, and vocational fields include education, applied arts (such as law and commerce) and applied sciences. They map the graduates' labour market experiences in terms of income, employment stability and job satisfaction onto their fields of study. Then they compare the graduates' employability skills with the skills that employers seem to reward in the graduates they employ.

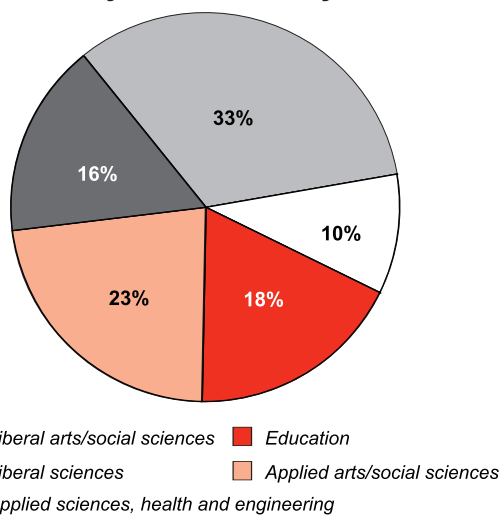
University graduates prefer vocational fields.

University graduates have chosen primarily vocational fields over the 1980s and 1990s although the share of vocational graduates has fallen slightly since the early 1980s. Lin et al explain that liberal education expanded in the mid-1980s in response to the increased demand (especially from women) for a university education and the demand was met by a proportional increase in liberal arts fields that are generally considered less expensive than vocational programs.

Most liberal graduates study the liberal arts and social sciences. A small fraction study liberal sciences. Vocational graduates divide fairly evenly between education, applied arts/social sciences and, in slightly higher proportion, applied sciences (including health, computer science and engineering).



Distribution of 1995 bachelors graduates by fields of study



Source: Lin, Sweet, Anisef and Schuetze (2000), Table 5.1

Vocational university graduates have better labour market outcomes.

Lin et al find that fields of study choices are significantly related to a successful labour market transition: two years after graduation the labour market favours vocational graduates over liberal graduates. The 1995 graduates in vocational fields earn more on average than those in liberal fields and have consistently lower unemployment rates. Vocational jobs also are more likely to be full time and permanent, with the exception of education jobs. Over one-half of vocational graduates find jobs closely related to their fields whereas well under one-half of liberal graduates do. Yet, despite their lack of success in many labour market outcomes, three in five liberal graduates would choose the same field of study again. Lin et al caution that these results are only two years after graduation and may not be borne out over the longer term when liberally educated graduates may gain an advantage because they benefit from a broad range of flexible, generic skills. Indeed, other studies have demonstrated that over the longer term labour market outcomes do tend to favour graduates from liberal fields.

Why do vocational graduates have better outcomes over the short term?

Lin et al find that despite the strong differences in the labour market outcomes of the two groups, employability skills differ very little between liberal and vocational graduates. The two groups rank themselves at similar levels in six skills categories: writing, critical thinking, solving problems, working effectively with others, leading and supervising others, and being able to use new technologies. Liberal graduates are somewhat more likely to assert that they possess good writing skills and vocational graduates are somewhat more likely to assert that they can learn and use new technology well. Lin et al note that the analysis is based on self-reported data by university graduates, and may depend on the subjective perception of the graduates.

The two groups differ dramatically in how employers use their skills, however. Vocational graduates have a far greater opportunity to employ their skills than liberal graduates do. The authors consider three reasons why this might be so.

- The workplace may not give liberal graduates the job opportunities to engage their skills,
- Universities may not equip graduates with the means to find the jobs.
- Employers may not make the best use of the skills of the liberal graduates that they employ.

Labour market outcomes in 1997 for the graduates of 1995

	Liberal		Vocational	
	Co-op program	Other	Co-op program	Other
Employed (%)	91.7	87.4	92.9	92.9
Annual job income (\$)	\$29,054	\$19,792	\$31,938	\$27,084
Full time employment (%)	95.3	75.5	97.0	84.7
Permanent employment (%)	83.9	68.3	87.5	71.9
Very satisfied with job (%)	52.5	35.6	51.1	46.3

Source: Lin, Sweet, Anisef and Schuetze (2000), p.27, 28

Lin et al suggest that employers may be misreading the signals about the skills and credentials that liberal graduates possess. Employers may seem more confident of the signals offered by vocational graduates because they operate through established contacts with professors and on-campus recruiting campaigns of vocational graduates. This rarely happens with liberal fields except with co-op programs, in which employers and potential employees come into close contact. To investigate this possibility Lin et al examine the outcomes of liberal and vocational graduates who have participated in cooperative programs. They find that co-op programs appear to offer employers reliable signals on graduates' employability skills. For both fields of study, the outcomes of co-op students surpass those of non-co-op students. Moreover, when employers have these signals, they value liberal graduates similarly to vocational graduates. The outcomes of liberal graduates who participate in cooperative programs approach those of vocational graduates from co-op programs.

Summary

Lin, Sweet, Anisef and Schuetze (2000) present clear evidence that the market favours vocational Bachelor's graduates over liberal graduates, at least early in their careers, despite the similar skills that both groups appear to possess. Lin et al draw out a number of policy research implications. First, because the selection of a field of study involves an element of risk, high school students and their families need access to information and advice on the intellectual requirement and employment potential of various fields of study. Second, employers would benefit from a better reading of graduates' skills sets. Universities may be providing the necessary skills to students, but trustworthy signals must be conveyed to employers so that they are aware that students have the skills. Co-op programs are one effective strategy. Third, universities should provide students in liberal fields with more work-related learning opportunities that may move away from the more traditional lecture format. The authors conclude with a reminder that universities have a mandate to cultivate an informed and critical intelligence in all their graduates, and a wholly market

orientation to the choice of fields of study may impede this mandate.

The value of a liberal education

...liberal education is the core of higher learning – in good economic times and bad – and in its effort to prepare people for employment, the university must not be permitted to raze its own intellectual and cultural foundations. Liberal education has a vital place in arts and science courses, and in innovatively designed professional and vocational programs. In any event, the liberal arts are not static; they continue to be reformed, but less in response to ephemeral market trends than on the basis of evolving intellectual currents. As employers themselves have periodically asserted, by broadening the knowledge base of employees, liberal education can enhance the abilities of graduates in applied fields and enrich society as a whole. As they develop programs and allocate resources, policy makers would be well advised to heed this advice.

Lin, Sweet, Anisef and Schuetze (2000)
p. 42

The gap in earnings between male and female graduates

To what degree do men and women reap different monetary rewards from the labour market? Wannell and Caron (1994b) study the earnings of the graduating classes of 1982, 1986 and 1990. They observe that the gap between men and women's earnings tends to shrink from one cohort to the next but increases within each class over time. In 1984, the gender earnings gap for 1982 graduates stood at 13 percent for university graduates and 16 percent for community college graduates. The gap five years after graduation widened to 19 percent for 1982 university graduates and 21 percent for 1982 college graduates. By 1992, the gap for 1990 university and college graduates had shrunk to 9 percent and 10 percent respectively.

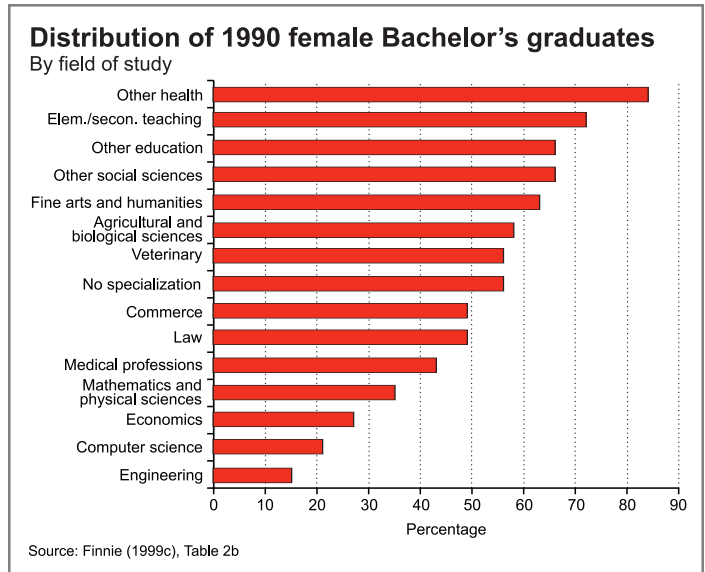
Women have advanced in almost all fields and across most industries. Gender differences tend to be less pronounced for university than community college graduates and, in fact, the earnings gap for PhD graduates has virtually closed.

Part-time work limits earnings for women.

Wannell and Caron cannot rule out discrimination as the cause for some of the gap, but systemic discrimination is unlikely. Child bearing and joint labour supply decisions within families explain some but certainly not the entire earnings gap. Hours of work play an important role in the earnings gap. Women are more likely to work part-time than men: part-time rates of employment for women are higher than for men and the gap increases between two years and five years after graduation. Even full-time women employees work on average two and a half to four hours less than men. For this reason, the wage gap between men and women (3.5 percent on average) is considerably smaller than the earnings gap (10 percent on average). Female university graduates' wages (as opposed to earnings) may actually be higher than men's when controlling for experience, job tenure, education and hours of work. Female community college graduates have a small hourly wage gap.

Which fields do women choose?

Finnie (1999b) shows that the overall share of female graduates has risen to the point where women comprised 54 percent of all Bachelor's graduates in 1990, but the share of women in each discipline has been quite stable between the classes of 1982 and 1990. There has been a very slow entry of women into typically male-dominated fields, with notable exceptions in commerce and law. Female graduates continue to be over-represented in education, fine arts and humanities, general social sciences, and nursing.



Gap in earnings growth traced to hours worked and occupation, not fields of study.

To what extent can the gap in earnings be traced to different fields of study chosen by men and women? Abbott, Finnie and Wannell (2000) revisit the issue of the earnings gap and the degree to which it widens as graduates gain job experience. They look at the factors underlying the differentials in earnings growth rates for male and female Bachelor's graduates, using NGS data for the classes of 1982, 1986 and 1990. Possible determinants include *time-invariant baseline characteristics*, which relate to education and personal history of graduates, and *time-varying current characteristics*, which relate to the jobs and family responsibilities of graduates.

Possible determinants of the gap in earnings growth for men and women

<i>Time invariant baseline characteristics</i>	<i>Time-varying current characteristics</i>
Field of study	Paid worker or self-employed
Whether enrolled in a co-op program	Full-time or part-time, or weekly hours
Age	Temporary/permanent job status
Family characteristics, such as language first spoken, parents' education	Region of residence
	Marital status
	Number of dependent children
	Occupation in current job
	Industry of current job

Source: Abbott, Finnie and Wannell (2000) p. 19

The authors find the strongest influences on earnings growth for both men and women come from the time-varying characteristics, particularly those relating to full-time, part-time status, occupation and industry. Differences in earnings growth for males and females do not seem to be related to the time-invariant characteristics such as fields of study. That is, the gap in earnings growth for men and women can be traced to the hours they work and the type of work they do, but not to the fields they choose to study.

