

EDUCATION AND ECONOMIC DEVELOPMENT—THE CANADIAN CASE*

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This study assesses the relationship of education and economic growth, economic development and economic progress in aggregate, in structural and in micro-economic terms on the basis of one hundred years of Canadian experience. Education is considered as a factor of input. The contribution made by knowledge resulting from additional education expands the capacity to produce, and increases the demand for goods and services and the desire for greater leisure. The dual function of education is stressed: the demand and supply effect. Education is examined both as a cause and a consequence of economic growth, economic development and economic progress, through its contribution to the quality of the labour force, earning capacity, both individual and national, productivity, the rate of economic growth and the character of economic development.

The Canadian experience suggests that educational progress generally occurred in line with economic development during the first eight decades, with the real take-off in educational advancement only occurring in the last two decades, when the nation reached the stage of technological maturity and high mass-consumption. Among the reasons for the lower ratio of gross national product devoted to education in the first eight decades were the low priority attached to education, the emphasis on investment in physical capital because of its shorter pay-off period than investment in human capital, and the heavy reliance on a substantial flow of immigrants who had obtained their education and training abroad. A distinct change occurred, however, in the last two decades, partly as a result of new technological challenges and partly as the result of changes in private and public attitudes, as the recognition of the rewards of education in terms of individual advancement and social progress led to a greater willingness to devote an increasing proportion of the nation's resources to investment in human capital, long pay-off periods notwithstanding.

This paper assesses the relationship of education and economic growth, economic development and economic progress in aggregate, in structural and in micro-economic terms on the basis of one hundred years of Canadian experience. It sets out the concepts of economic growth, development and progress, examines the role of education in the developmental process and analyzes quantitative evidence relating to the interrelationship between economic and educational advancement, as well as the benefits accruing to individuals and to society as a whole.

ECONOMIC GROWTH, DEVELOPMENT AND PROGRESS

Economic growth takes place when a nation's output expands. It is usually measured in terms of an increase in the gross national product in real terms. Such economic growth may take place because the factors of production,

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land, labour and capital, are expanding and sufficient demand for the resulting goods and services is engendered to warrant an increase in the nation's output.

Economic growth can take place without productivity rising, that is a unit of output being produced with a lesser input, without significant technological advances and without changes in the industrial and social structure. For if the factors of production are expanding, society is capable of creating a greater output of goods and services if demand for these also expands. But most nations are not satisfied with this type of economic growth. They aim also at continuously increasing productivity and they endeavour to achieve this objective through the adoption of technological advances, the application of entrepreneurial initiative, the accumulation and effective use of physical capital and human resources, changes in industrial structure and the build-up of social investment, as well as the pursuit of appropriate economic policies conducive to economic advancement. When economic growth takes this form it is usually described as economic development and is measured in terms of changes in gross national product in real terms per person working, or in terms of output produced per man-hour.

When economic development occurs, economic growth also takes place. But the reverse is not necessarily the case. When economic growth occurs without economic development, little or no economic progress may be made if economic progress is defined as an increase in the share of the nation's output available to each citizen. In this sense, economic progress can be measured in terms of changes in gross national product in real terms *per capita*.

For economic progress to take place, individual welfare has to increase; if not for all, so for the majority of the population. Hence, measurement of economic progress also involves an assessment of changes in income distribution. Variations in income distribution may be the result of market forces and individual initiative and/or the result of fiscal policies affecting income distribution including a progressive income tax system and a broadly based social security and primary industry support programme.

When a nation's capacity to produce is raised, this productive potential can be used either to create more goods and services and improve their quality and the satisfaction they yield to the individual and to society as a whole, or to reduce the number of hours worked, hence increasing leisure time, or to achieve both. As a result, economic progress will occur not only when gross national product *per capita* rises, but also when the average number of hours worked per week decline and/or the number of days taken as holidays increases.

Historically, developed nations have endeavoured to achieve both objectives, to increase output *per capita* and leisure time. Increasingly, less developed countries have also adopted such achievements as a long term objective of national policy.

A key factor in economic growth, development and progress is the labour force—the people who exert efforts to produce goods and services. Without denying the importance of the other factors of production, capital (which in a modern sense includes both physical capital as well as the willingness of the entrepreneur to risk capital and thus covers also entrepreneurial initiative) and

land (which includes natural resources availability and potential, both underground and above ground), the human element has always been a major determinant of economic and social progress.

The labour force in turn will be a most effective element in furthering economic development and economic growth if it is combined with other factors of production in a most favourable and efficient manner, and if its quality is enhanced, and combined with the spirit of adventure and determination to do well in both material and non-material terms.

Among the many factors that may contribute to raising the quality of the labour force and influencing its attitudes towards economic progress and social change, one element is singled out for examination in this paper and that is education, as it relates to Canada's economic development over the last century.

The analysis is carried on within the "stages" framework as presented by Rostow,¹ supplemented by an assessment of growth rates over intermediate periods measured in terms of decade changes or a combination of decades, as well as changes of quinquennial averages of aggregate economic indicators such as Kuznets has used.²

Rostow distinguishes five stages: the traditional society, the preconditions for take-off, the take-off, the drive to maturity, and the age of high mass-consumption. Rostow mentions three terminal dates for Canada, the take-off period, 1896–1914, and achievement of "technical maturity" in 1950. From these dates, the five stages applied to Canada can be delineated as follows:

1. The traditional society, 1605–1867.
2. The preconditions for take-off, 1867–1896.
3. The take-off, 1896–1914.
4. The drive to maturity, 1914–1950.
5. The age of high mass-consumption, 1950–1967 (and continuing).

There is considerable controversy over the applicability of the Rostow stages concept to economic development of many countries. In fact, Rostow himself voices some doubts whether the concept of the "traditional" society applies to a small number of countries which owe their origin to British colonizing efforts, the United States, Australia, New Zealand and Canada (the latter developed in part as a result also of French colonizing efforts).

