

# Education in Canada

*An Analysis  
of Elementary,  
Secondary and  
Vocational Schooling*

*Stephen T. Easton*



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THE ECONOMICS  
OF THE SERVICE SECTOR  
IN CANADA

*Series Editors:*  
*Herbert G. Grubel*  
*Michael A. Walker*

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of Elementary,  
Secondary and  
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## PREFACE AND SUMMARY

Chapter 1 provides an overview of the report and reviews the state of elementary and secondary education in Canada today. Eighteen percent of the population uses the service which employs almost 2 percent of the employed work-force. Using simple measures of number of years of schooling and the like, Canadians have more years of schooling than ever before—a median of nearly 12 years—and the amount of schooling is greater among younger cohorts.

Chapter 2 considers more sophisticated measures of schooling which impute value to the process. Three approaches are examined: the growth accounting method, which indicates that education has contributed historically to some 12 percent of Canada's per capita real growth (relatively low compared with similar measures computed for the United States); a rate of return calculation (both private and public) which finds a lower bound of approximately 8 to 14 percent on the private yield on an additional year of schooling; and a third measure based on an analogy with consumer surplus, which suggests that education's contribution is likely to be an order of magnitude less (although the appropriate evidence is not currently available to be precise).

Chapter 3 considers the rising cost of education and identifies the sources of the increase. In real terms, the cost of elementary and secondary schooling has been increasing at a rate of almost 6 percent a year over the past 25 years. Much of this has occurred because of the increase in teachers' salaries and the teacher/student ratio.

Chapter 4 considers the efficiency of schooling. Various characterizations of average cost schedules are rejected as inappropriately measuring quality. Since costs have been rising and there is little to suggest that output has been increasing, there is no reason to believe that productivity or efficiency is increasing. One way that might help increase productivity is to consider merit pay arrangements.

Chapter 5 examines the state of private schooling in Canada with particular reference to several voucher proposals. British Columbia's experience is considered in some detail as it has just recently been introduced.

Chapter 6 takes an overview of vocational training programmes that have been developed in Canada. The categories are diverse, including language training for civil servants and shop classes for elementary schools. The growth in these programmes has stabilized after rapid increases in expenditures during the 1960s.

Chapter 7 examines the future. The first sections explore the next 20 years by considering projections of the numbers of students and teachers and certain of the costs associated with a continuation of current arrangements. Although there will be but modest growth in the school-age population and little change in the teacher/student ratio in the near future, costs will continue to rise as the teaching force accumulates experience. The final sections draw together recommendations that have been advanced in earlier chapters which suggest a set of changes for the future. These range from identifying the performance of students in regular programmes of evaluation to allowing parents to assign a voucher to a school of their choice. A key ingredient is the ability of the teacher, principal, or school to receive at least some financial reward for improved student performance.

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## ABOUT THE AUTHOR

Stephen T. Easton is Associate Professor of Economics at Simon Fraser University. Born in Chicago in 1948, he received his A.B. from Oberlin College in 1970, an M.A. from the University of Chicago in 1972, and a Ph.D. from that same institution in 1978. During his studies, Dr. Easton was the recipient of both Woodrow Wilson and Ford Foundation Fellowships.

Professor Easton has taught at Simon Fraser University since 1975. He has held visiting positions in the Graduate School of Business at the University of Chicago and the Economics Department at the University of Rochester. Between 1980 and 1985, he lectured regularly at the Fondation Nationale des Sciences Politiques in Paris, and has lectured widely both in Europe and North America. For five years he was Associate Editor of *Economic Inquiry*, the journal of the Western Economics Association, and has recently completed a stint on the Editorial Board of the *Canadian Journal of Economics*.

Professor Easton's interests have been primarily in international trade and economic history, but in 1981 he became involved with an ongoing research effort to assess the impact of British Columbia's aid to independent schools. The current volume represents a broader look at some of the issues stimulated by that earlier research. Among his recent publications can be found articles in the *Journal of International Economics* and *Explorations in Economic History*.

# CANADA'S INVESTMENT IN EDUCATION

## INTRODUCTION

Over the past several years Canadians have become increasingly concerned with the quality of the elementary and secondary education received by their children. At the same time that the cost of education per child has been rising, there has been a general feeling that quality has been declining or at least has not kept pace with rising costs. Recent newspaper reports suggest that as many as one in five Canadians cannot read. At the same time, Toronto elementary school teachers are on strike and British Columbia teachers are mounting an instruction only campaign—the latest manifestations of significant public concern with our educational system.<sup>1</sup>

There are many difficulties associated with analysing elementary and secondary school education as it exists in Canada today. Education is primarily a provincial responsibility, and each province arranges its educational affairs in its own fashion. Comparisons among the provinces are difficult when each may have different goals. Evaluating educational output—what it is that is actually being produced in the school—also poses significant problems. Common to all services, output of education is intangible. As a service provided to the public by government, there is little by way of market pricing. Children must go to school until variously specified ages, and schooling paid for by taxes and administered publicly dominates any privately paid arrangements. Since the bulk of elementary and secondary education is neither bought nor sold in a market, the value of the service to the ultimate consumer cannot be valued directly. One of the consequences is that there is an almost irresistible tendency to value the service by measuring the cost of its provision. Higher costs may then be associated, spuriously, with higher levels of output.

Similar difficulties exist on the input side. In the absence of any clear measure of educational output, there is a tendency to identify greater input quantities and (apparently) higher input qualities with better output even though no firm link has been established between the higher level of inputs and more or better educational output. In the case of elementary and second-



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dary education, easily established criteria such as the number of teachers per student, the teacher's education, or the teacher's experience have come to be identified with better education for children. Yet there is little reason to believe that these are particularly valuable characteristics in increasing student performance.

These kinds of difficulties lead to a system of education in which there is manifest inefficiency. The goals of elementary and secondary education are indistinct. With the current organization of the industry, valuation of the output is difficult if not impossible. And with only the most tenuous correspondence between the structure of rewards within the industry and the outputs that the system provides, it would be remarkable indeed if the current mixture of teachers per student, school size, salaries, et cetera led to a cost effective blend.

The chapters that follow identify key ingredients that constitute the complex mix of current Canadian elementary and secondary education.<sup>2</sup> The subsequent sections of this chapter provide a sense of the size of the education industry as it is today and where we as an educated population currently stand as measured by traditional quantitative measures of years of schooling. Similar magnitudes are displayed for the United States. The purpose of such comparisons is not to suggest that Canadians are better educated or less well educated than residents of the United States but rather to allow us to observe our own numbers in perspective.

The second chapter delves more deeply into the process of measuring education's contribution to national income. Unlike the raw numbers of years of education, attempting to place a value on education brings to the fore the difficult process of assessing what the economic impact of efforts to educate have accomplished. The analysis is conducted in a setting in which changes in the amount of education improve the quality of the workforce or yield a measurable rate of return to resources that have been invested. The return on educational investments is calculated as it would be for any project.

Chapter 3 turns from estimating the aggregate impact of education to an assessment of its cost. Unlike the difficulties associated with measuring output, measures of costs incurred in the process of education appear to be more exact. Educational costs have steadily increased over the last quarter of a century. Per student costs of public education have risen at an average rate of 6 percent in real (inflation adjusted) terms. Chapter 3 examines the components of overall growth by partitioning the increases into those associated with the sharp fall in the student/teacher ratio, increases in teachers' salaries, and increases in various other costs. What emerges most strikingly from the figures is that teachers' salaries have risen relative to the

growth in national income, relative to the average manufacturing or industrial wage earners in Canada, and relative to teachers' salaries in the United States.

Chapter 4 pulls together the elements of output evaluation and input costs to make the case that the kinds of inputs associated with increasing costs have little to do with the kinds of outputs commonly hoped for from education. As such, the educational system is inefficient in that some reorganization of current resources could lead to both improvements in outputs and/or reductions in costs. One improvement to be contemplated is that of establishing a closer correspondence between those teachers who are successful in teaching and the rewards that they receive. Current salary arrangements pay relatively little attention to the quality of a teacher's output. Salary scales that reward years of teaching experience and the teacher's education (both attributes of the input) should be modified to include substantial recognition for better teaching.

Chapter 5 turns to a consideration of the role of independent schools in providing Canadian elementary and secondary education. In this chapter some of the variations in financing arrangements among provinces are described. A case is developed to suggest that, even when subsidized, independent schools provide a less costly way to meet the demands of many Canadians than does the public school system. Recent extensions of public subsidies to independent schools in British Columbia, and the decision to extend public financing to Roman Catholic secondary schools in Ontario raise the question of the appropriate vehicle by which aid may be extended. One of the methods discussed in this context is the "voucher" system in which parents assign the public's resources to the school of their choice. A voucher arrangement would help make schools more efficient. Those schools that were successful in satisfying the educational needs of the public would tend to prosper, and parents of children with different educational demands could offer incentives for schools to meet those demands.

Chapter 6 examines what little can be said about vocational education in Canada at the aggregate level. The major difficulty in assessing the role of vocational programmes in total is the lack of comparability in the statistical base. Programmes of different duration are lumped together. Programmes as varied as language training for civil servants are counted in the same totals as welding and other vocational trades. Very little analysis can be attempted without greater detail about particular programmes. To the extent that policy initiatives are contemplated for vocational programmes, consideration of the details of each proposal would have to be produced. There is simply not enough coherence to the general, public statistical categories to warrant detailed analysis.

#### *4 Canada's Investment in Education*

To remedy some of the deficiencies that appear in our current educational arrangements, chapter 7 looks ahead to suggest several kinds of changes. The first sections explore what costs will be if things remain more or less as they are. Later sections develop some alternatives. These suggestions are ranked from those involving the fewest changes in the current institutional structures to those involving the greatest changes. First, educational output must be measured along some dimensions. Although it is undoubtedly impossible to capture all the components of an education, some effort to obtain measures of student performance is desirable. Second, some method should be available to reward those educators whose activities improve student performance. Although such a system need not be the sole criterion for advancement, any modification of the current structure in this direction should link reward with output. Third, those schools that are perceived by parents as providing a better education should be allowed to expand, and some financial benefit should accrue to the educators involved. The importance of such an arrangement is that it permits resources to flow to those who have satisfied the customers. To the extent that unmeasured components of education provide a valued part of an education, parents can respond to these benefits as part of their decision to attend a particular school. Fourth, parents should have access to an educational voucher in some chosen amount that can be spent on any school licensed by the provincial authority. The voucher amounts can be augmented by individual parents, and schools may charge what they like.

The remainder of chapter 1 examines the elementary and secondary school system from several perspectives. Although all non-immigrants have had contact with the school system, fully 18 percent of Canadians are currently enrolled. By employing some 2.4 percent of the work-force, elementary and secondary education provides approximately the same employment as mining, forestry, fishing and trapping combined. Most of the discussion, however, describes a quantitative educational profile of the current population to establish both the importance of elementary and secondary education as a final product and as a base from which to assess the growth in various measures of schooling over the last decade.

### **AN OVERVIEW OF CANADA'S INVESTMENT IN EDUCATION**

#### **Introduction**

Education is one method by which Canadians acquire the human capital that complements physical capital and resources to produce the goods and services we consume and invest.<sup>3</sup> When we use the term "labour," we are

in large part implicitly referring to the return on investments to human capital. Much of the investment in human capital takes place in schools, colleges and universities which currently absorb over \$32 billion a year in government revenues. Only part of the process of formal education will be considered here; an assessment of non-vocational, post-secondary education is to be considered elsewhere. But there is much to be said about “lower education,” which is by far the most important component of most Canadians’ educational experience. In the past decade the amount of formal schooling received by the average Canadian has increased, but so has the cost and so has the criticism of the elementary and secondary school system. In this and subsequent chapters, some of the changes that have occurred will be described along with some of the problems that have been identified, and some of the solutions that have been proposed will be discussed.

This overview of some aspects of the current state of education in Canada serves as a preview to the more detailed consideration developed in later chapters which focus on valuing the output of education, assessing the costs of the inputs, and judging the efficiency with which the product is provided.

### **The Size of the Elementary and Secondary School Sector**

The public elementary and secondary school sector of the economy is large. It currently employs over one-quarter of a million teachers—2 percent of all those with jobs<sup>4</sup>—and provides educational services for 4.7 million students or some 18 percent of the total population. Table 1 describes the ebb and flow of the size of the education sector over the past 35 years.

The number of students grew in the post-war baby boom until one out of four Canadians was in elementary or secondary school in the early 1970s. The decline has been substantial. Now fewer than one in five in the population is in school, roughly the same proportion as in 1950. The number of teachers, too, grew rapidly during the 1960s. But unlike the student population, the number of teachers has remained stable, falling only slightly during the 1970s and 1980s. As a result, the student/teacher ratio has fallen from approximately 26 students per teacher to 18.

### **Canada's Formal Education**

If the numbers in table 1 describe the participants, how much education have Canadians purchased? The stock of educational capital and its rate of increase are the focus of this section. Although, as is discussed in chapter 2

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**Table 1**  
**Industry Size, Public Schools**

Year	Number of Students (millions)	Percent of Population	Number of Teachers (thousands)	Percent of Employment
1950	2.4	17.4	89.7	1.77
1960	4.0	22.4	153.0	2.55
1970	5.7	26.6	262.5	3.31
1980	4.9	20.2	261.5	2.44
1986*	4.7	18.3	254.9	2.17

Sources: Wilkinson 1986, p. 537; Statistics Canada 81-220 and 81-202, various issues; 81-568, p.159; Statistics Canada 1975, series D129 and D767286.

Note: \*estimated values.

**Table 2**  
**Years of Schooling Completed, 1984**  
**(population age 15 and over)**

Canada	Less than Grade 9	High School	Some Post- Secondary	University Degree
Males	20.7	48.4	19.5	11.5
Females	19.8	51.5	20.7	8.0
TOTAL	20.2	50.0	20.1	9.7

Source: Statistics Canada, catalogue 81-229, 1985, p. 225.

and 3, there is little consensus about how we measure either the stock or the increments to it precisely, a gross quantitative answer is provided in tables 2 and 3.

Table 2 provides a snapshot of the population in 1984 and the highest level of education obtained by Canadians. In the table, the category of "high school" means that the person has had at least some secondary school education but no post-secondary school formal education. The category of "some post-secondary" describes both those who have received some university training as well as those who have attended community colleges

**Table 3**  
**Median Years of Schooling**  
**(age 15 and over)**

Province	1971	1981
Newfoundland	9.4	10.5
Prince Edward Island	10.1	10.9
Nova Scotia	10.3	11.2
New Brunswick	9.8	11.0
Quebec	9.8	11.4
Ontario	10.9	12.1
Manitoba	10.6	11.4
Saskatchewan	10.4	11.4
Alberta	11.3	12.3
British Columbia	11.4	12.3
CANADA	10.6	11.8

Source: Statistics Canada, catalogue 81-229, 1985, p. 254.

and certificate and diploma courses. "University," in this breakdown, refers to those who have received a university degree of some kind.

From row 3 in table 2 we can see that at the present time the maximum level of education reached by 70 percent of the population (age 15 and over) is either elementary or secondary school. About half of all Canadians are found to have had some exposure to high school as their last level of education. Only 30 percent of the Canadian population has some post-secondary school education. Rows 1 and 2 describe the differences according to sex.

There are other ways to describe the amount of formal education that Canadians (age 15 and over) have obtained. Table 3 provides the median years of schooling throughout Canada in both 1971 and 1981 to highlight the changes that have taken place.<sup>5</sup> As we would expect, the increasingly educated population is reflected in increases in the median years of schooling. This is true in every province, and the provincial medians are tending to move closer together. Over the decade of the 1970s, the median rose by 1.2 years. Naturally, this has much to do with the demographic structure of the population. Younger people are getting more years of schooling than their elders, and this has been true at all ages.<sup>6</sup>

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**Table 4**  
**Schooling by Level Completed, 1981**

Canada	Less than Grade 9	Some Secondary	Some Post- Secondary	University or more
United States	Less than Grade 9	(1-4)	College (1-3)	University or more
<b>Males</b>				
Canada	23.0	49.3	17.3	10.5
U.S.	16.8	51.2	15.6	21.1
<b>Females</b>				
Canada	21.9	53.1	18.6	6.5
U.S.	16.7	55.2	14.6	13.4

Sources: U.S. Department of Commerce Bureau of the Census, 1982, table 228, p. 145;  
Statistics Canada, 81-229, 1985, p. 255.

Note: Canadian data for age 15 and over; U.S. data for age 25 and over.

But in developing our sense of the “quantity” of education, it is useful to have some point of reference. Table 4 compares the highest levels of education obtained in both Canada and the United States in 1981.<sup>7</sup> From the first column in the table, it appears that proportionally more Canadians than Americans have stopped their educations at the elementary and secondary school levels. Roughly the same number obtain some secondary education, although matters are complicated by Canada’s many provincial systems such as Grade 13 in Ontario and CEGEP in Quebec. The appendix to this chapter provides a detailed breakdown in a slightly different fashion which serves to confirm the remarks made in the text.<sup>8</sup>

While more Canadians obtain some post-secondary schooling, more Americans obtain university degrees. Median years of schooling in the United States is slightly higher than in Canada at 12.5 years in the U.S. compared to 11.8 in Canada, but this difference has narrowed. In the United States the median rose fractionally from 12.3 to 12.5 years of schooling during the 1970s, and from 10.6 to 11.8 years during the same time period in Canada. To the extent that the countries share similar educa-

**Table 5**  
**Public Schools Funding by Levels of Government**

Year	Total Expenditure on Public Schools	Percent of GDP	Percentage Share of Elementary and Secondary Financed by Each Level		
	(millions, current \$)		Federal	Provincial	Municipal
1950	328	1.8	3.6	37.8	58.6
1960	1224	3.2	4.1	43.5	52.4
1970	4638	5.4	5.9	57.4	36.7
1980	14730	4.8	2.7	68.8	28.5
1986*	21583	5.4	n.a.	n.a.	n.a.

Sources: Wilkinson 1986, pp. 537 and 549; Statistics Canada, 81-229, p. 165, and 81-220, 1986, p. 29.

Note: \*estimated values.

tional technologies and can be compared in this dimension, this education gap has been substantially eroded.

### Proximate Sources of Funding

If Canadians are well educated and getting more so,<sup>9</sup> what changes in governmental spending patterns have developed to support the process? Table 5 describes the changing pattern of elementary and secondary school finance over the past few years. Column 1 reports the current dollar expenditures on public education,<sup>10</sup> column 2 the share of gross domestic product that these constitute, and columns 3 through 5 the shares spent by each level of government. As is apparent from the table, the share of national income spent on elementary and secondary education has fluctuated over the past 35 years. As is argued in chapter 3, these increases and decreases are indicative of both the number of students and the costs per student. In the table they serve to normalize the current dollar expenditures in column 1 and help give a sense of the financial size of the elementary and secondary school sector to complement its numerical dimensions.

Columns 3 through 5 indicate that the location of funding has changed systematically over the years. The share of municipal spending has fallen relative to that of the province. Wilkinson (1986) suggests that this indicates a desire of the provinces to equalize per student expenditures among districts and redistribute the tax burden so that it too falls more equally on all districts.



## Conclusions

Canadians spend an amount equal to the federal deficit each year on education. The lion's share of that expenditure is at the level of elementary and secondary schooling.<sup>11</sup> The chapters that follow examine the value of that educational expenditure as measured by its contribution to the growth of national income, its rate of return and the like, and also probe more deeply into costs and productivity in the education sector during the past few decades. Chapter 5 looks at some alternative ways in which the current structure might be made more cost effective through various proposed mixes of private schooling with the public system. And chapter 6 offers a few remarks about the difficulty in evaluating the structure of vocational programmes as they are currently identified. The final chapter provides a commentary on what lies ahead if current trends are allowed to continue and suggests some alternatives.

## Appendix A

### Education Levels in Canada and the U.S.

Table 6 indicates the levels of education for age 25 and over in both Canada and the United States. The categories are separated in a way that differs slightly from those in the text. The Canadian Census categories have been collapsed into "Less than Grade 9"; "High School"; "Some Non-University Post-Secondary"; and "University," which includes both some university and degree categories. The categories are different in the United States. There is a "Less than Grade 9;" "High School," which is from one to four years; "College," which is from one to three years but includes what we might term university as well as non-university training; and "University." Thus, although especially relevant at the lower levels, comparisons must be made with these differences in mind.

Looking first at the level of education obtained by men (in the first two rows), some 23 percent of Canadian men have ended their educations with grade 8. This is relatively more than have done so in the United States.<sup>12</sup> Row 2 reveals that this is true for women as well, although not as markedly. Scanning down column 1, it becomes clear that this is true for every age category. Relatively more Canadians have ended their educations at a grade 8 level than have those in the United States.

Two other points can be seen by examining column 1. First, the differences tend to be larger at the older age levels; and second, the fraction of those who ended their educations at this early stage is steadily diminishing. Those who have been educated recently are far more likely to continue beyond grade 8. The trend is particularly apparent in Canada where, between the ages of 35 and 55, almost twice the proportion of people stop with grade 8 in comparison with the United States.

As far as secondary school education is concerned, again, there are some systematic differences between the United States and Canada, although any interpretation would be more complex for this middle ground. Even though fewer Canadians stop with a secondary school education, more Canadians participate in non-university post-secondary education. Also, more Canadians have stopped before secondary school. Because of the large proportion of Americans finishing high school in every age category, a higher proportion of the U.S. population (over age 25) ends their schooling with high school or less. More Canadians (as a fraction of the population) go on to some form of post-secondary education. This tendency is par-

**Table 6**  
**Schooling by Level Completed, 1981**  
**(age 25 and over)**

Canada	Less than Grade 9	Some Secondary	Some Non- University	University or more
United States	Less than Grade 9	(1-4)	College (1-3)	University or more
<b>Males</b>				
Canada	23.3	36.1	20.9	19.7
U.S.	16.8	51.2	15.6	21.1
<b>Females</b>				
Canada	18.1	43.6	32.2	15.1
U.S.	16.7	55.2	14.6	13.4
<b>Age 25-29</b>				
Canada	4.4	45.1	28.1	22.4
U.S.	3.9	52.9	21.9	21.3
<b>Age 30-34</b>				
Canada	8.4	38.6	27.1	25.9
U.S.	5.6	47.9	21.4	25.3
<b>Age 35-44</b>				
Canada	15.5	39.1	24.9	20.5
U.S.	8.5	53.9	16.1	21.5
<b>Age 45-54</b>				
Canada	27.3	40.1	19.2	13.4
U.S.	13.9	56.3	12.9	15.8
<b>Age 55+</b>				
Canada	38.5	36.9	14.4	10.2
U.S.	32.1	47.6	10.2	10.2

Sources: Canadian data derived from the 1981 Canadian Census of Population supplied by Statistics Canada, Public Use Sample Tapes. Responsibility for the use and interpretation of these data is entirely that of the author. U.S. data, same as table 4.

ticularly pronounced for some sort of non-university post-secondary school education. Roughly the same fraction of Canadians as Americans have at least what we term "university" educations or more. One outcome of this growth in university educated Canadians is that there is now a debate in Canada like that in the United States about whether the population is "over-educated" (Dooley 1986).

