

Education, Employment and Utilization Patterns of French-Canadian and English-Canadian Engineering Graduates

Les ingénieurs canadiens français et canadiens anglais : une comparaison

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Résumé de l'article

Cette étude compare l'éducation, l'emploi, la mobilité et les salaires d'un certain nombre d'ingénieurs gradués de langue anglaise et de langue française. Quoique notre principale préoccupation ait été l'aspect « emploi », nous devions considérer les autres facettes de ce problème.

Les canadiens français ont un meilleur dossier académique et font preuve d'une plus grande ambition que leurs confrères de langue anglaise. Ce sont néanmoins ces derniers qui, proportionnellement, présentent le plus haut taux d'inscription aux études graduées. Ceci est probablement dû au fait qu'un plus grand choix d'écoles et de programmes leur était disponible. Notons cependant qu'une fois entreprises, les études graduées ont eu une grande influence sur les étudiants de langue française, donnant ainsi à leur carrière une direction à peu près semblable à celle des ingénieurs de langue anglaise.

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Les patrons d'emploi des deux groupes ethniques présentent de grandes similarités. En plus de les retrouver dans la plupart des occupations, des fonctions et des industries, les détenteurs de diplômes supérieurs, tant français qu'anglais, occupent des fonctions hautement spécialisées et remplissent souvent, surtout pour les gradués des dernières années, des postes autres que ceux relevant du génie.

Cependant, alors que les canadiens français recherchent la reconnaissance et la responsabilité de « professionnel » les canadiens anglais semblent plus pressés d'occuper des postes de direction. Il y a peu ou pas de différence entre les deux groupes quant à la mobilité, à l'effort et à la satisfaction du génie comme préparation sous-graduée désirable au monde du travail. Il y a cependant une différence frappante entre les deux groupes quant à la distribution entre les secteurs industriels. Alors qu'on retrouve les canadiens français dans le secteur des services, leurs confrères de langue anglaise démontrent un haut degré de concentration dans le secteur manufacturier. L'analyse démontre clairement que de telles différences peuvent être attribuées tant au patronage qu'à la discrimination qui semble cependant plus justifiée dans le cas des services canadiens-français à l'endroit des gens de langue anglaise qu'à l'intérieur des entreprises manufacturières à direction anglaise contre les canadiens français. Cette situation change quelque peu et on peut s'attendre à trouver de plus en plus d'ingénieurs canadiens français dans le secteur manufacturier.

Les revenus annuels des gradués d'expression française et de langue anglaise étaient également relativement élevés au moment de l'enquête. La langue maternelle n'était pas une variable significative pour expliquer les variations dans les traitements. Occuper des postes de direction, être son propre patron et un certain nombre d'autres facteurs démontrèrent une corrélation positive et significative avec le revenu annuel. Malgré la rémunération apparemment bonne et un certain nombre d'autres circonstances, les gradués évaluèrent leur satisfaction vis-à-vis leur travail et leur entourage comme moyenne. On nota plusieurs exemples de sous-utilisation surtout chez les plus jeunes gradués à qui on ne confiait pas assez de responsabilités et qui n'utilisaient pas leur formation dans l'exécution de leurs tâches quotidiennes. Il y a cependant dans l'ensemble peu de désillusion vis-à-vis le métier d'ingénieur : le passage du temps, l'opportunité de faire des changements et la flexibilité du marché du travail sont autant de moyen d'accroître l'utilisation de ces ressources humaines et partant leur satisfaction.

On peut tirer deux conclusions de ce qui précède. Contrairement à certaines croyances et plusieurs écrits, les canadiens français couverts par cette étude semblent être pleinement intégrés au contexte industriel et économique des années '60. Ils font preuve d'une grande performance académique, de réussite, de mobilité et d'adaptabilité aux conditions de travail. Ils égalent à plusieurs égards et souvent dépassent les qualités et les qualifications de leurs confrères de langue anglaise. En second lieu, les ressemblances entre les deux groupes quant à leur éducation, leur travail et leur « pattern » d'utilisation sont beaucoup plus impressionnantes que les différences. L'explication peut bien en être que, pour atteindre ce résultat, les canadiens français devaient exceller dans quelques-uns sinon tous les aspects déjà mentionnés. Plus les programmes scolaires vont devenir semblables et plus il y aura de changements institutionnels, plus les patterns d'emploi des deux groupes ethniques vont simplement refléter les préférences et les désirs de chacun.

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Education, Employment and Utilization Patterns of French-Canadian and English-Canadian Engineering Graduates

Andrew C. Gross

In this article, the author compares the experience of French-speaking and English-speaking engineering graduates in Canada, focusing on similarities and differences in their education, employment and utilization patterns. This essay is based on a larger study which has dealt with engineering manpower in Canada.

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manpower in Canada. ⁽¹⁾ Both works are based on the author's 1965-1966 survey of those college graduates who received their bachelor's degrees in electrical engineering from a Canadian university in 1954, 1959, and 1964. Of a total population of 1,187 such graduates, 819 or about 70 per cent responded to a mail questionnaire. The choice of this branch of the engineering profession and the specific years of graduation was dictated by several considerations : relative homogeneity of education; standardization for years of experience; growing importance of this branch of engineering; existence of a pilot study of 1954 graduates by the Department of Labour; and the author's own experience in the field of electrical engineering.