In another paper³ this author presents evidence which confirms the legitimacy of Rostow's doubts. For in the colonial period, Canada was one of the

¹*The Stages of Economic Growth*, by W. W. Rostow, Cambridge University Press, London, 1960.

²*Income and Wealth of the United States, Trends and Structure*, two papers by Simon Kuznets and Raymond Goldsmith, ed. by Simon Kuznets, *Income and Wealth Series II*, International Association for Research in Income and Wealth, Bowes & Bowes Publishers, Ltd., Cambridge, 1952, and *Modern Economic Growth, Rate, Structure and Spread*, by Simon Kuznets, Yale University Press, New Haven, 1966.

³"Canada's Subsistence Economy Before 1860", by O. J. Fireston, paper given at the Fourth Congress of the International Economic History Association, Indiana University, Bloomington, Indiana, September 9–14, 1968.

frontiers of the developing European economy and in this sense she did not go through the phase of self-initiated growth which Rostow visualizes as a society moves from the “traditional” stage to the “take-off” stage.

Without denying that some elements of the early economic development of Canada are related to Rostow’s concept of the “traditional” society, the overwhelming number of characteristics support the view that the economic growth of the British North American colonies was more geared to what happened abroad than to domestically originated stimuli. While the early development of Canada could well be described in somewhat different terms from the concepts evolved by Rostow, the economic expansion that took place in the last century has many of the characteristics elaborated by Rostow as they relate to the take-off period and the stages that follow.

In considering the interrelationship between education and economic development in Canada over the last century, the question arises: What comes first? Economic development or education? Or can both be developed at similar rates as the growth of the education sector leads to better-trained men and they in turn help in speeding up the growth process?

These questions and the economic rewards that learning brings to individuals and to society as a whole are examined in subsequent sections of this paper. Before proceeding with the quantitative assessment there is need to consider whether structural changes, so essential to economic development, may be affected by education, and what in fact are the main economic implications of education.

STRUCTURAL CHANGES

Structural changes in their broadest context refer to significant variations over a longer period of time in the factors that contribute to input (and that includes the basic sources of productive capability, e.g. population, which is a source for labour, and resources discoveries, which provide the raw materials for product creation, as well as the different industries that produce goods and services to meet final demand) and to output (and that includes the manner in which product is used whether for investment or for consumption, with the latter in turn subject to structural classification, encompassing numerous sub-sectors of personal expenditures on consumer goods and services to which individuals will attach different priorities).

In a narrower sense, structural changes refer to changes in relative importance of the major industrial sectors that contribute to creating national output and in the process to providing opportunities for gainful employment and the earning of income. Colin Clark has emphasized the narrower concepts of changes in industrial structure while Simon Kuznets has extended the concept of structural change to a broad range of areas including in addition to economic changes, also to variations in social and political structure.⁴

⁴*The Conditions of Economic Progress*, by Colin Clark, 2nd edition, Macmillan and Company Limited, London, 1951; *Modern Economic Growth*, *op. cit.*, particularly Chapters 3 and 8.

No attempt is made in this paper to examine such structural changes as demographic factors, urban-rural distribution of the population, and the composition of the labour force, all of which have an important bearing on the economic growth pattern of Canada and the educational requirements of the country, or the many non-economic structural changes which Simon Kuznets and other economists have examined in recent years. Instead, brief reference is made only to three types of structural changes.

The first is changes in industrial structure covering agriculture, manufacturing and services. Such structural changes have had a significant impact in transforming the Canadian economy from that of a pre-industrial nation to a technologically mature society over the last century. Industrial maturity was reached after eight decades of industrial immaturity.

From the point of view of education, changes in industrial structure brought much greater pressures on the content and the quality of the output of the education industry, on the orientation and objectives of the educators and the educated, and on the training and vision of teachers and scientists on whose shoulders the main burden rested to create new knowledge and to communicate it to new generations of Canadians.

The second is changes in the structure of final demand for product distinguishing between private consumption, government consumption and capital formation, both domestic and foreign. Such structural changes have affected education in a number of ways.

As educational expenditures rise, they add to government consumption. But the decision of what resources a nation will devote to government consumption is not guided by the forces of the market. Different considerations of priorities affect the composition of the government product. These may be affected, among other things, by changes in the public's attitude on the role of government in economic affairs and the personality factor in political life, as the quality of government leadership varies over time. For public education has to be paid for out of taxes and government leaders have to decide how much they wish to tax the populace and how to spend the money. The latter factor may in part explain the timidity which several generations of politicians have demonstrated in Canada in coming to grips with the educational problems of this country.

As to capital formation, a large share and over time a greatly varying proportion of this type of expenditures have been financed in Canada from foreign sources. And with foreign capital came technological and managerial know-how contributing to a speed-up in the rate of industrial development and providing many new opportunities for employment of people with advanced education and training. At the same time, with the emphasis growing on science-oriented industries, particularly in the stage of technological maturity, strong pressures were exerted on the education industry to turn out the type of young people best adapted to the new age.

As to private consumption, education plays the ambiguous role of being considered by some economists as consumption, by some as investment, and by others as partly both. Without contributing to the controversy whether education is consumption or investment, and the literature on the subject is

growing,⁵ the main point is that in Canada, as incomes rose, consumers found that the range of choice of how to spend their money also expanded greatly. With outlays for the necessities of life representing a declining proportion of personal disposable income, more money was left to spend on other items than the essentials of living. At the same time, with incomes rising rapidly, the tax potential of the nation expanded significantly. Greater private and public affluence made it possible to spend more money on education, both in absolute and in relative terms.