Summary

Wannell and Caron (1994b) conclude that the earnings gap can be explained in large part by different hours worked by men and women, which may occur because of the allocation of child-bearing responsibilities and joint labour supply decisions within families. Despite the continued wide differences in fields of study for men and women, Abbott, Finnie and Wannell (2000) find no evidence of male-female differences in the effects of field of study on post-graduation earnings growth rates. Both Wannell and Caron and Abbott et al suggest that further research is required to provide a clearer answer to what accounts for the differences in post-graduation growth in earnings for men and women.

Graduates in non-standard employment

The labour market has undergone a substantial shift away from traditional full-time employment and towards more non-standard employment, such part-time employment, temporary positions and self-employment. The National Graduates Surveys studies show that university graduates do not seem to lack traditional job opportunities, but may prefer certain types of non-traditional employment at various stages in their careers.

Women are more likely than men to work in part-time and temporary jobs.

In his inspection of the job status of 1982, 1986 and 1990 university graduates, Finnie (1999c) observes similar unemployment rates for men and women, with substantial declines between two and five years after graduation. However, part-time employment rates for women exceed those for men and the gender differences widen in the years after graduation. Generally, employment opportunities improve with experience, which would lower part-time rates in the years following graduation, but many women also make labour supply decisions related to having and raising children, which may counterbalance the decline in part-time rates that occurs with greater experience. The disciplines most associated with part-time work, such as education, fine arts and the humanities and other health jobs, also tend to have a high proportion of women. Finnie wonders whether the presence of women in these occupations makes these occupations more amenable to non-standard employment. Would this suggest that the incidence of non-standard work might also be predicted to increase in disciplines such as commerce and law, where the participation of women has grown in recent years?

Women also have a greater likelihood of working in temporary jobs than men do. Occupations that usually have low rates of part-time work have low rates of temporary employment as well.

Self-employment increases with job experience.

One can be self-employed for two very different reasons. Salaried jobs may not be available and self-employment is a temporary alternative. Or, one may prefer the riskier option of self-employment because of the potential monetary or career opportunities — that is one may choose to become an entrepreneur. Finnie (1999a) observes an increase in the incidence of self-employment from two to five years after graduation. Because labour market opportunities tend to improve for graduates after they gain experience in the labour market, Finnie deduces that post-secondary graduates probably opt for self-employment. Between 1992 and 1995, the percentage of self-employed 1990 graduates increased from 6 percent to 11 percent for men and from

4 percent to 6 percent for women. Older, more experienced graduates would also have more access to capital and developed the business connections necessary to open their own business.

Women graduates – except PhD’s – less likely to be self-employed.

Finnie (1999a) observes that the incidence of self-employment did not change noticeably over three waves (1982, 1986, 1990) of graduates, and thus no clear trend in the options for self-employment over the 1980s and 1990s. University graduates tend to have slightly higher self-employment rates than college graduates. Most self-employed graduates come from the social sciences and humanities. Self-employment is also standard for those

status over the three-year survey interval. On average 4 percent of women and 7 percent of men moved from paid employment status to self-employment status; some of these would have voluntarily moved to self-employment, while others would have resorted to self-employment because they could not find paid employment.

Self-employed graduates have better employment outcomes.

Finnie (2001) pursues the matter further in an exploration of the success of self-employed graduates. He finds that earnings levels of self-employed graduates generally exceed those in standard employment. Furthermore, those who move from paid employment to self-employment between the first and second NGS interviews had higher growth in

earnings than those who remained in paid employment or who moved from self-employment to paid employment. Self-employed graduates also had greater job satisfaction and a closer job-education match than those in standard employment.

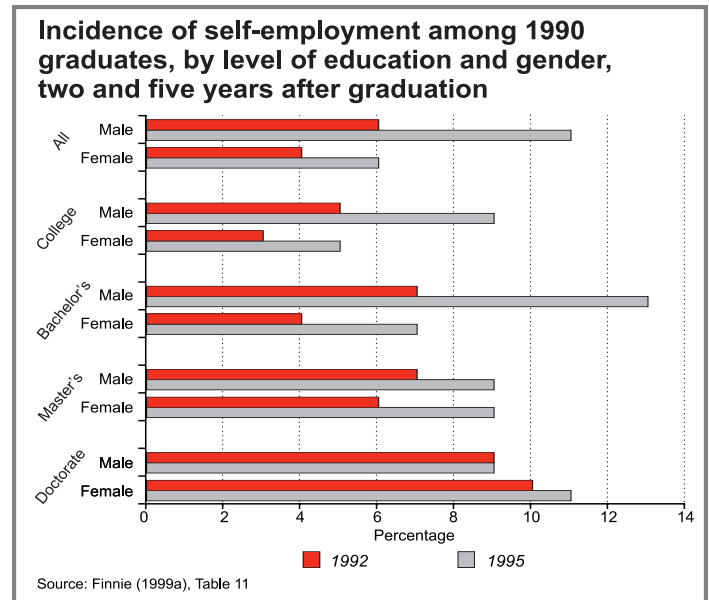
Job Status of University Graduates

	1982 graduates		1986 graduates		1990 graduates	
	1984	1987	1988	1991	1992	1995
Unemployment rates						
Males	8	3	10	6	9	3
Females	9	4	10	5	9	3
Percentage in part-time jobs						
Males	5	2	4	2	6	3
Females	12	12	11	11	10	10
Percentage in temporary jobs						
Males	21	5	18	7	18	9
Females	27	9	24	13	22	12

Source: Finnie (1999c), Tables 5-8

working in the medical professions. At the Doctorate level, women are as likely to be self-employed as men, whereas at other levels they are considerably less likely to be self-employed. One might speculate on a variety of possible reasons for this, none of which can be verified by the NGS data. Women might have less of an orientation towards risk-taking, or as entrepreneurs they might face some discrimination from credit markets or from those who hire independent professionals. Even so, self-employment can offer flexibility to working mothers.

Finnie examines the movement between self-employed and paid employed status over the two year and five year intervals after graduation. He finds that about two-thirds of self-employed graduates retained their self-employed



Summary

Finnie (1999a, c, 2001) concludes that for university graduates, the incidence of non-traditional jobs does not necessarily reflect a limited availability of regular paid positions, and therefore is not necessarily cause for concern. The share of non-traditional employment remained fairly constant for the 1982, 1986 and 1990 graduates. Women's professions tended to have a higher incidence of part-time and temporary employment compared to men and a significant portion of women remained in part-time jobs in the years following graduation. Self-employment tended to lead to better labour market opportunities in terms of higher earnings, closer job-education matches and greater job satisfaction. Finnie advises that further research be undertaken to identify which measures would make self-employment a more feasible option for certain groups of younger workers.

Trade/vocational graduates

The National Graduates Surveys defines trade/vocational graduates as those who have completed skills trades programs (excluding apprenticeships) that are 3 to 12 months long and do not necessarily require a high school diploma for admission. Trade/vocational graduates accounted for about one-fifth of all post-secondary graduates in the 1990 and 1995 NGS. Women make up just over one-half of 1990 trade/vocational graduates, whereas their predominance is considerably greater at the community college level (59%) and the university level (57%).

Trade/vocational graduates tend to have a relatively higher concentration of students in their thirties or older than college or university graduates. Almost one-half of 1990 trade/vocational graduates were over 28 years old, compared to about 20 percent of community college graduates and Bachelor's graduates. Trade/vocational graduates also tend to have been in the workforce before enrolling in their programs and a significant proportion has not completed high school. University and college

graduates, on the other hand, have usually been in school before entering their post-secondary programs and the large majority of graduates have high school diplomas.

The six trade/vocational fields of study are highly diverse, and can be divided into four female-dominated groups (arts, business, health and social services) and two male-dominated groups (engineering techniques and primary industries). Health fields differ markedly from other fields in that students have the highest education levels before enrollment, are most likely to complete a further program after graduation, and have the best labour market outcomes in terms of employment rates pay rates and use of skills in their programs.

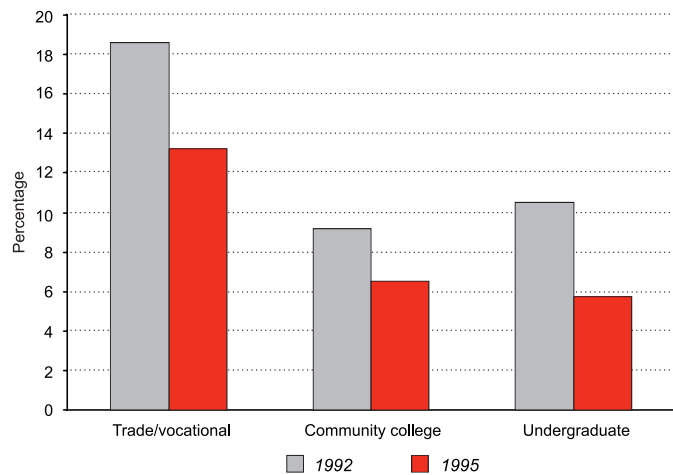
Labour market outcomes are less favourable in trade/vocational programs.

Boothby (2000b) describes the characteristics of 1990 graduates from trade/vocational programs and their labour market outcomes based on the 1992 and 1995 NGS. He finds that trade/vocational graduates are less likely to be employed, tend to earn less when they are employed, and make less use of the skills they acquired than graduates from other post-secondary programs. The unemployment rate for trade/vocational graduates was about twice that of community college and Bachelor's graduates in 1992 and 1995.

The occupational categories of trade/vocational graduates' jobs show striking differences compared to those of college and university graduates. Just 20 percent of 1990 trade/vocational graduates worked in skilled information occupations in 1992, compared to about 50 percent of community college graduates and over 80 percent of Bachelor's graduates. Trade/vocational graduates showed stronger representations than other graduates in goods occupations and service occupations.

Given the occupational distributions, one would expect that trade/vocational graduates earn less than other post-secondary graduates. Median hourly wages of employed trade/vocational graduates are consistently below 1990 college and Bachelor's graduates in 1992 and 1995. The gap in earnings among education levels is considerably wider for women than for men.