In the mail survey, graduates of the universities of Laval, Montreal, Ottawa, and Sherbrooke received French-language questionnaires, while all others received the English-language version. ⁽²⁾ In other words, the classification of respondents in the survey and in this report as French-Canadians and English-Canadians was based on university attended, rather than on native tongue. Table 1 illustrates that the relationship between the two methods of classification is quite close.

TABLE 1 — RESPONDENTS INCLUDED IN SURVEY, BY NATIVE LANGUAGE AND UNIVERSITY ATTENDED

	Class of		
	1954	1959	1964
1. English-Canadian university alumni	129	211	318
2. Native language : other than French	123	206	315
3. French-Canadian university alumni	26	56	79
4. Native language : French	29	60	70
5. No answer on alma mater	0	0	0
6. No answer on native language	3	1	6
TOTAL of lines 1 3, 5, or lines 2, 4, 6 = n =	155	267	397

(1) Andrew C. Gross, *Engineering Manpower in Canada*, unpublished Ph.D. dissertation, The Ohio State University, 1968. Areas investigated included historical information, supply of and demand for engineers, patterns of formal education, labor market experiences, and utilization of graduates in their employment.

(2) The classification of the University of Ottawa as French-Canadian is somewhat arbitrary, since it is a truly bilingual school (the only one in the survey). Its student body, faculty, and policies appear to be more French than English-Canadian. At any rate, since the number of respondents from this school is relatively small, changing the classification would not alter the results.

A detailed examination of the individual questionnaires revealed that only few French-Canadians attended English-Canadian universities and practically no English-Canadians entered French-Canadian universities. Those whose native tongue was neither English nor French generally attended English-Canadian universities (85 per cent of such graduates). In sum, for all practical purposes, French-Canadians and French-Canadian university graduates are interchangeable terms in this study, while English-Canadians or English-Canadian university graduates encompass those whose native tongue is not French.

Education

Since changes in curricula, characteristics of students, and extent of graduate schooling affected subsequent employment patterns, a brief discussion of these topics is appropriate. To ascertain changes in the engineering programs themselves, two different approaches have been used. The first involved a survey of journal articles during the 1950-1965 period; the second consisted of analyzing changes in specific college curricula during the same interval. The study of published information revealed a mixed and rather uncertain situation. In the words of one writer : « Some schools lean toward the scientifically oriented curriculum, others help the good solid practicing type engineer . . . but most schools steer a wobbly path between these. » ⁽³⁾ There was relatively little agreement on content and even less on the goals of engineering education. To analyse at least the former, the writer has personally examined over 60 college calendars and 5,000 individual courses. A summary of the results can be seen in Part A of Table 2. Engineering craftsmanship courses were deemphasized in both French and English-language universities between 1950 and 1965. French-Canadian universities did stress mathematics and physical science subjects to a greater extent than did their English-language sister institutions, though the difference was more salient at the beginning than at the end of the period. The share devoted to non-technical, elective, and optional courses, on the other hand, received greater emphasis in English-Canadian universities. In comparing Canadian with U.S. engineering programs, it was surprising to find that French-Canadian univer-

(3) H. G. Conn, "Engineering Education in Canada" in *Engineering Journal*, December, 1968, p. 39. Others writing on the same topic in the same journal in the 1960's include L. Boulet, C. Campling, R. Chant, G. Ford, W. Heslop, S. Kalra, B. Myers, D. Myers, et al.

TABLE 2 — SELECTED ASPECTS OF UNDERGRADUATE AND GRADUATE EDUCATION,
YOUNG CANADIAN ELECTRICAL ENGINEERING GRADUATES

	1954 class		1959 class		1964 class	
	Native tongue not French	Native tongue French	Native tongue not French	Native tongue French	Native tongue not French	Native tongue French
PART A :						
DISTRIBUTION OF UNDERGRADUATE CURRICULUM (100%)(a)						
% devoted to mathematics and physical sciences	26%	44%	29%	44%	30%	38%
% devoted to engineering theory and practice	66%	53%	62%	50%	49%	50%
% devoted to electives and non-technical courses	8%	3%	9%	6%	21%	12%
Number of universities	8	2	10	3	15	4
Part B :						
UNDERGRADUATE ACADEMIC PERFORMANCE (0-100 SCALE)						
Mean overall grade average	73.3	77.3	72.4	76.1	70.1	75.6
Standard deviation	6.2	4.9	6.6	4.1	6.2	5.8
% of respondents with 80 or above average	18.7%	53.8%	16.6%	32.2%	11.6%	30.4%
Number of respondents = n	129	26	211	56	318	79
PART C :						
GRADUATE SCHOOLING AND ADVANCE DEGREE HOLDING AS OF SEPTEMBER, 1965 (b)						
% some time in graduate school	31.8%	23.1%	40.2%	33.9%	29.5%	19.0%
% choosing engineering or science as study area (c)	20.7%	19.9%	27.7%	24.7%	21.5%	17.1%
% holding master or doctor degrees, all areas (d)	14.7%	11.6%	26.5%	25.0%	4.4%	8.9%
Number of respondent s = n	129	26	211	56	318	79