## NOTES

1. From September 12, 1987, to September 19, 1987, the *Vancouver Sun* ran front page headlines such as "Illiterate Canada: One in five can't read," "Survey shows Canada is falling behind U.S. in literacy stakes," or "The sad life of a secret illiterate." The underlying survey data upon which the stories were based had been developed by Southam Inc. in "Problems with schooling are the main reasons illiteracy is apparently growing in Canada, rough calculations by Southam News suggest" (September 12, 1987, A8). These articles give a sense of this concern.
2. Of course, any such elements considered are of necessity incomplete. There are literally thousands of scholarly and popular tracts on education each year.
3. See Schultz (1961) or Becker (1975) for an elaboration of this concept.
4. Private schools employ another 12,000 or so teachers and educate another 230,000 or so students.
5. The median splits the population in the sense that there are as many Canadians with more years of education above the median as there are with fewer years of education below the median.
6. Between 1971 and 1981, median years of education increased among those ages 15-24, from 11.5 to 12.1 years; ages 25-44, from 11 to 12.5 years; ages 45-64, from 9.5 to 10.5 years; and for those over 65, from 8.4 to 8.9 years (Statistics Canada, Catalogue 81-229, 1985, p. 254.)
7. Gordon Bertram (1966) wrote what was in part a comparative assessment of education in Canada relative to that of the United States. He identified Canada's income relative to that of the United States as a function of the education of the two populations. Canada's income being roughly 10 percent less than that in the United States. Bertram found that by many measures there was a lower stock of education in Canada, and using the growth accounting techniques discussed in chapter 2, he suggested that at least some of the difference could be explained as a result.
8. Canada's elementary and secondary educational system is under provincial control. As a result, there are many different patterns by which children are educated. Pre-grade 1 is neither compulsory nor universal, but increasingly popular. Between age 6 and 13 most students complete elementary schooling. About age 14 most enter some

kind of secondary schooling. There are many alternatives now to the traditional 8-4 plan (eight years of elementary and four of high school) which was the norm outside the Catholic school boards of Quebec. There are 6-3-3 and 6-3-4, as junior high school separates elementary from secondary. Vocational training has been set up in high schools, vocational schools and as post high school training. Courses at the trade level do not require high school graduation. In Quebec, after grade 11 there is a two-year academic programme available at CEGEP, college d'enseignement general et professionnel, or a technical programme of three years. Ontario still retains grade 13, unlike the other provinces. The exact details of elementary and secondary schooling can be found in any *Canada Year Book*. Some structural aspects of formal schooling are developed with reference to the relationship between public and private schools in chapter 5.

9. These terms are used in conjunction with the description of the number of years of schooling. How these years actually translate into the objectives of education is a more difficult issue. As is described in later chapters, the output of schooling is not very well defined. This makes it difficult to evaluate the importance of increases in the years of schooling obtained. A more precise statement than the one in the text would emphasize that Canadians are increasingly exposed to more schooling.
10. Expenditures on public education comprise the bulk of direct education expenditures in Canada. For example, in 1986-87, of the \$22.4 billion estimated as being spent on elementary and secondary schools, some \$853 million is spent on private education.
11. About two-thirds.
12. Several tables in chapter 2 develop the labour force implications of these figures in more detail.



## Chapter 2

# VALUING EDUCATION

### INTRODUCTION

Valuing the output of education is one of the most difficult tasks facing researchers who focus on the elementary and secondary levels. Three general approaches have persisted in the literature. The first, pioneered by Solow (1957), Kendrick (1961) and Dennison (1962, 1974), is the growth accounting approach. In this approach, the economy is viewed as a production function in which a set of inputs is combined to produce output—national income. The growth in national income is attributed to the growth of each of the inputs weighted by the share of that input in the national income. Education's<sup>1</sup> contribution to growth is measured by associating appropriately weighted changes in the amount of education with changes in national income.

The second measure of the value of education is highly critical of the first.<sup>2</sup> This second approach suggests that current measures of the value of education are fundamentally flawed as they fail to recognize that education is a produced input (Plant and Welch 1984). It should be treated differently from increases in the “natural” rate of growth of the labour force or general technological advance or other factor inputs that are implicitly treated as costless. What is worse, the data available for evaluating education's contribution are inadequate to the task. Correctly valuing the worth of education involves a full characterization of the economy's production process along lines not currently available.

The third approach to valuing education measures the rate of return to education. This approach is most frequently identified as a component of human capital theory developed by Schultz (1961), Becker (1964) and many others. Typically, two types of returns are emphasized. The private return, the rate of return perceived by the individual deciding whether to add another year to the educational capital already accumulated, and the social return, the rate of return perceived by society as a whole. The benefits of incurring an additional year of education are balanced against the costs,



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**Table 7**  
**Education and Population**

(Percent*)	Less than Grade 9	High School	Non- University	University
Males	22.3	37.3	21.2	19.2
Females	16.5	45.6	23.3	14.6

Source: Same as table 6, and the same disclaimers apply.

Note: There were 106,421 observations in the sample used for this table.

\*Rows sum to (approximately) 100 percent.

and then the value of the additional investment in education is compared with the return to other investments.

To get a better idea of these issues in the context of Canadian elementary and secondary education, let us turn first to some educational characteristics of Canada's population and then to some of the measures of the value of education. In this way we can focus on the significance of any potential changes that might be suggested by the subsequent analysis.

### EDUCATION AND POPULATION

To understand the importance of elementary, secondary and vocational school education in Canada, a brief look at the 1981 Census is instructive. Stressing the value of education to the growth of the economy emphasizes the work-force characteristics of the population: the number of workers with education level grade 9, high school, post high school, university, et cetera. In describing some of the outstanding educational characteristics of the population the divisions will be broad, focusing on age, sex, and labour force participation.<sup>3</sup>

#### Educational Achievement in Canada

Table 7 displays an overview of the Canadian population by level of educational achievement and sex from the 1981 Census. In the tables, the categories of education include those whose maximum educational achievement is less than grade 9, a high school diploma or equivalent, some non-university post-secondary education, and those who have university educations. The sample is for those who are age 15 and over.<sup>4</sup> As is apparent from the table, less than 20 percent of males and 15 percent of females have been exposed to university level education. Most have the

equivalent of a high school diploma or less. To the extent that resources are devoted to the various levels of education, the largest group in the population affected is that below university level. What may also come as a surprise to many Canadians is that just under 20 percent of the sample has less than grade 9 education. Now such a finding is highly age dependent, but even so the proportion ranges from 3.7 percent of women age 15 to 25 to a maximum of 50.3 percent of males age 65 and up.<sup>5</sup>

### **Education and Employment**

Tables 8 and 9 display the educational characteristics of Canada's population broken down by both employment classification and sex. In table 8, of those who are employed 17 percent have less than a grade 9 education, 38 percent have finished high school, and 23 percent have some non-university post-secondary education. In other words, among Canadian males who are employed, nearly 80 percent have not completed a university education. Fully 55 percent have a high school diploma or less education.

Table 9 shows that, for women as for men, about half of those who are employed have a high school education or less, and again, 80 percent have less than university degrees.

As revealed by these census data, the educational state of the country shows the effects of a steady increase in the average level of education as derived from various age groups. But even so, it is perhaps surprising to realize that at the present time so substantial a number of participants in the economy have less than a grade 9 education. Of males in the labour force, those with less education are disproportionately represented in the ranks of the unemployed. Figures 1 and 2 illustrate the point by plotting the unemployment rate for men and women with different education levels—elementary, secondary, non-university post-secondary, and university—by age groups 15-25, 26-35, et cetera. In figure 1 the first column of each educational attainment level is the rate of unemployment for age category 15 to 25. Men in this age category with less than grade 9 education display an unemployment rate of over 14 percent. Men with some high school education in the same age grouping have an unemployment rate of 7 percent. Table 8 gives the same breakdowns for women.

Although there is no effort here to establish lines of causation, these data provide an empirical backdrop consistent with the evidence in other countries as we assess efforts to measure education's contribution to national income growth and welfare. That is, the unemployment rate in this context represents more than simply lost output; it also reflects a good deal of human suffering. To the extent that education is causally associated with

**Table 8**  
**Male Education and Labour Force Participation**  
**1981 Census Data**

(Percent*)	Less than Grade 9	High School	Non- University	University
Employed	17.0	38.1	23.3	21.6
Unemployed	30.3	40.7	19.2	9.7
Not in the labour force	47.3	32.5	11.2	9.0

Source: Same as table 7.

Notes: There were 56,180 observations in the sample used for this table.

\*Rows sum to (approximately) 100 percent.

**Table 9**  
**Female Education and Labour Force Participation**  
**1981 Census Data**

(Percent*)	Less than Grade 9	High School	Non- University	University
Employed	11.8	3.3	26.1	18.7
Unemployed	17.0	48.0	22.4	12.6
Not in the labour force	22.3	48.1	19.9	9.8

Source: Same as table 7.

Notes: There were 50,241 observations in the sample used for this table.

\*Rows sum to (approximately) 100 percent.

Figure 1

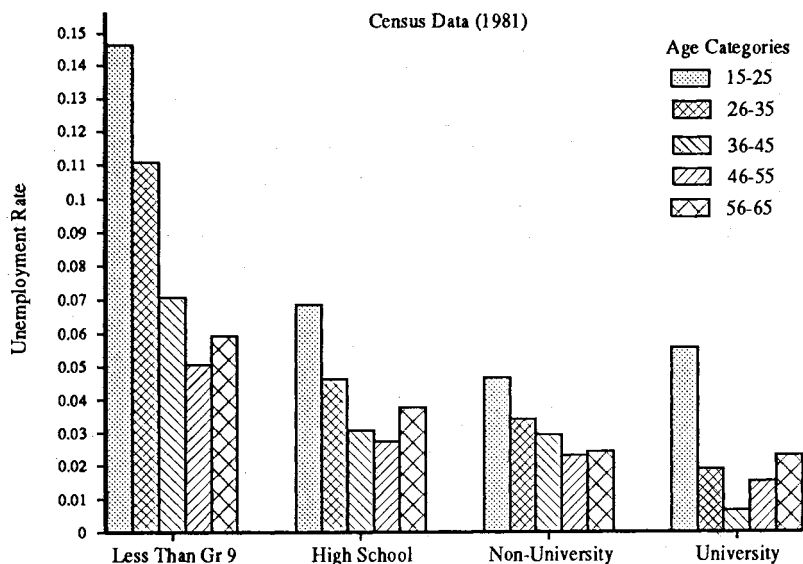
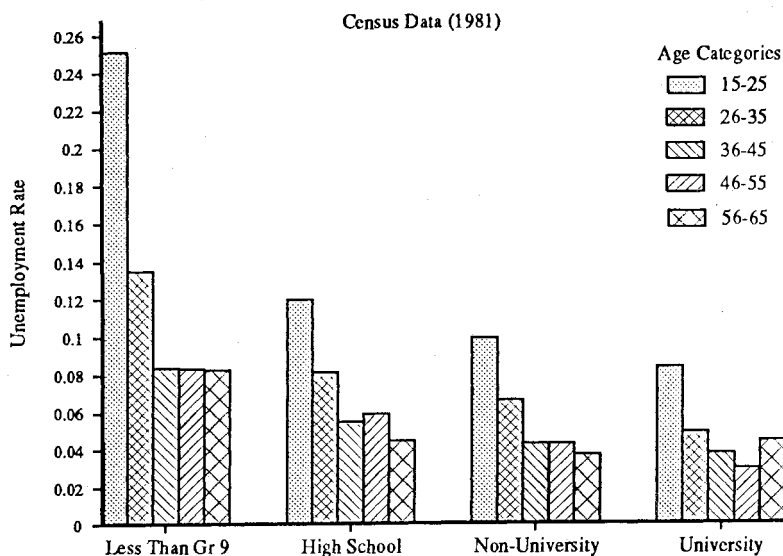
**MALE UNEMPLOYMENT BY EDUCATION & AGE**

Figure 2

**FEMALE UNEMPLOYMENT BY EDUCATION & AGE**

reduced unemployment, the benefits of education go beyond relatively easy to measure national income figures and the like (Michael 1982).

## A GROWTH ACCOUNTING APPROACH TO VALUING EDUCATION

The principles of growth accounting are based on viewing output in the economy as arising from a production function. The rate of change of output, or national income, is attributed to the rates of change of each of the inputs weighted by the share of that input in the production of national income. In early work of this kind, variations in output were associated with variations in labour and capital. Solow (1957) found that in the United States between 1901 and 1949, during which time total output per worker doubled, 87.5 percent of the growth in output was *not* explained by the factors included in the analysis. He ascribed this residual to some general notion of technical progress. Since then, many authors have attempted to explain some of this residual by looking more carefully at each of the components of the national production function.<sup>6</sup> By enhancing the stock of labour, education is seen as one important way of adding to growth.

The usual way of measuring education's contribution to the growth of national income is to write output as a function of all its inputs—labour, capital, et cetera. A useful simplifying decomposition is to impound all non-labour inputs in the symbol  $I$  and isolate education as having an impact on the effective stock of labour, so that labour,  $L$ , is a function of the amount of education,  $E$ , and the growth of the number of workers,  $N$ :

$$1) \quad Y = F(I, L(E, N))$$

Changes in output depend upon changes in the inputs  $I$ , changes in  $L$ , or upon changes in the production function itself,  $F$ . Changes in the effective stock of labour depend upon changes in the amount of education or in changes in the other determinants of the stock of labour—natural population increase and the like. For example, if the labour force alone were to change, then changes in output would reflect the contribution of labour.

However, if more than one factor, say capital, were to change as well, then some device is needed to apportion the change in output to either labour or capital. In general, this is a very difficult problem. The approach normally followed is to make an approximation of the stylized function represented in equation 1, and then work with small changes in the inputs. In the case of equation 1, this means that the percentage change in national income is a weighted average of the percentage rates of growth of its in-

puts. Let a “G” in front of a variable represent the percentage rate of growth of that variable. In rate of growth form, equation 1 becomes

$$2) \quad GY = S_I GI + S_L (S_E GE + S_N GN) + a GT$$

where GI is the growth in input I, GE is the growth in the education input, GN is the natural growth of the physical labour force, and GT is the growth in technical progress.  $S_I$  and  $S_L$  are the distributive shares of factor(s) I and labour in the total cost of production. The share  $S_E$  refers to the share of education in the total labour input index, and  $S_N$  refers to the share of the natural increase in the index. The coefficient  $a$  on the rate of growth of technology is immaterial since technology is measured as a residual, i.e., what is left over after other factors of production that can be identified have had their contributions to output assessed.

In the analysis of education’s contribution to growth, education, measured by some number of years of schooling or time spent in school, is included in calculating the effectiveness of the labour force. Various kinds of corrections help to account for changes in the amount of education at different age levels, and these changes are rolled into an aggregate measure of the labour force. The change in output relative to some base year is attributed to variations in both the number of workers and the amount of their education.

### Education’s Contribution to Canada’s Growth

Following the kind of methodology outlined above, Bertram (1966) developed a framework to assess the contribution of education to Canada’s economic growth from 1911 to 1961. During this half century, total output per employed worker rose at an average annual rate of 1.67 percent per year. In his study, Bertram found that improved labour quality due to formal education raised labour’s productivity by 0.52 percent per year on average. Combined with labour’s share in national income of 76 percent, education raised total factor productivity by 0.40 percent per year and thus accounts for fully one-quarter of the average increase in productivity growth. In terms of the average growth rate of real (inflation adjusted) gross national product of 3.3 percent, education’s contribution is seen as accounting for 12 percent of the total.

In contrast to Bertram’s findings for Canada, over the period 1929-57 Dennison (1962:73) finds that education contributed 23 percent to the growth of real national income in the United States. Bertram’s results indicate that education contributed about 11.4 percent to Canadian growth over those same years, or roughly half the U.S. figure.<sup>7</sup>

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Recent work by Jorgenson (1984) for the United States between 1948 and 1973 has developed the techniques by which education is included in the labour input. Unlike previous studies that have emphasized the large size of the residual (identified as technical change), these newer techniques suggest that of the average growth in real income of 3.9 percent per year, fully two-thirds is due to appropriately measured increases in labour and capital inputs. In contrast to earlier studies that have emphasized the advances in technology during the third quarter of the century, such a finding leads to an emphasis on identifying the characteristics of the underlying components which generate the contributions of these two inputs. Jorgenson shows that slightly less than half the increase in the total labour input in the United States is due to labour quality. The rest is due to changes in what we have described as N, the quantity and composition of the labour force. Of that increase in quality, 93 percent is due to changes in the education of the work-force. Studies for recent years have yet to be made for Canada.

In the above analyses, it must be observed that these constitute the contribution of all education to national income and productivity. Although elementary, secondary and non-university post-secondary training are not separated from the total, all who receive or obtain higher education also receive elementary and secondary school training. In terms of numbers, even today, as indicated in table 7, only 15 to 20 percent of the population has university training.

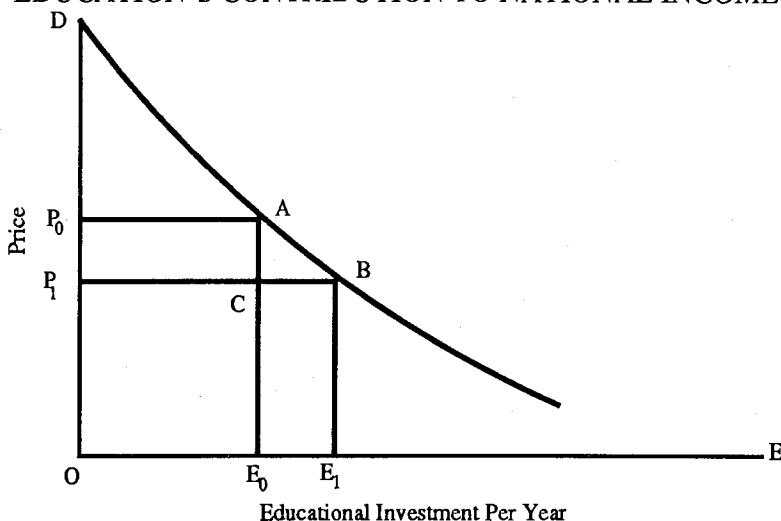
### **ASSESSING EDUCATION'S CONTRIBUTION: A DIFFERENT TECHNIQUE**

Economic growth is based on the accumulation of real productive assets. As human capital is one factor of production, the preceding section has viewed education's contribution to the national product as one of the processes by which human capital and, hence, labour quality and labour's income is enhanced. But one feature of education has not been stressed. Education is itself a produced input that uses inputs—labour, capital, et cetera—that might otherwise be employed in the production of goods and services.<sup>8</sup> In the usual growth accounting and rate of return calculations, the production of education is implicitly treated as an exogenous “quantity” that drives national income. Like increases in the size of the general population or (broadly speaking) the work-force, it is viewed as a costlessly obtained input.

Recognizing that education absorbs productive inputs provides a radically different interpretation of the growth accounting and rates of return calculations. If education is treated as an efficiently produced input into

Figure 3

## EDUCATION'S CONTRIBUTION TO NATIONAL INCOME



production, then the resources embodied in producing education must, on the margin, be worth the price that is paid for them.<sup>9</sup> What needs to be subtracted from the growth accounting model (and also less directly from the rates of return calculation) is the value of the primary resources used in producing the education itself. On net, assuming an efficient allocation of resources, the marginal contribution of education to real income growth is exactly equal to its marginal cost. Thus, correctly measured, education would have a zero contribution to national income growth.<sup>10</sup> By treating education as an exogenously determined input, traditional growth accounting methods and rate of return calculations ignore (by implicitly using a zero price) the resource costs used in producing the education input.<sup>11</sup>

Clearly, such an accounting procedure is inappropriate. Few would argue that education has no effect on national income. Even though the efficient allocation of resources requires that the value of an additional increment to education be zero on the margin, the infra-marginal gains to educated workers may be substantial and should be valued.

### An Agenda for an Alternative Measurement

The essence of the matter is to obtain an estimate of the value of education based on the underlying structure of production. If education is a factor of production, then there is a demand for education that is derived from the demand for output of the final good. In figure 3 the amount of education



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demand (E) is plotted (linearly) against the price paid for it (P). Initially, at price  $P_0$ , we have quantity of education  $E_0$ . As is well known from production theory, each point along the demand function represents the marginal product associated with an additional increment of education. At point A, for example, the height  $E_0A$  is the marginal product of  $E_0$  amount of education. Adding up the vertical lines from the horizontal axis to the demand schedule from 0 to  $E_0$ —the area  $0DAE_0$  in the figure—gives the total value of output. If constant production costs are assumed, a resource cost of  $P_0$  has been used to produce  $E_0$  education. Subtract the cost of education, price times quantity,  $P_0 \times E_0$  (the rectangle  $0P_0AE_0$ ), to get the “value of education,” the triangle  $P_0DA$ .

To assess the impact of a change, for example, in the cost of providing education—a change in price from  $P_0$  to  $P_1$  which entails an increase in the amount of education demanded from  $E_0$  to  $E_1$ —we wish to measure the increase in the value of output. The value of output rises by  $E_0ABE_1$ , for which we now pay cost  $P_1 \times (E_1 - E_0)$ . On net, the contribution of education to the increase in national income is the triangle  $ABC$ .<sup>12</sup>

The difference between the other techniques and our measure here is that the national income accounting approach would see the rectangle  $E_0CBE_1$  or some portion of it as a measure of the contribution of education in producing growth. Yet, as is clear, the cost of education has at all times been set equal to its value on the margin. The triangle  $ABC$  is a different way to measure the value of output contributed by the change in the amount of education. Geometrically, it seems clear that the size of the triangle will be systematically smaller than the educational cost rectangle, although the exact size must await the details of the technology.<sup>13</sup>

Although this approach is attractive as a more adequate characterization of education’s contribution, the underlying relevant parameters and characterization of technology have not yet been estimated. Therefore, this section was introduced as “an agenda” because an economically meaningful estimate of the contribution of education—elementary, secondary or higher—to Canadian growth has yet to be made.