ECONOMIC IMPLICATIONS OF EDUCATION

Education facilitates an understanding of human and cultural values and of family and community traditions, and it contributes to the expansion of knowledge. Thus education assists in making man a better man and a more knowledgeable one. In contributing to the enhancement and deepening of knowledge, education is only one out of several factors serving this purpose, though it has increasingly become a particularly important one. Other factors include experience, experimentation and exposure to opportunities of learning.

Expansion of knowledge affects the improvement of civilization at four different levels.

1. Human qualities may be enhanced through personality development including the broadening of the learner's mind and attitudes, the acceptance of and the adherence to moral principles, the exercise of logic and discipline in making rational decisions, the stimulation of intellectual curiosity and the questioning of preconceived ideas, increasing spatial, occupational and social mobility, the growing individual flexibility and adaptability to changes in the technological, social, political and economic climate, etc.

2. Social advancement may be attained in the sense of improved relations among the members of a community and groups within a nation, the sharing of the hazards of living, e.g., social insurance and social security, the provision of social capital and social services to offer adequate opportunities for all to advance (of which state-supported compulsory public schools and institutions for higher learning would be one example).

3. Political sophistication may be increased and this includes expanding political perception among citizens and raising the incidence of participation in political affairs, leading to greater democratization as well as more effective

⁵The claim that all or a good portion of expenditures on education should be regarded as investment in human capital has been recognized increasingly by economists in many countries, following the basic thinking of a number of pioneer contributors. Among them is Theodore W. Schultz (see his "Investment in Man: An Economist's View," *Social Service Review*, Vol. XXXIII, June 1959, "Capital Formation by Education," *Journal of Political Economy*, Vol. LXVIII, No. 6, December 1960, "Investment in Human Capital," *American Economic Review*, Vol. LI, March 1961, "Education and Economic Growth," *Social Forces Influencing American Education*, The Sixtieth Yearbook of the National Society for the Study of Education, Part II, ed., Nelson B. Henry, The University of Chicago Press, Chicago, 1961, *The Economic Value of Education*, Columbia University Press, New York, 1963). For a particularly lucid exposition of the circumstances under which educational spending may be considered consumption or investment, see *Investment in Education*, Report of the Survey Team appointed by the Minister for Education in October 1962, The Stationery Office, Dublin, 1965, pp. 378-385.

working of governments at different levels within a nation, and contributing to an increase in the understanding among governments and people in international affairs.

4. Economic progress may be achieved in that greater knowledge improves man's chances and opportunities of controlling his destiny in his continuous struggle to wrest from nature and science the fruits of his labour which he then can translate either into a greater volume of goods and services to be consumed or invested (involving deferment of consumption), or into greater leisure to be enjoyed by reducing what David Ricardo has called the "irksomeness of labour". Thus increasing knowledge, if used effectively, not only makes it possible for man to increase the quantity and quality of material benefits he can create, but also raises his capacity to pursue to a greater extent the non-material benefits which enable him to lead a fuller and more rewarding life.

To the extent that education adds to the expansion of knowledge, and the latter in turn contributes to economic progress, a better way of life can be achieved by the individual and by society as a whole. But whether this "better" way of life consists of a greater volume and a higher quality of goods and services at the disposal of each person, or whether it takes the form of greater leisure with consequent expansion of "joie-de-vivre," or a combination of both, is in most countries a matter of choice of the individual and of society as a whole.

This distinction is fundamental in any consideration of the reciprocal effect of education on economic growth. For if economic growth, development, and progress are measured in terms of gross national product, total, per person working or *per capita*, or similar indicators of economic activity, then increasing education may contribute to one of two different results. If the choice is greater emphasis on leisure, the rate of expansion of economic growth as measured in real gross national product terms may indicate a slow-down if compared with an earlier period of expansion when a lesser input devoted to education may have produced a greater rate of increase in gross national product, simply because individuals and the nation as a whole chose more work in preference to leisure.

On the other hand, if education stimulates consumer demand through greater willingness to accept innovations and acquire greater comforts of life, then the choice may be to take out the benefits arising from increased productivity in terms of higher real incomes to pay for expanded consumer purchases, rather than to increase leisure time. This was the case, for example, in Canada during the upswing phase in economic activity between 1961 and 1967. In that case, education contributes to raising the rate of growth of gross national product from the demand side, with supply factors responding to meet this demand.

What then are the effects of education on economic choice? Increased education may contribute to expanding the capacity of the economy to produce more goods and services. By deliberate choice, part of these enlarged capabilities may remain unused as society places greater values on leisure than on toil at one time, and opposing values at another time. The interaction between what are in essence economic and social phenomena has been emphasized in a recent study:

“One consequence of increased education . . . might well be a reduction in the measured volume of economic activity, because people might with every justification choose to devote an increasing proportion of their time to non-economic activities in their pursuit of happiness. Such a development could still represent progress even in the economic sense since the productive potential of the community might be increasing at the same time. The fact that this capacity is not used would, if expressed in gross national product terms, indicate that the economy was declining. This would clearly be an inadequate representation of the true position.”⁶

There is another dimension to the link between education, knowledge and economic activity. For knowledge to achieve social and economic meaning, it has to be transmitted from one person to others. That process of communication, usually formalized in an institutional framework, is represented by education. But the extension of knowledge, in turn, is dependent on education, not only because education trains the teachers who are the future communicators of knowledge, but also because it trains the scientists and other professionals who become the originators of new knowledge.

This knowledge-producing process creates a sector of economic activity which can be described as the education industry. And this industry, through the wider and more effective diffusion of knowledge, can bring economies of scale and external economies similar to those that occur in other industries producing goods and services.