Notes : a. Based on total program taken by members of the respective classes.

b. Percentages are not cumulative, but each line is based on "n".

c. This line as percentage of previous line : 65, 86, 69, 73, 73, 90.

d. This line as percentage of first line : 46, 50, 66, 73, 15, 46. These completion rates will rise for 1964 class members, since many were still enrolled in graduate programs at time of the survey.

sities came closer in their curriculum designs to American schools than the English-language universities. (4)

Engineering students and graduates have been frequently pictured as persons interested mostly in mechanisms and equations as they pursue technical careers. Research by others and the writer show that these men have diverse interests and like to work with people as much as with machines and abstract concepts. They are usually uncommitted to a specific career or organization. They come from a low socio-economic background and possess high intelligence relative to most other college graduates. (5) Engineering was chosen as a field of study, because it offered the quickest way to a profession, while law or medicine would have taken much longer. Because of their background and ability, engineering graduates are both ambitious and confident. If success cannot be attained in engineering, they are likely to seek areas where higher remuneration and status can be found, such as managerial occupations. They believe that engineering education prepared them for a range of diverse careers.

The quality of relatively high intellectual ability served the graduates well, since engineering education is known for its rigour and high standards. A McGill University survey of engineering students enrolled in that institute between 1910 and 1948 showed that the quality of undergraduates was equally high at the beginning and at the end of the period, despite equal or higher standards in 1948. (6) Yet in recent years and at least for the graduates surveyed here, there has been some decline in academic performance. The small, but significant decrease in academic averages from the 1954 to 1964 class, shown in Part B of Table 2, may be due to higher standards, increased enrolments, and to what is called « the knowledge explosion. » The French-Canadians performed significantly better in each class than the English-speaking respondents ; this is especially clear when comparing the share of respondents in the two groups with 80 or better overall grade average in the undergraduate years.

(4) For trends in the U.S., see R. Kloeffler, "100 Electrical Engineering Curricula," in *Electrical Engineering*, May, 1954, pp. 398-400 and L. Dwon, "Forces Influencing Engineering Education . . .," in *IEEE Transactions on Power Apparatus and Systems*, August, 1964, p. 828.

(5) These statements apply to engineering students in North America regardless of branch. Findings reported in this paragraph are based on an exhaustive survey of the literature, including *Psychological Abstracts*, 1929-1965 volumes ; data from the Dominion Bureau of Statistics and the U.S. Office of Education ; and the author's primary research in Canada and U.S.

(6) "Academic Performance," in *Engineering Journal*, May, 1955, p. 653.

Again, several forces may be at work : a more selective process, an easier grading standard, a more science-oriented curriculum, or an increased desire on the part of students at French-Canadian universities.

Factors influencing the extent of graduate schooling are similar to those which affect undergraduate training : individual aptitudes and desires, requirements of employers and universities, return on investment on such education, and opportunities for and support given to such preparation. ⁽⁷⁾ These factors, with the exception of high starting salaries for college graduates, reinforced each other so strongly that graduate school enrolments have been rising faster than undergraduate enrolments. The sharp rise in graduate engineering enrolment is attributable to advances in technology, increased hiring standards of employers, and decreases in the private cost of such schooling. The impact of the electronics revolution and the ensuing emphasis given to continuing education have influenced the electrical engineering graduates surveyed here to pursue graduate studies. ⁽⁸⁾ Among the 819 respondents, 260 or 32 per cent have undertaken advanced studies on a full or part-time basis and among this group 113 held master or doctor degrees as of late 1965. Both enrolment and completion rates will rise ; graduate schooling sometimes begins five years or more after obtaining the bachelor's degree and many 1964 class members were still in graduate school at the time of the survey.

When the graduate enrolment rates of the two major ethnic groups are compared, as is done in Part C of Table 2, a significant difference emerges showing an overall rate of 33 per cent for the English and 25 per cent for the French-Canadians. The Difference is especially remarkable in the light of (1) better academic performance of French-Canadians at the undergraduate level and (2) the science-oriented curricula of French-Canadian universities which would seem highly appropriate training for graduate studies. The results shown can be accounted for in part by the narrower choice of colleges and programs available to the French-Canadians in their native language. Another factor may be the stronger success-orientation of the French and their eagerness to enter well-remunerated positions as soon as possible. Once the French-Canadians undertake graduate studies, usually in engineering or science, they

⁽⁷⁾ For economic analysis see B. W. Wilkinson, *Studies in the Economics of Education* Ottawa, Department of Labour, 1966, and S.J. Mushkin (ed.), *Economics of Higher Education* Washington ; Government Printing Office, 1962.

⁽⁸⁾ For a summary of issues, see H. A. Foecke, "Continuing Education for the Engineer," in *Science*, May 13, 1966, p. 882.

do just as well as English-Canadians in completing requirements for an advanced degree. ⁽⁹⁾

Employment and Mobility

Before comparing the employment and mobility patterns of French-Canadians and English-Canadians, findings applicable to both groups should be summarized. Judging by their job titles and related information, about one-half of the employed electrical engineering graduates held positions as electrical engineers in 1965. The other half entered into other engineering, managerial, other civilian (mostly professional), and military occupations. Furthermore, even at the very beginning of their careers, about 40 per cent of the respondents shunned the field for which presumably their undergraduate education prepared them. More flexible curricula, new fields of technology, ambition, and lack of commitment to a specific area or occupation contributed to this phenomenon. The movement into managerial occupations became pronounced about five years after graduation and it got stronger with additional years of experience. The causal factors in this process were likely to be the limited number of high-level technical openings, higher remuneration, and better status attached to executive positions. Where graduates were unable to move into management, they often compensated for it by entering into administrative activities while nominally still holding an engineering occupation.