## RATE OF RETURN CALCULATIONS FOR EDUCATION

A third way of indicating the importance of education to the economic process is through rate of return calculations. A rate of return gives the yield on an additional dollar invested in an activity. In the context of education, it usually takes the form of the yield on an additional year of education.<sup>14</sup> Rate of return calculations are frequently used to compare one project with another, although there are many pitfalls in their mechanical

creation and application (Hirshleifer 1971).<sup>15</sup> For example, a government might wish to evaluate the return on an additional dollar spent on education versus an additional dollar spent on social assistance or national defence.

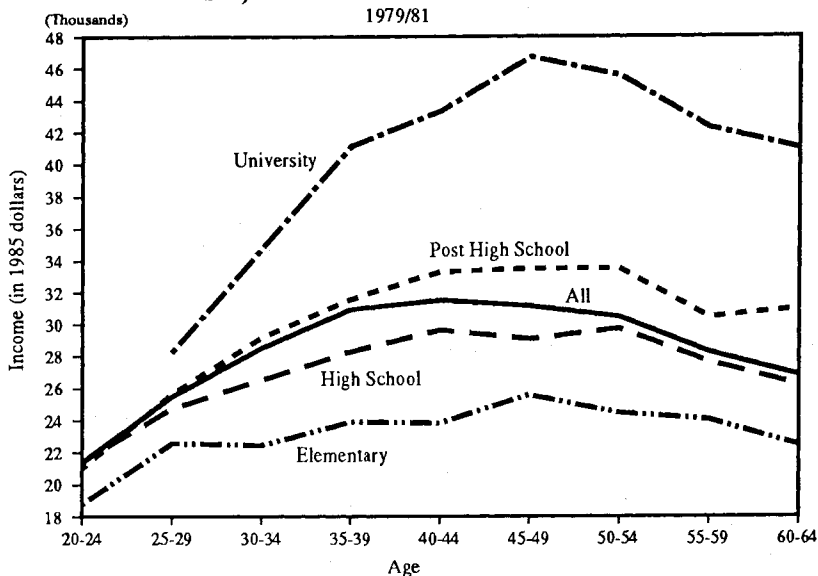
There have been a wealth of studies calculating the rates of return on education in many countries.<sup>16</sup> For Canada, however, there has been a gap of a decade between studies of higher education (Mehmet 1977, and Vaillancourt and Henriques 1986), and with the exception of one recent study by Constantatos and West, there has been little by way of explicit consideration of elementary and secondary rates of return.<sup>17</sup> Since there are relatively few specific studies of the return on elementary and secondary schooling, we might view the rate of return on university education as a lower boundary on the return to secondary education.<sup>18</sup> Secondary schooling must be completed before university, and diminishing marginal productivity theory suggests that the return on each additional year will be less than the return to the first years.<sup>19</sup> The rate of return to non-university post-secondary schooling is also of interest.<sup>20</sup> The following sections look first at a detailed study of the rates of return calculated for Canadian higher education and then at rates of return on elementary and secondary schooling.

### **Rates of Return to Canadian Higher Education**

In general, rate of return calculations involve two major components. First, some estimate is developed for the value of future income; and second, the costs of each additional year of education are obtained. For Canada, the most recent evidence is 1981 data analysed by Vaillancourt and Henriques (1986) that the private rate of return on higher education is between 7 and 14 percent for males, and the public rate of return is about 6 to 10 percent.

To develop an estimate of the future incomes of individuals with and without university educations, Vaillancourt and Henriques calculate an age/earnings profile for each of the educational groups they analyse.<sup>21</sup> They then develop a measure of the cost of university education, including both the various direct costs—tuition, fees, books, et cetera—and foregone earnings, what could have been earned had the student not been in university. These two components, the income stream and cost stream, are then discounted to obtain the present value of the net benefit of a university education. Alternatively, the rate of return calculation can be done by setting the present value of the net income stream equal to zero and observing what rate of return that implies, i.e., the rate of return that allows the investment to “break even.” These are the rates of return referred to above.

Figure 4  
AGE, INCOME AND EDUCATION



To see how the income stream from different levels of education is calculated, figure 4 illustrates an age/earnings profile for Canada based on data reported by Dooley (1986).<sup>22</sup> As is apparent from the figure, higher education is associated with higher levels of average income, although not all of the income difference is associated with education alone. Some innate capacity differences may also be involved.

Vaillancourt and Henriques suggest that the rates of return vary across the country by region. Table 10 reports the rates of return to university education by region (for men in 1981). Among the interesting features of table 10 is the observation that, as might be expected with a subsidized system of higher education, the public return is always less than the private return. Further, the return on an additional year of education falls, as is consistent with marginal productivity theory, lending some empirical credibility to the idea that the return on elementary and secondary schooling might be higher than that on university schooling.

An additional issue is raised by the recent rate of return calculations to university education. Mehmet (1977) found higher rates of return to university education in 1969 (22 percent) and 1972 (18 percent). Vaillancourt and Henrique's lower returns are also consistent with Dooley (1985, 1986), who finds that the earnings differential between university and secondary

**Table 10**  
**Percentage Return to Higher Education**  
**Men, 1981**

	Private Return	Public Return
Atlantic		
- 3 years	14	9
- 4 years	12	8
Quebec		
- 3 years	14	10
- 4 years	13	9
Ontario		
- 3 years	11	8
- 4 years	9	7
Prairies		
- 3 years	9	7
- 4 years	7	6
British Columbia		
- 3 years	10	7
- 4 years	8	6

Source: Vaillancourt and Henriques 1986, p. 454.

school graduates has been reduced during the decade from 1971 to 1981.<sup>23</sup> Although it is obviously of great concern from a public policy standpoint, it remains to be determined whether the relative decline is due to improvement at the secondary level or a decline at the university level. Dooley (1986) argues that most of the relative gain made by those with elementary or secondary school education took place in the early 1970s. During the late '70s, earnings of almost all groups—elementary, high school, some post-secondary, and university—declined, but earnings alone do not determine the rate of return.<sup>24</sup> There is little to explain the apparent fall in the relative rates of return at this time.

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**Table 11**  
**Rates of Return to Education in the United States**

Rates of Return				Private Return
Years	Private	Public	Years	
1-2	***	8.9		
3-6	***	14.5		
7-8	***	29.2	8	21.8
9-10	12.3	9.5	9-11	16.3
11-12	17.5	13.7	12	16.0
13-14	5.1	5.4	13-15	7.1
15-16	16.7	15.6	16	12.2
			17+	7.0

Source: Engerman 1971, p. 249.

Notes: \*\*\* indicates an infinite return. The studies differ on whether before or after tax returns are calculated. Columns 1 and 2 are for males in 1949; column 3 is for white northern males in 1959.

**Table 12**  
**Rates of Return**  
**(percentages)**

Year	College	High School
1939	14.5	16
1949	13.0	20
1958	14.8	28

Source: Becker 1964, p. 128.

### Rates of Return to Elementary and Secondary Education

Studies of the rate of return on elementary and secondary education consistently report high rates of return. One can easily imagine it being effectively infinite for small children who have virtually zero opportunity costs. On the other hand, missing one year of education may matter little if it takes a certain number of years of education to reach a minimal level of proficiency. Marginal productivity theory suggests that there will be higher rates of return on fewer years of schooling, and these tend to be confirmed. Tables 11 and 12 report some rates of return in the United States. In table 11 two

sets of data are arrayed by years of schooling, while in table 12 secondary and university years are distinguished.

In table 11 there is a tendency for the private return to education to be very high initially. Columns 2 and 3 give private and public returns to finishing various levels of schooling from one study, and column 5 gives the rates of return from a second study. Finishing grade 8 yielded the highest return in both cases. The return to completion of high school (years 11-12) is understandably above the return to completion of the years just before. Similarly, completion of university, indicated by completion of years 15-16, gives a better return than just two years work. However, university education levels have a lower rate of return than do high school years. This point is emphasized in table 12, which compares the rates of return of completion of high school to that of completion of university. In each year, the return to high school is greater than that to university. In sum, there is evidence that the rate of return to high school education and, presumably, elementary education lies above that associated with university.

A very recent unpublished study in which the return to elementary and secondary education in Canada is calculated directly is that of Constantatos and West. They emphasize the difference between the private and public cost of raising funds. For elementary schooling in which there is a zero marginal cost to raising public funds (the assumption comparable to that used in the calculations of tables 11 and 12), the social rates of return range from 16.8 to 13.6 percent, depending on the amount of lifetime earnings attributed to education. If the deadweight cost of raising the funds is included—the innovation in the Constantatos and West analysis—these returns fall to 12.2 and 9.3 percent. Such a deadweight loss occurs because taxation causes otherwise profitable transactions to be avoided or encourages otherwise unprofitable transactions to be concluded. Similar calculations for secondary school yield rates of return between 7.5 and 5.5 percent, with a zero marginal cost of public funds. These figures fall to 5.8 to 3.6 percent using the highest marginal cost assumption.

The conclusion of our discussion of the value of elementary and secondary school education is twofold. First, the usual way in which we evaluate education's contribution to the national income must be revised. It makes little sense to consider the value of education as the value of its contribution to growth without subtracting the cost of its provision. Second, there are too few studies of the rates of return to education in Canada to let us be confident that we have a consensus opinion about the current rate of return to elementary and secondary schooling. Indications are that it is roughly

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comparable today to those obtained in the past in the United States, but this is a research area which should be brought up to date.

Since there are so many students involved in elementary and secondary schools and the return to this kind of education is high, any kind of policy which affects elementary and secondary schooling has the potential to affect many Canadians. It seems to be a major omission for governments that pour billions into this kind of education not to be willing to systematically examine the results both over time and across provincial education systems.

## NOTES

1. Although education is the term used, formal schooling is meant in this context. On-the-job training or other methods of skill acquisition are not considered here.
2. There are other approaches to valuing education. Allen (1985) provides a sketch of several alternatives to the "human capital" approaches outlined in the text. Among these alternatives, the "signaling" model of Spence (1974) has been the most influential.
3. Appendix A contains a more detailed breakdown of the tables developed in the text. All data have been derived from the 1981 Census. I am indebted to A. Akbari for his help in preparing the tables.
4. The census collects various categories of educational attainment. Educational level is not collected by years of education per se. Thus studies which focus on rates of return to an additional year of education must impute some average number of years to a variety of categories. For example, Chiswick and Miller (1986) apparently do this.
5. From the census:

Percentage of Age Category with Less than Grade 9 Education

Age Category	Male	Female
15-25	5.0	3.7
26-35	7.0	7.0
36-45	16.8	16.7
46-55	30.1	25.8
56-65	35.9	30.5
65+	50.3	39.8

6. An extensive discussion of recent work can be found in the National Research Council's *Measurement and Interpretation of Productivity*.
7. Studies have been done for many other countries:



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Country	Dates	Percent Contribution of Labour Quality Increase to Growth
Belgium	1950-62	14
Denmark	"	4
France	"	6
Germany	"	2
Netherlands	"	5
Norway	"	7
United Kingdom	"	12
Italy	"	7
Mexico	1940-64	3
Chile	1940-64	7
India	1950-60	1

Source: Engerman 1971, p. 253.

8. Much of this section is drawn from Plant and Welsh (1984).
9. Assuming at this abstract level that factors of production employed in education are paid their marginal products.
10. The appropriate analogy is that of consumer surplus. On the margin a good is worth what you pay for it. But as Adam Smith recognized, water may be inexpensive but you cannot do without it. Diamonds are dear but they can be foregone. One way to characterize the value in this setting is to measure what the consumer would be willing to pay rather than do without. This is the concept that guides consumer surplus.
11. If education is subsidized, then the correctly measured rate of return or contribution to growth will be negative since the resource costs will exceed the value in production. This discussion abstracts from any possible public goods characteristics of education that might argue for a subsidy. The focus is on the various ways in which the contribution of education to the growth in national income has been measured.
12. Alternatively, if income increases and  $e$  is the income elasticity of the demand for education, then the gain in income for a linear-homogeneous production technology can be approximated as

$$(1/2) \times (dE) \times (dp) = (1/2) (\text{share of education in income})$$

$$\times (e^2) \times ((dY^2) / Y) / s$$

where  $s$  is the own-price elasticity of demand for education,  $Y$  is income and  $d$  is defined so that  $dE$  means the change in  $E$ .

13. Plant and Welch (p. 188) recalculate some estimates made for education's contribution to U.S. growth by assuming a Cobb-Douglas production technology with labour's share at 0.75. Whereas standard growth accounting techniques show educated labour's share of explained growth at 83 percent and a "sophisticated" growth accounting puts it at 42 percent, their corrected measure makes it 26 percent. Of course, they do not have "true" measures of the marginal product of education, let alone the marginal product of elementary and secondary which would be most relevant to the present discussion.
14. Jorgenson (1984) also focuses on the (average) amount invested per individual in the work-force in the United States. His technique goes beyond previous studies by imputing a value to non-market income. His findings are dramatically different from the traditional approaches that value only market income. He concludes that investment in education is a factor of ten greater than has been found using studies based solely on market income as the foregone cost of education. He finds lifetime investment in formal schooling on the order of \$100,000 per student or \$6,000 billion in 1973. This compares with a gross national product of about \$1,000 billion.
15. Michael (1982) makes the point that calculations of the return to education as they currently are made often fail to calculate the full effect of schooling. A general statement that the full marginal cost,  $MC$ , of an additional year of schooling equals the return means that the following equation holds:

$$MC = d(\text{Market Income}) / ds + d(\text{Enjoyment of School per se}) / ds + d(\text{Value of Non-market Production}) / ds + d(\text{Non-wage-Income}) / ds + d(\text{Market Prices}) / ds$$

where  $d(.) / ds$  is the change in each element with respect to a change in an additional increment of schooling.

There have been studies of each of these ingredients, but this research is very much on the frontier of our understanding.

16. See, for example, Schultz (1972) for bibliographical references to many studies.
17. One other study, Chiswick and Miller (1986, table A4), describes the results of an earnings equation for native born Canadians in which the natural logarithm of income is regressed against education and a host of other variables, including experience, experience squared and the

like. Education in this context is measured as years of study completed—apparently an imputation—and includes a measure of whether or not a degree is obtained. They find that the effect of an additional year of education increases income by about 3.9 percent if it does not lead to a degree. To the extent that we want to take account of the increase also associated with the additional year's education in leading to a degree (obtained by say 20 percent of the population), we have an increase in earnings of perhaps 4.2 percent in total. This interesting study is not directly aimed at analysing the returns to elementary, secondary and vocational training but focuses on language and ethnicity.

18. Engerman (1971, p. 249), however, compiles estimates made for the United States over the years. In each year the rates of return for high school are greater than for those in college, see table 12.
19. Results from two studies that support such a supposition for Canada are drawn from U. S. data which find similar patterns over grades in the United States. See table 11.
20. There is still a question in all of this literature of whether the investment unit should be a "year" of schooling. In his survey of productivity of education, Michael (1982, p. 141) remarks that there has been little by way of identifying the relevant dimensions. To the extent that elementary schooling is more homogeneous than higher education, this would be a good place to begin such research.
21. The age/earnings profile is estimated as a cross-section at a particular point in time, 1981. That is to say, data in Canada are not available to follow particular individuals through their education and earnings experience. Such panel data would provide a more secure basis upon which to base estimates of the return to education. Figure 4, for example, displays an age/earnings profile based on Dooley's (1986) figures.
22. Dooley's data are converted to 1985 prices.
23. Chiswick and Miller suggest that this may have more to do with the census reclassification of educational categories than with the actual returns to education.
24. In addition to the behaviour of direct costs, the foregone income of a university student is heavily weighted by the income of secondary school graduates. Non-university degree earners at the relevant ages are primarily those who have completed secondary school. For example, in 1981-82 there were 306,000 secondary school graduates and

70,000 college diplomas. Thus the behaviour of secondary school graduates' incomes will have a significant effect on the calculation of the rate of return to university education.



# THE COST OF ELEMENTARY AND SECONDARY EDUCATION IN CANADA

## INTRODUCTION

By almost any measure Canadians have seen the cost of education in elementary and secondary schools rise substantially over the past 25 years. Per student operating costs of the public school system measured in inflation adjusted terms have risen at an average rate of 6.1 percent per year between 1960 and 1982. By way of comparison, inflation adjusted per capita gross national product—a rough guide to society's increased command over productive resources or average income—has risen by only 3 percent per year over the same period. It is worth stressing that these figures indicate that the average cost of education has risen steadily.

In all years (save two) between 1961 and 1981, the real cost per student rose faster than the corresponding rate of real per capita national product. As government spending on education ranges between 3.2 percent of gross national product in 1960, 5.4 percent in 1970, and 4.6 percent in 1985, understanding the source of this steady increase is an important part of the way in which we perceive our public school system.

The following sections examine the costs of elementary and secondary education, identify the elements of the school budget giving rise to the increases in costs, and finally, delve more deeply into the largest single component of costs, teachers' salaries.

## AN OVERVIEW OF COSTS

Since 1960 real costs per student have been rising.<sup>1</sup> Figure 5 describes the path of real (1981 dollar) per student costs by various categories. Total cost is broken down into capital costs and operating costs. Operating costs are in turn broken down into teacher salary costs and other operating costs. What is striking about the figure is the determined upward drift in all but the capital costs, which remain roughly constant in real terms.

Figure 5

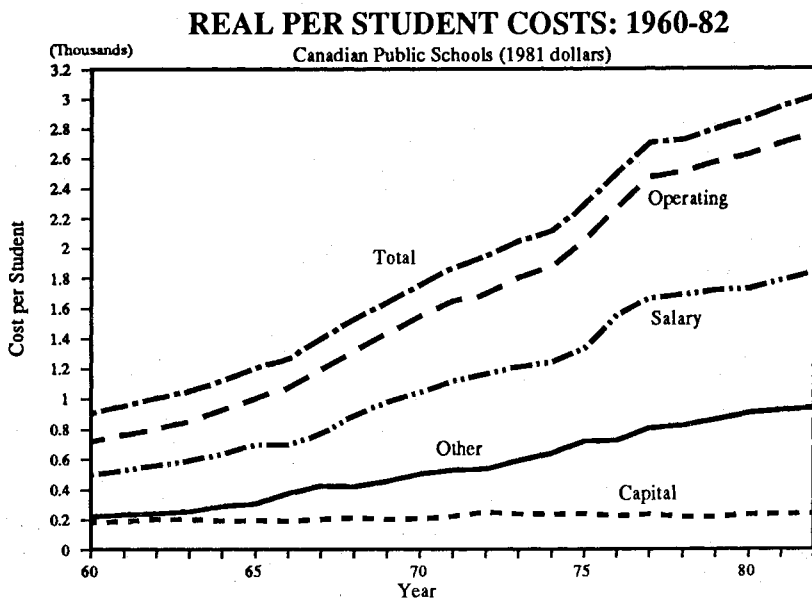


Table 13 displays the final effect of such steady growth. All costs have risen. The total cost of educating an average Canadian student in the public school system has gone up in real terms from \$900 to \$3,000 in the past 30 years. Both operating costs and capital costs have risen on a per student basis. Within operating costs, the major component, teachers' salaries has risen threefold while non-salary items, the category "other," has risen the most in proportional terms—fourfold.

The real increases in costs are reflected at the provincial level as well. Wilkinson (1986:539) provides the increases in per pupil operating costs that have taken place over the period 1974-83 in each province. Excluding Newfoundland, where costs rose 106 percent,<sup>2</sup> the increases ranged from 49 percent in Ontario to 83.5 percent in New Brunswick.<sup>3</sup> Thus, the increases that we observe are persistent and, in large measure, consistently found across the country.

It is apparent that capital costs have played less of a role than operating costs in the increase in total costs. To see which of the operating costs have generated the increases, a decomposition of the different costs of operation must be examined.

**Table 13**  
**Real Costs per Student in Canada**  
**1960/61 to 1982/83**  
**(in 1981 dollars)**

Year	Total Cost	Operating Cost		Capital Cost
		Salary	Other	
1960	900	500	221	184
1970	1760	1044	505	211
1980	2865	1728	902	235
1982	3015	1838	936	241

Sources: Costs from Statistics Canada, catalogue 81-208, various issues. Number of students, see sources of table 16.

Note: Costs are deflated by the Consumer Price Index based on 1981=100.

### **A Useful Decomposition of Operating Costs**

The increase in operating costs per pupil Canada-wide from school year 1960/61 can be allocated in a number of different ways. In table 13 the decomposition is entirely on a per student basis; that is, each reported element of cost is calculated relative to the number of students it serves. This is a useful way of identifying which costs have risen per recipient of the service. But if we want to develop some additional insight into the sources of the cost increases, there are more informative decompositions of operating costs that focus on the elements of cost for which there are (different) decision makers proximately responsible for each particular element.

Write operating costs as equation 1:

$$1) \quad (OC/S) = (SAL/S) + (OTHER/S),$$

where OC is real operating costs and S is the number of students, so that OC/S is real operating costs per student, SAL/S is real teachers' salaries per student, and OTHER/S refer to various costs discussed in the next section. Equation 1 can be further decomposed into:

$$2) \quad (OC/S) = [ (SAL/T) * (T/S) ] + (OTHER/S),$$



where  $SAL/T$  is the average salary paid to teachers,  $T/S$  is the teacher to student ratio, and the  $*$  indicates multiplication.

Although equation 2 is no more than an identity, it does contain variables of considerable interest. In effect, operating costs depend upon the behavioural variables of average salary, the inverse of the student to teacher ratio, and other costs. Since both average salary and the teacher/student ratio are determined by the participants in the school system, by looking at how these components have changed over time the total cost increase can be allocated in useful ways. To do so, the percentage rate of change of operating costs per student must be determined. This is written as equation 3, which describes the rate of growth of operating costs as a weighted average of its components:<sup>4</sup>

$$3) \quad G(OC/S) = (SAL/OC) * [G(SAL/T) + G(T/S)] + (OTHER/OC) * G(OTHER/S)$$

where  $G$  of a variable is the rate of growth of the subscripted variable. Thus  $G(OC/S)$  is the rate of growth of real operating costs per student,  $G(SAL/T)$ , the rate of growth of real average salary per teacher,  $G(T/S)$ , the rate of growth of the teacher/student ratio, et cetera. The term  $(SAL/OC)$  is the share of salaries in total operating cost. The share weights the increase of the two terms in square brackets—the sum of the growth rates in average salaries and the teacher/student ratio. The final term is the weight of “Other” in operating costs ( $OTHER/OC$ ) times the rate of growth of “other” expenses per student.