Such production economies and the effect of the expansion of the education industry on economic growth has been explained in these terms:

“The economies of scale and external economies . . . arise from a wider diffusion of knowledge. Economies of scale occur, firstly, because as one piece of knowledge is transmitted to an increasing number of people the transmitter(s) will very likely become more specialised and more proficient and, secondly, as more people acquire any piece of knowledge there is a greater likelihood of a cross-fertilisation taking place between them which may result in stimulating new knowledge or in more effectively propagating existing knowledge. External economies also arise from the possession of knowledge because the possessors may be able to use it in a way that benefits other people as well as themselves.

The knowledge-producing concept of education also throws light on the relationship between education and economic growth. Education can be both a cause and a consequence of economic growth—a consequence because as people become better off they may seek more education for its own sake, for the satisfaction it gives. Education may be a cause, in that education or specific aspects of it may be a necessary condition for the production of some goods and services. To the extent that education is a cause of economic growth one must try to ascertain the amount and nature of the education needed to attain any given level of output. Viewed in this light, education as a knowledge-producing process may be thought of as contributing to economic growth in two ways. Firstly, there may be an increase in the total stock of knowledge in a community by the transmission of existing knowledge to a larger number of people, secondly,

⁶*Investment in Education, op. cit.*, p. 386.

there may be an increase in the knowledge stock through the discovery or introduction of new knowledge.”⁷

For economic development to take place, a nation must be able to expand the capacity to produce and that means, as far as labour input is concerned, to increase the productiveness of this particular factor of production. This can be done by exposing the young before they enter the labour force to increased opportunities for extended and higher quality education, by providing the active labour force with opportunities to avail themselves of added training and adult education, and by making it easier for inactive members of the labour force to return to the labour market following an updating of their educational attainments, the latter of particular significance for married women who in Canada, as in the United States, are returning to the labour market in increasing numbers. Hence, in a growth context, learning involves continuing education.

There are many other aspects to this relationship between increased education and greater national productivity. There is the question of matching supply with demand for specific skills and educational experience and the working of the price system in bringing about a balance between demand and supply, bearing in mind the time factor. For it takes time to educate people and to give them the specialized knowledge and experience that modern technology requires.

The demand for experts in many fields is most immediate when industry endeavours to introduce innovations in production and distribution fields or when governments embark on social programmes, such as a significantly stepped up demand for doctors and nurses when a country introduces a national health programme encompassing prepaid public hospital and medical services.

On this point, W. Arthur Lewis observes: “There cannot be too many technicians, engineers or scientists.”⁸ And he could have added doctors, nurses, teachers and many other occupations, including in particular managers, since the latter group represents perhaps the single most important occupation required to keep an economy innovating and growing.

So far, social scientists have not come up with a fully satisfactory answer to the question as to whether there exists a specific correlation between supply of and demand for trained personnel at a given point of time and how this correlation changes under varying economic and social circumstances.

One of the reasons why scientific manpower planning, i.e. relating education and training to projected labour force requirements (by age, sex, education, skills, training, experience, industry and location), has been such an elusive field of endeavour has been that in most developed countries the absorptive capacity expanded more or less as rapidly as the supply of educated personnel increased. Hence, there was, in the past at least, less pressure on developing manpower planning on a scientific basis.

The problems are more complex in countries that have not as yet reached the stage of technological maturity. The difficulties an economist faces in

⁷*Ibid.*, p. 376.

⁸*Development Planning, The Essentials of Economic Policy*, by W. Arthur Lewis, Harper and Row Publishers, Inc., New York, 1966, p. 232.

advising the less developed countries where the number demanding education may exceed the foreseeable number of jobs has been described by Lewis in these terms:

An economist "can point out that a surplus of educated persons can only be a temporary phenomenon, since any economy can ultimately absorb any number of educated by reducing the premium for education and raising the educational qualifications for jobs. He can stress that a wide educational base is needed to find the best brains, which may make the crucial difference. He may welcome the fact that education raises aspirations, because low aspirations are one of the causes of low achievement. He can add that any kind of education must have some productivity, since it stretches the mind; but he cannot demonstrate that the marginal product of expenditure on education is bound to exceed that of other investments. Finally, he can remind the Government that education does not have to be productive in order to justify itself; it is valuable for its own sake."

The implication is that there are also human and non-economic aspects to education that may justify the social costs involved in providing it on an expanding scale irrespective of economic rationale.

Imbalances in matching the supply of specific occupations with job opportunities, adequately remunerated, will occur also in developed countries. In Canada, as has been the experience in a number of industrialized nations, such imbalances have in the past been largely resolved through immigration or emigration. During most of the century as an independent nation, Canada has been a major beneficiary as well as contributor to the "brain-drain."

Expanding the productive capacity of the labour force by itself will not lead to economic growth *per se*. There is also need to create sufficient effective demand to make economic use of the expanding labour force equipped with greater knowledge and skills as a result of more and better education and training. This is a broad generalization, the practical implementation of which faces innumerable difficulties, particularly when it comes to formulating educational policies and programmes designed to dovetail with and facilitate economic growth.⁹ Many countries have found it difficult to resolve such problems. The kind of questions that need answering before solutions can be found have been stated in these terms:

"We need to know *how* education enters into political or economic transformation, in what ways it interacts with other social processes, and in what sorts of time patterns. For which parts of the labor force is literacy essential? What, under various conditions, is the most fruitful allocation of resources between secondary and primary schooling, and with what distribution of responsibilities and costs? In what form and in which circumstances should

⁹Richard Stone has come forward with proposals for a new system of social accounts applicable to education which he describes as "a model of the educational system designed to work out the present implications of future levels of educational activity as determined by the evolution of the demand for places on the one hand and the economic demand for the products of education on the other." Such an educational growth model would in the first instance be separate from a general economic growth model, with the linking of the two models to take place at a later stage of development (see "A Model of the Educational System," by Richard Stone, *Minerva*, Volume II, No. 2, Winter 1965, pp. 172 ff.).