In terms of industrial deployment, about one-third of the respondents were found in manufacturing industries. The transportation, communication, and utility sectors, though still major employers, attracted and retained a decreasing share of the graduates; the opposite held true for the expanding sectors of government, education, and consulting services. About 40 per cent of the respondents were still employed in their first jobs six and even eleven years after leaving college. For mobile graduates, the process of job changing consisted of one move about every five years. Flexibility by both graduates and employers in the labor market is indicated by the fact that job shifts involving simultaneous changes in employer, industry, and occupation ranked first among all types of job changes in the first 5-year period after graduation and second during the next 5-year interval. Intrafirm occupational changes were about one-third

⁽⁹⁾ Note footnotes c. and d. in Table 2. Note also the relatively high rate of graduate enrolment for French-Canadians in the 1959 class compared to the 1954 and 1964 classes.

as high as all interfirm occupational job shifts, indicating that internal labor markets are important and often act as substitutes for job shifts between employers.

The employment and mobility patterns as well as related measures for French and English-speaking graduates are compared in Table 3. On the whole, one is impressed by the similarities rather than by the differences in the labor market behavior of the two groups. Similar undergraduate education, the strength and type of demand for engineering graduates, and the forces of industrialization reaching Quebec in the past decade account for the creation of similar patterns.⁽¹⁰⁾ Differences between the two groups can be attributed to specific distinctions in the educational and social background of the respondents. Thus, for example, a larger share of French than English start out and remain in engineering occupations, principally because the engineering-science orientation of French-Canadian universities was greater than that of the English-language institutions. Differences in the extent and type of graduate schooling reinforced the above patterns. But when there is substantial graduate training on the part of French-Canadians, as was the case for the 1959 class, employment patterns are again more similar. Admittedly, graduate studies were undertaken by one-fourth of both ethnic groups in that class ; but advanced training had apparently a greater differential impact on the careers of French-speaking respondents.

French-Canadians differ little from English-Canadian graduates in actual and potential mobility (job shifts made and job offers received), hours worked, and some other, similar measures. But young French-Canadians seem more ambitious, act without direct supervision for a longer time, and are more eager for professional recognition than the English. These results and comments made on individual questionnaires reflect a strong « drive » on the part of the French. They seem to be able and willing to match English-Canadians in job aggressiveness. They will also assert themselves in matters relating to the profession, often taking a strong and independent course of action. (An example of just such action recently is the independant attitude of the Corporation of Engineers of Quebec toward collective bargaining, salary surveys, etc). In sum, for the group of French-Canadians in the present survey, somewhat con-

(10) For some comments on the last area, see E. C. Hughes, *French-Canada in Transition* Chicago, University of Chicago Press, 1963, and H. F. Quinn, *Union Nationale* Toronto, University of Toronto Press, 1963, and hearings before the Royal Commission on Bilingualism and Biculturalism.

trary to John Porter's thesis, ⁽¹¹⁾ their education provided them with useful industrial skills at the technical and even administrative level. For the most part, they appear to be fully integrated into the economy of the 1960's.

It has been frequently alleged by many observers, including Professor Porter, that « by and large the British run the industrial life of Quebec. » ⁽¹²⁾ The charge of actual discrimination by English-Canadians against French-Canadians has also been raised. The data at hand permit a brief analysis of the manner in which native language and other variables interact and influence employment patterns, though the charge of discrimination will not be easy to demonstrate. In the United States, Herman Miller showed that employment patterns of whites and non-whites with equivalent education differed sharply and that educated Negroes were often working on menial tasks. ⁽¹³⁾ But French-Canadians in this survey frequently held positions comparable in every respect to those of English-Canadians and where differences did occur, they could be attributed to traditional preferences, social settings, or distinct educational programs. What the following paragraphs consider is whether or not employment patterns occur as a result of justifiable differences and preferences.

It will be recalled that about 36 per cent of all full-time workers from the three graduating classes worked in manufacturing industries. This figure is applicable nationwide and within the Province of Quebec. As Table 6 shows, however, there was a significant difference in the share of the two ethnic groups in Quebec manufacturing industries : 23 per cent for French and 54 per cent for English-speaking Canadians. Once hired, the French receive as much or more remuneration as the English-speaking graduates ; thus, discrimination, if any, occurs at the time of hiring, not thereafter. Turning next to the transportation and communication industries, one finds no significant differences between the share of jobs held by the two ethnic groups. But in utilities, represented primarily by the large power firm of Hydro-Quebec, a most salient difference in proportions exists : French was the native language of every respondent.

