Article

"Estimation of Educational Requirements in Occupations and Occupational Groups"

K. Weiermair
Relations industrielles / Industrial Relations, vol. 29, n° 1, 1974, p. 128-159.

The Estimation of Educational Requirements in Occupations and Occupational Groups

K. Weiermair

This paper explores the usefulness of employer surveys for purposes of assessing and forecasting educational needs in occupations and occupational groups.

INTRODUCTION

A variety of approaches to forecast manpower requirements and associated educational needs have been propagated in the past. Along with such contributions there has been a lengthy debate about advantages and disadvantages as well as methodological problems inherent in any of these forecasting models, which has been adequately described elsewhere. [1] One of the problem areas in manpower forecasting which still requires some subjective judgement and hence, introduces biases lies there, where occupations have to be translated into educational requirements. The problem is fundamental insofar as it is encountered in all exercises of forecasting educational needs for an economy no matter whether one chooses to use an input-output type of approach[2] or whether one prefers

WEIERMAIR, K., Assistant Professor, Faculty of Administration Studies, York University, Toronto.

[1] See for example O. MEHMET, *Methods of Forecasting Manpower Requirements, With Special Reference to The Province of Ontario*, Ontario Department of Labour, 1966.

[2] H.S. PARNES, *Forecasting Educational Needs for Economic and Social Development*, OECD, Paris, 1962.

to work with predictions of rates of return to education with occupation as the intervening variable [3].

Uncomfortable as it is, most observations have yielded that there is no one to one relationship between education and occupation at any point in time and manpower forecasters have therefore suggested two ways out of this bind. According to one approach, it has been suggested to evaluate educational requirements on the basis of job analysis schemes carried out for large samples of all occupations throughout the economy and to use these for subsequent manpower projections [4]. The other alternative which has been proposed was to revise educational standards for jobs and occupations through employer surveys, which would in this way indicate the need for educational up- or downgrading of occupations over the forecasting or planning horizon [5].

The following paper explores more fully the potential of using the latter approach i.e. employer surveys, for purposes of assessing and forecasting educational needs in occupations and occupational groups throughout the economy. In meeting with this objective the following lines of inquiry were pursued :

If changes in the educational structure of jobs, occupations and occupational groups can be reasonably explained as a function of time and if such changes have actually taken place, correlations between education and occupation for the total stock of employed people in various occupational categories will never be perfect at any point in time, due to these timely changes. From that it follows, that flow measures of educational requirements as contained in vacancy or hiring surveys to be taken over specified periods of time should be much more homogeneous with still existing variations in the educational structure of occupations being of a merely random character. Whether this is true and hence, whether or not survey data provide useful instruments of assessing and forecasting educational requirements must therefore depend foremost on the nature and degree of observed variations in educational requirements reported for particular occupational groupings. Part II of the study investigates some factors, which on theoretical grounds, were believed

[3] B.W. WILKINSON, « *Present Values in Life-time Earnings in Different Occupations* », *Journal of Political Economy,* 1966.

[4] R.S. ECKHAUS, « Economic Criteria for Education and Training », *Review of Economics and Statistics,* May 1964.

[5] B.W. WILKINSON, *Studies in the Economics of Education,* Department of Labour, Ottawa, 1965, p. 101.

to influence educational requirements and for which data were available. The implication of this analysis being, that if consistent relationships between certain hiring characteristics and educational standards were to be found, it could be argued that employer surveys produce biased results and hence call for additional weighting and/or sampling procedures. Two data sets, a private company hiring survey and vacancies reported to the Canada Manpower Centres, were used for the analysis.

Since it has already been suggested earlier to use CMC vacancy data for manpower forecasting and planning [6], comparisons of educational requirements in the same occupational groups were arranged for both CMC and company hiring data, to see whether in effect, CMC vacancy data were representative of educational needs throughout the Canadian economy. Part III reports on these findings.

Part IV puts trends in educational requirements as derived from the two surveys into line with earlier estimates of educational needs, worker trait requirement estimates and the previous 1961 Census figures.

Part V concludes with a summary and perspective on the potential use of employer surveys for purposes of manpower forecasting.

FACTORS DETERMINING EDUCATIONAL REQUIREMENTS IN OCCUPATIONS AND OCCUPATIONAL GROUPS

Studies about the educational structure of occupations both at high and low levels of occupational aggregation have demonstrated a considerable variance in the mean number of years of schooling [7]. A host of factors seems to account for this phenomenon. First of all, performance in any particular occupation is a rather complicated function of psychomotor skills, work experience, various types of received training and the forementioned educational preparation and hence part of the variation in educational preparation could be explained as a result of trade offs which employers make between formal years of schooling and some of these other individual employee attributes. Secondly, performance and performance requirements in a given occupation may vary from organization to organization due to variations in the firms' output characteristics and the make of an organization with respect to its size and stucture

---

6 B. WILKINSON, *Ibid.,* p. 120.

7 C.A. ANDERSON, « Patterns and variability in the distribution and diffusion of schooling, » in C.A. ANDERSON and M.J. BOWMAN (eds), *Education and Economic Development,* Aldine, 1965.

reflecting varying degrees of work specialization and promotion patterns and flexibilities. A third factor which would tend to destroy one to one relationships between educational preparation and occupation can be found in labour market imperfections. In a world of profit maximizing individual workers and employers with perfect factor markets (and keeping the above mentioned factors constant), similar incomes and more homogeneous educational requirements within occupations would prevail in the long run as a result of market adjustments is, however, perfect labour mobility. In the real world this process is, however, hampered by relatively high costs of information about labour market conditions on the part of both employers and job applicants, which leads to less than perfect mobility patterns. This in turn, can however, also encourage the use of short-cut search methods such as skill labeling procedures through paper qualifications and also lead to the emergence of skill licencing practices. Educational requirements may therefore very well in part reflect such imperfections, which are apparent in the form of segmented labour markets and institutionalized skill labeling and hiring practices. To disentangle all of the above cited factors and to assess their individual contribution to observed variations in educational requirements would obviously not only be a practical task in vein, but would also not be of absolute necessity for the primary objective of this study, which to recall, was to test for the validity of educational requirements forecasts derived from employer surveys. Data were therefore collected primarily for those factors, which were both expected to constitute determinants of educational requirements on theoretical grounds and which were also accessible from either private or public sources. The study used two sets of information, one was a sample of all job openings which were reported to Canadian Manpower Centers during the months of July, August and September 1970, the other set was derived from the response of a private survey, which asked companies for the characteristics of their last 20 hirings prior to the survey in 1971 [8]. CMC vacancy reports contained data with respect to job description, education and experience required for jobs, earnings offered, location and industrial classification of employers. The hiring survey collected information on job descriptions, years of schooling of new hires, job related work experience, starting wages or salaries, company size and location, industrial classification and the organizations' growth in sales and net investment in the two years preceding the survey.