technological training be given priority over academic? How do patterns of incentive and aspiration affect the outcome of this or that kind of schooling? How can incentives be modified to improve the contribution of education to diverse sorts of change? How different are the methods for transferring 'know-how' from those that spread knowledge? When, where, and to what extent should resources be devoted to the formation of human capital rather than physical capital? Are there situations in which education may even obstruct economic advance?"¹⁰

Notwithstanding difficulties of practical implementation, the objective of continuing economic growth and rapid economic development has been adopted by many countries the world over, encompassing industrialized and emerging nations alike, as a cardinal principle of economic policy. One of the consequences has been to place increasing emphasis on education as a significant contributing factor to the growth process, notwithstanding the fact that social scientists have not so far developed the full array of techniques and analyses required to provide many of the answers that policy makers are seeking in this field.¹¹

Thus both in theory and in practice a great deal of knowledge has still to be gained to understand more deeply the economic and social interrelationship between education and economic growth, development, and progress. The increasing amount of research work now being done in this field in a number of countries is encouraging, though time is of the essence, since many developed and underdeveloped nations are under great pressures to expand educational expenditures several times over during the next decade.

So far, the discussion has largely been concerned with the relationship of education and economic growth and development in aggregate and in structural terms. Education has been looked at primarily as a factor of input, that is, the contribution it makes to increasing the capacity to produce which, when fully used, will result in greater output. But education also contributes to increasing the demand for goods and services—quite apart from the desire for greater leisure. Thus education performs a dual function in the economic system, and this aspect is discussed in the two sections that follow.

EDUCATION AND FRONTIERS OF ECONOMIC ACHIEVEMENT

Education pushes back the frontiers of economic achievements in two ways. It increases the capacity to consume and it raises the capacity to produce.

The capacity to consume and the desire to raise living standards may be affected by education for the following reasons:

1. It widens the horizons of the consumer.
2. It aids consumer understanding of how to maximize the meeting of

¹⁰"The Role of Education in Development," *Development of Emerging Countries. An Agenda for Research*, by Mary Jean Bowman and C. Arnold Anderson, The Brookings Institution, Washington, D.C., 1962, pp. 153 ff.

¹¹Some progress is being made in developing concepts of education expenditures and educational capital consistent with economic theory (see for example, "The Treatment of Education in National Accounting" by Dudley Seers and Richard Jolly, *The Review of Income and Wealth*, Series 12, No. 3, September 1966, pp. 195-209).

wants and thus obtain the greatest possible satisfaction from a given or obtainable quantity of resources.

3. It generates a desire to obtain access to a greater range of choice to meet existing or newly developed wants.

4. It fosters a willingness to experiment with new ways to obtain consumer satisfaction and thus encourages business firms to innovate by developing new types or improved types of goods and services.

5. It creates increased opportunities to emulate living habits and standards of others, thus contributing to diversifying and expanding personal consumption of goods and services.

6. It contributes to changes in consumer values, with the emphasis shifting from bare necessities of life to greater demand for a higher quality and more variety of goods and services which yield greater consumer satisfaction.

7. It affects consumer attitudes towards material and non-material satisfaction obtainable from growing affluence.

8. It results in greater selectivity and critical assessment of the quality, serviceability and price of consumer goods and services coming to the market.

9. It makes it possible to translate the growing and more sophisticated capacity to consume into a higher, more variegated and more satisfying way of life that can be obtained from an effective blend of technological achievement and spiritual choice.

10. It contributes to public enlightenment with consequent influence on government economic and social policies which in turn may significantly affect consumer spending and living standards.

While education is one factor affecting consumer choice, there are many others. Consumer choices will also be influenced by business decisions, the manner in which entrepreneurs market and promote their products, and the product innovations they continuously offer to consumers thus widening their range of choice. And further, government fiscal and monetary policies may have a major effect on the capability of the consumer to meet his wants and to maximize his satisfaction.

Consumer spending is affected by many other factors as well, including levels and distribution of personal disposable income, current and future earnings, consumer assets and liabilities and the general mood and expectation of the consumer about his future well-being and the state of the economy. Thus is it important to bear in mind that educational attainments of the consuming public are only one variable, though perhaps an increasingly more important one in the process of determining consumer wants and consumer spending.

To turn now to the contribution which education makes to increasing the capacity to produce, it is helpful to use a broad definition of education in this respect. The latter may be defined to include the formal acquisition of knowledge in schools and in institutions of higher learning, as well as technical training undertaken in vocational schools or on the job.

The capacity to produce may be raised through education for the following reasons:

1. It increases human skills and extends aptitudes which, if properly combined with the efficient use of other factors of production, will increase individual and national productivity.

2. It raises managerial competence and entrepreneurial leadership, so essential to continuing economic progress.

3. It provides a basis for the ever-lasting search for scientific advancements, technological achievements and innovational accomplishments.

4. It pushes back the frontiers of risk-taking by extending the opportunities to venture into new areas, and by minimizing the possibility of failure and by maximizing the potential for success through proper business and financial planning and systematic and high-speed control measures.

5. It makes it possible to use the expanded capacity to produce so as to raise the nation's output and distribute it in a manner which contributes not only to maximizing consumer satisfaction but also makes possible the achievement of continued economic growth, higher levels of employment and real incomes, which in turn are prerequisites to raising standards of living and consumer welfare.

DUAL EFFECT OF EDUCATION

Just as the Harrod-Domar model of economic growth allows for the dual impact of investment—its contribution to raising capacity and its effect on levels of employment and income—so education can be said to have both a demand and a supply effect.

By turning out more knowledgeable and more sophisticated consumers, demand for goods and services is raised both in quantitative and qualitative terms. By training workmen to do a better job, and bringing to the fore business leaders who are productivity-conscious, innovation-oriented and risk-motivated, the capacity of the economy to produce more goods and services is expanded.