(11) John Porter *The Vertical Mosaic*, University of Toronto Press, Toronto, 1965, p. 92. In fairness, the full sentence should be quoted : « In the main, French-Canadian education was never geared to the provision of industrial skills at the managerial or technical level. »

(12) *Ibid.*

(13) Herman Miller, *Income of the American People*, J. Wiley & Sons, N. Y., 1955, pp. 46-47. The situation has improved somewhat since the mid-1950's.

TABLE 3 — SELECTED CHARACTERISTICS OF EMPLOYED YOUNG CANADIAN ELECTRICAL ENGINEERING GRADUATES,
BY NATIVE LANGUAGE, 1965

Percentage of respondents with characteristic shown (a)	1954 class			1959 class			1964 class		
	Native tongue : not French	Native tongue : French	Significant difference (where shown)	Native tongue : not French	Native tongue : French	Significant difference (where shown)	Native tongue : not French	Native tongue : French	Significant difference (where shown)
1. Started employment in engineering occupation	82.9%	96.6%	p < .05	68.3%	69.5%		63.7%	81.6%	p < .05
2. Working in engineering occupation now (1965)	54.5%	75.9%	p < .05	68.4%	72.4%		77.3%	89.7%	p < .05
3. Working in mining construc- tion or manufacturing now	40.7%	17.2%	p < .05	39.0%	30.4%		49.0%	30.9%	p < .05
4. Working in transport, com- munication or utilities now	23.5%	55.2%	p < .05	23.6%	26.8%		23.9%	52.9%	p < .05
5. Primary activity : technical function	29.3%	20.7%		32.7%	27.6%		58.3%	59.7%	
6. Primary activity : high-level technical function (b)	21.1%	10.3%		26.0%	20.7%		13.8%	14.9%	
7. Working over 50 hours per week	42.0%	28.6%		37.9%	36.4%		21.8%	19.7%	

8. Residing in Canada	81.3%	96.6%	p < .05	89.3%	96.6%		97.2%	95.6%	
9. Made no job shifts since graduation	33.3%	55.2%	p < .05	48.4%	41.4%		55.6%	45.5%	
10. Act on own initiative for less than 1 week	28.9%	41.4%		42.0%	39.6%		63.2%	49.6%	p < .05
11. Do engineering work more than half the time	43.3%	51.7%		55.2%	54.4%		48.4%	53.7%	
12. Hold professional engineer license	82.1%	93.1%		77.0%	94.7%	p < .05	—	—	
13. Hold engineer-in-training license	—	—		—	—		69.5%	89.7%	p < .05
14. Would like to be successful	65.8%	65.5%		61.4%	78.9%	p < .05	61.2%	80.9%	p < .05
15. Would choose same major again in college (c)	60.2%	75.0%		70.4%	70.3%		74.8%	78.8%	
16. Had no job offers in past 12 months	52.1%	37.9%		48.4%	41.4%		55.6%	45.5%	
TOTAL (d) — no.	123	29		196	58		248	68	

Notes: a. Applicable to those working full-time now, except as noted below.

b. Research, development, teaching, consulting.

c. Includes those not working full-time now; data for employed persons only would be 1 to 2 percentage points less.

d) Excludes 11 respondents who failed to answer certain questions.

TABLE 4 — DISTRIBUTION OF EMPLOYED YOUNG CANADIAN ELECTRICAL
ENGINEERING GRADUATES IN QUEBEC, BY INDUSTRY
AND NATIVE LANGUAGE, 1965

Industry	Employed graduates from three graduating classes			
	Province of Quebec			All locations, both groups
	Native tongue : not French	Native tongue : French	Significant difference (where shown)	
Manufacturing	53.9%	23.0%	p < .05	36.1
Transport., communication	25.5	18.7		13.1
Utilities	0.0	28.1	p < .05	14.0
Government, all levels	6.9	12.2		12.2
All other industries	13.7	18.0		20.9
TOTAL — p.c.	100. %	100. %		100. %
— no.	102	139		731

One may argue that « discrimination » against the French in the manufacturing sector has been more than offset by « discrimination » against the British in utilities. However, it is also possible to contend that there is no discrimination and that the patterns which evolved are attributable to mutual preferences of employers and employees for each other, in the respective industries. The data are consistent with either hypothesis and a clearcut choice cannot be made without additional evidence. An examination of the extent of bilingualism between the two ethnic groups can and does illuminate one possible reason for the apparent discriminations or preferences.

An employee of a Canadian manufacturing firm in Quebec should be bilingual in order to deal with his fellow workers and with the suppliers and clients of the firm. If given an intrafirm, but interprovincial transfer, such an employee must have a command of the English language, since all other provinces are dominated by English-speaking Canadians. But French-Canadian graduates meet the test of bilingualism : 95 per cent of them are fluent in English. Utility operations in Quebec, as elsewhere, are local in character ; intrafirm transfers are also intraprovincial ; and contact with fellow workers and customers is frequent. Since the majority of the population in Quebec (and even within Greater Montreal) is French-speaking, the command of the language is rightfully a prerequisite for employment. English-speaking respondents in this survey are not truly bilingual : only 18 per cent of them speak another language fluently and in a third of these cases the other language is not French. Thus, the discriminatory or premerential practices of Quebec utilities can be more readily explained than those of Quebec manufacturing enterprises.