---

[8] The sample was drawn randomly from the 1970 *Canadian Trade Index*.

In order to establish whether or not hiring or vacancy data would produce unbiased estimates of educational requirements for various manpower categories the analysis of the data first tried to find out to what extend some of the above cited characteristics surrounding a hiring or vacancy situation might have exerted an influence on educational standards and requirements which were asked for in particular occupations. For this purpose, a multiple linear regression model was used, where observed educational requirements within occupations or occupational groupings represented the dependent variable and where a set of vacancy and hiring characteristics depicted independent factors, which on theoretical grounds were expected to explain observed variations in educational requirements. The independent observations and their theoretical rationale for inclusion in the regression were as follows :

Employer Location

Perfect labour markets with respect to information and mobility would tend to equalize educational requirements for particular occupations both within regions and across regions. Imperfections on the other hand may lead to the effect of labour supply determining labour demand in the sense that employers may be more likely to ask for higher educational standards in those locations where they face a relatively greater supply of more educated people. Since larger Canadian cities have a relatively greater supply of educated people vis-a-vis smaller ones and since the schooling prevailing in the labour force of the Western and Central regions of Canada has been traditionally higher, one would, following this hypothesis, expect educational standards to be raised in larger cities and in the Western and Central parts of Canada. Specifically the hypothesis to be tested would be whether or not a relatively greater supply of more educated people positively effects educational standards.

Month of Reported Job Vacancy

The CMC data set recorded job vacancies for July, August and September. Since July and August can be considered as months of relatively ample supply of educated people, one might following the same line of reasoning as before, expect educational requirements to be higher during July and August as opposed to September. Again the hypothesis to be tested was whether supply and supply variations of educated people over time had a bearing upon educational standards set by employers.

Experience

Job vacancies from the CMC recorded only whether or not experience was asked for by the employer, in the case of hiring data, a continuous variable could be used which indicated the actual amount of work related experience of a newly hired employee in years. If occupations do not require educational standards in an absolute sense, but allow trade offs between work experience and formal schooling[9], some variation in educational requirements will be associated with varying experience of employees and this would have to be substantiated through a negative coefficient for the experience variable in the regression equation.

Monthly Earnings

Irrespective of the occupation involved, employers who maximize profits would only be willing to pay more for better educated individuals, if additional years of schooling also implied a higher labour productivity. If, in addition, performance in an occupation requires no fixed amounts of educational preparation in terms of schooling years, it follows that earnings and levels of education in any occupation would have to show very strong and positive relationships. On the other hand, if education and productivity were not closely related or if most occupations were such that they require some minimum or maximum amount of educational preparation, employers would be less inclined to offer different rates of pay with respect to educational background and hence the relationship between education and income can be expected to be much weaker. It should be pointed out however, that it is also possible to receive positive relationships for reasons of non-profit maximizing behaviour on the part of employers.

Industry

This explanatory variable was introduced to check whether and why educational standards for the same occupational groups would differ widely among industries. Originally a two-way split into the tertiary sector (trade, finance and service) and all other industries was arranged. The idea behind this, was to test whether, in effect, the former sector, which in the past had been characterized by a rapidly changing labour force in terms of

---

9 For earlier work on this topic, see : J. MATON, « Experience on the Job and Formal Training as Alternative Means of Skill Acquisition : An Empirical Study », *International Labour Review*, Vol. 100, No. 3, September, 1969.

both size and composition [10] asked for higher educational requirements. On theoretical grounds it was hypothesized that both the changed nature of demand for this sector and its growth pattern might have led to educational upgradings due to greater specialization and promotional flexibilities which accompanied the employment growth in this sector. In subsequent analyses different industrial breakdowns were singled out to determine whether different rates of technological change or productivity growth such as were experienced in a number of industries had a bearing upon educational requirements in most occupations and occupational groups.

Size of Employer

The variable indicated the number of people employed in a given establishment and was only available from the hiring survey. Since larger firms envisage longer-term career patterns for their employees, they may raise educational standards for a number of entry jobs in order to guarantee promotional flexibilities and work specialization should such needs arise in the future. The hypothesis therefore was, that in a number of occupational groups, firm size and educational requirements should be positively related.

Sales and Net Investment Growth

The variables indicated the year to year changes in sales and net investment for the two years preceding hiring and where only collected in the company survey. With respect to sales changes it was expected that organizational growth which tends to follow changes in sales and production would lead in a number of occupations to higher educational standards for reasons of new job requirements with respect to specialization, supervision and changed career outlooks for newly hired personnel. In the case of investment growth it was hypothesized that new investment particularly if it were to involve also qualitative changes of capital would necessitate higher educational standards in all work situations where capital and education appeared as complementary factors of production (i.e. new machines or new computer equipment may require better educated manpower).

---

[10] The tertiary sector has recorded the fastest labour force growth between 1931-1961, for reference see : N.M. MELTZ, *Manpower in Canada, 1931-1961*, Ottawa, Department of Manpower and Immigration, Research Branch, 1969.

Occupational Classification

Out of 42,510 employer requests recorded with CMC a sample of 2,467 job vacancies and a total of 1,449 hirings recorded in the company survey were used for the analysis. All vacancies and hirings were subsequently grouped into broad occupational categories comparable to a slightly modified version of the major occupational grouping used by DBS in the 1961 Census and further sub-grouped according to functional areas into which jobs and occupations fall logically within organizations. The latter distinction was arranged in view of the fact that educational standards in occupations were expected to vary considerably with respect to where an employee was utilized within an organization. The occupational breakdown and the number of observations recorded in those groupings for both data sets was as shown in Table 1.

TABLE 1

Occupatioal Classification and the Number of Observations

	Manpower Data	Manpower Data
Group I Managerial	30	37
11 employed in productions (such as plant or product managers)	5	11
12 in service or staff functions (such as R & D, Personnel, Actuarial services, etc.)	19	17
13 in marketing and sales (including advertising)	6	9
Group II Professionals	239	349
21 in production (chemists, engineers, etc.)	25	64
22 in service and staff functions (legal advisors, librarians, financial analysts, etc.)	178	220
23 in marketing and sales (analysts, trainees, etc.)	36	65
Group III Semi-Professionals	363	184
31 employed in production (such as technologists, quality control inspectors, etc.)	33	49
32 in service and staff positions (drafting, programming, etc.)	212	82
33 in marketing and sales functions (technicians, salesmen)	118	53