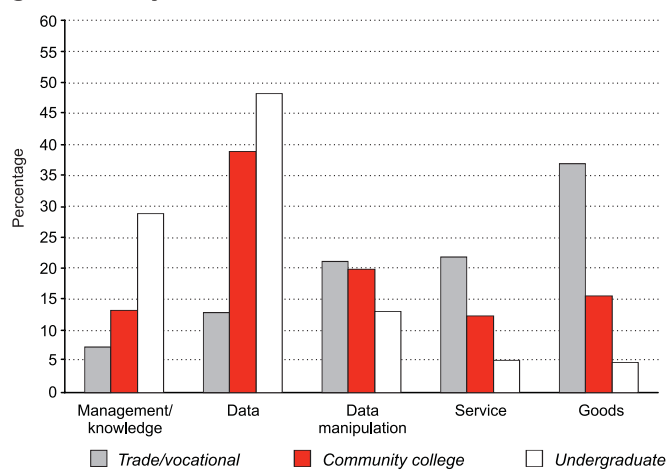
Unemployment rates of 1990 graduates, two and five years after graduation



Source: Boothby (2000b), Figure 3.6

Trade/vocational graduates are also somewhat less likely to use their skills in their jobs. In 1995, 71 percent of employed 1990 trade/vocational graduates used the skills they acquired in their programs on the job, compared to 78 percent of employed Bachelor's graduates. Those who acquire skills that are most useful to them in the labour market tend to be those working in occupations related to their course of study. Health graduates have the highest percentage of graduates who use their skills – 90 percent in 1992 and 85 percent in 1995. Skills usage decreased from 1992 to 1995 for every field of study except engineering techniques, which remained about the same.

Occupational category of employed 1990 graduates' job in 1992



Source: Boothby (2000b), Figure 3.8

Median hourly wage of employed 1990 graduates

	Men	Women
<i>Trade/vocational</i>		
1992	11.54	10.58
1995	14.10	12.82
<i>Community college</i>		
1992	12.98	12.50
1995	15.87	14.68
<i>Undergraduate</i>		
1992	14.42	14.42
1995	17.42	17.03

Source: Boothby (2000b), Figure 3.9

When they continue further in their education, trade/vocational graduates tend to attain community college degrees, whereas community college graduates tend to attain university degrees. A significant proportion of trade/vocational graduates enter apprenticeships after they complete their schooling, whereas only a small proportion of community college graduates do.

Summary

Boothby (2000b) concludes that the labour market outcomes may be less favourable for trade/vocational programs than community college or university programs, but so are the social and private costs of the graduates because their program durations are so much shorter.

Boothby proposes a revised definition of trade/vocational programs in the NGS that makes a clearer distinction between post-secondary education and training, and between vocational and general programs. Boothby suggests that this reclassification would provide more precise information on the labour market outcomes of those graduating from vocational programs.

Employment-equity groups

The Employment Equity Acts of 1986 and 1996 articulate the goal of workplace equality for women, visible minorities, aboriginal peoples and people with disabilities. The National Graduates Surveys have been useful in documenting the degree of success of workplace equality for those who have graduated from a post-secondary institution. Wannell and Caron (1994a) study 1990 graduates (two years after graduation) to ascertain the early labour market experiences of visible minorities, aboriginal peoples and people with disabilities. The authors define a category called “activity limited” graduates instead of “persons with disabilities” because the NGS do not use the same screening process as the Employment Equity Data Program.

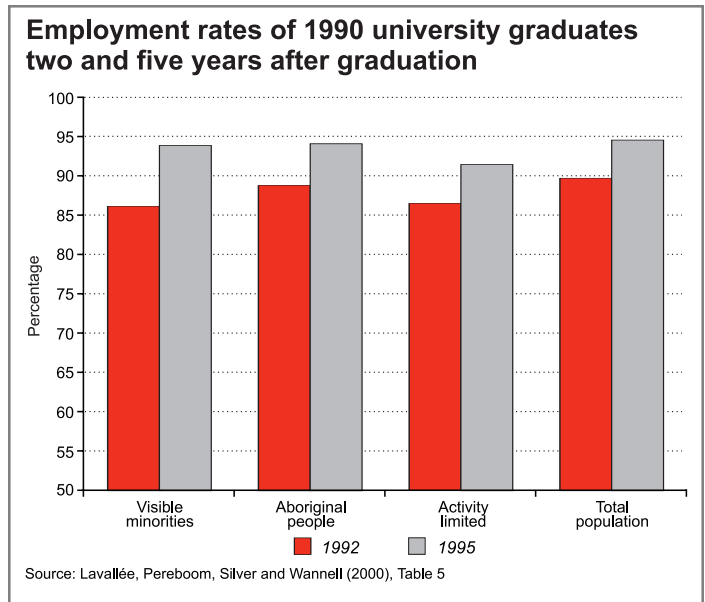
Lavallée, Pereboom, Silver, and Wannell (2000) build on this work in their examination of NGS graduates from 1990 (two and five years after graduation) and 1995 (two years after graduation). The authors construct labour market indicators that adjust for graduates’ different levels of education and fields of study.

Gap in employment rates smaller for university graduates than college graduates.

Both studies find that unadjusted employment rates tend to be moderately to substantially lower for the three target groups at all time points. Lavallée et al (2000) estimate that university graduates of the target groups had one to three-and-a-half percentage points lower employment rates than average, and college graduates had from 2 to 9 percentage points lower rates. Thus equity groups who graduate from college face relatively greater barriers to employment than those who graduate from university.

The authors also find that the gap between employment rates for visible minority university graduates tends to close over time, suggesting that visible minorities may face greater barriers to finding a job after graduation, but that these barriers decline as they gain more experience in the workplace. The employment disparities seem to be especially large for visible minority men. Aboriginal university graduates have only slightly lower than average

employment rates both two years and five years after graduation. However, the employment rates for aboriginals who graduate from community colleges are substantially below the average. Activity limited university and college graduates have lower than average employment rates both two and five years after graduation.



Employment outcomes of employment-equity groups do not reflect their skills.

Visible minorities tend to have higher levels of education and to have studied in fields that lead to better paying jobs. In the 1992 survey of 1990 graduates, visible minorities made up 9 percent of the total graduate population and of the Bachelor’s graduates, but 11 percent of the Master’s graduates and 17 percent of the PhD graduates. They were more likely to graduate from fields related to engineering, sciences and business and law rather than from the arts or social sciences. The earnings of visible minorities were at least as high as the average both two years and five years after graduation. However, after taking into account the effect on higher earnings potential of education levels and fields of study, visible minorities had earnings *penalties* of 1 to 10 percent. Thus their earnings levels did not reflect their higher levels of education and skills.

Aboriginal groups make up about 1 percent of the total 1990 university graduates and 2 percent of the college graduating population, compared to their share of 4 percent of the total population, and thus are significantly under-represented in the post-secondary population. Their representation in the post-graduate groups is too small to permit reliable estimates. The earnings of aboriginal graduates are about average two years after graduation, but deteriorate somewhat by five years after graduation.

The activity-limited make up about 4 percent of university graduates and about 7 percent of the total population, suggesting that this target group is moderately underrepresented in post-secondary education. Activity-limited graduates are more likely to have taken education, social sciences, fine arts and humanities than other graduates. They tend to earn somewhat less than average and their earnings gap widens over time.

Summary

The results of Lavallée, Pereboom, Silver and Wannell (2000) suggest that graduates in the equity groups who are as qualified as other graduates are less likely to find work and when they do, they have lower earnings. In short, there is a group of well-qualified graduates in the "employment-equity" group who are not employed to their full capacity. Thus there are potential benefits of redressing these disparities at the individual level in terms of eliminating income differentials, and at the societal level in terms of making better use of human capital. The results also suggest that some employers may be engaging in discriminatory practices, particularly against visible minority university graduates in the science fields where they are strongly represented. There are other explanations for the differences, such as the possibility that target groups do not have as easy access to informal labour market networks as others do. Lavallée et al suggest additional research should be done into the possibility of hiring bias against minority groups and into whether specific groups within the visible minority group are facing systemic discrimination.

Science and technology: jobs for the future?

The accumulation of knowledge in science and technology is particularly important in the economic development of a knowledge-based economy. Recent science and technology graduates play a key role because knowledge is changing so quickly and young people contribute greatly to the introduction and diffusion of new ideas. As Finnie and Lavoie (1999) observe, it is not just the number of science and technology graduates that matter, but also the way in which the economy takes advantage of these workers that is critical to economic performance. Finnie and Lavoie, building on earlier work in Lavoie and Finnie (1997b), assess the early labour market outcomes of graduates of science and technology programs by conducting an empirical analysis of their employment patterns, job-education skill matches, earnings levels and other indicators of meaningful and satisfying work. They compare the performance of 1982, 1986 and 1990 and 1995 university graduates in five science and technology fields to the performance of graduates from the social sciences and humanities. The five fields are:

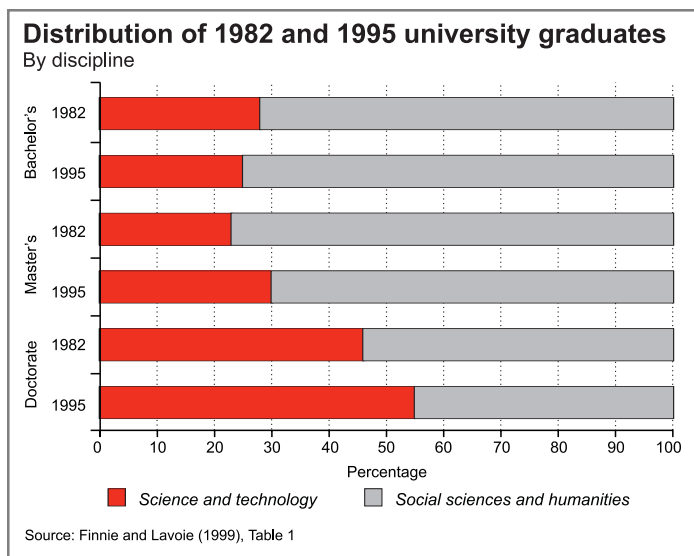
1. Pure science, such as mathematics, physics, chemistry
2. Applied science, which includes the various agricultural and biological sciences
3. Engineering
4. Computer science
5. Health sciences, a diverse group that includes doctors, dentists, pharmacists, nurses and the basic medical sciences

At the Bachelor's level, science and technology graduates comprised one-quarter of all Bachelor's graduates in 1995. Science and technology graduates were represented in higher shares at the Master's level (30 percent) and at the Doctorate level (55 percent).

Moderate decline in the proportion of Bachelor's graduates in science and technology.

The share of Bachelor's science and technology graduates level has declined over time, whereas the share at the Master's and especially the Doctorate level science and technology graduates has increased. Within the science and technology disciplines, there has been no significant shift in the shares of graduates, except for a small drop in engineering graduates at the Bachelor's level and significant increase at the PhD level.

Finnie and Lavoie note that the change in shares is broadly consistent with the post-graduation outcomes insofar as rather poor outcomes have characterized certain disciplines at the Bachelor's level, and relatively better outcomes have occurred at the Master's and Doctorate levels.