Using the decomposition of equation 3 identifies the effect of the increase in average salaries on real per student operating costs as the rate of increase in average salaries times the share of salaries in total operating cost. The same is true for the teacher/student ratio. Table 14 identifies the proportion of the percentage change in total cost per student attributable to increases in each of the components.

The first column reports the average percentage changes in real operating costs per student over the period.<sup>5</sup> Operating costs rose at an average rate of 6.1 percent per year, teachers’ salaries rose by 4.3 percent per year on average, the ratio of teachers to students increased by 1.6 percent per year; and “other” rose 6.6 percent on average.

The contribution of each cost element to the overall rise in operating costs depends upon its share in costs times the rate of growth. Thus, the 4.3 percent growth in teachers’ salaries explains about 38 percent of the total increase in operating costs. Changes in the student/teacher ratio account for another 25 percent. Finally, the category “other,” which is the most rapidly increasing of all, accounts for the same amount of increase as the increase in teacher salaries.

**Table 14**  
**Contributions of Increases in**  
**Salaries, the Student/Teacher Ratio, and Other Costs**  
**to Operating Costs in the Public Schools, 1960-82**

	Average Percentage Change (1960/61 to 1982/83)	Contribution to Operating Cost per Student (percent)
Operating Cost per Student	6.1	---
Average Salary	4.3	38
Teacher/Student Ratio	1.6	25
"Other" Costs per Student	6.6	38

Source: Costs, same as table 13.

What must be emphasized in the discussion is that the increases described in tables 13 and 14 are *real* increases. This means that to educate a student today costs more than three times as much as in 1960 (table 13), and of that increase, one-quarter is due to the change in the teacher/student ratio and almost 40 percent is due to the increase in teacher salaries. Some 40 percent is attributable to the category "other," which is discussed below.

### **"Other" Costs**

The costs included in the category "other" are materials for instruction; administrative costs; transportation; plant operation; and another, smaller "other" category. Table 15 describes the growth in these categories for the period 1978/79 to 1982/83 to give a sense of where the recent increases have been occurring.

What is apparent from table 15 is that the per student cost of administration is the most rapidly growing single item in overall expenses. Materials available for instruction per student have remained essentially unchanged in real terms. Plant operation has become more expensive, but not at the same rate as administration. As average school size began to contract, costs

**Table 15**  
**Other Real (1981) Operating Costs**  
**per Students, 1978/79 to 1982/83**

Year	Material Instr./ Student	Admin/ Student	Transport/ Student	Plant Cost/ Student	Plant Cost/ School	Other/ Student
	(1981 dollars)			(000)		
1978	74	154	135	322	115	137
1982	74	202	151	354	119	154
Average Rate of Growth						
	0	6.8	2.9	2.4	0.9	2.9

Sources: Same as table 13 and Statistics Canada, catalogue 81-220, various issues.

**Table 16**  
**Pupil/Teacher Ratios in Public Schools**  
**in Canada and the United States, 1960-86**

	1960	1965	1970	1975	1980	1985
Canada	26.1	25.0	21.6	20.2	18.6	18.3
United States	25.8	24.6	22.3	20.4	19.0	n.a.
Enrolment in Canada (millions)	4.0	4.9	5.7	5.4	4.9	4.7

Sources: U.S. data from Hanushek 1986. Canadian teacher data from Statistics Canada, catalogue 81-220, 1986, pp. 23-25; 81-229, 1984, pp. 178-81; 1980, pp. 140-41; 81-568, 1978, table 10, enrolments, 81-210, 1986, table 9.

of the physical plant operation per school rose only slightly but costs per student have risen much more.

What of the other major components of cost? The following sections examine, first, what has happened to the student/teacher ratio, and second, the salaries of teachers.

## THE PUPIL/TEACHER RATIO<sup>6</sup>

An important component of the increase in per pupil expenditures noted above has been the decline in the ratio of students to teachers. In this and the following two sections, some of the characteristics of the student/teacher ratio are developed. There are some major puzzles. The decline in the ratio is not an exclusively made-in-Canada phenomenon, nor a regional phenomenon, nor is it an artifact of the data. The underlying causes of the decline in Canada, as elsewhere, remain to be discovered.

The number of students in the public system rose from about 4 million in 1960 to a peak of 5.65 million in 1970/71. It has now fallen by one million in 1986/87 to a projected 4.66 million. From 1960, the ratio of students to teachers<sup>7</sup> has fallen steadily by a total of almost 30 percent—from over 26 pupils per teacher to just over 18 (projected) for 1986/87. Table 16 provides a description of the fall in the aggregate figures. By way of comparison similar numbers are attached for the United States.

As is evident from the table, the fall in the ratio of students per teacher is not unique to Canada. Although such a decline is often identified with arguments about the quality of education (a topic developed more fully in

**Table 17**  
**Student/Teacher Ratio Adjusted for the Mix of Students**

Year	Unadjusted Student/Teacher Ratio	Adjustment	Adjusted Student/Teacher Ratio
1960	26.1		
1970	21.6	0.6	22.2
1980	18.6	0.8	19.4
1985	18.3	0.8	19.1

Sources: For the number of students at different grade levels see *Statistics Canada, Education in Canada: A Statistical Review for the Period 1960-61 to 1970-71*, Ottawa: Information Canada, 1973, and sources from table 16.

chapter 4) or an effort to retain a given number of teachers once peak enrolments had been reached, the bulk of the decline in the teacher/student ratio began a decade before 1970/71 and took place during the 1960s as enrolments were rising. A similar phenomenon was experienced in the United States. Thus, one important ingredient in costs, the teacher/student ratio, displays a secular decline over the last 30 years that has boosted costs by roughly 25 percent of the total real cost increase.

### Correcting for the Mix of Elementary and Secondary<sup>8</sup>

One question that arises from these figures is the extent to which the changing ratio of students to teachers is due to a change in the mix of primary, elementary and high school students each of whom may be associated with a qualitatively different ratio of students to teacher.<sup>9</sup> Suppose, for example, the student/teacher ratios found in 1960 were to be used but the actual number of students in the different groups—pre-grade 1, grades 1 through 8, and high school—were allowed to follow post-1960 numbers, i.e., separate the mix from the teacher/student ratios. What would be the implied student/teacher ratio had the mix of students remained constant over the past quarter century? Table 17 reports the answer.

Column 1 of table 17 gives the actual teacher/student ratios in Canadian public schools at selected intervals. Column 2 indicates the adjustment that would have to be made to correct for the 1960 student mix of elementary and secondary school students. Column 3 indicates what the value of the student/teacher ratio would have been had the mix of age groups remained the same as in 1960. Between 1960 and 1985, the change in the student mix

**Table 18**  
**Student/Teacher Ratios by Province, 1960-86**

Province	1960	1970	1980	1986	Percentage Change:	
					1960-86	1976-86
Newfoundland	29.9	25.0	19.2	17.4	-41.7	-15.1
Prince Edward Island	25.2	19.1	19.6	19.9	-21.2	2.1
Nova Scotia	26.9	21.5	17.5	17.0	-37.0	-11.3
New Brunswick	26.0	21.5	19.6	19.4	-25.2	-8.8
Quebec*	24.0	20.4	16.1	16.2	-32.6	-16.2
Ontario	28.2	21.8	20.0	19.1	-32.1	-6.1
Manitoba	25.4	21.4	18.3	17.8	-30.0	-9.9
Saskatchewan	24.2	22.5	18.9	19.3	-20.1	-5.8
Alberta	25.0	20.9	19.4	18.9	-24.5	-7.3
British Columbia	27.1	24.4	19.4	20.4	-24.7	0.1
Yukon	25.3	24.4	18.2	17.2	-32.1	-4.6
Northwest Territories	27.1	19.3	18.2	20.0	-26.1	4.8
CANADA	26.1	21.6	18.6	18.3	-30.0	-8.7

Source: Same as table 17.

Note: \*The data for Quebec are almost all estimated rather than actual values. This leads to some very peculiar discrepancies in the ratio. See, for example, the figures on number of teachers from the source *Education in Canada*, 81-229, 1983, and the *Advanced Statistics of Education 1982-83*, 81-220, 1983, for an illustration of the problems.

accounted for a little over 10 percent of the total change. Of the fall in the average student/teacher ratio from 26.1 to 21.6 during the 1960s, 0.6 of that was due to the change in the mix of elementary and high school. The rest was due to changes in the student/teacher ratio. Since the differences are so small, we shall deal with the actual ratios.<sup>10</sup>

### Changes in the Provincial Student/Teacher Ratios

Table 18 summarizes the changes in the student/teacher ratios by province from 1960 to the present. Over the past 26 years, the student/teacher ratio has fallen dramatically in every province. Since 1980, however, there is at least some evidence that the decline has abated. Over the past decade, the ratio has actually risen slightly in B.C., P.E.I. and the Northwest Territories, and the same is true from 1980 to 1986 for Quebec and Saskatchewan, al-

though the Quebec numbers are less reliable than the others as they are frequently estimates. But on the whole, the fall in the student/teacher ratio has been a phenomenon common to every province.

From the analysis of the past several sections, it is clear that the student/teacher ratio has fallen in a systematic fashion over time and from region to region. What causes such a decline will be discussed in subsequent sections.

## TEACHERS' SALARIES

As shown in table 13, the growth in teachers' salaries in Canada has been substantial. From the early 1950s to the present, the increase has been much faster than that obtained by teachers in the United States or by broad classes of other income earners within Canada.

To see this most clearly, column 1 in table 19 shows the ratio of average Canadian teacher salaries relative to teacher salaries in the United States (adjusted for the exchange rates prevailing at the time). Starting in 1950, Canadian teachers received roughly 60 percent of that obtained by U.S. teachers. Their relative position reached parity around 1970 and has reversed, with Canadian teachers enjoying a relative advantage of 30 percent over their U.S. counterparts since the mid-1970s.

Column 2 shows that Canadian teachers have improved their positions relative to the earnings of manufacturing workers and industrial workers (not shown). From being paid 80 percent of the manufacturing wage in 1950 to parity in 1960, teachers are now paid roughly 50 percent more.<sup>11</sup> But this only describes the phenomenon.

Both in terms of domestic income growth and by international comparison, Canada's teachers have made remarkable progress in raising their income over the last 40 years. This income growth is well above that enjoyed by the average of other members of Canadian society and is certainly greater than that which has taken place in the United States.

In column 3 the increase in income enjoyed by U.S. teachers relative to U.S. manufacturing wages is described. Starting from a higher relative base, U.S. teachers gained, too, but not in the same way as in Canada. In parentheses is the teacher's salary relative to average earnings in the United States. From 1960 the increase is roughly 20 percent compared with the near 50 percent gain in Canada.

**Table 19**  
**The Comparative Growth of Canadian Teachers' Salaries**

Year	Canadian Teacher/ U.S. Teacher Salaries (percent)	Canadian Teacher/ Canadian Mfg. Wages (percent)	U.S. Teacher/ U.S. Mfg. Wages* (percent)
1950	59	80	99
1960	82	100	111(123)
1966	79	114	111(135)
1971	106	135	124(143)
1976	141	138	116(136)
1981	131	144	111(138)
1983	131	155	--- (149)

Sources: Column 1, U.S. data on teacher salaries, from Hanushek 1986, p. 1149, after 1950. For 1950 and column 3, U.S. data on teacher salaries and manufacturing wages (weekly wage multiplied by 52) from United States Department of Commerce 1975, p. 169 and p. 375, and annual 1982, p. 768. Canadian data from Statistics Canada 1975, E90, and Bank of Canada 1986, L1267. Figures in parentheses in column 3, the ratio of teacher salaries to average earnings in the U.S., from Hanushek 1986, p. 1149. Exchange rate data from Statistics Canada 1975 and Bank of Canada 1986. Canadian teacher salary data, same sources as table 14.

Notes: \*The figures for teacher salary relative to average manufacturing wage are those without parentheses and are for the years 1950, 1960, 1965, 1970, 1977, and 1980. Figures in parentheses are relative to average earnings in the U.S. and are less directly comparable to column 1.

## **Characteristics of Public School Teachers**

What are we to make of this tremendous growth of teachers' salaries? Is it in response to what might be described as a steady relative increase in the human capital of teachers for which they are simply being remunerated in a normal fashion? Or are there other reasons for their increased remuneration?

It must first be said that the various salary estimates and comparisons presented in the earlier section are probably an underestimate of the actual increases in all teachers' incomes. Teachers are frequently the beneficiaries of various kinds of job-related benefits not always available to other workers (Marcotte 1984), and these as well as relatively pleasant working



conditions should be valued as part of the “full income” received (Lucas 1977).<sup>12</sup>

The following section looks at how Canadian teachers have increased their levels of human capital. The possibility that the increase in salary reflects an increase in the proportion of teachers assigned administrative roles is considered. And finally, what role increased labour relations “militancy” on the part of unions may have meant is examined.

### **Human Capital Accumulation**

Teachers have improved their qualifications over the past 30 years. This is a phenomenon that has been observed in both Canada and the United States. In Canada it has taken the form of an increasing percentage of the teaching population completing a B.A. From 1960, when three-quarters of elementary and secondary school teachers did not have a degree, the proportion in Canada has fallen to 17 percent and will doubtlessly continue to decline. Similarly, the fraction of teachers with post-graduate degrees has also been on the rise, albeit in smaller numbers—from 2 percent in 1960 to just under 10 percent in 1983.

In the United States, a far greater proportion obtain M.A. degrees at this time, a B.A. being almost universal. Between 1971 and 1983 the fraction of the teaching force with a master’s degree or more rose from 27 percent to 53 percent.

The teaching experience of the two populations is roughly similar, with 13 years being the median level for both. Since 1950 (not shown in the table), the years of experience of Canadian teachers has developed in a U-shape. In both 1950 and 1975 eight years of experience was the median level, with a post-World War II low of 6.6 years in 1966 and 1967. Since then, there has been an overall increase in the level of experience which is captured in table 20. This table draws together some other relevant inter-temporal characteristics of the teaching force in Canada and compares them with those of teachers in the United States.

The import of table 20 is twofold. First, teachers’ qualifications, experience, and age have been increasing; this goes at least part of the way toward explaining the observed increase in real salaries. As the work-force accumulates more experience, it follows that there will be some payment made for that investment on average.<sup>13</sup> Second, however, the explanation is less satisfying when we recall that salaries of teachers in the United States have risen less than in Canada, and they are lower in direct comparisons.<sup>14</sup> At the level of formal qualifications at least, U.S. teachers are better educated as a group and have comparable teaching experience.<sup>15</sup> The dis-

**Table 20**  
**Characteristics of Elementary and Secondary School Teachers**  
**1972/73 to 1983/84**  
**Canada and the United States**

Year	Canadian Teachers		Average Age	Canadian Teachers	
	Proportion with No Degree (Percent)	M.A+		Average Experience (Years)	Median
1960	74.9	2.3			8.0
1970	52.4	4.6			7.3
1972	48.5	5.7	35	9.4	7.0
1983					
Canada	17.1	9.6	39	13.6	13.0
U.S.	---	53.0			13.0

Sources: U.S. data Hanushek, 1986, p. 1149; Statistics Canada, columns 1 and 2, 1975, W250, W256, 81-229, 1984, p. 182; 81-202, 1985, pp.17 and 47; 81-568, p. 176.

**Table 21**  
**The Proportion of Administrators and Teachers**  
**in Canada's Public Education System, 1972-83**

	Principal	Vice- Principal	Department Head	Teacher
1972/73	5.6	3.1	6.5	84.8
1973/74	5.6	3.0	6.4	84.9
1974/75	5.4	2.9	6.4	85.2
1975/76	5.4	2.9	5.5	86.2
1976/77	5.4	3.0	5.5	86.1
1977/78	5.3	3.0	5.6	86.1
1978/79	5.4	3.0	5.5	86.1
1979/80	5.5	3.0	5.6	85.9
1980/81	5.5	3.1	5.7	85.8
1981/82	5.3	3.0	5.7	86.0
1982/83	5.4	3.1	5.6	85.9
1983/84	5.4	3.1	5.7	85.8
1984/85	5.4	3.1	5.8	85.7

Source: Statistics Canada, catalogue 81-202, p. 22.

Note: All provinces and territories except Quebec.

**Table 22**  
**Nominal Salary Growth Within**  
**Different Administrative Categories, 1972-84**  
 (all figures in current dollars)

Salaries of					
Year	Teachers	Principals	Vice- Principals	Department Heads	Total
1972/73	9,568	15,643	14,461	15,065	10,436
1984/85	34,565	47,942	44,443	42,577	36,070
Ratio of row 2 to 1	3.6	3.1	3.1	2.8	3.5

Source: Statistics Canada, 81-202, 1985.

crepancy in salaries cannot be explained by the growth in teacher experience or nominal qualifications. Canada's teachers have fared well by comparison with their counterparts in the United States. A third point for additional research is to explain why it is that Canadian teachers' salaries have risen when median experience was falling in the early 1960s—even were experience to be accepted as the main reason for the increases of the 1970s and 1980s.

### Teeth to Tail

One possibility for explaining the rapid rise in what is measured as teachers' salaries is that these salaries have risen in part as a response to rising levels of administrative personnel who form an ever larger part of the core of educators. Table 21 displays the "teeth to tail" ratio in aggregate, i.e., the percentage of various levels of administrators and teachers relative to the total number of educators employed in the schools.<sup>16</sup>

Even though average costs have risen and average salaries have risen, the proportion of principals and other administrative personnel has shown no determined tendency to rise or fall on aggregate. There is little reason to believe that the proportion of administrators is responsible for the large increases in real costs. Furthermore, as table 22 indicates, the greatest increase in salary over the period has taken place in the salaries available to *teachers* rather than in the earnings of principals, vice-principals and department heads.

**Table 23**  
**Proportion of Educators with Administrative Responsibilities**  
**1983/84**

	Newfound- land	P.E.I.	Nova Scotia	New Brunswick	Ontario	Manitoba	Saskat- chewan	Alberta	British Columbia	Yukon	N.W.T.
Elementary:											
Teachers	89.23	86.94	90.22	89.51	90.31	90.53	84.09	88.95	88.46	90.12	85.29
Principal	6.85	5.71	6.02	6.82	6.54	6.47	11.03	6.26	7.57	6.40	10.20
VP	3.57	5.05	3.00	3.16	2.47	2.05	4.49	4.28	2.93	2.91	4.31
Dept Head	0.35	2.31	0.76	0.52	0.67	0.95	0.39	0.52	1.05	0.58	0.20
Secondary:											
Teachers	76.97	82.99	86.92	80.54	75.72	85.42	86.32	84.68	79.45	75.00	86.72
Principal	7.85	3.05	3.06	3.60	1.70	3.30	3.98	4.08	2.80	13.75	7.03
VP	5.90	4.06	3.59	5.48	2.57	3.27	3.89	4.83	3.51	3.75	6.25
Dept Head	9.28	9.90	6.43	10.38	20.01	8.01	5.81	6.41	14.24	7.50	---
Average											
Salary (\$)	30,400	29,500	33,800	31,200	36,200	34,100	32,500	(n.a.)	36,000		

Source: Statistics Canada, 81-202, 1985.

However, the same cannot be said at the provincial level. Table 23 indicates that there is considerable variation in the number of school administrators across provinces. In the table, the levels of administration are broken down by level of schooling, since it seems clear that higher divisions have generally required more administrative input, presumably because of the increased specialization necessary. The average salary is also reported.

In the major provinces, roughly 90 percent of elementary school educators are strictly teachers. But in secondary education, the share ranges from about 87 percent in Nova Scotia to 75 percent in Ontario, although with grade 13 this may be an artifact. The component displaying the greatest variability is that of "department head."

But what of the direct relationship of salary and within school administration? As might be expected, excepting Quebec and Alberta for which the appropriate data are not available, the highest average salary rests with Ontario and British Columbia. These are the provinces with the lowest proportion of teachers without administrative responsibilities. Thus, at least some of the between province variation is explained by the different structure of nominally administrative responsibilities.<sup>17</sup> How this effects the actual in-class ratio of teachers to students or the efficiency of school operations is less clear. Many principals teach part time, especially at the lower levels, and other school level "administrators" are also in the classroom.

The cost of education at the elementary and secondary level in Canada has risen steadily over the past 30 years. Most of the increase has come from changes in the mix of teachers to students and the increase in teachers' salaries. The increase in salaries has been attributed to an excess demand for teachers in the 1960s (Anderson and Gunderson 1982:383), but this fails to explain the increasing rise in the 1970s and the continuous decline in the student/teacher ratios.

## UNIONIZATION AND SCHOOL COSTS

Another reason teachers may have been particularly successful in obtaining such high levels of income relative to others in Canada and to teachers in the United States is that they have been able to form effective bargaining units. Although there is no direct quantitative Canadian evidence about this of which I am aware, recall that except for Quebec and Ontario all teachers in public schools in a province are in one bargaining unit. As one Canadian labour relations textbook has remarked, "teachers'... associations in par-

ticular, have become more militant in recent years" (Anderson and Gunder-son 1982:390).

As long ago as the 1920s, the "privileges" of bargaining were given to some teacher associations. After the Great Depression and World War II, the "right" to bargain over salaries was entrenched.<sup>18</sup> During the period of rapid salary growth in the "golden years" of the 1960s, there were strikes but most were of relatively short duration.<sup>19</sup> It is not clear what gave rise to increased activity on the part of teacher organizations—to what extent they were acting in response to perceived new political versus economic opportunities—nor is the reason governments chose to let salaries and costs climb established. This remains an open issue; but some of the proximate reasons why costs have risen are less obscure.

With the provinces taking an increasing role in financing lower education by establishing province-wide cost-sharing formulas, there is an effective floor on both minimum service levels and salaries (Muir 1970). Provinces effectively pay each teacher on a province-wide basis, leaving comparatively little scope for significant local salary differences based on market forces. There is a strong tendency to allow third party intervention in negotiating contracts. It also enhances the harmonization of contracts across districts as "pattern" contracts are established. This means that whatever market forces are disciplining the wages and other work conditions of the contract, they are attenuated by a quasi-judicial process.

Looking at the kinds of contracts in the various provinces, several features are noteworthy (Marcotte 1984). First, in each province there is a grid based on education and measured by years of formal schooling and relevant teaching experience. Second, the number of years to the maximum salary in each salary category tends to be few compared to working life.<sup>20</sup> Third, salary maxima tend to be quite similar for experience and educational criteria.

The consequences of the various arrangements, which are locally negotiated in British Columbia, Alberta, Manitoba and Ontario and provincially in the others, is that many teachers are quickly at the maximum grade in their category. For example, in 1983 with 12 years to the maximum in any category in any province (or 15 in Quebec), the level of median experience was 13 years. Quite clearly there is a great incentive for teachers to emphasize increases in the scale maximums rather than increases in the starting levels, merit pay and the like. This can be observed in the relatively wide variety of starting salaries across provinces (Marcotte, p. 12).