	Company Data	Company Data
Group IV Clerical	1,285	454
41 employed in purely administrative functions (such as payroll, inventory or bookkeeping)	629	196
42 employed in support and service functions (such as secretaries, typists, etc.)	381	198
43 auxiliary services (filing, mail, messenger services)	275	60
Group V Skilled workers	50	43
51 working in production (skilled craftsmen of all kinds)	11	15
52 in service and auxiliary functions (maintenance mechanics, electricians, etc.)	39	28
Group VI Semi-skilled workers	246	175
61 employed in production (such as machine and press operators, etc.)	28	127
62 employed in service and auxiliary functions (stationary engineers, mill wrights, etc.)	218	48
Group VII Unskilled workers	258	207
71 employed in production (such as assembly line workers, etc.)	52	97
72 in service functions (labourers, cafeteria help, construction workers, etc.)	206	110

Although it was recognized that finer occupational breakdowns might enhance better statistical results yielding higher R^2 for our regressions, the breakdown was contained for the following reasons : a) For once it became evident that the occupations selected in the sample showed a much narrower range of job duties than was expected apriori reflecting the fact that for each major occupational grouping only a certain sub-set of jobs was reported and hence, these could be conveniently accommodated into our classification scheme, b) secondly, too great a dissaggregation of occupations would have led in our analysis to a number of empty cells for some cross-classifications thereby rendering a good many comparisons meaningless and c) thirdly, for the type of analysis pursued here, (i.e. the

exploration of major determinants effecting educational levels for job families and occupational groups) greater aggregations produce more operational results, particularly if the findings were to be used later for purposes of assessing forecasting instruments. Tests were, however, arranged for particular occupations to validate aggregate findings.

Before discussing particular results from the multiple regressions which were run for a number of occupational groupings and occupations from both the public and private data sources, the following tables are inserted to provide an overview of the direction of influence which the independent variables took in the regressions.

TABLE 2

Significant Multiple Correlation Coefficients on Various Occupational Groupings *

Occupational Groupings	Multiple Correlation Coefficient (R)	R^2	Level of Significance (per cent)
Production Manager		.49	5
Managers in staff functions		.57	5
Sales Manager		.71	5
Management Trainees		.66	5
Professionals in Production		.55	5
Professionals in Staff Functions		.30	5
Professionals in Sales & Marketing		.40	5
Mechanical Engineers		.13	10
Electrical Engineers		.12	10
Accountants		.47	5
Semi-professionals & Technologists in production		.51	5
Semi-professionals & Technologists in staff positions		.36	5
Semi-professionals & Technologists in sales or marketing		.32	5
Salesmen		.39	5
Clerical (Admin. functions)		.23	5
Clerical (Support functions)		.11	5
Clerical (Auxiliary functions)		.10	5
Skilled workers in Production		.93	5
Skilled workers in service functions		.39	5
Semi-skilled workers in production		.20	5
Semi-skilled workers in service functions		.29	5
Unskilled workers in Production		.80	5
Unskilled workers in service functions		.17	5

* Only functional groupings and individual occupations pertaining to one data set are reported here.

TABLE 3

**Manpower Data : Number of Signs of Coefficients of Independent Variables
(Multiple Regressions significant at the 5% or 1% Level)**

Variables	Broad Occupational Classes			Occupational Classes Further Subgrouped into Functional Areas		
	Positive Coeff.	*Nega-tive Coeff.*	*No Sign or Insig-nificant*	*Positive Coeff.*	*Nega-tive Coeff.*	*No Sign or Insig-nificant*
Region	2	1	4	9	2	5
City Size	4	2	1	4	2	10
Month of Hiring	3	1	3	7	1	8
Wages and Salaries	4	0	3	9	0	7
Experience	1	6	0	1	12	3
Industry (Tertiary sector versus all other)	1	0	6	4	3	9

Altogether 45 multiple regressions were run on various occupational
groupings counting both company and manpower data, six of which were
later excluded either because multiple R^2 were insignificant or because
some of the dummy variables showed up to be univalued. For the re-
maining 39 runs R^2 varied greatly between such low values as .10 and
up to .93 ; in most cases only about 60% of the coefficients were them-
selves significant. The results are tabulated in Tables 2 and 3 and will
be discussed subsequently variable by variable.

INTERPRETATION OF RESULTS

Region

The hypothesis set forth earlier was that job vacancies in those prov-
inces, which had both a higher school-enrollment of the population in the
schooling age and a relatively better educated labour force, this being
true for all provinces west of Ontario including this province [11], would
ask for better educated manpower relative to all other provinces, if and
only if a more educated labour force and greater availability of better
educated manpower have a bearing upon the educational dimension of

---

[11] The western region appears to have had in 1961 an average level of education
for its work force of 9.6 years against 8.8 in the eastern region. For reference see :
Census of Canada, 1961, Vol. 3, Part 1, Labour force : occupations by sex, showing
age, marital status and schooling : Atlantic provinces, Ontario and Quebec and
Western provinces.

TABLE 4

Company Data : Number of Signs of Coefficients of Independent Variables (Multiple Regressions Significant at the 5% or 1% level)

Variables	Broad Occupational Classes			Occupational Classes Further Subgrouped into Functional Areas			Individual Occupations		
	Positive Sign	Neg. Sign	No Sign or Stat. Insign.	Positive Sign	Neg. Sign	No Sign or Stat. Insign.	Positive Sign	Neg. Sign	No Sign or Stat. Insign.
Region	3	0	4	6	3	9	4	0	2
City Size	2	3	2	0	6	12	0	2	4
Size of Employer	1	0	6	6	4	8	4	0	2
Wages & Salaries	6	0	1	11	1	6	4	0	2
Experience	1	4	2	2	10	6	2	4	0
Companies' Previous Sales Growth	3	3	8	nf	nf	nf	2	2	2
Companies' Previous Investment Growth	3	2	9	nf	nf	nf	2	0	4
Industry : a) Tertiary Sector	1	0	6	2	0	16	1	1	4
b) Industry with Highest Growth in C/L Ratios **	4	0	3	nf	nf	nf	nf	nf	nf
c) Industry with Highest Productivity Growth ***	4	0	3	nf	nf	nf	nf	nf	nf
d) Industry with Highest Growth in hourly earnings	2	1	4	nf	nf	nf	nf	nf	nf

nf   not feasible cross classifications
**   C/L ratio was gross capital stock per manhour
*** refers to net output per manhour

TABLE 5

Signs of the Regional Coefficient for Various Occupational Groupings (Significant regression equations from both data sets were used here)

		Positive	*Negative*	*Statistically Insignificant*
Managerial	11		x	x
"	12	xx		xx
"	13	xx		xx
Management Trainees				x
Professional	21			xx
"	22	xx		
"	23			xx
Mechanical engineers				x
Electrical engineers		x		
Accountants		x		
Semi-professional and Technical	31	x	x	
"	32			x
"	33	xx		
Salesmen		x		
Clerical	41	xx		
"	42	xx		
"	43	x		x
Skilled workers	51	x		x
"	52		x	x
Semi-skilled workers	61	x		x
"	62	x		x
Unskilled workers	71	x	x	
"	72	x		x

hiring decisions. As can be gleaned from the following table no consistent relationship between educational requirements and the regional variable seemed to show up :