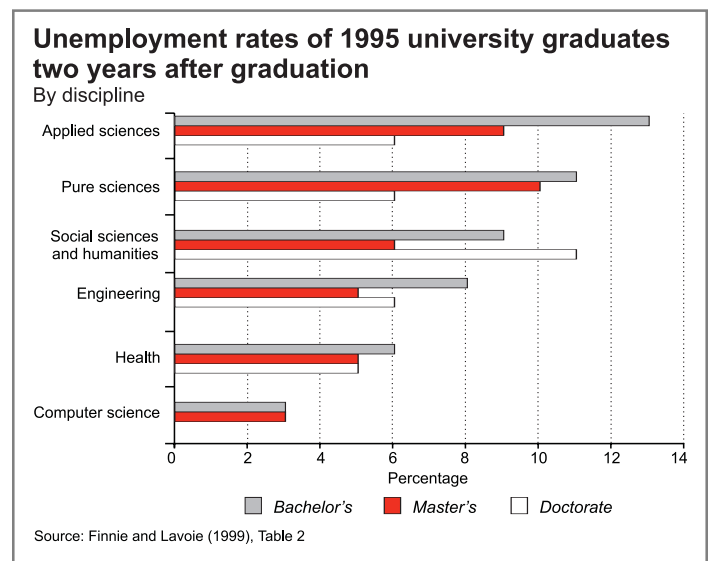
Pure and applied science graduates do not fare as well as other graduates.

Finnie and Lavoie find a wide variation in early careers of graduates in the science and technology fields. Computer science graduates perform strongly compared to graduates from the social sciences and humanities, probably because they have an advantaged position in terms of their favourable "skills bias" which characterizes information and communication technologies. Computer science graduates have been characterized by high rates of employment, jobs

closely related to programs of study, good salaries and high levels of overall satisfaction in their programs.

Health graduates have also done well, and engineers have performed solidly compared to the social science and humanities graduates. Graduates from the health disciplines usually have the greatest certainty of finding a job, and to having a job related to the education program and where earnings and job satisfaction were high. Engineering graduates had fairly high employment rates, job satisfaction and earnings levels. The excellent job-education skill match and job prerequisite results for Bachelor's engineering graduates indicate that they are well prepared for the jobs they find.

Pure sciences and above all applied sciences have had much weaker outcomes, particularly at the undergraduate level – a concern flagged by Finnie and Lavoie, given the increasing importance of science and the growing interaction of science and technology in the economy. Applied science graduates at the Bachelor's level had among the worst records in all the indicators suggesting that these graduates have not found rewarding careers and are underutilized in the economy. However, at the Master's and Doctorate levels the outcomes improve considerably for applied science graduates, suggesting that graduate school has been the pathway to productive careers. Pure science graduates generally had somewhat more positive



Outcomes of 1995 Graduates by discipline, two years after graduation

	Distribution of graduates by discipline	Unemployment rates	Men earnings \$ 1997	Job-education skills match	Index of overall satisfaction with the education program
<i>Bachelor's</i>					
Pure science	3	11	31,200	61	58
Applied science	6	13	23,400	48	60
Engineering	7	8	34,500	76	78
Computer science	2	3	35,700	83	91
Health	7	6	36,500	87	84
Social sciences and humanities	75	9	28,100	61	73
Total	100	9	29,500	64	74
<i>Master's</i>					
Pure science	4	10	36,700	69**	76**
Applied science	4	9	33,900	71*	76**
Engineering	10	5	43,700	72	81*
Computer science	2	3	43,000	67**	87**
Health	9	5	56,200	88	87*
Social sciences and humanities	70	6	44,200	76	84
Total	100	6	44,600	76	84
<i>Doctorate</i>					
Pure science	15	6	38,200	79*	69**
Applied science	12	6	34,400	85*	74**
Engineering	16	6	47,300	80*	76**
Computer science	2	—	—	—	—
Health	11	5	44,200	93*	84**
Social sciences and humanities	45	11	47,500	88	86*
Total	100	8	43,900	85	80

Note: The means with no asterisk (*) have standard errors below 1. Those with one asterisk have standard errors between 1 and 2. Those with two asterisks have standard errors between 2 and 3.

The long dash (—) indicates that the data are not reliable enough to release.

Due to differences in rounding, total percentages may not necessarily add up to 100.

Source: Finnie and Lavoie (1999)

outcomes that applied science graduates but were behind those in the social sciences and humanities.

Engineers: key players in the accumulation of technology.

Technological change is a pivotal force in economic growth and engineers play a critical role in technological innovation. Lavoie and Finnie (1996a to 1997b) identify this role in several studies on the early career patterns of 1982, 1986 and 1990 engineering graduates.

They find engineers make a successful entrance into the workforce relative to graduates from the social science and humanities. Engineers from the three graduating classes

consistently have much lower unemployment rates and higher earnings than graduates from other fields. They tend to have a closer than average match between their skills and jobs, and to evaluate their education programs highly. Women engineers have closed the earnings gap with male engineers; indeed, they have surpassed it. Engineering is the only field where this has occurred. Lavoie and Finnie find that:

- Current market conditions in terms of earnings levels and unemployment rates exert a strong influence on the choice of specific field of study of engineering students. The good news is that engineering students tend to enter fields where the prospects are most

promising, and respond quickly to changing labour market conditions by shifting their fields of study to where they expect the greatest demand will be.

- Mobility enhances the sharing of technological information and makes the labour market more dynamic. Prevailing employment opportunities influence graduates' initial choices of the industrial sector they work in, but "path dependency" then seems to limit subsequent mobility. When shifts in demand occur, new graduates take up the slack rather than graduates who are already in the market. Engineers' mobility might be improved by introducing more generic skills in engineering programs.
- When the labour market weakens, graduate school enrollment for engineers increases significantly. The incentives may not be in place to attract those who are the best graduate school candidates instead of those who have fewer labour market opportunities.
- The representation of women engineers has remained small despite their progress in earnings levels relative to men, and their satisfaction with the engineering field and with their choice of educational programs. Only 13 percent of 1990 engineering Bachelor's graduates were women, compared to 30 percent of the pure sciences and 58 percent of the overall graduate population. Women's overall satisfaction with engineering jobs is not high, which may explain why so few women enter the engineering profession. It may take more than financial incentives to encourage women to pursue engineering.

Summary

It is unclear why pure and applied science graduates at the Bachelor's level have worse employment outcomes than graduates from occupationally specific science programs or the social sciences and humanities, especially given the key role that science and technology plays in today's economy. Lavoie and Finnie (1999) postulate that the private sector may undervalue pure and applied science graduates because private investments in research centres can be prohibitively large: the private

sector may make shortsighted investment decisions without taking into account the long-term benefits of research and development. Lavoie and Finnie caution there may be fundamental structural problems on the demand side, which lead to the under-evaluation of science and technology in general and the associated relatively weak outcomes for science and technology graduates. That is, Canada may be suffering from an "innovation gap." Lavoie and Finnie suggest that policies that simply shift the supply of graduates in the short run to meet prevailing market conditions may be shortsighted and that longer term; demand-side initiatives that stimulate increases in private R&D and expand research activities relating to science and technology may be the better strategy.

The quality of the education-job match

The quality of the match between the skills taught in post-secondary education and the skills required by employers have emerged as a central policy concern, particularly given how quickly labour markets can change in a global, knowledge-based economy. Many people see the role of higher education as one of providing students with the knowledge and skills to work in specific occupations. In this case, a successful education-job match occurs when graduates from specific programs find work in related occupations, that is, they have a good program-job match. Others have begun to place importance on more portable, generic skills such as communicating, problem solving and teamwork, skills that are valued in a broad range of occupations and can be adapted to changing job requirements. In this case, a successful match occurs when a graduate finds employment where she can make good use of her generic skills.

Krahn and Bowlby (2000) assess the quality of the education-job skills match for graduates from various fields of study in terms of the program-job match approach and the generic-skills approach. They look at the match for

university graduates as well as trade/vocational and career/technical graduates.

Approaches to the Education-job Match

<i>Program job match</i>	<i>Generic skills match</i>
Does the employer require a specific post-secondary credential?	Critical thinking Problem solving
What skills/knowledge are used on the job?	Writing Teamwork
Is the job related to the field of study?	Leadership Use of New technology

Source: Krahn and Bowlby (2000), p. 15

Graduates who train for specific vocations have a good program-job fit.

The authors find that overall only 60 percent of 1990 trade/vocational career/technical college graduates Bachelor's graduates work in a job with a good program-job fit two years after graduation. The program-job fit in terms of credentials increases with the level of education and is 10 percent higher for Master's and 20 percent higher for PhD graduates. Only 40 to 50 percent of trade/vocational, college and university graduates at the Bachelor and Master's levels use their credentials extensively on the job. However, close to 80 percent of graduates at the PhD level use their credentials extensively on the job. As one might expect, the differences among fields of study are large. Graduates from professional programs that train for specific vocations or occupations, such as health sciences, engineering, law, and medicine have the highest program-job fit in terms of credentials. Less than one-half of university graduates from the fine arts, humanities and social sciences assert that they had a good program-job fit in terms of credentials.

Krahn and Bowlby contend that a good program-skills match does not necessarily mean that those hired have gained the necessary employment-related skills in their post-secondary education. Rather, this type of match indicates the extent to which employers hire graduates with a *presumed* set of skills that supposedly correspond to their program of study, without necessarily finding out whether these skills exist. This may be one reason why vocational students have a better fit: employers tend to hire according

to the field of study rather than the observed skills of the individual graduate.

Many university-level fields of study have good generic-skills fit.

With the generic skills approach, the differences among fields of study are much smaller. Indeed, some fields that do poorly in the assessment of their program fit have attained relatively high generic skills from their post-secondary education. For example, Bachelor's graduates from the humanities attest to having higher levels of writing and critical thinking skills than graduates in some occupationally specific programs. In general, university programs improve critical thinking and writing skills, whereas trade/vocational and career/technical programs have a slight edge in improving the use of new technology skills. The assessment of student skills is a self-assessment and not a test-assessment, and so may depend on the perceptions of those being assessed.

None of the post-secondary programs seem to be doing well in developing leadership and teamwork skills. This is despite the fact that these are skills in high demand by employers.

Despite evidence that university arts and science programs do a good job in developing students' critical thinking skills, Krahn and Bowlby find that graduates from these programs are less likely than those in other programs to find jobs that use these skills. The authors speculate that the problem may not be with the educators, but with the labour market. That is, educators appear to be developing these skills in graduates, but employers may not recognize that graduates have obtained the skills, and so may not hire them in jobs that make use of the skills.

Summary

Krahn and Bowlby (2000) draw out the implications of their findings for policy makers, employers and educators. They note that, even though the traditional arts and science university programs may not provide the best program-job fit, this does not necessarily mean that resources should be redirected from these programs to

programs that are more occupationally specific. If policy makers intend to develop the more generic employability skills to accommodate the need for portable skills and lifelong learning, they should think twice before redirecting resources away from the fields that are most likely to develop these skills.