In the light of intuitive beliefs that in general French-Canadians tend to be immobile and some evidence that in fact their intergeneration occupational mobility has been relatively low, ⁽¹⁴⁾ the relationship between native language and interfirm mobility was examined. Figures in Table 3 provide a summary of the situation. Approximately 55, 33, and 85 per cent of the 1954, 1959, and 1964 French-Canadian graduates were still in their first jobs at the end of 1965. The corresponding figures for English-speaking graduates were 33, 44, and 89 per cent, respectively. Thus, only in the case of the 1954 class was there a significant difference between the two ethnic categories. The fact that occupational changes frequently accompany moves between employers have been already noted. The more extensive graduate schooling of both ethnic groups in the case of the 1959 class (and, it may be safely presumed, in case of the 1964 class), the more progressive climate prevailing in Quebec since 1960, and recent changes in the policies of manufacturing organizations have probably all contributed to the relative rise in the mobility of the French-Canadian respondents. In view of the evidence reported earlier, the end result is encouraging, whether or not the factors cited are the truly causal ones.

(14) Yves de Jocas and Guy Rocher, « Inter-Generation Occupational Mobility in the Province of Quebec, » in *Canadian Journal of Economics and Political Science*, February 1957, pp. 57-68.

Earnings and Utilization

In 1965, mean annual earnings of 1954, 1959, and 1944 French-Canadian electrical engineering graduates were \$11,220, \$9,330, and \$6,550. Corresponding remuneration of graduates whose native tongue was not French amounted to \$10,480, \$8,740, and \$6,450. This is an especially interesting finding in the light of three additional bits of information : (1) salaries in manufacturing were higher than those paid by utilities and related industries, (2) managerial occupations were better paid than engineering ones, and (3) English-Canadians showed a higher concentration in manufacturing and in managerial occupations than did the French-Canadian group. But one-way and even two-way classifications are liable to be distorted by the phenomena of association and interaction. Thus, it was decided to use multiple linear regression analysis to assess the relative impact of numerous factors on income. The results of this analysis, performed for each class and certain sub-groups, are reported in detail elsewhere.⁽¹⁵⁾ Among the variables showing significant, positive correlation with annual salary were these : self-employed status, managerial occupation, residency in the U.S., months spent in present job, academic performance, hours worked, and professional registration. Mobility (actual and potential), executive or consulting function, ambition, and responsibility level were significant too, but to a lesser degree. French-Canadians « scored » well on some of these variables, including self-employment, ambition, academic record, and professional status, while English-Canadians, as already noted, did well on others. On the whole, it is clear that individual qualifications, past and present labor market behavior contribute to earnings, and native tongue or ethnic background has little influence, if any.

In assessing utilization, three criteria were used : (1) usefulness of specific education for the job, (2) necessity of having such undergraduate preparation for the position held, and (3) utilization in and satisfaction with the work environment. In terms of these measures, several instances of underutilization were found, especially among the younger graduates. Less than one-third of the respondents made considerable use of their undergraduate major (i.e. electrical engineering) in the performance of their work assignments. This is a rather low figure compared with

(15) A. C. Gross, « Patterns and Determinants of Income of Canadian Engineering Graduates, » in *Industrial and Labor Relations Review*, forthcoming issue.

results reported for similar groups in the U.S. ⁽¹⁶⁾; apparently, the state of technology in Canada does not permit as much specialization as is possible south of the border where interests and requirements can be matched to a very specific extent. Employer requirements in Canada for a specific education were viewed as unrealistic or artificially high by many graduates and especially 1964 class members. ⁽¹⁷⁾ But mitigating factors were present: using college training on the job improved with time; opportunities were available to make changes in employer, function, and occupation; and « trade-offs » were possible whereby one facet of utilization could be sacrificed in order to gain another.

The first two criteria of utilization, probed in additional ways, are not discussed further at this point. The third aspect, that of utilization and satisfaction in the work environment in general, was analyzed with the aid of an 11-item interval scale. In this analysis, using a scale of 50 to 100 points, three questions dealt with the technical, three with the managerial, and five with the general aspects of the work. Mean values for these items and the « grand score » are shown by graduating class and native language in Table 5. The most salient difference is not between English and French (or in terms of occupation or function, not shown here), but between older and younger men. This agrees with findings reported previously, but now it is possible to pinpoint one cause of dissatisfaction on the part of the 1964 graduates. Whereas the older men acted without supervision for an average of 2 to 3 weeks, the younger men seldom did so beyond a 1-week period. ⁽¹⁸⁾

In comparing the graduates within a given class by native tongue, the French generally score higher on items related to the technical features and the broad circumstances of the work, while scoring lower on items related to the administrative aspects of the job. ⁽¹⁹⁾ These results mirror differences in education and work experience. French-Canadians have received a more science-oriented, more technical preparation and held a higher share of engineering occupations than was the case for the English-Speaking respondents. The higher satisfaction levels reported by

⁽¹⁶⁾ *Two Years After the College Degree*, National Science Foundation, Washington, 1963.

⁽¹⁷⁾ For similar findings in the U.S., see the two essays, E. H. Schein, « The First Job Dilemma », and F. Herzberg, « Motivation, Morale, and Money », both in *Psychology Today*, March, 1968, pp. 26-37 and 42-45, 66-67, respectively.