With similar findings, B. Wilkinson [12] concluded that region does not matter at all. This however, may be a hasty conclusion. Further inspections of the educational structure of different occupational groups per province reveal, that while it was true that the western region from Ontario to the Pacific had, on the average, a better educated labour force by a full year in 1961, educational differences were more or less pronounced depending on the type of occupational grouping that one chooses. For example, in the managerial and professional categories, the total spread between the two regions was not more than .3 and .4 years respectively. Surely such minor differences should have little if any impact on hiring patterns. On the other hand, for clerical occupations where the total spread between the two regions was two full years, one should expect a strong positive coefficient for the regional variable, which as a matter of fact was observed for both manpower and company data. Another aspect which has to be taken into account were variations between provinces within the regions, which were particularly pronounced for skilled, semiskilled and unskilled workers. Although educational levels for these groups were higher in the western region, there were also considerable differences between such provinces as British Columbia, Manitoba and Ontario on one hand, and Quebec and the Maritimes on the other. In conclusion, the evidence does not allow a complete rejection of the regional variable as suggested by Wilkinson, but it rather seems, that whenever strong differences in the educational structure between regions or provinces showed up, that this was also reflected in hiring patterns.

City Size

Since on the aggregate smaller cities display a relatively less educated labour force [13] and are faced with a relatively smaller output of new school graduates, the apriori expectation was to find a positive coefficient between the size of an urban centre and educational requirements requested. This is how the variable behaved for the various occupational groupings used :

[12] B. WILKINSON, *Studies in the Economics of Education,* op. cit., p. 114.

[13] DBS, *Census of Canada 1961* : Vol. I, part II : Population, School Attendance, and Schooling, Table 73, p. 2.

TABLE 6

**Signs of Coefficient for City Size for various Occupational Groupings
(Significant regression equations for both data sets were used)**

Occupational Groupings		Negative	Positive	Statistically Insignificant
Managerial	11		x	x
,,	12		x	x
,,	13			xx
Managerial Trainees			x	
Professional	21		x	x
,,	22	x		x
,,	23	x		xx
Mechanical Engineers			x	
Electrical Engineers				x
Accountants				x
Semi-professional and Technical	31			xx
,,	32	x		x
,,	33			xx
Salesmen				x
Clerical	41		xx	
,,	42		xx	
,,	43		x	x
Skilled Workers	51			xx
,,	52			xx
Semi-skilled workers	61			xx
,,	62		x	x
Unskilled workers	71	xx		
,,	72		x	x

Again no consistent relationship was observed with the majority of coefficients being either insignificant or negative. Instead of again entirely rejecting the hypothesis as was done by B. Wilkinson [14] one might argue here that other factors such as differential mobility patterns of various occupations, location of smaller cities vis-à-vis bigger metropolitan areas as well as differential educational endowments for specific occupational subgroups as opposed to aggregate educational levels between larger and smaller cities may have accounted for the instability of the coefficient. For example, if managerial and professional manpower were more mobile,

---

[14] B. WILKINSON, *Ibid.*, p. 114.

either because they were more aware of job opportunities across Canada or because they were employed and moved by large companies which have standardized educational requirements then this would have an equalizing effect on the educational structure both at the regional and city level and lead to an insignificant coefficient. On the other hand, smaller cities may be faced with an excess supply of geographically immobile high school and community college graduates who instead of migrating to larger cities with better employment and career opportunities, may prefer to remain in their communities and take on lower paying and less challenging clerical jobs. This would, for example, explain the negative sign observed for this occupational group in both data sets. Furthermore, it presumably matters whether a small city is located only a few miles away from a large metropolitan area such as is the case with smaller urban centers surrounding Toronto, Montreal or Quebec or whether the next large city is located hundreds of miles away. Unfortunately, the sample did not allow further breakdowns along those lines. Similarly, there is no way to control for differential educational breakdowns among cities other than on an aggregate level [15]. What the results seem to suggest is that city size is probably of minor importance with respect to educational requirements asked for, with the exception of geographically immobile types of labour. These results are in line with the previous ones on the regional variable, reflecting the much greater equalization of educational requirements within provinces and regions than among them and as such fits also well into the Canadian literature on migration [16].

Month of Hiring

As had been mentioned previously, it was expected that job vacancies during the summer months would ask for more education relative to September. A positive coefficient was expected because of the greater availability of better educated people for all occupational groups during this period. Using manpower data only the following signs were recorded for this variable, as seen in Table 7.

---

[15] Unfortunately, the 1961 census does not provide schooling for occupational groups at the city level, but only provides statistics concerning average schooling per labour force incorporated cities, see DBS, *Census of Canada 1961*, Series 3.1, Table 13.

[16] For tests on geographical mobility using distance and education as explanatory variables, see Thomas J. COURCHENE, « Interprovincial Migration and Economic Adjustment », *Canadian Journal of Economics*, III, No. 4. November 1970, pp. 550-576.

TABLE 7

Signs of Coefficients for Hiring Months
(Significant regression equations, manpower data only)

Occupational Groupings		Positive	Negative	Statistically Insignificant
Managerial	11			x
,,	12			x
,,	13			x
Professional	21			x
,,	23	x		
,,	22		x	
Semi-professional and Technical	31	x		
,,	32	x		
,,	33			x
Clerical	41	x		
,,	42			x
,,	43			
Skilled Workers	51			x
,,	52			x
Semi-skilled workers	61			x
,,	62			x
Unskilled workers	71	x		
,,	72			x

What the coefficients seem to indicate is that availability of educated manpower did matter for the majority of jobs that fell into the occupational categories, 3, 4, and 7 which happen to be the typical categories for student summer employment. On the other hand, vailability did not matter for those categories where temporary or seasonal employment was of lesser significance. Given that a firm derives certain cost-advantages from hiring students during the summer such as avoidance of costly backlog work during vacation time and lowered screening and recruitment costs for prospective graduate employment, it can actually be argued that educational requirements were not even raised for those categories, which recorded higher averages during the summer months. In conclusion, variations in supply conditions of educated manpower over shorter periods of time seem to be unimportant for setting educational standards, at least as far as the Canada Manpower data indicate.