And as demand for more goods and services presses on the expanding capacity of the economy to produce more goods and services, the supply is increased. In the process, more employment and income is generated, not just because of the ensuing increases in demand for consumer goods and services, but also because the latter is accompanied by and at times preceded or followed by increases in demand for capital goods and government services. For a country to turn out an increased volume of goods and services, and to do so more efficiently, greater outlays are required to create the capital facilities and the governmental infra-structure, so essential if continuing economic development and economic growth is to be achieved.

The next section will turn to a quantitative assessment of the relationship between education and Canadian economic development.

THE CANADIAN EDUCATION INDUSTRY

What are the main characteristics of the Canadian education industry?

1. It is an industry whose rate of growth exceeds the rate of expansion of most sectors of the Canadian economy.

2. It is an industry where the rate of technological progress, innovations and experimentation is being speeded up, resulting in an increase of the rate

of obsolescence of both the output and the input. To illustrate the former, about one-half of knowledge acquired in institutions of higher learning by the medical profession and scientists and engineers working in industries with rapid product change is claimed to become obsolete in about ten years. To illustrate the latter, teachers need retraining, curricula have to be revised continuously, education aids are being replaced by new devices, mass communications require a revamping of the system of transmitting knowledge, buildings become cramped and inadequate, and equipment becomes obsolete.

3. It is an industry where supply is continuously lagging behind demand. This is due in part to the backlog of demand built up as a result of an inadequate rate of expansion in the past, in part to increasing affluency of individuals and society as a whole, and in part to changes in the public's attitude and valuation of the benefits of education, both in economic and non-material terms.

4. It is an industry that operates in an imperfect market where the "buyers" of the product, that is the persons obtaining an education, are in many instances not the originators of the buying decisions (parents making decisions for their children), where demand is largely not a matter of choice (compulsory education to the age of sixteen), where the product is largely provided without *direct* charge to the buyer ("free" education at the public elementary and secondary level, though most parents pay for education indirectly through taxes), where the buyers have inadequate knowledge of product alternatives (inadequate student counselling), and where the price system is ineffective in allocating resources (since a large part of the operations of the education industry is financed by governments, either directly or thorough grants, with social and political considerations frequently being the motivating factors rather than economic reasoning).

5. It is an industry with mixed ownership and direction, public and private, the former preponderant, with the two sectors guided by somewhat different motivation as to objectives and the best methods of realizing them. At the same time, it is a "sensitive" industry where such concepts as "teacher quality" and "academic freedom" loom large in affecting the composition and output of the education sector.

6. It is an industry where the scale of operations can be both a handicap and an advantage. Too small administrative units at the elementary and secondary school level, particularly in rural and semi-rural areas, have brought about many inefficiencies, inadequate quality of teaching, wasteful operations and misallocation of resources, necessitating the organization of large and more efficient administrative units. At the same time, some of the institutions of higher learning have become so large that decentralization of organization and the creation of additional universities and junior colleges became necessary to achieve a combination of increased efficiency and high quality of teaching. Small classes make it possible for teachers to give more individual attention to pupils. Quality considerations of educational performance have produced a trend towards smaller classes, notwithstanding the great increase in numbers of those seeking education. The problem of reorganizing the educational system in Canada has been particularly complicated by factors of geography and demography. Most of Canada's population is concentrated in two dozen metropolitan centres and

major cities, with the rest spread out thinly across the continent, some five thousand miles in length. Thus, providing adequate educational facilities has become in part a transportation problem.

7. It is an industry that operates in a federally constituted country, with ten provincial governments primarily responsible for education which they exercise in cooperation with many thousands of local administrative units (school boards, institutions of higher learning and vocational training, etc.). Standards of education lack uniformity and this is not without effect on the quality of education and the mobility of the labour force. The burden of financing Canadian education is heavy and it rests mainly on the shoulders of junior governments which are financially weaker than the central government. This has made it necessary for the federal authorities to offer assistance. A conflict ensued as to the form such assistance might take and it has led to continuing disputes between federal and provincial governments. While a *modus vivendi* exists, Canada is still far away from finding a solution to this puzzling problem acceptable to eleven different legislatures and governmental bodies, and the public at large.

8. It is an industry where pedagogic, social and economic research relating to both input and output are essential but where less work has been done than almost in any other major sector of economic activity in Canada.

It is against this background of the special characteristics of the Canadian education industry that the facts presented below about its size, growth and composition should be viewed.

Education in Canada represents an industry with a budget of over \$4 billion, equivalent to about $7\frac{1}{4}$ per cent of the country's gross national product. It employs over a quarter of a million full-time teachers, about $3\frac{1}{2}$ per cent of the labour force, together with tens of thousands of supplementary staff and part-time teachers. Educational capital expenditures involve over \$1 billion annually, spent mainly on buildings and equipment, and representing about one-quarter of all outlays on social capital and equivalent to more than 10 per cent of business capital investment. About one-half of all local government spending, one-third of provincial government expenditures and about 5 per cent of federal government outlays are made to meet Canada's explosive growth of the education industry.

The great majority of teachers are employed in elementary and secondary schools, some 230,400 in about 20,600 institutions, with some 200,000 classrooms. Of these institutions, about 92 per cent are public and 8 per cent are private.

About 20,700 full-time university teachers look after 233,000 full-time students, registered in some 400 institutions of higher learning. The figures relate to the academic year 1966-1967 which recorded a 13.0 per cent increase in university enrolment over the year previous. Remarkd the traditionally cautious Dominion Bureau of Statistics: "If present trends continue the 1966-1967 full-time enrolment figure may be doubled in six years."¹²

¹²*Preliminary Statistics of Education, 1966-67*, Dominion Bureau of Statistics, Ottawa, February 1968, p. 24. (See also *Enrolment in Canadian Universities and Colleges to 1976-77, 1966 Projection*, by Edward F. Sheffield, Association of Universities and Colleges of Canada, Ottawa, 1966).