Krahn and Bowlby also suggest that educators address the issue of how leadership and teamwork skills can better be developed in graduates and who should be charged with improving these skills. They also might consider whether generic skills can be improved in all fields of study without eroding the skills developed in the current curriculum.

Employers might look beyond their traditional programs where they hire new workers. The generic skills that are fundamental to a knowledge-based economy can often be found in graduates from the less occupationally specific programs.

The pathways to a post-secondary degree

Not all students proceed directly from high school to a post-secondary degree and then into the workforce. Some take a longer, more indirect path to complete their degree: they study part time or take time off from their studies to work or take care of children. Others continue their education after graduating, or work for some years and then return to school or take training. The choices students make regarding their path from school to work, and the consequences of their choices have important policy implications. With recent increases in tuition and average levels of student debt, the traditional direct route to completing a degree may become more difficult for certain students to pursue because they need to work so they can afford to continue their education. If students who take an indirect path have lower incomes or worse employment prospects, then an argument can be made for finding ways to encourage them to take a more direct route to completing their studies.

Direct and indirect paths to a degree.

Wannell, Pereboom and Lavallée (2000) study three cohorts of undergraduates (1982, 1986, and 1990) from the NGS to ascertain who is more likely to take the indirect route to a degree, and whether those who take an indirect route are at a disadvantage in the labour market. The authors designate a direct pathway as one of full-time study, by students with no children who graduate by age 25, and an indirect pathway as one without these characteristics.

Those who take an indirect path tend to have different socio-economic statuses than those who take a direct path. The indirect path-takers are less likely to have parents with high levels of educational attainment, which may suggest that their parents may not have the incomes or the educational experience to encourage them to continue their studies. Parental educational indicators have a particularly strong influence on women.

In part because they are older than average, indirect graduates are also far more likely than direct graduates to be married and have children. Among the indirect group, nearly 40 percent of women and 30 percent of men are parents two years after graduation, ten times the percentage of their counterparts who take a direct path. Male students who take an indirect path are much more likely than those on a direct path to have borrowed money, suggesting that financial constraints may have led them to an indirect path of studies. Conversely, female students who take an indirect path are less likely to have borrowed money, possibly because married female students who continue their studies tend to suspend their education until they have financial support from their spouses.

Those in the quantitative and professional fields tend to take the direct path.

Students on the direct path are apt to concentrate in high earning fields and fields with specific job skills. Graduates in fields of study with high earnings are 50 to 100 percent more likely to take the direct route than those in low earnings fields. So are those who concentrate in quantitative fields such as sciences, math, engineering and professions such as medicine and law. Those on the indirect path are more likely to be teachers (probably because of the increase

in educational requirements from a teacher's, certificate to a BA), or be taking education, fine arts or humanities, fields that tend to have a relatively high concentration of women.

Graduates who take an indirect path are not at a disadvantage in the labour market...

Those who take a direct route to a degree have the advantage of graduating when they are younger and may have more current academic qualifications. Those who take an indirect route may be older but have gained more work experience. The authors find that on average there is little economic penalty associated from taking an indirect route because employers compensate for the human capital that graduates attain while taking an indirect route to a degree. Two years after graduation, indirect graduates have about 15 percent higher average earnings than direct graduates. Subsequently the gap narrows quite quickly and by five years after graduation, the gap has almost closed. Thus those who are unable to take the direct route to a degree need not be concerned that they are penalized by lower incomes in the labour market. This does not necessarily suggest that students are always better off when they take time off from school to work: a necessary condition is that they return to school to complete their degree.

Wannell et al discover that work experience augments the earnings of indirect students in the arts and humanities more than in the more quantitative fields. In fact, the earnings in the more job-specific fields of the sciences, math, engineering, architecture commerce economics and law are similar for direct and indirect graduates. Thus students who are in the "softer fields" in the humanities are more likely to be rewarded for gaining human capital while taking an indirect path than students in the more specific fields.

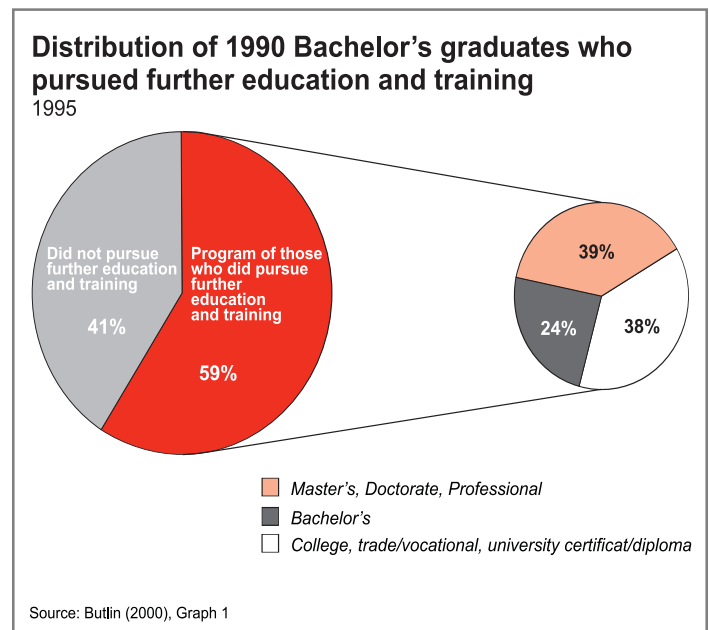
...but are less likely to pursue further education.

Students who take the direct path improve their chances of continuing further with their education. They are about 40 percent more likely than indirect students to have obtained a new diploma beyond their Bachelor's degree. This is true for both men and women.

Who pursues further education?

Butlin (2000) delves further into the question of who continues on for further education in his study of 1990 Bachelor's graduates from the NGS two and five years after graduation. He selects graduates who are under 26 years old, have high school as their previous level of education, and finish their Bachelor's degree in six years or less and estimates how the socio-demographic and enrollment factors affect the chances of continuing a post-secondary education.

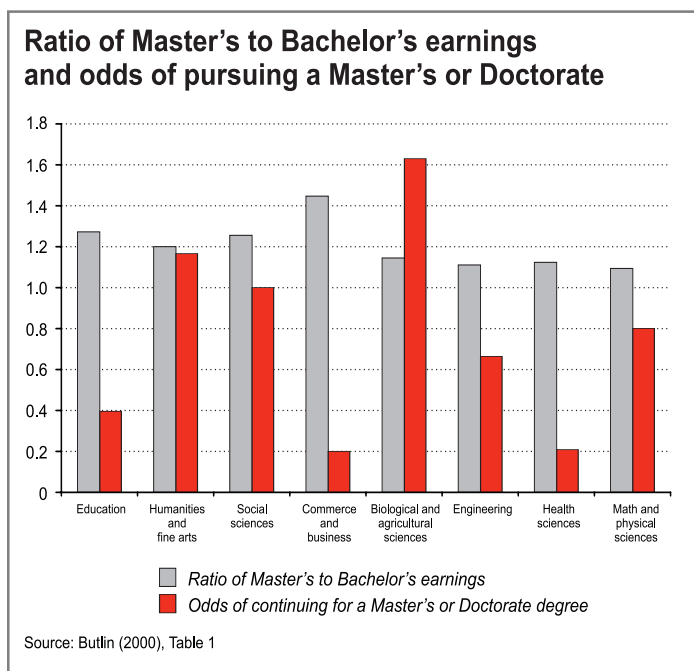
Butlin finds that three in five Bachelor's graduates pursue some further education within five years of graduating, the majority of these within two years of graduation. About one third of these take Master's or Doctoral programs, and the rest take programs at the Bachelor's level, the College/trade vocational level, the university certificate/diploma level or the professional level.



Those who continue in their education enjoy a substantial earnings benefit. Five years after graduating, full-time Bachelor's graduates earned \$37,000 in 1995 dollars compared to \$46,000 for Master's and \$50,000 for Doctoral graduates. Therefore there is a substantial earnings benefit to obtaining a Master's degree.

Field of study a key predictor in pursuing further education.

Bachelor's graduates from fields that relate to specific occupations, such as education, commerce, management and business, engineering and health professions are less likely to pursue further education than graduates from the social sciences. This is despite the fact that Master's graduates in the specific occupations have higher earnings premiums from their degree than the Master's graduates in the social sciences. It may be that social science graduates continue in part because they are more likely to be unemployed two years after graduation than commerce, management and business graduates.



Socio-economic status and a direct path to a degree also key factors.

Butlin finds that graduates whose parents have university degrees have higher odds of pursuing further education, particularly of taking professional, Master's or Doctoral programs. The chances increase even more when the parents have a Master's or a PhD.

Several of Butlin's findings reinforce the observations of Wannell et al (2000) that students taking an indirect route are less likely to continue further in their education. Butlin finds that older graduates are less likely to pursue further

post-secondary education. Those who study part-time are much less likely to take a professional degree (such as law or medicine) or a graduate degree. Bachelor's graduates who have more than two years full-time work experience are also less likely to pursue further education than those who have no experience. Those who do continue tend to take certification or first professional programs rather than Master's or PhD programs.

Co-operative students have about the same chance of pursuing a second degree as those in a regular program. Thus students who enroll in co-op programs, in which work experience is included as part of the post-secondary program, are more likely to continue further in their education than students who take time off from school to work.

Student loans do not seem to discourage students from continuing their education. Graduates with less than \$15,000 in student's loans have the same likelihood of continuing education as those with no student loans. Students with more than \$15,000 in loans had a higher tendency to pursue Master's and Doctorate programs instead of vocational or certificate programs. Possibly students who are committed to long-term educational goals are the ones who are prepared to take on more debt to complete their education.

Summary

Wannell, Pereboom and Lavallée (2000) and Butlin (2000) show that many who take the indirect path to complete an undergraduate degree receive higher earnings for the experience and skills they obtain along the way. An indirect route allows students to combine family and school responsibilities without being penalized for taking longer to complete their degree. However, those who take an indirect route tend to be from a lower socio-economic background compared to those who take a direct route, and when pressed financially might not return to complete their degree. Moreover, they are much less likely to pursue further education after completing their first degree. Students who take an indirect path may benefit from co-operative programs

or internships that combine work experience and traditional academic instruction so that they can maintain their ties to school while working.

Financial considerations in post-secondary education

Over the past few decades, the costs of education have shifted from the public sector to the students themselves, raising concerns about whether higher tuition levels have discouraged some students from pursuing post-secondary education. Some students may not be able to borrow as much as they need to pay for their education. Those who need the most financial assistance may not be the ones targeted for assistance. Those who do borrow may be saddled with too much debt after they graduate.