Wages and Salaries

If employers either believe that more educated people are more productive or if they hire better educated people to meet future changes in their demand and/or production set up (technological change) they would usually reward such increased present or future productivity in the form or more schooling with higher wages and salaries. If, on the other

hand, they were not profit-maximizing they may simply hire and pay more to better educated individuals because they have enough slack to accommodate it or because this may add something to their prestige, or both. In the latter case, the relationship between earnings and education could be non-significant or even negative. When earnings offered (manpower data) and actually paid upon hiring (company data) were related to educational requirements in the regression-set, the following coefficients were observed :

TABLE 8

Signs of Coefficients for Earnings
(Significant regression runs for both data sets were used)

Occupational Groupings		Positive	Negative	Statistically Insignificant
Managerial	11			xx
"	12	xx		
"	13			xx
Managerial Trainees		x		
Professional	21	xx		
"	22	xx		x
"	23	x		x
Mechanical Engineer				x
Electrical Engineer				x
Accountants		x		
Semi-professional and Technical	31	x	x	
"	32	xx		x
"	33	x		x
Salesmen		x		
Clerical	41	xx		
"	42	x		x
"	43	x		x
Skilled Workers	51			xx
"	52	x		xx
Semi-skilled Workers	61			xx
"	62	xx		x
Unskilled Workers	71	x		x
"	72	xx		x

The relationship between education and earnings was clearly positive and got stronger as one moved up the occupational ladder. Although a positive relationship does not entirely reject the non-profit maximizing hypothesis, it seems rather dubious that this is what we observed with our data. For once prestige hiring of better educated people would presumably occur only for certain types of manpower such as professional and managerial personnel in staff positions, while the data here shows positive relationships across all occupational categories. It, therefore, remains that

employers tend to reward better educated people higher because they believe them to be more productive. This, however, does not automatically imply that current earnings will always have to reflect current productivities it may very well be that firms hire relatively better educated individuals into certain jobs and occupations because they either expect changes in their organization or because they envisage a long-term career path of their hires which could upset the equality of earnings and marginal productivity in any one particular period observed, but guarantee that they are equal in the long-run. With respect to our analysis, it implies that some of the observed variation in educational requirements may have to be explained by such characteristics as expected technological change which may vary among organizations and industries [17].

TABLE 9

Signs of Coefficients of Experience requested (manpower data) and actually reported (company data) (Significant regression runs were used)

Occupational Groupings		Positive	Negative	Statistically Insignificant
Managerial	11			xx
"	12	x	x	
"	13		x	x
Managerial Trainees			x	
Professional	21	x	x	
"	22		xx	
"	23		xx	
Mechanical Engineer		x		
Electrical Engineer		x		
Accountants			x	
Semi-professional and Technical	31		xx	
"	32		xx	
"	33		x	x
Salesmen			x	
Clerical	41		x	x
"	42		xx	
"	43		x	x
Skilled Workers	51		x	x
"	52		x	x
Semi-skilled Workers	61			xx
"	62		xx	
Unskilled Workers	71	x	x	
"	72		x	x

[17] Some rudimentary tests checking for such factors will be applied in a later section of this paper.

Experience

If experience were a true substitute for formal schooling, a negative relationship between educational requirements and work related experience should be expected. The variable behaved very much in the hypothesized direction with 24 negative signs against only 5 positive coefficients. The occupational breakdown is shown in Table 9.

In the case of company data, actual years of work related experience were recorded and, hence, it was possible to read off directly the trade off between experience and schooling from the regression ceofficient. Taking only three broad occupational groups, it was found that on the average one additional year of schooling was equivalent to 4-5 years of experience for professionals, the ratio being 5-6 years for semi-professional and technologists and approximately 10 years for skilled workers. These trade-off ratios are interesting by-products insofar as they give a rough indication of the relative effectiveness of schooling versus on-the-job training Apparently, the higher up an individual was in the occupational and educational ladder, the greater the impact of experience versus schooling, which also seems to imply that either the pay-off from on-the-job experience was greater for occupations with higher educational standards or that in effect the relationship becomes complementary as one moves up the occupational ladder [18].

Size of Employer

Apriori larger firms (in terms of employees) were expected to hire better educated people for size usually is accompanied with greater internal specialization and larger employers may have a longer planning horizon and greater promotional flexibility over individual careers within the organization. Although positive signs outweighted negative signs the relationships observed were not even stable within given occupational classes and disappeared when broader occupational classifications were used. For example, in the group of clerical personnel, lager employers demanded better educated people in administrative and service functions but less education for people in auxiliary functions, such as filing clerks. Similarly, they asked for better educated technologists in production jobs but wanted relatively less educated technicians when they were in marketing or sales functions. The only occupational group where larger firms seemed to prefer better educated individuals where semi-skilled workers

---

[18] The fact that 4 of the positive signs occurred with managerial and professionthal sub-groups tends to lend some support to this idea.

irrespective in what functions they were working. The signs were distributed in the manner shown in Table 10.

TABLE 10

Signs of Coefficients for Employer Size
(Significant multiple regressions for company data were used)

Occupational Groupings		Positive	Negative	Statistically Insignificant
Managerial	11			x
"	12			x
"	13			x
Managerial Trainees		x		
Professional	21		x	
"	22			x
"	23			x
Mechanical Engineers		x		
Electrical Engineers		x		
Accountants				x
Semi-professional and Technical	31	x		
"	32			x
"	33		x	
Salesmen				x
Clerical	41	x		
"	42	x		
"	43		x	
Skilled Workers				
"	51	x		
"	52	x		
Semi-skilled Workers	61			x
"	62	x		
Unskilled Workers	71		x	
"	72			x

What probably happens as firms grow is that they start to restructure jobs and occupations. This is a gradual process which does not imply a uniform upgrading of educational requirements across all jobs and occupations, but rather causes changes in certain groups of jobs which become more specialized and require more schooling; very often this can be achieved simultaneously through changes in job content and re-arrangements and substitutions within and between jobs and occupational clusters leading to increased standards for one type of job and decreases in others which all may belong to the same occupational group. In addition, changes in educational standards along with firm size will be determined by such factors as changes in the supply of particular skills, the type and speed of experienced growth of an organization as well as

differences in the organizational make up to a firm particularly with respect to training possibilities in the organization. In conclusion, no unique relationship between firm size and educational requirements could be postulated from the data.

Sales and Net Investment Growth Prior to Hiring

Both variables were only available from company data and not all organizations had reported changes in sales volume and net investment for the years 1969 and 1970 prior to hiring new employees in 1971. Apriori it was expected that both variables would positively influence educational requirements for similar reasons as firm growth of firm size. The results did again not allow any clear cut generalizations of stable relationships between an organization's growth in either the sales volume or the amount of new investment undertaken previously with the exception of three observations which are worth while reporting. It appeared that the higher the firm's past growth in sales, the greater the likelihood that they would ask subsequently for raised standards for its semi-skilled workers while the opposite was true for unskilled personnel. A possible explanation for this phenomenon may be the fact that as the volume of operation to be performed in an establishment, increases, over time, a certain number of jobs in the unskilled category emerge which not only require little previous education but which probably also offer little scope for individuals' career growth while on the other hand, semiskilled jobs became more demanding and/or contain promotional flexibility to the extent that people can be moved later into the skilled category through additional training thereby accommodating the firm's future demand for skilled workers at presumably lower cost [19]. In the case of investment growth, the only occupational category which demonstrated consistently positive signs were professionals. Obviously, more investment particularly if it involved also newer and more sophisticated technology required better educated manpower in the professional sphere. It should be pointed out that these findings are quite consistent with earlier observations on firm size where similar relationships were found for the same occupational categories.