⁽¹⁸⁾ Based on question 10 in Table 3 and supporting information.

⁽¹⁹⁾ Respondents could choose any number between 50 and 100; every fifth number was labelled, e.g. 50 = minimum, 55 = low, 60 = fair, 65 = moderate, etc.

TABLE 5 — MEAN VALUES OF SELECTED ASPECTS OF SATISFACTION
AND UTILIZATION IN CURRENT POSITION,
YOUNG CANADIAN ELECTRICAL ENGINEERING GRADUATES

(SCALE : 50-100 ; 50 = MINIMUM, 75 = AVERAGE, 100 = MAXIMUM)

Item	1954 class		1959 class		1964 class	
	English	French	English	French	English	French
1. Technical content of job relative to all other factors	69.4	71.1	72.8	72.5	70.6	73.0
2. Degree of confidence in ability to carry out technical assignments	82.1	83.7	82.3	83.8	80.8	82.6
3. Opportunities for technical advancement in present organization	69.3	73.0	72.6	75.5	69.1	73.4
4. Managerial content of job relative to all other factors	68.2	67.9	67.7	66.7	64.3	63.0
5. Degree of confidence in ability to carry out managerial assignments	78.6	75.5	79.8	75.9	75.0	77.1
6. Opportunities for managerial advancement in present organization	75.1	73.8	77.3	78.3	74.9	75.3
7. Working conditions (facilities ; work rules) in present organization	79.7	74.0	77.2	79.4	76.3	75.8
8. Fairness and adequacy of your remuneration (salary ; benefits)	76.2	77.2	72.8	76.2	72.8	69.8
9. Status and prestige accorded you by your organization	76.0	77.2	73.6	78.5	71.8	73.4
10. Degree of satisfaction achieved from work you are now performing	79.7	81.1	79.3	82.3	74.0	76.9
11. Extent to which engineers are treated as professionals	75.1	77.6	73.2	77.7	70.7	74.0
Grand Utilization Score	829.2	832.2	828.7	846.7	800.1	814.5

the French (the last five items, i.e. 7 through 11) are remarkable in light of the fact that they scored higher in academic performance and were more ambitious than their English-speaking colleagues! ⁽²⁰⁾ Although the matter was not probed further, one possible explanation is as follows. The French-Canadian population as a whole has a somewhat lower educational attainment and a somewhat lower socio-economic status than the English-speaking portion of the Canadian population. Therefore, to have risen as high as they did, gives a greater sense of achievement and satisfaction to the French graduates than to their English-speaking counterparts.

Summary and Conclusion

This report compared the education, employment, mobility, earnings, and utilization patterns of selected English and French-Canadian engineering graduates. The focus of inquiry was on employment, but to investigate this topic the other aspects had to be considered as well. In their undergraduate programs, French-Canadians received a more science-oriented and a more technical training than the English-Canadians and this difference had a definite impact on the subsequent labor market behavior of the two groups. However, curricula at the two classes of universities are becoming more similar and this again will be mirrored in the employment patterns of the graduates. The French showed a better academic record and were more ambitious than the English; yet the latter group had a higher enrolment rate in graduate studies which was probably due largely to the wider choice of schools and programs available to them. Once undertaken, graduate schooling appears to have a strong impact on French-Canadian graduates, channeling their careers in a direction which resembles that followed by the English-speaking group.

There are many similarities in the employment patterns of the two ethnic groups. Both are well represented in most occupations, functions, and industries. Advanced degree holders in both cases pursue high-level technical functions and recent graduates of both French and English origin are frequently to be found in occupations other than engineering. Members of the two groups rate equally well on many job-related measures, although the French-Canadians do somewhat better in seeking professional registration and responsibility, while the English-Canadians seem eager

(20) On the matter of ambition, see the line in Table 3, « would like to be successful » (third from the bottom).

to enter managerial occupations. There is little or no difference between the groups in terms of mobility, effort, and satisfaction with engineering as a desirable undergraduate preparation for the world of work. But there is a striking difference in industrial deployment, with the French clustering in utilities and the English showing a relatively high concentration in manufacturing. Analysis makes it clear that such differences can be attributed to preferences as well as to discrimination; but if the latter is present, it appears to be more justified in the case of French utilities against the English, than for the British-run manufacturing organizations against the French. At least portion of this situation seems to be changing and one can expect to find more French-Canadian engineering graduates in manufacturing industries.

Annual earnings of both French and English-Canadian graduates were equally high (relative to all Canadian wage-earners) and native language was not significant variable in explaining variation in earnings. Self-employment, managerial occupation, and a host of other factors did show a positive, significant correlation with annual salary. Despite apparently good remuneration and other favorable circumstances, the graduates rated satisfaction with their work environment as average. There were several instances of under-utilization, especially on the part of younger graduates who were not given as much responsibility as they desired and who did not use their training in the performance of work assignments. On the whole, however, there is little disillusionment with engineering; passage of time, opportunity to make changes, and flexibility in the labor market provide means of increasing one's utilization or satisfaction.