The education industry caters to the needs of about 8.3 million Canadians, or about 40 per cent of the total population. About 6 million people are obtaining education and training on a full-time basis, while 2.3 million are involved in adult educational programmes on a part-time basis. Education has become a way of life for many Canadians and the continuity of that process has become increasingly recognized.

With a nation where four out of ten people are learners, the education industry faces not only explosive growth but continuing pressures with the demand for well-trained staff, buildings, equipment, libraries and research facilities exceeding the supply in most institutions in this country. Bottlenecks and scarcities result and this is reflected particularly in shortages of scientific and professional personnel in certain occupational categories, from engineers to medical doctors, from social scientists to teachers, and from technicians to nurses.

The build-up of that pressure is indicated by the fact that during the stage of high mass-consumption, 1950–1967, Canada's population rose by about one-half while her school enrolment more than doubled, her total expenditures on formal education increased ninefold and her capital expenditure on schools and universities rose tenfold, while gross national product expanded threefold.

Remedies to deal with the educational explosion have been largely in the hands of provincial governments and local authorities with the British North America Act of 1867 (Act of Confederation) specifically placing education as a responsibility of the provinces. The situation is complicated by the fact that Canada has ten different provincially operated systems, with some unique features including the provision of education in English and French in a number of provinces.

The Federal Government has certain direct responsibilities in special areas including the two northern territories, the provision of education for Indians and Eskimos and for Canadian personnel employed abroad. In more recent years the Federal Government has provided increasing financial assistance to the education industry.

The growing pressures felt by the Canadian education industry have not been just the result of very large increases in numbers. The concepts of what education entails and how the objective of learning can best be realized have undergone major changes. Emphasis has been directed "towards keeping young people in school longer and in having them complete a vocational or academic course."¹³

Quantitative changes have been accompanied by qualitative changes. Even with Canada's birthrate falling in the more recent period (and this trend is continuing), the pattern of age distribution and longer learning periods continue to add to the heavy and growing demands of the education industry. "At the same time an 'explosion' in new knowledge has raised many problems at all levels. A variety of visual and auditory aids have been introduced into the classroom: television, the overhead projector, programmed instruction by machines, and language laboratories. Increasing use is being made of computers

¹³Canada, *One Hundred, 1867–1967, op. cit.*, p. 371.

for marking papers, preparing reports, processing attendance and other reports, and for scheduling classes.”¹⁴

Under strong pressures, the Canadian education industry has expanded by leaps and bounds, particularly in the last decade, and it has produced levels of education and scientific and technical training that, notwithstanding inadequacies and irritations, have served the economy well. Still the achievements of this industry have remained behind the level attained in the United States and this has created certain difficulties for Canada. Some of the problems have significant long-term implications for economic development and these are examined later on.

EDUCATION AND THE STAGES OF ECONOMIC DEVELOPMENT

W. Arthur Lewis once remarked: “Poor countries cannot afford to pay as much for education as richer countries.”¹⁵ This observation can be reworded in historical perspective by saying: “Rich countries start out as poor countries, and during the period of poverty cannot afford to pay as much for education as later on when they are richer.”

This has been Canada’s experience. During her early history, Canadians could not afford to spend much on education. They had to devote their main efforts to developing a virgin country. Education was in the hands of the clergy. Separation between church and state in matters of education evolved slowly in Canada, and quite differently from the development in the United States. In that country the First Amendment to the Constitution with its “Free Exercise and Establishment Clauses” set out in specific terms the separation of functions. “With respect to education these provisions carried a twofold purpose: to ban the teaching of sectarian doctrines in public schools and to restrict the use of public funds exclusively for public education.”¹⁶

With the main stem of Canada’s population being largely French (Catholic) and English (Protestant), education during the first stage of Canada’s economic development, i.e. before 1867, has been greatly influenced by the varying role played by the church in maintaining control over learning in the elementary and secondary schools. The transformation to non-sectarian teaching came slowly and not without protracted controversy.

Very early in their attempts to change from non-secular to lay education, the settlers found that the provision of education required public support and that the lack of indigenous teachers had to be made up by importation from abroad. In the 1770’s, English residents of Montreal raised one hundred pounds to bring in a school-master from New York. But the money did not last long and the residents petitioned the governor for financial assistance. By 1789, four such teachers were receiving grants of two hundred pounds each, and the beginning of establishing a publicly supported school system had been made.

¹⁴*Ibid.*

¹⁵*Development Planning, op. cit.*, p. 104.

¹⁶*Formative Ideas in American Education, From the Colonial Period to the Present*, by V. T. Thayer, Dodd, Mead & Company, Inc., New York, 1966, p. 41 (see also pp. 112 ff.).

The development of the publicly supported school system, initially following the British pattern but increasingly influenced by modern ideas evolving in the United States, received great impetus in English-speaking provinces in the early nineteenth century,¹⁷ while at about the same time Quebec, or Lower Canada as it was called then, established a new system for the operation of non-sectarian schools.¹⁸

Further major changes came in the 1840's with legislation enacted providing for separate denominational schools for a religious minority, supported by public funds, allotted "according to their number, of the monies appropriated and raised by assessment for the support of Common Schools."¹⁹

While primary schooling developed early, followed by secondary education, it took two centuries to develop institutions of higher learning. Some tentative beginnings were made in establishing the *Seminaire de Quebec*, a Roman-Catholic College of Arts and Theology founded in 1663, which became a university in the modern sense in 1852 and was then renamed after the founder of the college, Bishop Laval. Before that date, English-language universities had been established in Halifax, Dalhousie University in 1820, in Montreal, McGill University in 1821, the University of King's College in Upper Canada, 1827, later to become the University of Toronto, and in Fredericton, New Brunswick, King's College, to become later the secular University of New Brunswick in 1859.