Industry

There are a good many reasons why particular industries would ask for relatively better educated personnel. In the following analysis, three

---

[19] This is true particularly if jobs contain a good deal of firm specific skills and if recruitment and turn-over costs are very high.

such industrial groupings were singled out for further scrutiny to see whether or not some additional explanation could be picked up by this variable. The first group involved all those industries which, in the past, had experienced the most rapid expansion in employment which was the case with organizations in the trade, finance and services sector [20].

The apriori reasoning here was that high employment growth may have lead to a general upgrading of skills due to internal expansion and greater promotional flexibility, however, it could have also been that growth was accommodated with lower quality type of manpower. As it turned out, no marked differences were found to exist between the tertiary sector and the rest of the sample and the only occupational group where higher educational standards prevailed in the tertiary sector was with certain types of clerical jobs.

The second group which was singled out were all those industries which from 1957-1967 had experienced the greatest growth in gross capital stock per man hour [21]. The expectation here was that greater capital growth, particularly if it involved non-neutral technological change, should lead to higher educational standards in at least some occupations and occupational groups with the exception of managerial, semiskilled and unskilled manpower. The relationships observed were particularly strong with professional manpower and as such confirm earlier results with the « net investment growth » variable. The next group which was pulled out, were industries that recorded the highest past growth in total productivity relative to all other industries [22]. Unfortunately, however, this grouping correlated so highly with the previous one that the results were almost identical. The last industrial grouping made for a distinction between industries with a high past growth in hourly earnings relative to all other industries for the same period 1957-1967 [23]. Positive coefficients were recorded here for professional and skilled manpower.

---

[20] According to computations by the Department of Labour, Clerical, Commercial, Financial and Service occupations showed the greatest increases over the past 30 years : Canada, Department of Labour, Economics and Research Branch, *Occupational Trends in Canada 1931-1961,* Ottawa, Queens' Printer 1963, Table 4.

[21] Identification of these industries was facilitated by computations provided in : Harry H. POSTNER, *An analysis of Canadian manufacturing productivity. Some preliminary results,* Economic Council of Canada, staff study No. 31, Queens' Printer, Ottawa 1971, Table 2-2, p. 11.

[22] Harry H. POSTNER, *Ibid.,* p. 11.

[23] Harry H. POSTNER, *Ibid.,* p. 11.

The preceding analysis has elaborated on some broad determinants of educational requirements among which productivity and productivity associated characteristics appeared to have had the strongest explanatory power. The fact that fairly strong and consistent positive relationships between educational requirements and wages paid or offered existed, that high productivity growth industries required relatively better educated manpower and that temporary variations in the supply of educated manpower did not effect hiring standards seem to support the hypothesis, that employers act in a profit maximizing way setting educational standards according to perceived educational needs and prices to be paid for various types of manpower. Rational firm behaviour is further evidenced indirectly by the fact, that employers tend to accept trade offs between education and experience for given levels of job performance. Against this stands the contradictory finding that regional and locational supply variations have a bearing upon hiring standards. This was particularly true for all clerical occupations, where educational standards not only appeared to be much higher in certain provinces but where actual standards exceeded worker trait requirements already at the time of the 1961 census [24]. With a type of labour that may be geographically immobile and where wages and salaries may not be easily adjusted downwards, employers appear to raise educational standards at times or in places of abundant supply thereby minimizing employment cost or maximizing profits. This, however, accentuates imperfections on the supply side through unnecessary upgrading of jobs and leads to a divergence between actual and required educational standards. The crucial question here is whether this phenomenon was only peculiar to one type of manpower over a certain period of time with market forces eventually initiating mobility patterns that bring educational requirements in line with actual needs or whether the market mechanism may not be all that important. The fact that studies on rates of return for given amounts of education in individual occupations [25] show an equalization of rates within occupational groups but not between them suggests that supply adjustments, if they take place, may be very slow. It can be similarly argued, that large employers react to labour market changes, not so much with dramatic changes of their established wage and salary structure but rather tend to adjust with educational up or downgrading of jobs and the provision of additional

[24] Bruce WILKINSON, *Ibid.*, pp. 94, 95, Table 17.

[25] B. WILKINSON, « Present values of lifetime earnings for different occupations ». *Op. cit.*

training [26]. Thus, while in a long-run equilibrium type of situation, educational standards and requirements have to converge, there is no compelling reason for them to be equal in the short-run. The variety of employer and market characteristics which according to the analysis appear to effect educational standards in occupations, makes it very doubtful that hiring or vacancy surveys will produce unbiased estimates of educational requirements for purposes of manpower forecasting, or planning, unless more elaborate sampling and forecasting procedures were to be adopted with respect to some of these intervening variables considered above [27].

ADDITIONAL SOURCE OF BIAS WITH CMC — VACANCY DATA

In the previous section it has been argued that educational requirements for occupations reported in surveys would have to be weighted according to such sample characteristics as employment region, type of industry, firm characteristics etc. in order to derive more realistic estimates of present and future required educational needs in occupations throughout the Canadian labour force. But while such corrections are necessary for all types of employer surveys, CMC vacancy data may yet suffer from a second bias, which relates to the representativeness of employer requests placed with CMC. It has already been noted by others that CMC's penetration rates vary considerably with respect to the type of occupations sought by employers, with bench work and processing type of jobs and occupations being relatively over, and professional, technical, or managerial occupations being relatively underrepresented [28]. What has not been reported and what seems to be brought out in the present analysis in the fact, that these quantitative misrepresentations may, at the same time, impart qualitative biases. When comparing i.e. educational requirements reported for the same occupational groups in both the vacancy and the hiring survey, in tables 10 and 11 it becomes evident that CMC's mean years of schooling were consistently lower for most occupational groups

---

26 Peter B. DOERINGER & Michael PIORE, *Internal Labour Markets and Manpower Analysis*, D.C. Heath & Company, Lexington, 1971, p. 41.

27 As such the problem is similar to the quantitative assessment and forecast of labour demand, for a treatment see : Douglas HARTLE, « Predictions derived from the Employment Forecast », *Canadian Journal of Economics*, Vol. XXIV., No. 3, August, 1958, pp. 373-390.