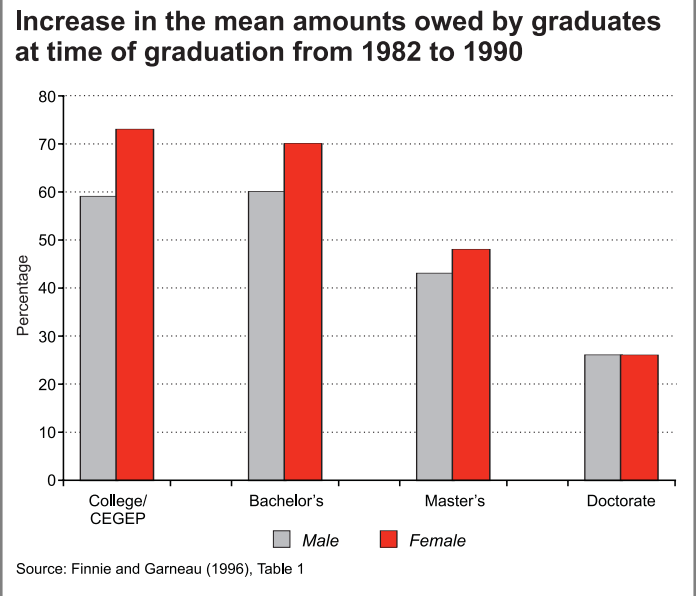
Finnie and Schwartz (1996) and Finnie and Garneau (1996) address these issues in their analyses of the borrowing and repayment patterns of post-secondary students. The authors compare 1982, 1986 and 1990 graduates whom the National Graduates Surveys interviewed two and five years after graduation. They find that debt burdens did not seem too onerous for most graduates, although those who were unemployed or underemployed generally did have difficulty in repaying their loans.

1990 graduates borrowed appreciably more than 1982 graduates.

Finnie and Schwartz (1996) and Finnie and Garneau (1996) find that borrowing for 1990 graduates exceeded that for 1982 graduates, not because more students were taking out loans, but because average loans were higher. The incidence of borrowing increased slightly for college and Bachelor's graduates (to just under one-half in 1990), stayed about the same for Master's students (one-third), and declined substantially for PhD graduates (to about one-quarter in 1990).

However, average levels of borrowing rose considerably for all levels graduates between 1982 and 1986, likely because loan limits increased in 1984 and then edged up

further between 1986 and 1990. Average borrowing increased between 60 and 70 percent (in 1990 constant dollars) for college and Bachelor's students, just fewer than 50 percent for Master's students and about 25 percent for Doctorate students. Women increased their borrowing slightly more than men.



Students would have borrowed more if the limits had been higher.

Finnie and Schwartz (1996) and Finnie and Garneau (1996) observe that if borrowing limits had been higher, students would likely have borrowed more. Demand factors, such as tuition costs, a student's financial need or the amount a student expects to earn after graduating, did not have much effect on borrowing levels. Supply factors, such as program eligibility rules that cap student loans, are the principle determinants of borrowing. Governments provide financial assistance to students based on eligibility rules related to financial need, up to a fixed overall limit, and once this limit is reached, students cannot increase their borrowing. Thus tuition increases alone would not likely lead to higher borrowing – unless eligibility rules also changed — because many students would already have borrowed the limit for which they were eligible. Given that borrowing is supply-constrained, many students would likely borrow more at the same terms and conditions if they had the chance. Finnie and Schwartz (1996) and Finnie

and Garneau (1996) cannot determine from the NGS data whether students would borrow more because of the inherent generosity of the program or because students are in genuine need of funds.

Borrowing levels varied considerably by province, in large part because provinces had different assessment procedures and offered different combinations of loans and grants to students. Accordingly the opportunity for financial assistance depends in part on where a student comes from.

Graduates between 1982 and 1990 not overburdened with debt.

Finnie and Schwartz (1996) and Finnie and Garneau (1996) show that the debt burden, measured as the debt-to-earnings ratio two years after graduation, increased for all levels of graduates between 1982 and 1990, especially for Bachelor's graduates. By 1990 the median debt-to-earnings ratio ranged from 0.15 for Doctorate graduates to 0.3 for Bachelor's graduates. Debt burdens in 1990 were typically higher for women, because their earnings after graduation tend to be lower. The repayment rate after two years fell somewhat because students paid their loans back more slowly.

Even though their debt burdens increased, few graduates (only 7 to 8 percent of Bachelors graduates) reported difficulty repaying their loans. This suggests that, on average, students could have borrowed more without becoming unduly burdened with debt. However, repayment difficulties pervaded the unemployed and those with lower earnings.

The relationship between borrowing and socio-economic background is not strong in the research conducted by the authors, an indication that the student loan program may not have been successful in targeting the students most in need of financial assistance.

Debt loads rose appreciably for 1995 graduates.

The 1997 survey of 1995 graduates reports that students took on even more debt at a time when tuition fees increased and student loan programs became more flexible.

Tuition fees (in 1995 constant dollars) rose 46 percent between 1990 and 1995 and 57 percent between 1986 and 1995. The ceilings for loans under the Canada Student Loan programs increased substantially from \$105 per week to \$165 per week in 1994, allowing students eligible for loans to borrow more. Interest relief programs changed to include those with low earnings as well as those who were unemployed. Provinces also removed some arbitrary differences in assessment procedures, making access to loans fairer across regions and governments also cut back bursary programs.

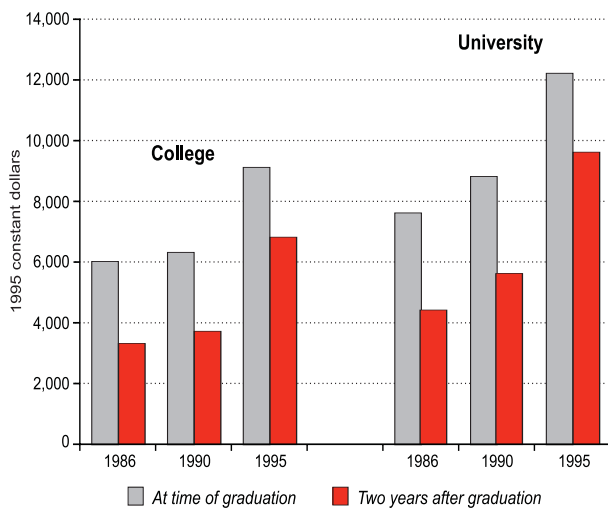
Even though tuition costs increased and loan programs became more flexible, the share of students taking out loans did not rise in recent years. Just over one-half of 1995 post-secondary graduates borrowed to finance their education, about the same proportion as in 1990 and 1986. However, the 1995 graduates who borrowed had considerably higher debt levels compared to graduates in previous years. The average 1995 graduate owed 38 percent more in government student loans (in 1995 constant dollars) than 1990 graduates and 61 percent more than 1986 graduates. University graduates owed an average of \$12,000 and college graduates owed an average \$9,000.

The 1995 graduates also paid off their loans more slowly than graduates of previous years, partly because they had more debt to repay, and partly because they paid back smaller amounts. Two years after graduation, the 1995 graduates had paid back only one-quarter of their loans whereas 1990 graduates had paid off one-third and 1986 graduates had paid off one-half respectively.

Summary

Finnie and Schwartz (1996) and Finnie and Garneau (1996) suggest that more research be undertaken using data that is more detailed than the NGS to determine whether some students from certain socio-economic backgrounds are discouraged from a post-secondary education because they cannot get enough funding or do not want to be overburdened with debt after graduation.

Average amount owed by college and university graduates to loan programs



Source: National Graduates Surveys and *The Class of '95* (1999), Chart 16

Finnie and Schwartz (1996) and Finnie and Garneau (1996) counsel that borrowing limits should increase to meet the greater financial needs of students, and that repayment plans become more flexible so that higher limits do not create excessive debt burdens for graduates. Income Contingent Loans for example would give some leeway for those having difficulty repaying their loans because of insufficient earnings.

Interprovincial and international mobility of graduates

When post-secondary graduates migrate to another province or country they take with them high levels of skills, the capacity to earn income, and the potential to improve the labour force and economic performance of the regions where they move. Which graduates move and to what extent do they benefit from moving? Does mobility allow provinces to capitalize on their considerable investments in education? Post-secondary education is within the provincial jurisdiction, and graduates may be leaving provinces that financed their schooling to work elsewhere. The increase in migration to the U.S. of the most highly

qualified graduates has also raised concerns about whether Canada is capitalizing on its investment in post-secondary education.

High rates of interprovincial mobility for graduates.

Burbidge and Finnie (2000, 2001) study the interprovincial migration of Bachelor's level graduates from the 1982, 1986 and 1990 classes from the time they enter university until five years after graduation. They find a high mobility rate of graduates compared to the youth or adult population. Six to seven percent of students moved from their province to attend university and 13 to 15 percent moved between pre-university and five years after graduating. In contrast, about one and a half percent of adults and 2 percent of youth population migrated to other provinces during the 1990s.

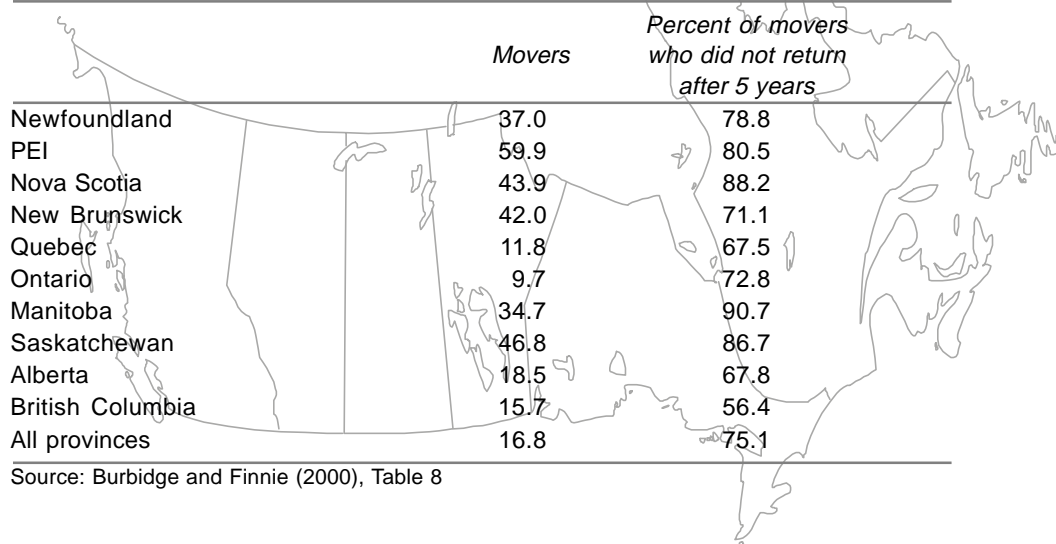
The mobility rates vary widely across provinces from as low as 10 percent in Ontario to as high as 60 percent in PEI. Nova Scotia is a magnet for university students, and Alberta, BC and Ontario are magnets for graduates looking for jobs.

University students and graduates don't just move away to gain some experience and then return home settle down: their moves tend to be long term. Less than one-quarter of those who moved subsequently returned to the province where they lived before they went to university.