It is difficult to observe the effects of teacher bargaining in Canada's provinces since there is relatively little variation in the kinds of arrangements that would let us test the effects of what is, effectively, unionization.

And since private schools are at the present time a relatively small proportion of the school-age population, we turn to evidence gathered in the United States where there are significant numbers of both union and non-union schools.

### **Evidence from the U.S. Experience**

What is known about the effects of unionization on costs of schooling? A recent study by Baugh and Stone (1982) has shown that teacher unions increase the salaries received by teachers. Chambers (1978) shows that unions tend to reallocate expenditures that are made within a school district's budget, and Ebert (1984) finds that schools use different work rules when unions are present. And although Gallagher (1978) shows that operating budgets of unionized school districts are on average 9 percent higher than non-unionized districts, Hall and Carroll (1973) and Chambers (1978) find little or no differences. The most complete and sophisticated study to date, Eberts and Stone (October 1986), however, finds that unions raise cost by between 7 and 15 percent.

Eberts and Stone examine the effects of unionization on costs by making an effort to hold quality of education constant in addition to characterizing the input mix of students by various educational and other family characteristics. Their findings are noteworthy in that they explore the effects on school systems in several dimensions.

First there is the effect on teacher compensation. Moore (1976) found that unionization raised salaries by 6 percent. In the United States during the late 1970s, union teachers tended to earn between 12 and 22 percent more than non-union teachers (Baugh and Stone 1982). Thus there is some presumption that what we have observed in Canada is at least consistent with what has been taking place piecemeal in the United States.

Second, there is at least fragmentary evidence to suggest that unions have an effect on the production technology within the school district (Eberts and Stone 1984). In general, teachers in unionized districts are more productive than teachers in non-union districts in the United States.<sup>21</sup> This observation is consistent with union productivity effects observed in the private sector (Freeman and Medoff 1978), although the increase in productivity of 5 or 6 percent in the public schools is both smaller than that found in the private sector and more than offset by the increase in costs.<sup>22</sup> Further, these increases are not equally shared by all students. Specialized small-group instruction which benefits the best and the poorest students tends to be crowded out of the programmes. Other studies of student performance (Summers and Wolfe 1977) have found that poorer students do bet-

ter when they are with newer teachers rather than experienced teachers. Unionization tends to increase the longevity of teachers in their occupation and works against the least capable as well.

Thirdly, there is what Eberts and Stone (January 1986) refer to as the factor-use effects of unionization. Class size restrictions and other contract limitations have an impact on the mix in which factors of production are used in the education process. Hall and Carroll (1973), Eberts (1984) and Woodbury (1985), looking at different district samples and at different points in time, find higher teacher/student ratios in unionized districts. The costs associated with these factor-use restrictions does not fully offset the productivity effects, but it does significantly attenuate them.

In sum, with the teacher productivity effects partially cancelled by the different use of other factor inputs—significantly more teachers per student—the net effect of unionization is to raise the cost of schooling by raising teachers wages without a compensating increase in overall productivity.

How does such experience in the United States square with what we observe in Canada? There are two facts that stand out. In the absence of any direct tests of the proposition that unions raise costs, we have seen that Canadian schools have increased teachers' salaries at a very rapid rate over the past quarter century. Second, we have seen the teacher/student ratio rise in substantial measure.<sup>23</sup> Although both phenomena are present south of the border, neither has been as extreme.

Such evidence would be consistent with either of two scenarios: collective bargaining is more extensive in Canada than in the United States and has raised teachers' salaries in consequence, or the impact of collective bargaining is increasing more quickly in Canada than in the United States. In the first case, we may expect to see U.S. teacher salaries approach Canadian salaries if collective bargaining continues to spread in the United States, but teachers' relative income position within Canada would remain (roughly) unchanged. In the second, the relative rates of growth (or change) in collective bargaining strength will determine relative teacher wages, but teachers in both countries will increase their relative income positions. Given the massive changes that have already occurred to teachers' salaries within Canada, recent efforts to reduce provincial public sector spending (British Columbia being the outstanding example over the past few years) may give an opportunity to judge whether the impact of collective bargaining has reached its zenith or will continue the trends of the past 30 years.



## NOTES

1. Which is why the amount spent on education—as a fraction of national income, et cetera—is not a particularly useful measure of the relative cost of education over time. Such measures depend in a significant way on the size of the relevant population rather than capturing the efficiency with which expenditures are being made.
2. Wilkinson suggests that this may be due to a catching up phenomenon as costs in Newfoundland were lower than any other province in 1974 and roughly comparable in 1983/4 (Wilkinson, p.539).
3. Specifically, the percentage increases are:

Nfld	PEI	NS	NB	Que	Ont	Man	Sask	Alta	BC	Canada
106	51	68	84	76	49	71	77	75	65	67

4. Take the logarithmic derivative of equation 2.
5. The averages in the table have been calculated by simply averaging the annual changes in the rates of growth.
6. The following will deal with the student/teacher ratio rather than the teacher/student ratio. It makes no difference other than in sign in the algebra of equation 3, and the units of the student/teacher ratio are more congenial to use than their inverse.
7. Following Statistics Canada practice, we shall include principals, vice-principals, and department heads in our count of teachers, or educators as the category is often described. Obviously, this leaves open the question as to the amount of classroom contact provided by the measured teacher/student ratio. Similarly, it leaves the number of administrative tasks per administrator unresolved. The variation in the ratio of the different administrative to teaching categories is discussed in the section “Teeth to Tail.”
8. Unless explicitly noted, the following discussion will describe figures for the public school system.
9. Wilkinson (1986) notes that costs of high schools are seen as 10 to 50 percent more expensive than elementary schools.
10. Although it is easy to imagine that a detailed breakdown of the student/teacher ratio, adjusting for the change in grade mix, is desirable in principle, since the weights chosen are dependent on the judgement of the investigator and the problem at hand no such adjustment will be pursued here.

11. Another set of teachers in Canada are university professors, whose salaries have risen from a median of \$11,400 in 1967/68 to a mean of \$46,000 in 1983/84. Elementary and secondary teacher salaries have risen from \$6,640 to \$35,100 over the same period; i.e., the ratio of teachers' salaries to university professor salaries has risen from 58 percent to 75 percent.
12. And further, the higher the measured income level the higher the un-measured amenity values are likely to be.
13. Such a return will be to investment in firm-specific capital. The investment in skills that can be transferred—general human capital—will tend to be paid for by the individual not the firm. In this regard see Becker (1964, 1975).

The investment must be productive. There is little direct evidence of this in the literature. Wolfe and Summers (1977) find that newer teachers are more successful than more experienced teachers with some types of students.

14. It must be said, however, that these conclusions are drawn from highly aggregative data. They do not adjust for the tax rates or various subsidies in each country and region.
15. There is a case to be made that some of the increase in apparent qualification (e.g., additional years of education) on the part of teachers is a result of the character of negotiated contracts. This is true both in the United States (Hanushek 1986:1148) and Canada (Marcotte, p. 12). How much increases in the numbers of teachers with degrees of different kinds reflects degree inflation and how much constitutes genuine increases in productive investment has not been assessed.
16. This, of course, is not the same thing as the category "administration" that was discussed previously. That category refers to administration outside the schools proper—district or school board level.
17. McKee (1985) finds little difference in costs at the elementary level between Ontario and British Columbia. Instead he suggests that the bureaucratic structures will evolve in response to competitive forces from some initial differences in constraints. Although the argument is developed in terms of the forces that move provincial administrations, there is no reason why similar kinds of competitive forces will not be at work at lower levels of administration. The evidence of table 23 is that some school level differences among provinces exist.

18. For example, Alberta 1941; Manitoba 1948; Saskatchewan 1949; Nova Scotia 1957; British Columbia 1958; Quebec 1964; and New Brunswick 1968.
19. See Muir (1970) for a description.
20. Marcotte (1984:16) found between 10 and 15 years as the maximum time to reach the top of the grid in his extensive sample of actual contracts.
21. This is a partial effect on output as it does not include either the salary cost of teachers or other costs described herein.
22. Weiss (1966) argues that unions first organize firms with high productivity which accounts for the observed relationship.
23. These phenomena have not been explicitly identified in Canada. There is some scope for research, however, as some provinces (e.g., British Columbia) prohibit "working conditions" which are consultative being tied to salaries which are negotiated.

# EFFICIENCY IN PRODUCTION

## INTRODUCTION

One of the most surprising things about evaluating the efficiency with which education is provided in Canada is the paucity of studies. Cost or production technology studies of education in Canada are few and far between. Even the relatively simple question “Does the addition of another student tend to increase average cost?” has no clear, unambiguous answer. Yet, such a question should be of vital interest to provincial and local authorities in these times of declining enrolment and increasing restraint in the public schools. It is also of great general interest in assessing the effects of vouchers on costs. Parents, taxpayers and employees of the school system all have an interest in these issues as shall be seen.

## THE IMPORTANCE OF THE AVERAGE COST FUNCTION

The shape of the average cost function, which plots average cost per unit against output, has been the focus of attention in Canadian studies. The traditional theory of cost found in every economics textbook describes the process by which costs are minimized. In a competitive environment, if price is above average cost, this is a signal to the market for new firms to enter the industry, which drives price down.<sup>1</sup> If average cost is above price, it is a signal for firms to leave the industry. If the average cost curve is U-shaped, costs will be minimized by choosing the level of output at the bottom of the U. If production took place at any other point on the average cost curve, a different level of output would lead to lower unit costs and, in a competitive environment, higher profit. If the average cost of providing a service such as education takes place at the minimum of the average cost curve, then production costs are being minimized. If they take place elsewhere on the cost curve, then some increase or decrease in the level of output can lower average cost, making production in some sense more efficient.<sup>2</sup>

There are two ways to view the exercise of finding the cost curve. It can be viewed as a reflection of the historical relationship among costs and output, or it can be seen as an outcome of some process of cost minimization that takes place at the level of the school or school board.<sup>3</sup> There is some doubt about this procedure as we shall see below, but it provides a good place to start as the data for Canada have been interpreted as having strong implications for current policy.

### Studies of Average Cost

There have been some studies of cost functions. For Canada, those of Dawson (1972), Wales (1973) and Kumar (1983) develop the major issues. In the United States, there were early studies by Hirsch (1960), Osborne (1970), Riew (1966, 1972), Cohn (1968), and Cohn and Riew (1974). Most recently, Eberts and Stone (1986) have examined the cost function in the context of teacher unionization. For the United Kingdom, Glennerster and Wilson (1970) follow Riew's (1966) approach, and Watt (1980), and Bee and Dolton (1985) have all looked at average cost functions in private schools.

There is unanimity neither in approach nor conclusion of these studies. But, in a general sense, all estimate a total cost function like equation 1,

$$1) \quad TC = a. + b. ENROL + c. ENROL^2 + d. ENROL^3 + e. QUAL + f.X + g.P$$

where ENROL is enrolment,  $ENROL^2$  is enrolment squared,  $ENROL^3$  is enrolment cubed, QUAL is some measure of quality, and X is the vector quantity of other inputs such as heat, light, et cetera, for which P is the vector of associated prices. Or, as frequently found in recent years, estimates are made of the average cost function so that each of the quantity elements in equation 1 is estimated on a per student basis, sometimes adjusted for output quality, sometimes not. Thus, some form looking like equation 2 results:

$$2) \quad AC = (TC/ENROL) = b. + c. ENROL + d. ENROL^2 + e. (QUAL/ENROL) + f. (X/ENROL) + g. P$$

where AC is average cost, and the other variables are as before.

For there to be a U-shaped average cost curve, the sign of c must be negative and the sign of d positive; i.e., as the number of students increases, at low levels of "output" (student) costs must be falling. But as the number of students gets larger, the quadratic term (in the average cost function) must become large enough to dominate, thus raising average costs above some minimum.

## **Evidence in Canada**

Dawson (1972) examined total costs in public secondary schools in Ontario by looking at 377 school districts. To separate district costs from school costs he looked at both single school districts, and multiple school districts. He conducted three estimations of total cost in which output was considered as (i) average daily attendance, (ii) attendance adjusted by an index of educational quality based on a set of inputs for each school including teacher experience, teacher turnover, average number of teachers with B.A. degrees, and (iii) attendance adjusted by an output quality index based on achievement test performance.

Dawson found average costs in single school districts either decreasing or constant with respect to scale. An increase in the size of the student body would lower average costs or leave them unchanged. In the case of multiple school districts, the estimated cost functions become uninterpretable. Kumar suggests that this follows from a failure to distinguish geographically extreme school boards from one another. Dawson's study also leaves the source of the scale economies ambiguous since it is conducted at a district level. For any policy implications of such a cost function to be useful, the source of the implicit gains must be identified.

Wales (1973) looked at British Columbia elementary and secondary schools at a more disaggregated level, having had access to individual school cost information. He estimated the average cost function for individual elements of cost such as teacher salaries, principal salaries, et cetera as well as for overall average variable cost. Unlike Dawson, however, he does so for a "standard" school. He made no adjustments for individual school "quality"—either as an input bundle or as an output mix.<sup>4</sup>

But like Dawson, Wales concluded that there is evidence of decreasing costs. Looking at salary costs in particular, he found that smaller schools have lower student/teacher ratios than large schools. This leads to falling costs as school size increases. When school district costs are considered, there is more evidence of falling average cost as the number of students in the district rises.

Kumar (1983) conducted the most extensive cost analysis in the Canadian literature, breaking costs into 19 separate categories for 38 Ontario schools. Like the others, he too found evidence of decreasing average costs as a function of school size. And, where there was some indication of increasing costs, the minimum cost point was well beyond the average school size in the sample.<sup>5</sup> The results lead to a conclusion that between \$75 and \$168 per student (between 1975 and 1977) could have been saved

by increasing school size by 100 students. This prescription amounts to a savings of roughly 5 percent of operating cost.

### **Evaluating the Evidence**

What are we to make of such findings? If taken at face value, these studies suggest that Canadian schools can be enlarged at substantial savings to the taxpayer. But two lines of argument throw some doubt on such an interpretation. The first is an empirical observation, and the second is a reinterpretation of the existing evidence.

The first observation is that when schools have the choice, in the sense that parents choose schools of particular sizes, they tend to choose smaller schools on average. Of the private schools in Canada, the average number of pupils over the past quarter century has ranged between 130 and 240, and these averages have always been smaller than the average size of public schools which have ranged from 160 to 385. Similar observations can be made for the United States. Although undoubtedly due in part to different mixes of elementary and secondary schools, the salient feature is that to the extent that the marketplace indicates the size of school that pleases the consumer, that size tends to be lower, not higher, than what is observed in the public school system.

Secondly, the evidence is not that clear when school districts are consolidated and/or make reductions in the number of schools. McKee (1985) found that in Ontario's experience with consolidation, costs per student increased rather than fell. This points to some of the limitations of the evidence on costs estimated by cross-sections, and Kumar (1983) found the cost function to be unstable when measured across time periods. It leaves considerable doubt about the applicability of the cost function as a device to predict the behaviour of costs over time.

The second problem with the existing evidence can be split into two different areas of reinterpretation. First, in the studies described thus far, the underlying experiment is that of changing the number of students—economies in the scale of operation. The various controls for quality of education (in equation 2) are things like the teacher/student ratio. There is a problem with the use of the teacher/student ratio as a measure of quality. This point is pursued in the next section describing extensive efforts to model those observable school variables that contribute to quality.

Second, the observation that we are not at the minimum cost point on the average cost curve is suggestive of several possibilities. The average cost curve may be tangent to the demand schedule. (This is the scenario of monopolistic competition described in note 1.) Suppose each school has a

catchment area in which costs of transportation, differing neighbourhoods, et cetera, generally mark the points at which two schools vie for students. By lowering the “price” or raising the quality, more students are attracted to the school. Competition among schools will ensure that the price falls until average cost is just equal to price. But schools face downward sloping demand in their catchment area. The slope arises from the parents’ realization that to send their child to a school farther away involves costs. More parents will seek alternatives to a particular school if the “price” is high.

Thus, the observation that a school system can save money by expanding schools is not the same thing as saying that parents (or taxpayers on the whole) are better off if the school system enlarges the size of the average school. These observations are perhaps most relevant in the context of private school costs (Bee and Dolton), but this gives rise to two additional queries. Do we know what is being maximized in the public school? What are the policy implications if we are observing historical costs rather than minimum costs associated with various levels of output? Recent studies of the educational production function which try to identify the relevant measures of inputs and outputs associated with public education may shed some light on these matters.

## THE EDUCATIONAL PRODUCTION FUNCTION

The general theory that underlies studies of production functions is that some well-defined output is produced by combining some inputs such as labour and capital to produce or transform an initial bundle of raw materials into final output. The inputs applied to the transforming process add value to what is there initially. If the prices of the various inputs are known, then the least cost set of inputs can be identified for any given production technology. This general approach has been widely used throughout economics and has proved to be applicable to a wide range of problems from characterizing the production of hydroelectric power to banking services.

The production function approach to education has had its greatest impact after the publication of the Coleman report (Coleman et al. 1966), which found that schools were not significant in affecting students’ performances. Although this conclusion has been hotly debated and generally rejected, Hanushek (1986) suggests that much of the antagonism toward the use of production theory stems from unhappiness with the conclusions that schools are not using their inputs efficiently.

The production function theory applied to the educational process views the achievement of a student as a function of a set of inputs which include teachers, curriculum, other students, general characteristics of the schools



and the characteristics of the student which are brought to the relevant level of education, both genetic and social. There are any number of difficulties in application.

### **Outputs and Inputs**

Although the usual theory of production is developed in the context of a single homogeneous good, the service of education is primarily concerned with improving the quality of the individual in some dimensions. These may be identified as better test scores and good grades, or sometimes they are seen as better attendance records in school, a greater likelihood of the student continuing for additional schooling, or in giving the student better attitudes toward society. Because of these difficulties in identifying the output of the educational process, some researchers reject this approach out of hand (Hanushek 1986:1150). The quantity of education at the individual level is almost always measured as years of schooling or highest grade level achieved, and although this has strong implications for the production process itself, as a matter of empirical practice little else is used.

The various measures of both the quantity and quality of education are attempts to proxy the way in which education affects post-schooling performance. As Hanushek (1986:1151) puts it, "While seldom fully articulated, the theory is that more schooling makes people more productive in the labor market, better able to participate in democracy, better consumers, and so forth—in other words, healthy, wealthy, and wise."

Education is highly correlated with a wide range of positive measures of achievement. Like so many investments, there is no way to observe future performance at the moment at which the investment in education takes place. Obviously, there are many steps linking output at the school level with future achievement. But none the less, many studies have been made correlating education with higher salaries, job satisfaction, greater labour force flexibility, personal health, reduced crime, political socialization and voting behaviour, divorce rates, and many other attributes of health, wealth and wisdom.<sup>6</sup>

As suggested above, quality is both difficult to define and difficult to measure. Wilkinson (1986) observes that public perception of education is that there has been a deterioration of quality of various traditional skills in mathematics and language. The Science Council is concerned about the quality of education in the sciences (Science Council of Canada 1984). Employers have complained about the preparedness of the work-force (Ontario Ministry of Education 1981). Parents have reacted to the lack of time spent on basics in the classroom—a trend that evolved during the 1960s

with an increase in elective subjects and open classrooms—or at least so it is perceived by some (*Vancouver Sun*, March 14, 1986).

There is little by way of systematic verification of what is acknowledged to be a general unhappiness with the current quality of education (Ontario Ministry of Education and Ministry of Colleges and Universities 1975, and Hedges 1977), and there is at least some evidence that some of the lower averages observed may be associated with a greater fraction of the school-age population continuing to higher levels of education than previously.<sup>7</sup> But regardless of the reality, and there is precious little quantitative evidence, Canadians are not alone in their concern for the quality of education. In the United States, concerns over what then Secretary of Education Bell referred to in 1983 as “a rising tide of mediocrity” in secondary schools has sparked a torrent of interest in the public schools.<sup>8</sup>

At the same time as there has been a general feeling of dissatisfaction with the quality of the output of education, many provinces have reduced the visible process of validation which has made it increasingly difficult to assess what has actually been taking place. Ontario ended province-wide examinations in 1967, as did many others. British Columbia, however, has recently reinstated provincial testing at the grade 12 level, and these exams must be included as a substantial part of the final high school mark for the year. The Macdonald Commission also recommended national standards for testing.

But as important as the perception of the deterioration of quality has been, an equally serious issue is how we go about measuring the relevant output qualities. There are basically two approaches. First is the revealed output approach described above in which education of one kind or another is correlated with different measures of output such as income or health or whatever. The second is the use of some form of testing at the school level.

The use of test scores to measure educational achievement is obviously far from satisfactory in and of itself. Usually the tests take little account of the marketplace or what we have described above as various conceptions of the relevant educational output. What they may be best at doing is predicting future achievement in additional education, which indeed is the avowed purpose of tests like the Scholastic Aptitude Test (SAT). None the less, various kinds of aptitude and achievement tests are typically chosen as a measure of output, albeit incomplete, of the educational process in elementary and secondary schools.

What is the appropriate approach to standardized testing? There is little doubt that no matter what tests are used only part of what an education provides will be tested. Worse yet, if the tests become ends in themselves, then there may be teaching for the test rather than tests for what is being

taught. But these issues aside, there is no comprehensive battery of standardized tests of educational achievement throughout Canada currently available to researchers. With the public perception that quality in the schools has been deteriorating, some method of assessment needs to be derived. If it is to improve upon past testing methodologies, not only should it test what has been taught, a worthy goal, but it should also help us to distinguish what a student brings to the educational process by way of initial skills, achievement and background. In this way we can begin to describe the value added by education in our schools in a systematic way.

Having described some of the difficulties in measuring the outputs of the educational process, the question of measuring inputs and their interaction with measures of output will now be addressed. Most studies of the education production function view a student's performance at a moment in time as an interactive function of inputs of innate ability, motivation, family, peers, schools and teachers.<sup>9</sup> Family and peer inputs are usually treated along socioeconomic and demographic dimensions: family size, education, income and the like. Measures of the inputs provided by schools are described by teacher to student ratios, class size, and total expenditures of the school on different facilities and activities. Typically, teachers are described in more detail as to their ages, experience and educational levels.