The two key conclusions which emerge from this report are these. First, somewhat contrary to certain beliefs and earlier writings, the French-Canadians surveyed here appear to be fully integrated into the economic and industrial milieu of the 1960's. They demonstrate high academic performance, drive and success-orientation, mobility, and adaptability to working conditions. In many respects they match and in some others they exceed the qualities and qualifications of their English-speaking colleagues. Second, the similarities in the education, employment, and utilization patterns of the two ethnic groups are certainly much impressive than the differences. It may well be that to achieve this result, the French-Canadians had to excel in some or all of those measures just cited. As educational programs become more similar and as other institutional changes occur, the employment patterns of the two ethnic groups will merely reflect individual preferences and desires.

LES INGÉNIEURS CANADIENS FRANÇAIS ET CANADIENS ANGLAIS : UNE COMPARAISON

Cette étude compare l'éducation, l'emploi, la mobilité et les salaires d'un certain nombre d'ingénieurs gradués de langue anglaise et de langue française. Quoique notre principale préoccupation ait été l'aspect « emploi », nous devons considérer les autres facettes de ce problème.

Les canadiens français ont reçu, au cours de leurs études sous-graduées, une formation plus technique et plus orientée vers l'aspect scientifique que les canadiens anglais. Cette différence fondamentale a eu un impact certain sur le comportement du marché du travail des deux groupes. Notons cependant que les syllabus de cours au niveau des universités se ressemblent de plus en plus : ceci aura également une influence sur les patterns d'emploi des gradués.

Les canadiens français ont un meilleur dossier académique et font preuve d'une plus grande ambition que leurs confrères de langue anglaise. Ce sont néanmoins ces derniers qui, proportionnellement, présentèrent le plus haut taux d'inscription aux études graduées. Ceci est probablement dû au fait qu'un plus grand choix d'écoles et de programmes leur était disponible. Notons cependant qu'une fois entreprises, les études graduées ont eu une grande influence sur les étudiants de langue française, donnant ainsi à leur carrière une direction à peu près semblable à celle des ingénieurs de langue anglaise.

Les patterns d'emploi des deux groupes ethniques présentent de grandes similitudes. En plus de les retrouver dans la plupart des occupations, des fonctions et des industries, les détenteurs de diplômes supérieurs, tant français qu'anglais, occupent des fonctions hautement spécialisées et remplissent souvent, surtout pour les gradués des dernières années, des postes autres que ceux relevant du génie.

Cependant, alors que les canadiens français recherchent la reconnaissance et la responsabilité de « professionnel » les canadiens anglais semblent plus pressés d'occuper des postes de direction. Il y a peu ou pas de différence entre les deux groupes quant à la mobilité, à l'effort et à la satisfaction du génie comme préparation sous-graduée désirable au monde du travail. Il y a cependant une différence frappante entre les deux groupes quant à la distribution entre les secteurs industriels. Alors qu'on retrouve les canadiens français dans le secteur des services, leurs confrères de langue anglaise démontrent un haut degré de concentration dans le secteur manufacturier. L'analyse démontre clairement que de telles différences peuvent être attribuées tant au patronage qu'à la discrimination qui semble cependant plus justifiée dans le cas des services canadiens-français à l'endroit des gens de langue anglaise qu'à l'intérieur des entreprises manufacturières à direction anglaise contre les canadiens français. Cette situation change quelque peu et on peut s'attendre à trouver de plus en plus d'ingénieurs canadiens français dans le secteur manufacturier.

Les revenus annuels des gradués d'expression française et de langue anglaise étaient également relativement élevés au moment de l'enquête. La langue maternelle n'était pas une variable significative pour expliquer les variations dans les traitements. Occuper des postes de direction, être son propre patron et un certain nombre d'autres facteurs démontrèrent une corrélation positive et significative

avec le revenu annuel. Malgré la rémunération apparemment bonne et un certain nombre d'autres circonstances, les gradués évaluèrent leur satisfaction vis-à-vis leur travail et leur entourage comme moyenne. On nota plusieurs exemples de sous-utilisation surtout chez les plus jeunes gradués à qui on ne confiait pas assez de responsabilités et qui n'utilisait pas leur formation dans l'exécution de leurs tâches quotidiennes. Il y a cependant dans l'ensemble peu de désillusion vis-à-vis le métier d'ingénieur : le passage du temps, l'opportunité de faire des changements et la flexibilité du marché du travail sont autant de moyen d'accroître l'utilisation de ces ressources humaines et partant leur satisfaction.

On peut tirer deux conclusions de ce qui précède. Contrairement à certaines croyances et plusieurs écrits, les canadiens français couverts par cette étude semblent être pleinement intégrés au contexte industriel et économique des années '60. Ils font preuve d'une grande performance académique, de réussite, de mobilité et d'adaptabilité aux conditions de travail. Ils égalent à plusieurs égards et souvent dépassent les qualités et les qualifications de leurs confrères de langue anglaise. En second lieu, les ressemblances entre les deux groupes quant à leur éducation, leur travail et leur « pattern » d'utilisation sont beaucoup plus impressionnantes que les différences. L'explication peut bien en être que, pour atteindre ce résultat, les canadiens français devaient exceller dans quelques-uns sinon tous les aspects déjà mentionnés. Plus les programmes scolaires vont devenir semblables et plus il y aura de changements institutionnels, plus les patterns d'emploi des deux groupes ethniques vont simplement refléter les préférences et les désirs de chacun.

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