The migration behaviour of men and women are very similar, although their labour market outcomes differ substantially. Men are more likely to be full-time workers than women, although the differences have converged somewhat for more recent cohorts.

The authors find that migration tends to have a greater effect on labour market status than labour market status has on migration. Five years after graduation, those who have moved have a significantly lower probability of being unemployed or working part-time involuntarily, particularly those moving from the Maritimes, Quebec, Manitoba and Saskatchewan. Those who move to Ontario Alberta and BC have significantly higher earnings five years after graduation than those who don't move.

Distribution of interprovincial movers, 1990 Bachelor's graduates



Source: Burbidge and Finnie (2000), Table 8

A "brain drain" of the most talented graduates.

In their study of the results of the *Survey of 1995 Graduates Who Moved to the United States*, Frank and Bélair (1999) report that 1.5 percent of post-secondary 1995 graduates moved to the United States between graduation and 1997. This number does not take into account the number of graduates from the U.S. and other countries that moved to Canada during the same period.

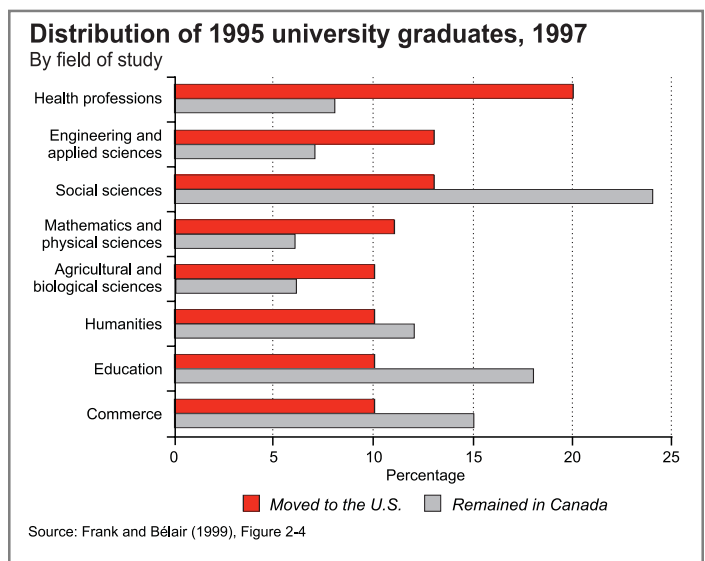
The most talented graduates were the most likely to leave: about 12 percent of Doctorate graduates moved to the U.S., and about 44 percent of those who moved ranked themselves in the top 10 percent of their class. University graduates who were in the health professions, engineering and applied sciences and mathematics and physical sciences were more likely to have moved than graduates in other professions.

Graduates move to the U.S. mainly for work-related reasons.

More than half of those who moved (57%) did so for work related reasons. Another 23 percent moved to continue their education and the remainder (17%) moved for marriage or relationship reasons. Women comprised the vast majority of the latter category. For the most part, graduates arranged their jobs themselves and were not recruited by U.S. employers.

Forty-four percent of those who moved for work-related reasons cited better job opportunities, particularly in their own field, and higher salaries as their reasons for moving. Few mentioned lower taxes explicitly, although they may have considered taxes when they cited salaries as a reason for moving.

Nearly 30 percent of the graduates who moved were in the health professions. They entered the labour market at a time when Canada underwent serious restructuring in the health sector and graduates turned to the U.S. for employment opportunities.



Graduates who moved were generally successful.

Those graduates who moved to the United States were more likely than those who stayed in Canada to find work closely related to their field of study and with higher levels of skills and higher salaries. For example, 85 percent of engineering and applied science graduates who moved to the United States reported having jobs closely related to their fields compared to 58 percent of their counterparts who stayed in Canada. Graduates in health related fields showed a similar pattern. Graduates who moved to the United States also had higher earnings. Median earnings of Bachelor's graduates in natural and applied sciences were 23 percent higher upon arrival in 1999 Canadian dollars for movers than for non-movers. The gap for those in the health occupations was similar.

By 1999, the vast majority of those who had moved to the United States were still living there; about 18 percent of the graduates had returned to Canada, about one half of those for work-related reasons. About 43 percent of those still in the U.S. said that they planned to return. It remains to be seen, however, whether these graduates actually will return or are simply keeping their options open while retaining access to U.S. jobs.

Summary

Burbidge and Finnie (2000, 2001) find that the inter-provincial mobility rates of Bachelor's graduates were high relative to the rest of the adult population and that moves tend to be of a permanent nature. Moving significantly reduces the probability of working part-time involuntarily or being unemployed.

Frank and Bélair (1999) conclude that the movement of 1995 graduates to the U.S. was relatively small, but that those who relocate tend to be high-quality graduates in certain key fields. They note that the demand for skilled graduates remains high in the U.S., compensation is generous and jobs are accessible, which suggests that the factors encouraging graduates to move southward are still in play.

Concluding remarks

Research based on the National Graduates Surveys shows that the outcomes of post-secondary graduates have generally been positive. Despite concerns that changing labour markets have put young graduates at a disadvantage, there is no evidence from the NGS of a widespread deterioration in their labour market outcomes in recent decades. It is worth noting, however, that the NGS do not address the outcomes of those who did not graduate from post-secondary institutions. Further research is needed to better understand issues relating to access to post-secondary education. In particular, what factors discourage some youth from enrolling in post-secondary education or from completing their studies? What are the private and social consequences of not pursuing a post-secondary education?

The NGS results show that even though their debt burdens increased, few graduates reported difficulty repaying their debt. Repayment difficulties were more frequent among unemployed graduates and those with lower earnings. Also, by focussing on graduates, the NGS cannot tell us whether rising tuition fees and debt burdens have contributed to discourage students from pursuing post-secondary studies. Students from lower socio-economic backgrounds are particularly vulnerable to higher costs of education and their status needs to be monitored.

What about other types of barriers? Research is needed to determine the effects on access to post-secondary education of institutional barriers such as limits on enrollment in colleges and universities in certain regions, and limits on enrollment in particular fields of study. More work also needs to be done to assess the effects of motivational barriers such as early school experience and family backgrounds. Other surveys such as the Youth in Transition Survey (YITS) and the Programme for International Student Assessment (PISA) hold promise in determining the extent of these barriers.

Some students take longer to complete their degree because they study part-time, take time off to care for their children or work to finance their education. Those who take an indirect path to a degree tend to come from lower socio-economic backgrounds than other students. Although they do not tend to suffer lower earnings after they graduate than those who take the direct route, they are less likely to pursue further education. Students who enroll in co-operative programs instead of taking time off from school to work have a better chance of pursuing further education, perhaps because they maintain their ties with the educational institution when they are working. More research is needed to assess whether a wider range of co-operative programs or other policies are needed to encourage those from lower socio-economic backgrounds to pursue further education.

Universities seem to be providing graduates with good generic employability skills (leadership and teamwork skills are notable exceptions). However, employers may not recognize these skills in their prospective employees, particularly in graduates from the liberal fields of study. Employers may also under-employ graduates who are not in occupationally specific fields, with obvious consequences for labour productivity in Canada. There is still much to be learned about matching the skills of graduates to available jobs and using the skills to their full potential.

The percentage of graduates by fields of study has remained quite stable over the 1980s and 1990s, despite the increased emphasis in the economy on science and technology. Although science graduates in the occupationally specific fields such as computer science, engineering and health sciences have very good labour market outcomes, those in the pure and applied sciences tend to have inferior outcomes. The private sector may not fully realize the value of these graduates. Perhaps the skills of some science graduates are not fully developed until they complete education at the Master's or Doctoral level. More work is needed to find out why.

The NGS research has tended to look at average or median outcomes of post-secondary graduates. However, research by HRDC on rates of return on education has shown a

wide variance in outcomes within fields of study, which is often much greater than the variation among fields of study. The NGS research on the relationship between earnings and fields of study suggests that there is a considerable overlap among fields of study. More research is needed to understand better the determinants of the variance of outcomes among post-secondary graduates.

Despite considerable progress of women graduates, there remains a substantial difference in the outcomes of male and female graduates. The gap between men and women's earnings shortly after graduation has narrowed over cohorts, although the gap widens for each cohort in the years following graduation. The part-time status of many women is one factor determining the earnings gap. Female graduates are more likely to opt for part-time work than male graduates, perhaps because their labour supply decisions take into consideration their family and childcare responsibilities. On the other hand, males are more likely than females to be self-employed. Self-employment entails a higher risk than paid employment, but research with the NGS suggests that the outcomes of self-employed workers are favourable compared to paid workers. Further research might help to further clarify whether different outcomes for men and women are related to labour market barriers or different labour supply choices.

University graduates have far higher mobility within Canada than other young people and they tend to move away from their home province permanently. Their labour market status tends to improve considerably after the move. Thus mobility of graduates within Canada has potentially large benefits to the economy; a challenge is how to encourage mobility and still capitalize on provincial investments in post-secondary education.

The National Graduates Surveys have proven to be an abundant source of information about the transition of graduates between school and work. The results provide a benchmark to assess future outcomes of post-secondary graduates in Canada.