The actual measures that are employed in each of a number of studies is discussed in Hanushek (1979). The major problems are that there is seldom an appropriate measure of innate ability, and any test of achievement relies upon contemporaneous data for both what is being used as input and what is measured as output. There is little effort or ability to follow-up the detailed effects of schooling in later years in the work-force. Finally, any measure of the output of education should be in terms of value added, not simply in the level of performance. The fact that bright children perform well is not a commentary on the effectiveness of education. What is relevant is the improvement in performance over what would have happened had other inputs been used.

Another major issue that can be tackled in the context of the production approach to education is at least an implicit evaluation of the various inputs used in the production process. If, for example, repeated samples of students over time were in contact with a particular teacher or school or whatever input, then potentially the effect that input had on the performance of the student could be evaluated. Studies by Hanushek (1971) and Murnane (1981), among others, pursue this approach.

## **The Evidence**

A massive amount of evidence has been accumulated describing the relationship of inputs to outputs. Hanushek (1986) describes no fewer than 147 estimations. Let us summarize these findings and consider their implications for public policy.

## **Teachers**

Of some 112 studies examining the impact of the teacher/student ratio on student performance, only 9 show a statistically significant<sup>10</sup> positive impact, 14 show a significantly negative relationship, and the rest, 89, show no significant effect. Of 106 studies examining the effect of teacher education on student performance, 6 show a significantly positive effect, 5 show a significantly negative effect, and 95 show no significant effect. Of 109 studies of teacher experience, 33 show a significantly positive effect on student performance, 7 show a negative effect, and 69 show no significant effect. Even this latter result is potentially attenuated by the distinct possibility that teachers with more experience are able to select the classes to which they are assigned. In sum, if student performance is broadly seen as the output that is being produced, traditional input measures are not systematically related to higher levels of output.

Does this mean that teachers are unimportant to the performance of their pupils? No. Individual teachers have a significant effect on student performance. Research by Murnane (1975) and others (Armor et al. 1976) has shown, first, that some teachers are able to raise the performance level of their students, second, that these teachers are highly correlated with principals' evaluations of these teachers as good or skilled teachers, and third, that these teachers tend to be those who perform well on verbal ability tests (Hanushek 1981).

The thrust of the empirical evidence is that reducing the student/teacher ratio in no way raises the quality of education that is being provided within the range of student/teacher ratios examined. Similarly, better educated and more experienced teachers do not systematically enhance the quality of education.<sup>11</sup>

## **School Expenditures**

As teacher salaries loom large in overall instructional budgets, it should come as no surprise, given the evidence described above, that higher expenditures per pupil are not systematically related to student value added.<sup>12</sup>

Further, there is no systematic effect of any of the various components of the school budget on student performance.

## CONCLUSIONS

What is it that constitutes efficiency in education? The cost curve studies are flawed in that they do not look at the relevant measures of output—value added—and tend to use measures of inputs as measures of output quality. The notion of efficiency is that production takes place at cost minimizing levels of output for given prices of the inputs used in production. Canadians are paying a great deal more today without any obvious measure of increased output. To the extent that observed cost increases are linked with the education and experience of the teaching force and there are no clear changes in output quantity or quality—or at least no changes commensurate with the increases in cost—Canadian school productivity is declining.

Beyond this general observation, however, there is a clear need for better and more consistent measures of output. One project that could be undertaken is to develop a data base that relates the output measures we have—standardized tests of various kinds—to specific inputs, ranging from courses and teachers to schools and curricula, in a longitudinal study of the relationship between school performance and labour market performance and other indicators of social well-being. Such a sample would enable Canadians to better measure the return on the \$34 billion or so spent each year.

Until a clear link is established between the pupil/teacher ratio and the quality or quantity of education, it would seem foolish to pursue the apparent goal of an ever decreasing student/teacher ratio. Within the ranges of the student/teacher ratios observed in recent history, there are few reasons to do so if student performance is part of the rationale. Similarly, the growing qualifications of teachers as measured by their educational achievements should be reassessed as a guide for salary increments. Experience, too, suffers from the same problems as the other two characteristics by which most teachers are paid. It relates to inputs, not outputs, and is most clearly identified with growing costs in an aging teaching force.

Since teachers and their salaries are one of the major costs of elementary and secondary education, the next section examines a proposal that has surfaced regularly for many years. Merit pay, a general term that links salaries to some measures of output, deserves careful consideration as one possible reform.

## INCENTIVES AND MERIT PAY

One of the issues that arises from the discussion of efficiency is consideration of what the appropriate criteria for teacher remuneration should be. Rewards for the teacher's educational attainment and experience play the dominant role in teaching contracts in Canada. Yet, as we have seen, these features have no clear influence on the actual production of educational output insofar as we are able to measure it. What leads to such a state of affairs, and what should we see otherwise?

Various proposals amending the traditional teachers' salary formula have been proposed. Some consider salary adjustments based on labour market conditions in various subject areas, while others suggest the introduction of pay differentials for clear classroom excellence. Major U.S. studies have recently proposed both, although not for the first time. From Adam Smith to the present, the concept of merit pay in particular has caught the public's attention, and different school districts in the United States have attempted to implement it.<sup>13</sup>

To understand why merit pay proposals are attractive and yet why they so frequently are rejected, the next section sketches some of the underlying theory. From there we review the difficulties inherent in making a merit pay system work in a public school environment. The perhaps surprising conclusion is that for increasing productivity (or efficiency) in schools, merit pay has not worked and will not work. The final substantive section develops an argument to supplement the traditional case for merit pay in the schools. Merit pay combined with a payment for student enrolment will answer at least some of the arguments that doom the (simple) merit pay proposal and provide a basis for better schools.

### The Theory of Contracts

The modern theory of contracts (Alchian and Demsetz 1972) suggests that what determines the way in which rewards are paid depends upon the nature of the work and the cost of monitoring the output. The theory assumes that (i) workers have goals that are in some measure different from those associated with their employers; (ii) monitoring the output of a particular process is costly; and (iii) that imperfect monitoring means that workers will behave "opportunisticly" in the sense that they will engage in behaviour that appears to pursue the employers goals but is not necessarily consonant with it. Although this theory has been developed for market-oriented firms, unless employee goals are identical, similar incentives will exist in non-market institutions that face some kind of budget constraint.

The kind of employment contract we observe will depend upon the characteristics of the work that is done, the cost of evaluating that work, and the potential for opportunistic behaviour. In understanding what potential there is for an alternative to the salary scale of current practice, this approach suggests that we focus on the details of the process by which education takes place to assess the opportunities for opportunistic behaviour, the trade off between work incentives and the cost of monitoring the work performed. To explore this issue, we turn to an analysis of an alternative that is commonly suggested to the current salary scale.

### Merit Pay

Some merit pay schemes involve paying teachers explicitly on the basis of their students' test score results (Bachrach, Lipsky and Shedd 1984).<sup>14</sup> There are few cases of school districts actually adopting this piece-work system (Murnane and Cohen 1986, p. 4). One of the difficulties of using such a system in a school is that the algorithm that specifies payment creates incentives for the teacher to maximize the total point increase among students. Thus, those students with learning problems or those who are at the very top are less likely to receive attention. Is this bad? If we were happy with the way in which the points reflected desirable outcomes, no. But often parents are unhappy with the apparent "neglect" of their children. Further those subjects that are easily tested and scored are taught to the detriment of those in which performance is less easily measured (Coltham 1972, p. 24). Yet some of those subjects (e.g., history) are thought to be core subjects.

Although the available evidence suggests that teachers do respond to incentives, the implication that fine tuning the reward structure is a solution to the problem founders on one fundamental proposition—we have little consensus on what constitutes the appropriate weights. This is especially true in the case of public schools. As Murnane and Cohen (1986, p. 5) put it, "Instead of explicitly debating what the weights should be, it is common in public education to delegate decisions on resource allocation to teachers and administrators, with the inoperable admonition that they provide every student with the opportunity to fulfill his or her potential." In private schools we expect to see a greater consensus on what an education is supposed to be accomplishing (Erickson et al. 1979), yet private schools seldom use an explicit system of merit pay.<sup>15</sup>

Murnane and Cohen (1986) suggest two reasons for this. First, a good part of teaching involves team effort. As a result, much of the production of a student's education comes about as a joint effort in which a particular



teacher's contribution cannot be attributed in an effective way. As a result, compensation schemes that stress explicit and measurable output lead to teachers allocating more time toward those activities that contribute to measured output directly and can be identified as a particular product of the teacher. They substitute away from activities that are unmeasured or that involve team effort and are not easily identified with the teacher. Yet these latter activities, like supervision and safety, contribute to education overall. Thus, the cost of maintaining a system of rewards based on explicit output *appears* to be open to too much substitution away from hard to measure but valuable activity.

Second, merit pay plans that have been installed typically suffer from two problems in execution. First, since not all output can be measured directly and the total pay packet depends on both measured and unmeasured output, assessment of the whole must be seen as "fair" or at least coherent. Supervisors must be able to identify why a particular teacher failed to receive a particular increase relative to his or her peers. Second, having identified why a teacher is being paid less than his or her peers, the supervisor must be able to suggest how performance can be improved.

Both of these issues pose problems. Murnane and Cohen report that although principals can identify who the "good teachers" are, they find it much more difficult to explain why the teachers are good or why other teachers are not as good. As a result, except for the most superficial kinds of organizational help, principals are unable to help poorer teachers improve their performance in a systematic fashion. In those school systems in which merit pay survives, rewards are typically given for extra work rather than good work. Further, when bonus awards are given, the administration is careful *not* to call attention to the fact as it would cause ill will among those not rewarded. What then is the fate of payment by output rather than input? Are we doomed forever in an upward drift of the salary scale based on what may very well be the nearly irrelevant features of teacher education and experience?

### **A Different Merit Pay Proposal**

There are two levels on which this can be approached. The first is the level of the individual public school; the second is at the level of the district or system. Within the context of the public school system, the arguments outlined above do not deny the usefulness of payment for output rather than input. Rather, what seems to be suggested is some kind of two-part pricing. For those inputs that can be monitored, let us by all means identify the relevant *improvements* in performance that take place. If there are sig-



nificant sets of outputs that are not identifiable, some judgement must be made to split the structure of rewards into fixed and variable components.

Consider first the variable component for which adequate output guides are available. If team production is the relevant unit of account, then let the team be the appropriate unit of reward. If the relevant team is the school, then so be it. As long as there is some valuation of output within the school system and teachers and administrators can organize their own inputs to improve their students' performance, we might reasonably expect improvements.

But what of the less easily identified "fixed" price outputs, e.g., safety, supervision during activities, perhaps some aspects of fine arts enjoyment, et cetera? If teachers have limited time, these must be slighted since there is less incentive to produce them in the amounts in which they are desired. Some incentive is needed to give schools, or the team, the incentive to produce the "right" amount of outputs that are not directly identifiable.

Even though the relevant output is assumed not to be directly measurable, this is not to say that participants in the school system do not value the product. School safety or art and the like—tasks and subjects sometimes asserted to be less amenable to direct quantitative evaluation—have persisted as part of education for many years. Parents or taxpayers implicitly value the services schools provide. And they value the total product, not just that which is measured. As was described above, there is relatively little direct testing of educational outcomes today.

How can this valuation be used to provide incentives for public schools to produce the right amount of unmeasurable but valuable and valued output? One way is for schools to be rewarded by receiving at least some of their operating costs as a function of the number of students they service. For given physical facilities, allow parents to "vote with their feet." If a school is providing a relatively large amount of the unmeasurable but valued output, let the school benefit by taking in more students. The school could then hire more teachers, pay teachers or administrators more, or allocate the resources in some way consistent with their success. To the extent that teachers in a particular school focus entirely on the measurable they may raise their income on this score, but they will lose as parents who perceive the lack of the valued but less measurable outputs enroll their children elsewhere. A balance will have to be struck, but it will be a balance based on outputs rather than inputs.

But do parents respond to these kinds of issues? Do parents in fact perceive the value of school outputs not strictly measured? The answer is, assuredly, yes. An example is provided by the French immersion programmes that have swept Canada during the last decade.<sup>16</sup> Here is a kind of educa-

tion which is clearly valued by some parents, but just as clearly not valued by others. Children in the programme often have to travel to specific schools in which the opportunity exists to learn in French. Not every school offers the programme. If the “quality” of the education were inadequate, there would be little reason for parents to incur the extra costs associated with travel beyond their nearest school. Even in the current system of public education, the Tiebout effect<sup>17</sup> (economists’ jargon for voting with one’s feet) plays a role.

What would be an outcome of changes such as those described above? Ratios such as the teacher/student ratio would be less important. Particular teachers might well teach in different ratios. Teacher salaries would be at least in part dependent upon student performance rather than the teacher’s own educational history and longevity.<sup>18</sup> The system would be more efficient in the sense that incentives set by the demanders of the service would give more precise signals to the suppliers of the service.

One of the reasons the merit pay argument described in earlier sections seemed inadequate is that it cannot do the task alone if there are important unmeasured outputs. But the issue has been interpreted too narrowly. Straight payment for performance on standardized tests encourages teaching for the test. Allowing rewards to the appropriate educational team to be based on unmeasured as well as measured performance gives a greater chance of success.

But if parents of children in school are to monitor the quality of the school system’s performance, a question arises. Why should only parents of children in school be allowed to monitor the output and, by rewarding performance, thereby set the goals for an educational process paid for by all Canadian taxpayers? The answer is to consider the current arrangement. At the present time taxpayers provide full support for all public and partial support for many independent schools, and there is no mechanism whereby participants in better quality schools—evaluated by parent or non-parent taxpayers—can be rewarded directly. With the kind of arrangements described above, parents as a subset of taxpayers have incentive to monitor the level of educational output. They can make their tastes known in an effective fashion and this, as has been argued, is an improvement over current practice.

What about the choice of goals? Today, if taxpayers do not subscribe to what is being accomplished, in addition to lobbying various levels of educational bureaucracy and government they can reduce the amounts allocated to elementary and secondary education. Under a system which rewards merit, the same blunt instruments would be available, including the taxpayers’ prerogative to reduce the overall level of funding. A merit

response proposal does little to change the mechanisms by which the non-parent taxpayer can affect the educational system. It does allow for at least some of the interested parties to have a direct effect on the educational process. To the extent that all taxpayers share common goals, the process will become more efficient. To the extent that groups of taxpayers have competing interests, these proposals will have little impact on the way in which political decisions evolve.

## NOTES

1. Of course, price is equal to marginal cost in a competitive environment.
2. It must be stressed that the organization of the education industry does not necessarily conform to this model. The purpose of this discussion is to sketch the reasons for interest in the problem of average cost. One of the gaps in the literature to this point has been a serious effort to characterize the industrial organization of the education business. Like much of the literature in public education, analysis is hampered by the lack of explicit prices which makes estimating traditional demand schedules difficult. In particular, since schools frequently draw from a particular catchment area delimited by some general notion of transport costs, the demand schedule facing individual schools may be downward sloping. If so, the competitive model may not be the appropriate framework in which to explore the problem. Some form of monopolistic competition may be a more useful way to conduct the analysis.
3. See Eberts and Stone (1986) for a discussion of the kinds of cost minimizing behaviour that may characterize school districts.
4. At least this is true in the body of the paper. Some results standardizing for salary cost as a function of years of education and experience are alluded to as well (Wales, p. 713).
5. The lack of consistency in the results across different years leads to instability of the elements of cost that displayed increasing, decreasing or peculiar shapes. The author makes this point and it should be taken seriously. How to interpret it, however, is another matter which is discussed below.
6. Any number of these are surveyed in Hanushek (1986) and Wilkinson (1986).
7. In the United States, however, with the SAT more generally given to those going to university, falling test scores between 1967 and 1982 (from an average of 958 to 893 where 200 is roughly one standard deviation) have given more concrete expression to the dissatisfaction. It is a little distressing to realize that teachers score poorly on average on these examinations. In 1982 the combined score of those majoring in education was 813 out of a total of 1600 (*U.S. News and World Report*, p. 38).

8. As Hanushek notes (1986:1141), "during a two-month period in the spring of 1983 no fewer than five notable reports on the nation's schools appeared...The Department of Education has responded with two major reports..." and at least two other major reports are being developed.
9. For an extensive list of studies see Hanushek (1979, 1986).
10. By significant, in this context we mean at the usual 95 percent confidence level.
11. As described in note 7 above, one feature of some concern in the United States has been the observation that teachers perform increasingly poorly in comparison with other groups on standardized tests—a mean of 813 out of 1600 on the combined verbal and mathematics SAT in 1982 as compared with 826 in 1977. Those electing education ranked 26th of 29 identified majors in their performance. (The national average was 899 and 893 respectively.) Such test results are not available for evaluating Canadian teachers.
12. It is true that expenditures per pupil are correlated with raw performance, but these results are "explained" in the studies referred to once family characteristics are included in the regressions.
13. Wilkinson (1986:544) describes the current state of efforts to test the effect of merit pay in the United States and notes that "as yet, little enthusiasm for this type of policy exists in Canada." Citing British Columbia's experience, only 13.3 percent of the general public favoured paying teachers according to merit in 1985. Wilkinson none the less wonders if the current interest in the United States may yet spill into Canada. In the United States there are many historical examples of what has been termed merit pay. As early as 1918, 48 percent of school districts reported having some kind of merit pay system. By 1928 this had waned to 18 percent, and between 1939 and 1953 large city school systems that used merit pay had fallen from 20 to 4 percent (Murnane 1986).
14. The discussion that follows deals with extremes—payment for points versus payment for other things. This strategy is chosen to highlight the major arguments at issue, not to suggest that these are the only alternatives.
15. Murnane (1986) reports that only 7 percent of the Catholic schools in the United States have any kind of merit pay system in place. None of these systems used student test scores to set salary differentials.

16. From school years 1980/81 to 1984/85, French immersion programmes have increased from 1.7 percent of total enrolment to 3.7 percent of total enrolment, or more than 140,000 students. Most of the growth occurred in the last two years.
17. Tiebout (1956) made the case for the way in which people respond to local government taxation and expenditures.
18. This is in no way to deny the potential importance of the teacher/pupil ratio or the education and experience of the teacher. But when all is said and done, these are measures of inputs that are at best only correlated with outputs in an imperfect way. The argument advanced in the text is that outputs should have at least some role to play in the system of rewards.



# THE ROLE OF INDEPENDENT SCHOOLS IN CANADIAN EDUCATION

## INTRODUCTION

From Confederation to the present time schooling has been a provincial responsibility. Manifesting concern over a potentially hostile English speaking central government, Quebec led the provinces in retaining control of what was then elementary and secondary schooling. Canada is unique among the industrialized countries in having no central administrative authority overseeing education.

It should come as no surprise that with each province developing its own educational system, relationships between public schooling and private or independent schools, as they prefer to be known, are as varied as the provincial landscape. Every province provides the opportunity for independent schools to coexist with the public school system. Some provinces—Ontario, Saskatchewan and Alberta—operate “separate” Roman Catholic schools, and in Quebec, Catholic schools have been administered separately from Protestant schools.

The number of students involved in private schools has waxed and waned over the years. At the present time about 4.7 percent of all elementary and secondary students are enrolled in independent schools. Since 1971, this fraction has grown from 2.5 percent although there is considerable variation in the numbers as can be seen from the Canada-wide ratio in figure 6.<sup>1</sup>

## A BRIEF SKETCH OF THE PROVINCIAL ARRANGEMENTS<sup>2</sup>

Since each of the provinces makes its own arrangements with respect to private schools, it will be helpful to have a very brief idea of each province's system. Table 24 provides a cross-section of the numbers involved.<sup>3</sup> The first column reports the number of students enrolled; the second column reports the fraction of the total provincial school population. The number of students in the East tends to be much smaller than that



**Table 24**  
**Fraction of Elementary Students in Independent Schools**  
**1986/87\***

Province	Number of Students	Percent of all Students
Newfoundland	320	0.3
P.E.I.	55	0.2
Nova Scotia	1,970	1.1
New Brunswick	750	0.5
Quebec	98,670	8.6
Ontario	66,510	3.6
Manitoba	9,630	4.6
Saskatchewan	3,010	1.5
Alberta	15,340	3.3
British Columbia	34,790	6.7
Canada	231,045	4.7

Source: Statistics Canada, catalogue 81-220, 1986.

Note: \*Estimates.

in the West. Quebec and British Columbia have proportionally the largest fractions of elementary students in independent schools.

There are three major forms of schooling available in Canada. The public school system is available in every province and is funded by government. The Roman Catholic separate school system is publicly funded in Ontario, Alberta and Saskatchewan. Independent or private schools may exist within each province and receive direct funding in British Columbia, Alberta, Manitoba, and Quebec. For those provinces in which over 1 percent of elementary and secondary students are reported as being in independent schools, a sketch of the diverse arrangements follow.<sup>4</sup>

With the exception of some programmes involving the handicapped, New Brunswick private schools are not assisted by the provincial government. The provincial Department of Education does inspect the schools and offer evaluations of the schools, teachers and programmes.

Nova Scotia does not fund private schools although they may purchase certain materials for instruction under the same arrangements as public schools. All costs are borne by the parents groups running the schools. Independent schools must be certified by the Minister of Education.

Historically and today, private education in Quebec, especially at the secondary level, has been more important than in other provinces. There was no Department of Education until the mid-1960s. All schools must be inspected and given a permit to operate whether they receive public funds or not. Teachers in private schools must have the same qualifications as those in public schools, and curriculum guidelines are the same. Funding can be for schools in the “public interest,” in which case they receive 80 percent of the costs of public schools in the preceding year, or schools may receive 60 percent of the costs of public school operation. Some receive no funding.

Ontario private schools file a notice to inform the Ministry of Education that they plan to operate and must provide “satisfactory instruction.” Teachers do not have to hold provincial teaching certificates. At the secondary level, Ontario graduation diplomas may be obtained if curriculum guidelines are followed and inspections are permitted. Although there is no direct support to private schools, various tax exemptions are permitted for purchase of materials. Roman Catholic or separate education has been supported since the British North America Act, but support stopped in grade 10. Proposed in 1984, direct support is now being extended to separate high schools.

In Manitoba there is direct support for private schools on the basis of full-time equivalent capitation. The schools are inspected and may utilize programmes located in public schools.

In Saskatchewan there is both a state-supported separate school system and private schools. Although private elementary schools receive no support in principle, direct grants are available at about 55 percent of the public school operating grant and 10 percent of capital costs. Qualifying for support involves meeting a number of criteria, including length of operation of the institution, enrolment, and curriculum and teacher qualification requirements.

Alberta provides partial support to private schools in contrast to the full public support available for public and separate schools. After fulfilling curriculum, teacher qualification and language requirements, a private school may receive up to 70 percent of the per student operating grant paid to public and separate schools—roughly 50 percent of public and separate school costs. Private schools not receiving funding need not meet the funding requirements.