28 Economic Council of Canada, *Design for Decision Making — An Application to Human Resource Policies*, Eighth Annual Review, Queens Printer, 1971, Table 8-7, pp. 182.

except for unskilled, semiskilled and kindred occupations, where they were actually higher. Most people in semi-skilled and unskilled occupations use Canada Manpower Centers for their job-search while more highly qualified manpower considers a variety of search methods with CMC being relatively unimportant [29]. It therefore is not too surprising to find that employers tend to raise educational requirements for those jobs and occupations where they expect to be provided with a relatively large choice of applicants and lower them for those where their choice is expected to be constrained and CMC is used as a sort of last resort. In conclusion, it is presumably safe to argue, that employer requests as reported to the CMC provide information, which does not lend itself easily to applications in manpower forecasting and manpower planning. Vacancy data are not only derived from a small and biased fraction of the employer population, but they also contain qualitative biases which unfortunately cannot be easily corrected through appropriate weighting schemes.

CHANGES OF EDUCATIONAL REQUIREMENTS
FOR OCCUPATIONAL GROUPS OVER TIME

While surveys do not provide the most accurate assessment of educational needs or requirements, they can nevertheless be very useful pieces of information with respect to underlying trends. For example, as with our two surveys, these could be compared with earlier surveys, the last census figures and the then estimated worker trait requirements for the same occupational groups in order to infer whether or not educational upgradings have occurred in those occupations or broader occupational groups which were known to have had educational gaps previously [30]. As can be seen from Table 11 at a very high level of occupational aggregation it appears that this is what has happened with the possible exception of the clerical, administrative and the unskilled labour category. In the latter cases, educational standards were raised far beyond worker trait requirements estimated for the labour force in 1961 [31]. With respect to clerical manpower, this may imply that the next years will see an increased tendency for high school graduates to either move into other occupations that require a high school degree such as certain skilled worker jobs or

[29] Dennis R. MAKI, *Search Behaviour in Canadian Job Markets,* Economic Council of Canada, Special Study No. 15, October 1971, pp. 55-60.

[30] Worker trait requirements are reported in : WILKINSON, *Studies in...,* *op. cit.,* pp. 94, 95, Table 17.

[31] B. WILKINSON, *Ibid.,* pp. 94, 95, Table 17.

TABLE 11

Mean, Lowest and Highest Education and Standard Deviation for Occupations from Company and Manpower Survey

		Company Data					*Data From Manpower Offices*			
Occupational Classification	*Lower Limit*	*Upper Limit*	*Mean*	*Standard Deviation*	*No. of Obs.*	*Lower Limit*	*Upper Limit*	*Mean*	*Standard Deviation*	*No. of Obs.*
11	12	19	15.36	2.665	11	12	17	15.20	2.179	5
12	10	20	14.76	2.784	17	12	18	15.26	2.357	19
13	12	17	13.78	2.291	9	12	17	13.33	2.191	6
21	12	21	17.11	1.266	64	16	19	16.96	0.540	25
22	12	21	16.40	1.572	220	9	19	16.44	1.406	178
23	12	19	15.97	1.630	65	12	17	15.31	1.493	36
31	8	16	12.96	2.102	49	12	17	14.00	1.146	33
32	10	17	13.52	1.816	82	8	16	13.23	1.428	212
33	9	17	12.92	1.829	53	8	16	11.78	0.991	118
41	9	16	12.23	1.764	196	9	16	11.75	1.054	629
42	9	17	12.21	1.304	198	10	18	11.51	0.871	381
43	8	15	11.57	1.172	60	8	13	10.63	1.000	275
51	8	14	10.53	1.732	15	7	10	8.45	1.449	11
52	9	16	12.00	1.563	28	7	14	10.51	1.433	39
61	0	14	10.54	2.123	127	7	12	10.25	1.515	28
62	0	14	10.48	2.288	48	7	14	10.44	1.472	218
71	0	14	9.18	2.698	97	7	13	11.60	1.965	52
72	0	13	6.90	4.623	110	7	14	10.16	1.455	206

TABLE 12

Actual Average Education of the Canadian Labour Force 1961 Census *, Estimated Educational Requirements for 1961 **, Required Average Education in 1964 ***, and Educational Requirement Estimates from 1971 Samples

		1961 Census Average Education (years)	Years of Education by GED level 1961 (years)	Estimates from Employment Survey B. Wilkinson 1964 (years)	Present Estim. for 1970-1971 Company data (years)	Present Estim. for 1970-1971 Manpower Data (years)
Group 1	Managerial	10.4	14.7	14.6	15.2	14.8
Group 2	Professional	13.3	15.3	15.4	16.4	16.3
Group 3	Semi-professional and Technical			12.7	13.2	12.8
Group 4	Clerical and Administrative	10.8	9.8		12.4	11.4
Group 5	Skilled workers	8.1	9.9	8.6	11.5	10.0
Group 6	Semi-skilled workers			8.00	10.5	10.4
Group 7	Unskilled workers	7.2	6.2	8.0	8.0	10.3

*   Source : *1961 Census of Canada,* Vol. 3, Part I, Labour Force, Occupations by sex, showing age, marital status and schooling.
**   Source : B. WILKINSON, *Studies in the Economics of Education ... op. cit.,* pp. 94, 95, Table 17
*** Source : B. WILKINSON, *Ibid.,* Table B, p. 138.

to acquire additional schooling and move into semi-professional and technical occupations. As there are high marginal rates of return on these types of schooling, this may provide the best option particularly for female high school graduates, who in the past have seen a very narrow occupational choice.

With respect to the category of unskilled labour, the recent up-gradings of educational standards beyond requirements appears to reflect the fast that employers have started to hire through enty ports envisaging long-term employment in which unskilled labour is subsequently moved into semi-skilled and skilled jobs through additional on the job training. Empirical evidence from U.S. on labour force adjustments in the blue collar category, suggests that this is what actually has happened in some U.S. industries [32].

SUMMARY AND PRELIMINARY CONCLUSIONS

Employer data on vacancies or hirings can be usefully employed to show some general trends of educational requirements in broader occu-pational groupings. Data of this kind, particularly if larger samples are involved, could be similarly used for purposes of analyzing major deter-minants underlying educational requirements. What such data will not permit is to construct a more rigourous model, which would be able to accurately predict educational standards across groups of skills or occu-pations. To get to this stage, much more knowledge is needed on the process of substitution between different types of labour both from a hteoretical and empirical point of view. In particular, it would be desir-able to have models which could explain both the amount as well as the timing of qualitative labour force adjustments following technological advances or variations of skill supplies whether at the firm, industry or national level. Work which now exists in this area, is still much too as-sumptuous to allow any practical applications in manpower assessment and forecasting [33]. The other area where additional research would be desirable concerns supply responses at a very disaggregated level such

---

[32] U.S. Department of Labour, *Work Force Adjustments in Private Industry —
Their Implications for Manpower Policy*, Research Monography No. 7, Washington, 1968.