Bibliography

Studies presented

- Abbott, Mike, Ross Finnie and Ted Wannell (2000). *Gender Differences in Earnings Growth of Recent University Graduates in Canada: Empirical Evidence from the National Graduate Surveys*. Research Paper R-00-1-2E. Ottawa: Human Resources Development Canada and Statistics Canada, 94p.
- Appleby, John, Daniel Boothby, Manon Rouleau and Geoff Rowe (1999). "Distribution of Rate of Return by Field of Study and Level of Education in Canada." Unpublished working paper. Ottawa: Applied Research Branch, Strategic Policy, Human Resources Development Canada.
- Appleby, John and Manon Rouleau (1999). "Est-il rentable de poursuivre des études postsecondaires au Canada: une analyse temporelle des rendements à l'éducation." Unpublished working paper. Ottawa: Applied Research Branch, Strategic Policy, Human Resources Development Canada.
- Boothby, Dan (2000a). *Earnings Differences by Detailed Field of Study of University Graduates*. Research Paper R-00-1-5E. Ottawa: Human Resources Development Canada and Statistics Canada, 63p.
- Boothby, Dan (2000b). *The Trade-Vocational Educational Pathway in Canada: 1990 Trade-Vocational Graduates in the 1992 National Graduates and 1995 Follow-up Surveys*. Research Paper R-00-1-6E. Ottawa: Human Resources Development Canada and Statistics Canada, 88p.
- Burbridge, John and Ross Finnie (2001). *Employment Outcomes and the Interprovincial Mobility of Baccalaureate Graduates*. Research Paper R-00-2-2E. Ottawa: Human Resources Development Canada and Statistics Canada, 45p.
- Burbridge, John and Ross Finnie (2000). *The Geographical Mobility of Baccalaureate Graduates: Evidence from three Cohorts of the National Graduates Surveys, 1982, 1986 and 1990*. Research Paper R-00-1-8E. Ottawa: Human Resources Development Canada and Statistics Canada, 51p.
- Butlin, George (2000). "Bachelor's graduates who pursue further postsecondary education," *Education quarterly review*, Vol. 7, No. 2; also, *1990 Bachelor's Graduates Who Pursue Further Post-Secondary Education*. Research Paper R-00-1-4E. Ottawa: Human Resources Development Canada and Statistics Canada, 42p.
- Finnie, Ross (2001). "Setting Up Shop: Self-Employment Amongst Canadian University Graduates." Ottawa: Human Resources Development Canada and Statistics Canada, Forthcoming, Research paper R-00-2-4E.
- Finnie, Ross (1999a). *A Dynamic Analysis of the School-to-Work Transition of Post-Secondary Graduates in Canada*. Research Papers R-99-14E. Ottawa: Applied Research Branch, Strategic Policy, Human Resources Development Canada, 97p.
- Finnie, Ross (1999b). *Earnings of Post-Secondary Graduates in Canada: Changes in the Structure of Earnings in the 1980s and 1990s*. Research Paper R-99-12E.b. Ottawa: Applied Research Branch, Strategic Policy, Human Resources Development Canada, 50p.
- Finnie, Ross (1999c). *Earnings of Post-Secondary Graduates in Canada: Holding their Own—Trends in Employment Rates and Earnings Levels*. Research Paper R-99-12E.a. Ottawa: Applied Research Branch, Strategic Policy, Human Resources Development Canada, 36p.
- Finnie, Ross (1999d). *Earnings of University Graduates in Canada by Discipline: Fields of Plenty, Fields of Lean—A Cross-Cohort, Longitudinal Analysis of Early Labour Market Outcomes*. Research Paper R-99-13E.a. Ottawa: Applied Research Branch, Strategic Policy, Human Resources Development Canada, 58p.
- Finnie, Ross (1999e). *Earnings of University Graduates in Canada by Discipline: What You Study Matters—An Econometric Analysis of Earnings Differences of Bachelor's Level Graduates*. Research Paper R-99-13E.b. Ottawa: Applied Research Branch, Strategic Policy, Human Resources Development Canada, 44p.
- Finnie, Ross and Saul Schwartz (1996). *Student Loans in Canada: An Economic Analysis of Borrowing and Repayment Using the National Graduates Surveys*. Working Paper W-96-3E. Ottawa: Applied Research Branch, Strategic Policy, Human Resources Development Canada, 51p.
- Finnie, Ross and Gaétan Garneau (1996). *Student Loans in Canada. A Cross-Cohort Micro Analysis of Student Borrowing for Post-Secondary Education*. Research Paper R-96-16E. Ottawa: Applied Research Branch, Strategic Policy, Human Resources Development Canada, 28p.
- Finnie, Ross and Marie Lavoie (1999). "Careers in Science and Technology in Canada: Evidence on Recent Graduates." Unpublished research paper. Ottawa: Applied Research Branch, Strategic Policy, Human Resources Development Canada.
- Finnie, Ross and Marie Lavoie (1997). *The School-to-Work Transition of Engineering Graduates: A Cross-Cohort, Longitudinal Analysis of Four Major Decisions in the Engineering Career*. Research Paper R-97-3E. Ottawa: Applied Research Branch, Strategic Policy, Human Resources Development Canada, 36p.
- Frank, Jeff and Éric Bélair (2000). "Stateward Bound." Ottawa: Statistics Canada, Canadian Social Trends, No. 56, Spring.
- Frenette, Marc (2000). *Which Fields of Study Lead to Satisfying Jobs: Evidence on the Level and Growth of Job Satisfaction*. Research Paper R-00-1-7E. Ottawa: Human Resources Development Canada and Statistics Canada, 47p.
- Krahn, Harvey and Jeffrey W. Bowlby (2000). *Education-Job Skills Match: An Analysis of the 1990 and 1995 National Graduates Surveys*. Research Paper R-00-1-1E. Ottawa: Human Resources Development Canada and Statistics Canada, 85p.
- Lavallée, Laval, Bert Pereboom, Irving Silver and Ted Wannell (2000). *Employment Equity Groups Among Post-Secondary Graduates*. Research Paper R-00-1-3E. Ottawa: Human Resources Development Canada and Statistics Canada, 71p.
- Lavoie, Marie and Ross Finnie (1997a). *The Management Ladder for Recent Engineering Graduates in Canada*. Research Paper R-97-15E. Ottawa: Applied Research Branch, Strategic Policy, Human Resources Development Canada, 37p.
- Lavoie, Marie and Ross Finnie (1997b). *Is It Worth Doing a Science or Technology Degree in Canada? Empirical Evidence and Policy Implications*. Research Paper R-97-16E. Ottawa: Applied Research Branch, Strategic Policy, Human Resources Development Canada, 44p.
- Lavoie, Marie and Ross Finnie (1996a). *The Accumulation of Technology: A Cross-Cohort Longitudinal Analysis of Recent Engineering Graduates*. Working Paper W-96-10E. Ottawa: Applied Research Branch, Strategic Policy, Human Resources Development Canada, 130p.

Lavoie, Marie and Ross Finnie (1996b). *The Early Careers of Engineers and the Accumulation of Skills in the Canadian Economy*. Research Paper R-97-4E. Ottawa: Applied Research Branch, Strategic Policy, Human Resources Development Canada, 21p.

Lavoie, Marie and Ross Finnie (1996c). *The Occupational Dynamics of Recent Canadian Engineering Graduates Inside and Outside the Bounds of Technology*. Research Paper R-97-5E. Ottawa: Applied Research Branch, Strategic Policy, Human Resources Development Canada, 31p.

Lin, Zeng, Robert Sweet, Paul Anisef and Hans Schuetze (2000). *Consequences and Policy Implications for University Students Who Have Chosen Liberal or Vocational Education: Labour Market Outcomes and Employability Skills*. Research Paper R-00-2-3E. Ottawa: Human Resources Development Canada and Statistics Canada, 48p.

Silver, Irving, Laval Lavallée and Bert Pereboom (2000). *Labour Market Transitions of Graduates*. Research Paper R-00-1-9E. Ottawa: Human Resources Development Canada and Statistics Canada, 53p.

Wannell, Ted and Nathalie Caron (1994a). *A Look at Employment-Equity Groups Among Recent Post-Secondary Graduates: Visible Minorities, Aboriginal Peoples and the Activity-Limited*. Ottawa: Statistics Canada, Analytical Studies Branch, Research Paper Series, No.69, 61p.

Wannell, Ted and Nathalie Caron (1994b). *The Gender Earnings Gap Among Recent Post-Secondary Graduates, 1984-92*. Ottawa: Statistics Canada, Analytical Studies Branch, Research Paper Series, No.68, 42p.

Wannell, Ted, Bert Pereboom and Laval Lavallée (2000). *Does the Straight and Narrow Pay? The Path to a Degree and Labour Market Outcomes*. Research Paper R-00-2-1E. Ottawa: Human Resources Development Canada and Statistics Canada, 43p.

Survey reports (in chronological order)

Barr-Telford, Lynn, Geoff Bowlby, Warren Clark (1996). *The Class of 86 Revisited: Compendium of Findings of the 1991 Follow-up of 1986 Graduates Survey with Comparisons to the 1988 National Graduates Survey*. Ottawa: Human Resources Development Canada and Statistics Canada.

Clark, Warren, Margaret Laing and Edith Rechnitzer (1986). *The Class of 82: Summary Report on the Findings of the 1984 National Survey of the Graduates of 1982*. Ottawa: Secretary of State and Statistics Canada.

Clark, Warren (1989). *The Class of 82 Revisited: A Compendium of Findings of the 1987 Follow-up of 1982 Graduates Survey with Comparisons to the 1984 National Graduates Survey*. Ottawa: Employment and Immigration Canada and Statistics Canada, Catalogue LM 134E91.

Clark, Warren (1991). *The Class of 1986: A Compendium of Findings of the 1988 National Graduates Survey of 1986 Graduates with Comparisons to the 1984 National Graduates Survey*. Ottawa: Employment and Immigration Canada and Statistics Canada, Catalogue LM 198E92.

Frank, Jeff and Éric Bélair (1999). *South of the Border: Graduates from the Class of '95 Who Moved to the United States*. Ottawa: Human Resources Development Canada and Statistics Canada, Catalogue MP43-366/2-1999.

Little, Don and Louise Lapierre (1996). *The Class of 90: A Compendium of Findings from the 1992 National Graduates Survey of 1990 Graduates*. Ottawa: Human Resources Development Canada and Statistics Canada, Catalogue SC-125-12-96E.

Paju, Mike (1997). *The Class of '90 Revisited: Report of the 1995 Follow-up Survey of 1990 Graduates*. Ottawa: Human Resources Development Canada and Statistics Canada, Catalogue SC-082-10-97.

Taillon Jacques and Mike Paju (1999). *The Class of '95: Report of the 1997 National Survey of 1995 Graduates*. Ottawa: Human Resources Development Canada and Statistics Canada, Catalogue SP-121-04-99.

Information on the NGS methodology

Clark, Warren, Margaret Laing and Edith Rechnitzer (1986). *The Class of 82: Summary Report on the Findings of the 1984 National Survey of the Graduates of 1982*. Ottawa: Secretary of State and Statistics Canada.

Clark, Warren (1991). *The Class of 1986: A Compendium of Findings of the 1988 National Graduates Survey of 1986 Graduates with Comparisons to the 1984 National Graduates Survey*. Ottawa: Employment and Immigration Canada and Statistics Canada, Catalogue LM 198E92.

Little, Don and Louise Lapierre (1996). *The Class of 90: A Compendium of Findings from the 1992 National Graduates Survey of 1990 Graduates*. Ottawa: Human Resources Development Canada and Statistics Canada, Catalogue SC-125-12-96E.

Taillon, Jacques and Mike Paju (1999). *The Class of '95: Report of the 1997 National Survey of 1995 Graduates*. Ottawa: Human Resources Development Canada and Statistics Canada, Catalogue SP-121-04-99.

About this Bulletin...

The Applied Research Bulletin is a Human Resources Development Canada document summarizing recent work of a research or analytical nature carried out primarily under the auspices of the Applied Research Branch, Strategic Policy. Publishing is coordinated by the Branch.

Mailing address: Applied Research Branch, Human Resources Development Canada, 165 Hôtel de Ville Street, Phase II, 7th Floor, Hull, Quebec, Canada K1A 0J2
Internet site for the Bulletin and other publications:
<http://www.hrdc-drhc.gc.ca/arb>

Copies of papers or changes to the mailing list:

E-mail: research@spg.org
Telephone: (819) 994-3304
Fax: (819) 953-9077

ISSN: 1483 2852