In 1977, British Columbia established the Independent Schools Support Act which allows support to independent schools. After three years of operation, a school may receive about 10 percent of the cost of the public school in the district by meeting minimum curriculum requirements. By

meeting more rigorous curriculum, teacher certification and evaluation requirements, a school may receive 30 percent of public school costs in the district. There are also some indirect supports available such as funding for textbooks.

## **VOUCHERS AND THE GROWTH OF PRIVATE SCHOOLS**

With the recent growth of Canadian private school enrolments, a number of issues have arisen that pertain both to Canada in particular and to the general issue of private versus public schools. What role do we perceive for private schools in the Canadian educational scheme? Do we wish to encourage or discourage their operation? Do private schools foster (undesirable) elitism? Does the taxpayer wish to support particular religious instruction? Are private schools more efficient than public schools? Would competition among different kinds of schools be good?

Many of the traditional complaints about support for private schools arise from concern that tax dollars are being spent to support a particular religious group or groups. Unlike the United States where a relatively clear separation of church and state is embedded in the Constitution, provinces have the responsibility in Canada, and each province has come to different conclusions about the result. In the largest provinces, it is clear that at the present time there is support for Roman Catholic schools. The issue seems to be whether this support should be extended to other groups not whether it should cease altogether. In 1977, British Columbia decided to offer direct support to private schools, and recently Ontario extended support to separate high schools. If Canadians are more willing to pay taxes to support alternatives to the public school system, what harm or benefit can there be from changes in the current mixed system?

Although private schools have been in existence since well before Confederation, in the last decade particular groups have felt that the public schools no longer offer the kind of guidance that they, as parents, wish for their children (Wilkinson, p. 553). Often such reasons are associated with a feeling that there should be greater “discipline” in school, and that children should be offered more direction in what parents feel are the “rights and wrongs” in behaviour. These feelings have been identified in a number of surveys (Erickson et al.).

In addition to dissatisfaction with the public system based on religious and moral concerns, there is also a general unhappiness (described in chapter 4) with the ostensible deterioration in the quality of public education. This unhappiness is partly captured by the move to raise standards, return to province-wide testing and the like. Intellectual support for private

schools as vehicles for improving the quality of education has developed in the context of introducing an educational voucher plan although it is not clear whether much of current policy has been based on this idea.

A voucher is effectively a payment made by the government to a school chosen by the parent of the child being educated.<sup>5</sup> Schools for profit would be encouraged to provide alternatives to the public system. Proposed by Friedman (1962) and West (1968, 1985), the voucher offers the benefit of introducing competitive choice into the provision of schooling services. If parents are competent to provide for their children in other dimensions, then, runs the argument, there would be an improvement in their welfare if they were able to choose among different varieties of education. Schools would have the opportunity to offer different educational packages to appeal to the different wishes of parents.<sup>6</sup>

The public school system which is currently funded by taxes, has at least some of the characteristics of a monopoly in the provision of school services which are provided at a "price" of the average tax rate.<sup>7</sup> With a voucher system (as originally conceived) in place, each parent would have the alternative of buying education provided by any number of private firms. The state would not have to operate schools in its own right. Instead, the state's role would be limited to deciding what amount of subsidy should be offered to each child or family and providing a normal kind of commercial and legal environment.<sup>8</sup>

Many voucher schemes depart from this model in a number of ways. These include: (i) continuing support for schools run by the state, and vouchers available only to private schools; (ii) requiring that parents be allowed to pay *only* the voucher amount to the school;<sup>9</sup> (iii) giving vouchers based on individual or regional need; or (iv) allowing vouchers to be used within the public school system only.

Possible advantages of a voucher scheme are many (West, 1968, 1985, 1986). It offers the opportunity of wider choice, less elitism, lower cost and higher educational standards. The perceived demerits include arguments that vouchers cause greater elitism, higher costs and reduced educational standards (Krashinsky 1986). Let us consider each in turn.

The opportunity for wider choice is relatively uncontestable in one sense. It is unlikely that parents would all choose identical educations for their children. Some might like more emphasis on "basics," others might prefer centres emphasizing the arts, still others might prefer "open classrooms." The list is as endless as the varieties of foods we eat and the clothes we wear. Many might wish to augment the money provided by the state. But no child would be denied a sum less than what was determined as the basic voucher.

Obviously, the value of the voucher would be contentious. One way to side-step the issue is to argue for a voucher worth exactly the amount of the current per pupil subsidy to the public schools. This would negate one of the asserted advantages of the voucher, to lower costs to the taxpayer. Even if costs were to remain constant, however, there would be a benefit from the voucher system as schools were forced to compete with one another for pupils. And at given prices, or voucher values, quality would presumably be the vehicle for the competition to take place, i.e., quality as defined and perceived by parents. If parents are seen as responsible for their children's welfare, then there will be a net benefit. A more diverse menu will be able to cater to parents' wishes more effectively and flexibly by tailoring the kind of school to the size and tastes of its constituency. The current system taxes parents who wish an alternative to whatever "public" system is in place in two ways. They must pay at least some taxes for public schooling, and they must take the set of offerings of the public system if they avail themselves of the service. A voucher at current costs would improve the variety of education offerings available.

### **External and Public Benefits**

One general response to the issue of vouchers is to assert that the public schools produce an educational product that is distinct from that which could be produced in a private school. The public school education confers on its students both a private benefit and a benefit to society that is not captured by the individual. This latter benefit exhibits the characteristics of a "public good."<sup>10</sup>

The private benefit is the increase in the student's well-being, financial and otherwise, that results from being educated. The student is fully able to capture this benefit in the sense that it is the student who receives the return on the education or enjoys the new outlooks that the education brings with it. But there is also, it is asserted, a characteristic of a public education that makes a person a better person "for society." It is a benefit that is external to the individual. By making a student more conscious of the democratic process, for example, there is a benefit conferred on all members of society. It is a benefit not captured by the individual who has obtained the education.<sup>11</sup> Furthermore, by being a better person in this sense, everyone else can "consume" this benefit; i.e., the fact that one individual benefits from a student being a better person does not mean that another cannot also benefit. The result is that there is a tendency for such a "public good" to be under-provided.<sup>12</sup> Nobody has an incentive to produce very much of it, even though everybody thinks that it is a good thing.

This kind of argument can be misunderstood. The presumption that there is both an externality and a “public good” is an important one. West (undated) considers the issue by allowing the characterization as a maintained hypothesis. He is able to derive a general equilibrium outcome of a mixed system that contains both public and private schools. Schools are distinguished by different private and public “technologies” of transmission of the private and external (public) goods.

But another response is to separate the problem into two pieces. First, the external effect. The substantive issue is whether the province is the proper unit for producing the good that has the externality. Perhaps the appropriate level for the transmission of values is at the municipal level, perhaps even the federal level. The appropriate policy for an “externality” is to “internalize” it, i.e., to let the group that benefits be in charge of monitoring its provision. There is no empirical literature relating externalities to schooling as yet (West, undated). But even so, the presumption that there are external benefits produced in public schools does not mean that the current structure is appropriate. Further, even if we were confident that we could identify the relevant externality and its “location,” there is still no reason to assume that the province is the relevant provider of the supply of this service. An alternative is for the public system to “contract out” the production of the particular components of education conferring the externality. This could be accomplished by specifically subsidizing production of the relevant components.

The second question is that of the “public good” character of the values, et cetera being transmitted. Again, the relevant point is that even if we accept the argument that all parties gain from the provision of a little of the good, this does not imply that the public system should be the only provider of the service. In the extreme, imagine a system in which fine arts or social studies were paid for, in part, by a specific subsidy.

Thus, neither the external effects argument nor the public good argument diminish the value of a voucher system. The appropriate response to the problems they raise, if they are genuinely perceived to be present, is to pay for those things that are wanted. You do not have to become a cook if you want just one piece of the pie.

## **Elitism**

Do independent schools foster elitism? Of course a voucher system, and private schools in general, increase selectivity. The voucher is designed to support individual preferences for education by making a minimum level of resources available to everyone. With such a system, we would expect a

larger variability in programme offerings outcomes compared to offerings of public schools today.<sup>13</sup> If income is perceived to be a constraint, then the appropriate policy is to give a higher level of voucher, recognizing that it is a direct transfer and, presumably, a taxable benefit.

Arguments against allowing parents to spend more on education are puzzling.<sup>14</sup> These arguments tend to introduce both inefficiency and inequity into the provision of schooling services. With current choices, parents who choose to give their children educational advantages must settle in districts which provide what they perceive as relatively good quality education. Their choices are constrained by the (relatively large) expenditures required for housing in these districts.<sup>15</sup> If parents are able to direct resources toward schools that cater to their needs, then the (comparatively small) additional expenditures on schooling will allow a less wealthy family to none the less emphasize the qualities they prefer.

What has been the record of private schools in Canada? Interestingly, Erickson et al. (p. 90) found that in comparing public and private schools in British Columbia, the means of parental incomes were essentially the same, as were patterns of home ownership, parental marital status, and several other socio-economic and demographic variables. What was different was that although incomes were similar, independent school parents were more highly educated than parents in the public school sample. There was greater diversity in income levels and some other socio-economic background variables among parents in private schools surveyed than among the public school parents.

## **COST OF A PUBLIC SCHOOL AND VOUCHER SYSTEM**

Suppose that we were to consider a voucher programme for private schools that maintained public schooling as it is now with size determined by the number of those who did not choose to attend private schools. One important issue that arises is the extent to which costs of public education would rise or fall. As we have described in chapter 4, the evidence characterizing the shape of the cost curve facing public and private schools is not very satisfactory. Suppose first that average costs are constant.<sup>16</sup> In this case the increase or decrease in the tax bill depends upon the amount of the voucher relative to the cost of the public system. For a given number of students who use the private school option, the tax savings is the difference between the voucher amount and the cost of the public school times the number of children withdrawn.

Alternatively, if public school average costs are falling with an increase in the scale of operations, then there will be a rise in average costs as-

sociated with the reduction of scale due to the departure of students into the private market.<sup>17</sup> However, if private school costs are falling with increases in scale of operations, then the difference between them will guide total expenditures on education. This is an empirical proposition for which we have only a few indications. We need a comparative study of private and public school costs in comparable environments. Part of the difficulty is that the scale of operations is only one issue, the level of costs is another. As Wilkinson (1986:547) suggests, the few Canadian studies that exist generate diverse results. There has been at least one important experiment conducted recently in Canada. A decade ago British Columbia decided for the first time to subsidize independent schools. Although school cost and quality data were not ideally suited to testing the proposition that independent schools offer lower cost education, one element of cost, teachers' salaries, was explored with very clear results.

### **BRITISH COLUMBIA'S AID TO INDEPENDENT SCHOOLS**

As described above, British Columbia introduced aid to private education in 1978. There were a number of restrictions in the legislation. The most important for current purposes is that aid was available only after a school had been established for five (subsequently altered to three) years. The original amount available was \$500 per pupil which, in 1977/78—the year before the subsidy went into operation—was about 30 percent of the operating cost of an average public school and about 50 percent of the operating cost of an independent school (Brown 1979).

In order to get some idea of the kinds of cost differences to government associated with a voucher, which is what the British Columbia experience might be thought to be, we need to estimate both the demand for education and the supply. The increase in the voucher from zero to \$500 lowers the price of a private school education. This means an increase in the number obtaining a private education and thus withdrawing from the public system. What is needed is a measure of the elasticity of demand—the percentage change in the number of students in private schools relative to some percentage change in the price of that schooling. This is something very difficult to get from the schooling literature, but it is necessary to estimate the effect of the voucher on the number of new participants.

### **The Demand for Private Education**

Estimating the demand for private education has been a difficult task, and although there are a few studies at the elementary and secondary school level, they are far less reliable than those available in many other branches



of economics. The reason is simple. The relative price of private education is very difficult to measure. Although we have some measures of tuition fees and the like, the cost of going to a public school is not observable. It is not the average tax rate alone, as the time cost of getting to school and the number of children in school all affect the true full price. As a result, although there are many measures of the income elasticity of the demand for independent education, there are many fewer estimates of the price elasticity.

In the United States, Black, Lewis and Link (1977) estimate a relatively low (tax) price elasticity of demand (in Delaware) for public education of -0.15, but estimates of six different studies (Black, Lewis and Link, p. 160) vary anywhere between this and -0.70. These studies assume a median voter model in which demand for education at the district or state level is a function of what the voter will perceive as the cost of education. An exception to this methodology is Rubinfeld (1977) who uses household data to obtain a demand for public education and finds price elasticities in the range of -0.56 to -0.69.

Easton and Busche (1983) examine 1980 British Columbia survey data in which questions were asked about tuition, family characteristics, and school attendance. A set of implicit prices for public schooling are calculated, and then the choice of school system is correlated with the relative price of private schooling, and other relevant variables.<sup>18</sup> The estimated value of the elasticity of demand for private schooling is roughly -0.7. On the basis of this elasticity they conclude that there will be an increase in the demand for British Columbia's private schools by between 12,700 and 15,000 in the long run. In fact, adjusting for the decrease in school age population from 551,000 to 520,000, if a decade is the long run, the study would predict 1986/87 enrolment in independent schools of between 35,000 and 37,000. The actual number in 1986/87 is put at 34,790. The top line in figure 6 shows the proportion of the total school population enrolled in independent schools in British Columbia relative to the Canada-wide enrolments. British Columbia enrolments in private schools have always been higher than the national average, but the effects of the new subsidy are apparent in the divergence of the two curves in the last few years.

The cost of funding the system of education will also be affected by aid to independent schools. In the British Columbia case, using a difference in costs of nearly \$700, Easton and Busche assume a constant average cost of education to find that a funded private school voucher at this level would save something in the order of 10.5 million (1980) dollars. But these amounts are not the total benefit because they ignore the benefit to the parent of the greater opportunity for selection.

Figure 6

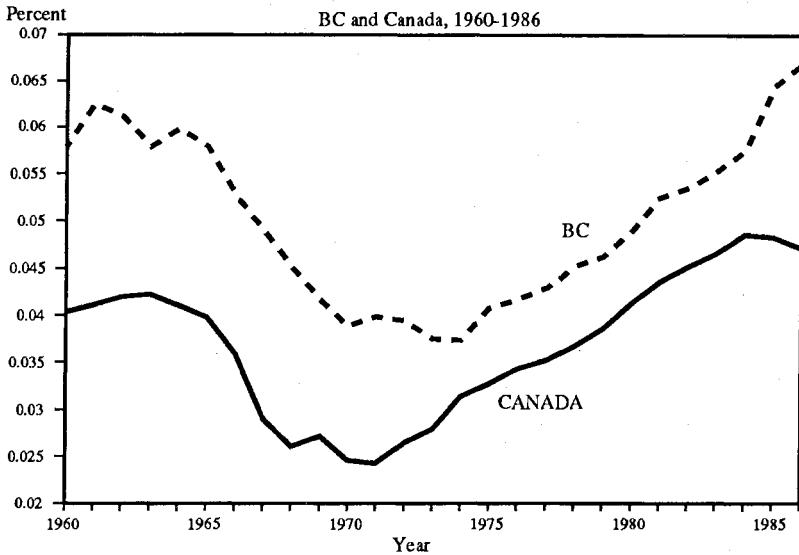
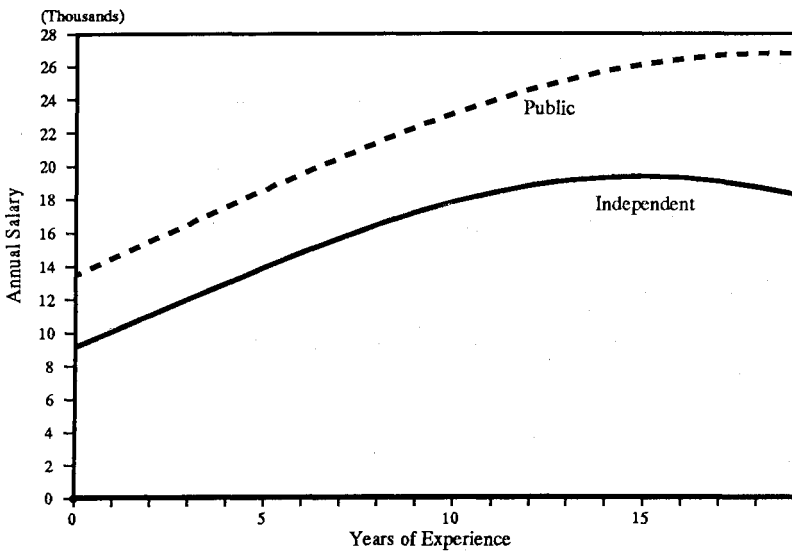
**ENROLMENT: INDEPENDENT/TOTAL**

Figure 7

**BC TEACHER INCOMES BY CONTROL: 1980**

### **One Element of Cost: Teachers' Salaries**

One area of school costs in British Columbia that was examined (Easton 1983) at the time of the introduction of this voucher scheme was that of teacher salaries in private and public schools. Figure 7 plots the income-experience profile of public and private school teachers. As is quickly apparent from the figure, of the independent schools surveyed, salaries were substantially lower at every point. Interestingly, the public and private schools paid roughly the same salary increases for additional years of teacher education, but school-specific experience was important in the independent school although not in the public school. There was also much greater variation in the range of salaries paid among the survey respondents at each level of experience in the independent schools.

Although but one piece of the cost puzzle, one source for the lower cost of independent schools obviously appears to be that they are able to pay lower salaries. Whether this would persist in the face of a determined effort to boost the number of students in the independent schools is an important issue for which there is as yet little evidence.<sup>19</sup>

### **CONCLUSION**

The increase we observe in independent schooling today is well within historical norms. What is different is the educational climate within which the changes are taking place. Unhappiness with the public school system in a number of dimensions is putting pressure on provincial governments to consider alternative educational structures.

British Columbia, with its relatively new aid to independent schools, will help to provide a set of data to determine which hopes and fears develop from one of the most determined efforts to implement a voucher system. It remains to be seen whether the limits will be from the demand for independent schooling or from the insistence that the public system not be allowed to contract. As has been remarked in many settings, we are flexible in expansion but not in contraction. In British Columbia, recent changes to the regulations governing the administration and teaching of elementary and secondary schools are consistent with an effort to ensure increased flexibility.

## NOTES

1. In 1867 and 1981/82 the proportion in private schools was 4.35 percent (Wilkinson 1986:553).
2. Bergen (1981) and Wilkinson (1986) provide helpful summaries of the arrangements by province.
3. Indeed it is hard to tell what is public and what is private in the statistical data. If the school is a "separate school," it is not counted as private. Thus Roman Catholic schools are private in British Columbia and Manitoba where they are partially funded, but not in Alberta and Saskatchewan where they are wholly funded (Wilkinson, p. 554).
4. But see Wilkinson (1986:554) for some of the minor complexities of the Newfoundland system in which Roman Catholic, Pentecostal, and a Seventh Day Adventist school board are publicly funded but not reported as private.
5. A voucher could be a chit given to each parent, cashable only by appropriately designated schools. For example, it could be for an amount equal to that spent on publicly run schools. There are many possible voucher schemes, some of which will be described below. The actual mechanism of payment with the voucher given to the parent or given to the school chosen by the parent is immaterial.
6. Educational voucher packages may include inspection of schools and/or other regulation. They may include differential amounts of vouchers based on educational "need," the underprivileged receiving more, et cetera. The key notion that is not abandoned is that the parent has the opportunity to choose an alternative to the public system. There is a debate about whether a parent should be allowed to add to the voucher.
7. The large subsidies given public schools are frequently complemented by regulation of private schools that further restrict entry. The tax rate differs from the usual price in that everyone pays it although not all would choose to obtain the services provided.
8. Having a voucher scheme in place is no guarantee that schools will be given license to choose their own mix of teachers, work conditions, et cetera. For example, in the Netherlands where 70 percent are educated via a voucher system, the student/teacher ratio is set, teachers cannot be fired, the state sets the curriculum, and there are uniform national exams. See James (1984) for a discussion of the various arrangements.

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9. Interestingly, in the Netherlands schools cannot charge more than the voucher amount.
10. This point is hotly debated in West (1986, undated) in support of vouchers and Krashinsky (1986). To say that the product of private and public schools differs is not the same as saying that public schools provide more of the characteristics identified as public goods or provide greater positive externalities. In the absence of any empirical evidence, it is a grossly unwarranted assumption. The stance taken here is that if this is perceived as a problem for private schools, there are ways in which it may be addressed that do not in and of themselves require a system of publicly produced education.
11. West (undated, p. 3) suggests (without prejudice) that two general kinds of externalities can be identified in the literature. Those “associated with general literacy, the growth of which facilitates economic and community transactions ... and the transmission of a common set of values and attitudes that make a stable and social life possible.” Many authors despair of making these arguments more precise. It is hard to know if any serious weight should be attached to them.
12. Both because it is an externality and because it has the “public good” characteristic.
13. Such a remark follows from an assumption that tastes for different characteristics of education are more likely to be met in a system in which individual parents can actively (and financially) encourage schools to cater to their needs. It is not to say that there are no differences in quality among public schools today. One need only visit schools in poorer areas of large cities or poorer rural schools and contrast them with those in wealthier suburbs to realize that there exist enormous variations in the quality of education in our public system. West (1968) points to the irony of politicians who glorify the equality of public education, pillory British private schools, and ensure that their own offspring are well outside the public education system.
14. See Krashinsky (1986) for a description of such schemes.
15. Equality of expenditure across districts is little indication of equality of value added, as we have seen in chapter 4.
16. In this discussion we shall assume constant quality for convenience.
17. Although total government expenditures will decline as schools close.
18. This is done on the basis of a probit analysis.

19. In public schools the share of teachers' salaries in the total expenditures is about 60 percent while in independent schools the fraction is roughly 55 percent. (See, for example, Statistics Canada, 81-208, 1987, p.49 and p. 56.) Thus, there are two sources of lower expenditures: the lower level of salary and the lower share of total costs that this relatively high cost item contributes.



# VOCATIONAL EDUCATION

## VOCATIONAL TRAINING

The categories for which vocational training data are collected are both diverse and diversified. Expenditure data are drawn from a variety of educational sources including post-secondary and elementary and secondary. Although the mandate of this analysis is not post-secondary education, there is an unavoidable agglomeration of both data and programmes.

The data on expenditures includes a number of programmes. There are government sponsored training programmes provided by technical institutes, public trade schools (of which there are relatively few now), and community colleges. At the level of vocational non-post-secondary, data include apprenticeship and training-in-industry allowances that are paid to trainees, language courses for federal employees, trades training in provincial reform schools, fire department training, forest ranger schools, police training institutes, and staff training in different provincial and federal departments and agencies. Private business and trade school courses, including dance, music and driving, are also covered.