[33] For examples see : J.R. MINASIAN, « Elasticity of Substitution and Constant Output Demand Curves for Labour », *Journal of Political Economy*, Vol. 49, (June 1961). K. ARROW, H. CHENERY, B. MINHAS and R. SOLOW, « Capital Labour Substitution and Economic Efficiency », *Review of Economics and Statistics*, Vol. 43, (August, 1961).

as particular occupations or skills and their timing. Given that such changes affect almost every skill or occupation to a different degree and in a different way, the only feasible alternative to gain adequate insight into the actual process of substitution may be extensive and repeated inquiries of such substitution processes at the firm level [34].

A clearer vision of labour mobility and labour substitution at a fairly disaggregated level, however, will not only sharpen our understanding of the market mechanism for various levels and types of education, but it also constitutes the key ingredient of more operational and meaningful exercises in manpower and educational planning and forecasting no matter which technique one may want to employ [35].

L'ESTIMATION DES EXIGENCES D'ÉDUCATION DANS L'EMPLOI ET LES GROUPES OCCUPATIONELS.

Cet article traite de l'utilité des études qui sont effectuées auprès des employeurs afin d'inventorier et de prévoir les exigences scolaires pour l'accession à différents postes ou l'entrée dans différents groupes professionnels. Il poursuit trois objectifs.

Il se demande d'abord si les données sur les vacances, qui sont recueillies au hasard, à partir d'échantillonnages fournis par les employeurs, constituent des données de base valables desquelles on puisse mesurer le degré d'instruction requis pour accéder aux différents postes ou si elles ne dissimulent pas certaines déviations attribuables au caractère particulier de chaque firme.

Il analyse ensuite les données relatives aux vacances recueillies par les Centres de main-d'oeuvre du Canada en fonction de leur valeur pour l'affectation de la main-d'oeuvre et la prévision des besoins du marché du Travail.

Il compare l'estimation des exigences scolaires tirée d'un échantillonnage des demandes de main-d'oeuvre présentées par les employeurs aux Centres de main-d'oeuvre du Canada ainsi que d'un deuxième échantillonnage des embauchages à l'aide d'un relevé des employeurs avec des estimations antérieures et le recensement de 1961.

La première partie de l'article analyse l'importance relative que peut avoir, à l'occasion d'un embauchage ou d'une vacance, le caractère particulier de l'en-

---

[34] For a first and very fruitful analysis of this kind in Canada see : M.L. SKOLNIK and W. McMULLEN, *An Inquiry into Substitution between Engineers and Technologists,* Report submitted to the Committee of Presidents of Universities of Ontario, November 1970.

[35] A number of economists have made similar comments concerning manpower forecasting eg. see : W.G. BOWEN, *Economic Aspects of Education,* Princeton, Industrial Relations Section, Princeton University, 1964, p. 35; R. G. HOLLISTER, *A Technical Evaluation of the First Stage of the Mediterranean Regional Project,* OECD, Paris, 1966.

treprise sur la scolarité exigée dans des situations professionnelles variées. On a choisi comme instrument d'appréciation l'analyse de régression linéaire. On pensait que les différents facteurs qui caractérisent théoriquement les employeurs comme le site de l'entreprise en fonction de la province ou de l'importance de la ville, la nature et l'ampleur de l'entreprise, les salaires offerts, l'expérience requise et les succès de la compagnie dans le domaine des ventes et des investissements dans le passé, utilisés comme variables indépendantes par rapport au degré de scolarité demandé pour différentes catégories professionnelles, exerceraient une influence sur le niveau d'instruction qu'on exigerait. Or, à l'exception de l'ampleur de l'entreprise, du mois d'embauchage et du montant des ventes et des investissements, on est arrivé aux rapports auxquels on s'attendait, bien que ceux-ci aient été de force inégale compte tenu des différentes catégories professionnelles.

L'analyse a confirmé l'hypothèse selon laquelle les variations de l'offre parmi les travailleurs disponibles de différents niveaux d'instruction aussi bien dans le pays dans son ensemble que dans chacune des provinces peut avoir une influence sur le degré de scolarité demandé par les employeurs pour des emplois similaires dans des occupations ou des groupes professionnels donnés. Ceci était surtout vrai dans le cas de métiers qui ne se prêtent pas à la mobilité géographique. Par ailleurs, on a trouvé qu'il existait des rapports négatifs entre la somme d'expérience et le degré de scolarité désiré par les employeurs dans la plupart des groupes de métiers ou de professions, ce qui indique que les employeurs sont disposés à faire des compromis entre les années d'expérience et les années de scolarité. D'autres facteurs qui caractérisent les entreprises comme le type d'activité industrielle dans lequel la firme est engagée ou certains succès comme la productivité passée de l'entreprise et la croissance des investissements ont donné des rapports positifs en regard du degré d'instruction dans le cas de certaines catégories professionnelles, principalement parmi celles qui comportent un degré élevé de compétence. Étant donné que l'analyse a révélé des rapports passablement logiques entre le niveau d'instruction exigé et l'ensemble des facteurs qui entourent les offres d'emploi et les embauchages, l'auteur a rejeté l'idée d'utiliser de simples échantillonnages pris au hasard pour déterminer les besoins en matière d'instruction en ce qui concerne les marchés du travail et il suggère de recourir plutôt à des échantillons pondérés et stratifiés.

La deuxième erreur d'appréciation qui est ensuite discutée a trait à la qualité des données relatives à la main-d'oeuvre recueillies par le Ministère de la main-d'oeuvre et de l'immigration auprès des Centres de main-d'oeuvre. En faisant une étude comparative des rapports d'embauchage des employeurs et des statistiques des centres de main-d'oeuvre concernant les vacances, on a découvert des divergences marquées dans les échantillons quant au nombre moyen d'années de scolarité pour la plupart des groupes professionnels. La cause de ces écarts, a-t-on dit, provient de la nature et de l'importance des centres de main-d'oeuvre du Canada en tant qu'outils de sélection et d'embauchage pour les employeurs et, en conséquence, ils varient selon les métiers ou les professions. Ceci conduit malheureusement à des erreurs dans l'estimation des exigences requises pour certaines occupations et ont pour effet de rendre les relevés concernant les vacances plutôt inadéquats en tant qu'instruments d'affectation de la main-d'oeuvre et de prévision des besoins du marché du travail.

La dernière partie de ce travail vise à comparer l'état de la scolarité de catégories professionnelles plus étendues lors du recensement de 1961 et à l'occasion

d'un relevé antérieur de B. Wilkinson avec les deux présentes enquêtes. Il en ressort qu'il y a eu élévation des exigences pour toutes les catégories professionnelles, quoique les écarts ne soient pas tellement prononcés par rapport à ce qui existait antérieurement pour les groupes des dirigeants, des hommes de profession et des ouvriers qualifiés, mais les exigences se sont élevées en ce qui concerne les employés de bureau, les ouvriers spécialisés et les manoeuvres.

L'article conclut par un court exposé sur la nécessité de pousser les recherches concernant les exigences de scolarité en fonction de la prévision des besoins des marchés du travail.