For manpower training programmes and most other components of the federal/provincial occupational training and development programmes, the government purchases training courses for selected students. These courses are of various durations from a few weeks to a year. Provincial institutions actually provide the programmes, and students receive a living allowance. The federal government pays roughly 75 percent of the cost. In private sector occupational training, fees cover all expenditures.

Vocational training occurs at several levels. In elementary and secondary it takes place as part of the school curriculum and may or may not be a fully absorbing programme for the individual student. In post-secondary institutions, vocational training is distinguished from career training. The latter involves secondary graduation which is not necessary for vocational development. Community colleges, which include institutes of technology, applied arts and technology institutions, CEGEPs and the like offer university transfer credit courses and career courses as well as vocational courses.



Expenditure data for vocational courses have been allocated to trades training and are generally excluded from the post-secondary level.

As should be apparent from the above discussion, the lack of homogeneity of the vocational category makes detailed analysis of the time series statistics of enrolments both difficult and inappropriate. Data on the 200,000 or so enrolments are not relevant as short-term courses as well as annual programmes are included and the mix is highly variable. What we can accomplish, however, is a sketch of the patterns of expenditure on the category "vocational training," writ large, to see how it has varied over the past decade.

## **EXPENDITURES ON VOCATIONAL AND TRADES TRAINING**

The bulk of the expenditures on vocational and occupational training is manpower training. In 1979/80 for example, 80 percent of the \$1.2 billion spent was on this category. Table 25 provides a summary of the data. Column 1 reports the total current dollar expenditures on vocational training. Although current dollar expenditures have risen, constant dollar expenditures (displayed in column 2) have changed relatively little, rising only slightly over the last 15 years. The great expansion in vocational training was during the 1960s. Registrations, which it must be recalled do not allow us to identify either the individuals or the duration of the programmes, jumped from 84,000 in 1961/62 to 446,000 by 1970/71.<sup>1</sup>

To get some idea of how vocational training expenditures have moved generally, column 3 deflates the nominal expenditures of column 1 by the total amounts spent on elementary and secondary education. As can be seen, there is a slight drop in the proportion since 1970, but the fraction has stayed roughly constant over the last half decade.

Provincial expenditures on vocational training are displayed in table 26. There is a distribution of expenditures that remains somewhat stable over time although Ontario's large share has diminished somewhat as has Nova Scotia's. Alberta has made substantial gains. Not shown are the Yukon and Northwest Territories.

In sum, although there have been substantial changes in the amounts spent on vocational training over the past 25 years, there has been relatively little change in the last 15, either at the level of total expenditure or as a piece of elementary and secondary school expenses. Although we can identify the costs of the programmes in total, there is such diversity in the programmes covered that there is little point in trying to make careful assessments of per student output and the like. Registrations into programmes are what are recorded. Unlike the school system, there is no standard by which an average can be reasonably computed.

**Table 25**  
**Expenditures for Vocational and Occupational Training**

Year	Current Dollars (000s)	Constant* Dollars (000s)	Percentage of Expenditure on Elementary & Secondary
1960	47,200	150,414	4
1970	574,816	1,399,941	12
1980	1,287,109	1,447,816	10
1985	2,102,772	1,653,122	10

Sources: Statistics Canada, 81-229, various issues; 81-560, 81-568, p. 25 and p. 14; 81-220, p.28.

Note: \*1981 constant dollars.

**Table 26**  
**Provincial Expenditures on Vocational Training, 1986/87**

	Current Expenditure (000s)	Share of Total	Share of Total (1970/71)
Newfoundland	74,083	3.3	4.6
Prince Edward Island	17,144	0.8	0.8
Nova Scotia	82,807	3.7	6.5
New Brunswick	67,211	3.0	3.5
Quebec	486,835	21.7	20.2
Ontario	558,656	24.9	34.0
Manitoba	88,269	3.9	4.1
Saskatchewan	123,435	5.5	5.4
Alberta	307,718	13.7	9.0
British Columbia	210,668	9.3	10.2
Canada	2,246,287		

Sources: Statistics Canada, 81-560, p. 14; 81-229, 1986, p. 28.

**NOTE**

1. These numbers include private, sponsored and post-secondary school courses and not high school courses.

# CLOSING COMMENTARY AND PROJECTIONS

## INTRODUCTION

Two kinds of conclusions are considered in this chapter. First, a look at what the future holds for the elementary and secondary system if present trends continue. Secondly, a look at what kinds of activities can be undertaken to enhance the education received by Canada's children.

## THE PAST AS THE FUTURE

As discussed in earlier chapters, over the past several decades the real (inflation adjusted) costs per student of elementary and secondary education have risen by almost any measure we care to use. These cost increases have occurred during periods of rising enrolments and declining enrolments; they have increased during periods of rising inflation and declining inflation; and they have increased during periods of low unemployment and high unemployment. Of course, rising costs in and of themselves are not a reason for change if the desired quality or quantity of education has risen in a commensurate fashion.

Unfortunately, there is little evidence to suggest that there is or has been a simple correspondence between higher costs and more or better education. In the last decade, while the number of students in Canadian elementary and secondary education has declined by more than 11 percent, the number of teachers has decreased by less than 4 percent, leading to lower and lower teacher/pupil ratios.<sup>1</sup> And yet, there is no systematic evidence to suggest that this has resulted in an improvement of the quality of education. Average teacher salaries have risen in real terms, and like the student to teacher ratio there has been no case made that this has improved the quality of education.<sup>2</sup>

These observations of what has transpired can be put to some use to suggest what lies in store for us in the future. Certain kinds of projections are

important insofar as they provide a bench-mark against which we may assess any potential changes in policy directions.

## **FUTURE COST**

To develop a sense of what lies ahead for the elementary and secondary educational systems of Canada, it is useful to look at some of the components that may give rise to additional costs in the future, and thus, focus on salary costs which comprise two-thirds of all operating costs. The total salary bill can be written as the product of the salary per teacher times the number of teachers. The number of teachers in turn may be thought of as the number of students per teacher times the number of students. Thus, for purposes of looking ahead the problem can be partitioned into the behaviour of each of the components, recognizing that there is a multiplicative interaction that would raise (or lower) the total salary bill by more than simply the sum of the increases.

The components examined are (i) the number of students, (ii) the number of teachers per student, and (iii) the salary per teacher. The number of students in the system is an important operating constraint, especially in the short run. By examining forecasts of overall student populations over the next few years, a sense of the environment in which schooling will be functioning can be suggested. The number of teachers per student is another important part of cost. As has been seen, increases in the teacher to student ratio have led to substantial cost increases in the past and have the potential to raise costs still further in the future. And finally, in examining the average salary paid to teachers, rather than trying to anticipate provincial and local funding authorities by forecasting changes in the level of teachers' pay or other benefits, the focus will be concerned with future salary increases that are a part of the current salary system.

### **The Student Population**

The evolution of the school-age population for the next 15 years is tabulated in table 27. Taking the population of five to seventeen year-olds as indicative of the relevant school-age population, the first column gives both regional and Canada-wide figures in index form with 1986 (equal to 100) as the base. In the table, each column to the right shows anticipated changes in five-year increments. Although these forecasts are at best only rough indicators of what can be expected, they do suggest a modest increase in elementary and secondary school enrolments Canada-wide by 2001, with decreases in the Atlantic provinces, Quebec, and the prairies more than offset by increases in Ontario and British Columbia.

**Table 27**  
**Projected Population Ages 5-17**

Regions	Year			
	1986	1991	1996	2001
Atlantic	100	96	98	97
Quebec	100	98	99	93
Ontario	100	100	105	108
Prairies	100	97	97	94
British Columbia	100	103	110	116
CANADA	100	99	102	102

Sources: Statistics Canada, 81-210, 1976, p.14-20; 1986, p. 14.

Notes: Figures for regional growth for 1986-2001 are from Statistics Canada, catalogue 81-210, 1976, adjusted for the overall decline in population growth assumed in 81-210, 1986.

For the next decade, however, the aggregate school-age population will remain near current levels.<sup>3</sup> However, the regional changes are quite substantial with growth being seen in Ontario and British Columbia.<sup>4</sup> As a matter purely of increases in enrolments, the future growth in Canadian elementary and secondary schools is primarily regional rather than national. Although there are expected increases in the school-age population of Ontario and British Columbia—in contrast to the decreases that have taken place in the past decade—other regions of the country may experience continued gradual declines. Whatever lessons have been learned in coping with falling enrolment will continue to be relevant.

From a national perspective, the change in numbers is gradual. The numbers of students alone will add little to the total costs of elementary and secondary school education. How we cope with the regional disparities is a different matter. While all provinces have tended to share the declining enrolments in the recent past, new stresses will become apparent as some provinces expand while others continue to contract. As a provincial responsibility, there is no simple mechanism by which resources in declining enrolment provinces can be transferred to those experiencing expanded enrolments.

## **The Growth of Teachers' Salaries**

As was described in chapter 3, teacher salaries have risen substantially over the past 30 years. This section looks toward the future, but it is difficult to forecast teachers' salaries. The level of public school salaries is in large measure a question of provincial (and local) government policy. Both provincial governments and their policies change in relatively unpredictable ways. Rather than attempting to forecast the actual amounts that will be allocated, the kinds of costs that are already built into the extant salary structure will be exported. That is, suppose teachers' salaries were to remain frozen at current levels, would costs continue to rise?

The key to understanding why this is a relevant question is to recognize that under current salary arrangements, salaries are paid as a function of the experience and education of the teacher. Even if the (real) salary scale is frozen, the structure of the teaching population will tend to raise total salary costs over the next few years as teachers gather more experience.

To see how this will take place, imagine that every retiring teacher—at the highest experience-related average salary—is replaced by a new teacher at the lowest average salary. All teachers at intermediate levels are assumed to progress upward by a one-year experience-salary increment.<sup>5</sup> The effect of this procedure is to keep the total number of teachers constant to allow attention to focus on the consequences of the structure of the current teaching population.<sup>6</sup>

Table 28 describes the outcome of the experiment. Using the 1983 salary bill as the base for an index of salary costs, table 28 shows the potential increases that are attributable to the structure of the teaching population. If the current salary scale remains in place, total salary costs will increase gradually to the mid-1990s. Salary costs will be nearly 6 percent higher—in real terms—by 1991, simply because of the structure of the population of teachers and the nature of the current contract structure. Even by the year 2001, costs arising from the structure of today's teaching population will still be higher than they were in 1983. Not until 2006 will the current cost bulge work its way through the salary structure.

The message in the calculations presented in table 28 is simple. To the extent that we continue to reward our teachers in the next two decades as we do today, salary costs will be rising even if salary scales are frozen in real terms. It will be 20 years before this component of costs returns to current levels even were the number of students and the teacher/student ratio to remain constant.

Will salaries continue to increase as they have done? Any increases in salary scales will be compounded by increases associated with the structure

**Table 28**  
**Projected Total Salary Bill of Educators**  
**Based on Current Salary Distribution**  
**(percent of 1983/84 totals)**

	1983	1991	1996	2001
<b>TOTAL SALARY INDEX</b>	100.0	105.7*	104.9	101.9

Source: Statistics Canada 81-202, 1985, p. 43.

**Notes:** Current experience distribution projected at current salaries. Total number of teachers held constant by keeping the number of replacements (at zero experience salary) equal to departures, which are assumed to take place at 36 years of experience.

\* Maximum salary bill is calculated as 106.4 percent of the 1983/84 salary bill in 1994 (or 1994/95). The annual index appears as table 29 in Appendix B.

of the teaching population and the criteria by which salary increments are currently arranged. As these are based on our ability to monitor inputs easily, there is no reason to assume that any corresponding increase in the quality of public education will result.

### **The Student/Teacher Ratio**

As reported in chapter 3, the ratio of students to teachers in public schools has fallen dramatically since 1960. From an average of 26 students per teacher a quarter century ago, current levels amount to slightly more than 18. This fall has meant a higher cost of education, as the same number of teachers have serviced what has been a declining number of students. The lack of a rationale for this intense free fall in the student/teacher ratio has been discussed above. What is noteworthy, however, is that there is at least some empirical suggestion that the fall in the ratio is approaching a minimum. A simple fit of a curve through the student/teacher ratio suggests a minimum during the early 1990s or late 1980s.<sup>7</sup>

There is no suggestion that this decline, which appears to be halting at 17 or so students per teacher on average, is doing so for good cause. But since there is no evidence to buttress the value to the student of any one ratio or another, the only conclusion that can be drawn is that if the present trends continue there will be only modest increases in costs from this source.<sup>8</sup>



## **SUMMING UP**

If current trends continue, there will be gradual increases in the cost of the elementary and secondary education system as we know it. What will be lacking is an assurance that these costs reflect an increase in the amount of education provided to young Canadians—either in quality or quantity. At the present time there is little in the public school system that encourages cost effectiveness in general. The appropriate size of a school district, school or classroom is not driven by its effectiveness in “educating” children according to some commonly accepted standards. Teachers are not hired and fired on the basis of their teaching effectiveness. Without some basis for judging the output of the school system, it obviously cannot be cost effective since the concept itself presumes that resources will be directed toward known ends in a systematic fashion. Current organization dictates that outputs are judged by inputs. More teachers per student is assumed to result in better learning. Longer terms of teacher service and greater teacher education are rewarded. There is little opportunity to reward better teaching as judged by parent, principal or pupil.

## **SOME ALTERNATIVES**

Indictments are always easier than prescriptions, and educational policy in Canada presents the problem in a severe form. The next sections bring together an overview of the proposals for reform that have been advanced in earlier chapters. Rather than repeating the arguments in favour of the proposals from the point of view of efficiency and equity, the emphasis is shifted to the role that could be assumed by different participants: parents, taxpayers and governments. Policy options available to one level of government may not be feasible for another. In addition, policy options may be contingent. For example, if parents bore the full cost and responsibility for their children’s education, it is likely that schools would be rated like companies to assist parents in making educational investment decisions. But as the taxpayer is not likely to leave the oversight of education solely to the parent of today’s generation of children, consideration of other kinds of information gathering are appropriate.

### **The Role of the Parent and Taxpayer**

In some broad sense there is a consensus that the state will make public resources available to school-age children for their education. There is much dissatisfaction at the present time with schooling as it is presently constituted. The cost and quality of the educational system do not seem to be adequately linked. Over and above the decision about how much tax

paying Canadians are willing to pay for their commitment to education, what is at issue is the nexus of responsibility to monitor the education provided. The current structure of financial rewards within the school systems throughout Canada does less than it should to encourage excellence in teaching. Teacher experience and additional years of a teacher's education are the measures of inputs that are generally rewarded. The dimensions relevant to such an evaluation should be based on output-related measures, and in this there are two issues. Who should measure the output, and what mechanism should determine how that output is valued?

Consideration of an alternative institutional setting will focus on the role of the federal and provincial governments, with local governments subsumed in the latter. As has been argued in chapters 4 and 5, the parent is the best monitor of how well a school is able to meet that parent's objectives for his or her child's education. To the extent that the parent's objectives are similar to those of all taxpayers, the parent acts as a monitor for all taxpayers. To the extent that the objectives differ, the (current) bureaucratic and political process exist to provide redress.

Present arrangements are inflexible. A parent's only route to influence the course of a child's education within the public educational system is to work within the educational or political bureaucracy or settle in the neighbourhood of a particularly desirable school. The usual financial incentives that motivate performance in the private economy have no counterpart in our schools. Only by going outside the system of public education—which involves costs over and above taxes paid—can a parent directly obtain the quality of services he or she feels is appropriate.

From the point of view of the general taxpayer who is not currently a parent, other parents may help to monitor the performance of the school system. But with little information available about the significance of the educational output resulting from the taxes paid for education, there is an obvious gap. Some appropriate rate of return should be available if the taxpayer is to supplement the monitoring of the parent. As has been argued in chapter 2, current data do not provide an adequate characterization of the role of elementary and secondary education in the Canadian economy. Here, perhaps, is a role for the federal government.

### **A Role for the Federal Government**

It has frequently been observed that unlike most other countries, Canada has no national presence or Ministry of Education at the federal level. Except for responsibilities to national defense and native peoples, any direct role is circumscribed by the Constitution. In an indirect fashion, however,

the federal presence in a reformed educational system might be seen as a watch-keeper of national standards. One of the major problems that bedevils any assessment of educational quality is the process of monitoring the output of the educational system. As discussed in chapter 4, the issue is a complex one. Aspiring to identify the components of education that allow a student to “succeed” in the post-school environment, the student is presented with a menu of curricular and extra-curricular activities, examinations and certifications for some minimum number of years.

One potential role for the federal government in the educational process is as a disinterested monitor of what is taking place nationally. In particular, the federal government could provide a framework by which individual provinces could assess their performance in education. In addition to the collection of statistical evidence relating to the number and size of programmes and the number and characteristics of teachers and their remuneration, the federal government could provide a Continuing Survey of Educational Performance which could illuminate the educational outcomes of all the provinces. Such a survey could develop data on a longitudinal basis to capture not only the performance of individuals in school but their achievements after their elementary and secondary education. A survey that was national in scope would help to provide bench-marks for policies by drawing on a sample that is broader than any particular provincial environment.

### **The Role of the Provincial Government**

With primary responsibility for educational policy, provincial treatment of educational matters understandably varies from province to province. But two principles emerge from the discussion of chapters 3 through 5. Parents should enjoy greater flexibility in choosing the schools their children attend; and successful educators should be rewarded. By allowing parents to have alternatives to a particular school, flexibility enables parents to report which institutions are successful and which are failing to provide the kind of education desired. The report will be in the form of increased attendance in desirable schools and decreased attendance in less desirable schools. Flexibility can be provided in many ways. Vouchers can be made available to parents whose children attend public schools for use only in public schools. Parents can be given the right to choose among public schools and assign their vouchers to that school. Vouchers can be made available to parents for use in any (qualifying) public or private school. Such vouchers could be supplemented by parents willing to pay for whatever perceived benefits are available at a higher cost school. As discussed in earlier chap-

ters, each of these options provides an opportunity to make the school system more effective in meeting the wishes of parents and taxpayers.

A second principle is that of rewarding performance. It is an important complement to the flexibility which helps identify successful schools. Those who are responsible for a school's success in meeting parents' objectives should be allowed to share that success in a financially meaningful way. Looking at teaching contracts today—whether negotiated locally or provincially—suggests that a teacher with great teaching skill has little opportunity to gain relative to a less skillful teacher with the same nominal education and experience. In the context of increased opportunity for choice, a school that is persistently perceived as successful should be able to translate that success into better pay for those responsible. The counterpart is that there will be less funding available to schools that are perceived to be of poorer quality, as fewer students choose to attend. Schools may close and teachers may have to seek employment at the more successful, expanded schools. Although education and experience may prove to be helpful indicators of successful teaching, they cannot continue as the sole guides to salary.

## NOTES

1. Between 1976 and 1986 enrolment fell by 11.7 percent. The actual number of teachers has declined by 3.3 percent.
2. It is possible that there has been an improvement in the quality of education over the past 30 years. But the link between the various inputs—the teacher to student ratio, the salaries of teachers based on experience and education, et cetera—has not been established. As a result, persistent falls in the number of students per teacher or increases in salaries due to experience of the work-force give no assurance that there is an increase in the product—the quality of the education available to the child. This means that there is no basis along these dimensions for adding to costs. Further, and equally important, even if we were to regard the various input components as moving in the “right direction” with higher teacher/student ratios and the like, such a policy does not give any guidance in stopping the process at a particular teacher/student ratio or salary.
3. Of course, conscious acts of policy may cause different patterns to ensue. If there are dramatic changes in immigration, school-leaving ages or the like, then the number of students might be altered. As described in the sources to table 27, these are sets of estimates based on a variety of assumptions about net reproduction rates and migration patterns.
4. Regional growth figures are presumably dependent upon local economic conditions as well as national demographic changes.
5. No account is taken of any differences in the retention rate at each experience level.
6. This assumes that other criteria for salaries are captured by the experience categories. In particular, educational levels which lead to higher salaries may be expected to continue to increase. This means that the estimates presented in the text are likely to underestimate the growth in costs associated with the current experience-salary structure.
7. This is obtained from a regression of the student/teacher ratio with a constant, time, and time-squared as regressors as displayed in table 30 of Appendix B.
8. Recent bargaining in Ontario elementary schools over the amount of preparation time available to teachers during the school day reminds us that the number of teachers does not necessarily translate into hours

in the classroom. With the same number of teachers, each with one 40-minute “period” per day of preparation, the effective staff will be reduced for a given number of physical staff members. Arguably, if salaries remain the same, the effect is to increase the salary per unit of classroom instruction since at least some preparation now done at home will be accomplished on the job. Effective salary per teacher, too, will be increased.



## APPENDIX B

### Educators' Salary Projections and Trends in Student/Teacher Ratios

Table 29  
Annual Projections of Total Salary Bill of Educators  
Based on Current Salary Distribution

Year	Total Salary Index
1983	100.0
1984	101.1
1985	102.1
1986	103.0
1987	103.8
1988	104.4
1989	105.0
1990	105.4
1991	105.7
1992	106.0
1993	106.3
1994	106.4
1995	105.6
1996	104.9
1997	104.2
1998	103.5
1999	103.0
2000	102.5
2001	101.9
2002	101.7
2003	101.4
2004	101.1
2005	100.3
2006	99.7

Source: Statistics Canada 81-202, 1985, p. 43.

Notes: Current experience distribution projected at current salaries. Total number of teachers held constant by keeping the number of replacements (at zero experience salary) equal to departures which are assumed to take place at 36 years of experience.



**Table 30**  
**Trends in the Student/Teacher Ratio in Canada's Public Schools, 1960-86**

Ordinary Least Squares: The dependent variable is the ratio of students per teacher in Canadian public schools.

Variable	Coefficient	T-Statistic
Constant	27.175792	117.02571
Time Trend	-0.5866897	-15.348793
Time Trend-sq.	0.0090328	6.8176886
R-squared	0.982653	

Minimum value (projected) for the ratio at 32.5 years beyond 1960.

Ordinary Least Squares (correcting for first order serial correlation of the residuals): The dependent variable is the ratio of students per teacher in Canadian public schools, 1961-86, 26 observations.

Variable	Coefficient	T-Statistic
Constant	28.13	29.96
Time	-0.713	-5.889
Time-squared	0.013	3.606
Auto-reg. param.	0.63	3.966
R-squared	0.99	

Minimum value (projected) for the ratio at 27.4 years beyond 1961.

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Source: See table 16.

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