In the early stages, higher education placed major emphasis on the humanities and the arts, with interest in the sciences deferred to a later date when industrial development and growing awareness of educational achievements abroad (in the later period largely emulation of American progress) began to exert growing influence on the pattern of educational development in Canada.

Looking at the role of education in Canada's first stage of economic development, the period of the traditional society, certain common characteristics can be noted:

1. The pattern of educational development was shaped by religious, cultural, traditional and philosophical factors. During most of the period, economic considerations had very little or no influence.
2. The emphasis was on "basic" education at the primary and secondary levels, and on the humanities and the arts at the level of higher learning, with improvements at one level followed only after a considerable time lag by improvements in the next higher level. Development of technical training at

¹⁷In Upper Canada (Ontario), the two main statutes were "An Act to Establish Public Schools in Each and Every District of this Province," 1807, and a more far-reaching Act following the American pattern, the "Common School Act of 1816." Common School Acts were passed in Nova Scotia in 1811 and in New Brunswick in 1816.

¹⁸"Act to Establish Free Schools and to Promote the Cause of Education," 1810.

¹⁹Act passed in 1841, 4 and 5 Vict. Cap. 18, Art.11. This Act applied only to Upper Canada, with provisions made for Lower Canada in a separate statute in 1845, leading to the establishment in that province of two separate and distinct school corporations. Further amendments followed rounding out the system of separate schools before the advent of Confederation in 1867. Of these, the two most important statutes were the ones passed in Lower Canada in 1860 and in Upper Canada in 1863 (for further details see *Investment in Canadian Youth, An Analysis of Input-Output Differences Among Canadian Provincial School Systems*, by John E. Cheal, The Macmillan Co. of Canada Ltd., Toronto 1963, pp. 20 ff).

the post-primary level and scientific orientation at the university level had to await the greater advances in technology and expanded industrialization which only developed as Canada moved through the stages of the pre-conditions of take-off and the take-off.

3. The strong denominational character of education and the development of the separate school system, different from province to province, had far-reaching consequences on the quality of education and the development of skills necessary to advance the country's economy from one stage to another. In essence, the type of educational system evolving in Canada during the pre-Confederation period was a contributing factor to delaying the take-off stage in the northern half of the continent as compared with the rate of growth and type of industrial progress experienced in the United States. Rostow places the take-off stage for the United States as between 1843 and 1860, as compared with 1896–1914 for Canada.

Inadequate information is available to assess the retarding effects on the rate of economic growth in the colonial period resulting from the slow progress made in expanding and improving the educational system and in particular the retarding effects of the denominational school system. But some studies relating to the more recent past exist which are suggestive of what some of the economic implications might have been.

Based on an examination of the relationship between input and output of different educational systems in operation in Canada during the 1950's, evidence obtainable appeared to support the following conclusions:

“A significant negative correlation was found between educational output and the degree of denominationalism in provisional school systems. This negative relationship was supported also in a comparison of the outputs of the dual school systems of Quebec and the public and separate school systems of Alberta. Factors found to be associated with denominationalism were lower per-pupil expenditure, lower teacher salaries and qualifications, lower personal incomes, and greater educational need in terms of both the number of children to be educated and the number of years to schooling in the adult population. It was also found that several provinces higher in denominationalism were making more effort relative to ability than provinces with less denominationalism, but were nevertheless achieving a lower output. The denominational factor in Canada's provincial school systems would seem to have a significant association with the regional differences that have been found in educational inputs and outputs. This factor would seem to be related to cultural variables that find expression in attitudes towards education, which may play a significant role in determining the retention power of the schools and, subsequently, the productive power of the population.”²⁰

4. Colonial administrators placed a low priority on education in the early period. And later when the settlements were given a reasonable degree of self-determination in domestic affairs, low levels of incomes and the comparatively high costs of education—for some teachers had to be attracted from abroad and paid higher than the going wage-scales—limited the capacity of the provinces to raise education to the levels required that would bring forth an adequate

²⁰*Investment in Canadian Youth, op. cit.*, p. 119.

flow of young people trained to cope with the requirements of a society which was slowly moving from a rural and agricultural pioneering community to a more urbanized, more commercially active, and ultimately more industrially oriented nation.

The social scientist wishing to establish what proportion of Canada's gross national product was devoted to expenditures on education at the time of Confederation and through the remainder of the nineteenth century faces major data problems. However, a general impression can be gained from partial data covering a major sector of government expenditures on education. Statistics are available of receipts of publicly controlled elementary and secondary schools going back to 1870 and continuing to the present.

For the period 1926 to date, comprehensive estimates of total expenditures on formal education prepared by the Dominion Bureau of Statistics are available. During this period, expenditures by publicly controlled schools have comprised between 60 per cent and 70 per cent of total education expenditures for most years.

Allowing for non-coverage, as a first approximation it appears that Canadians spent about \$1 *per capita* (plus or minus) on education in 1867 and they devoted less than 1 per cent of their gross national product to that purpose.

Piecing together the incomplete data available for the first six decades with the more complete estimates obtainable from official sources in the last four decades, the following tentative conclusions can be offered about the relationship between education and economic growth in Canada between 1867 and 1967:

During the preconditions for take-off stage, 1867–1896, Canada's population grew at an annual average rate of 1.4 per cent and gross national product in real terms by 3.3 per cent. During this period *per capita* expenditures on formal education rose from \$1 to \$2.50. The ratio of educational expenditures to gross national product rose from less than 1 per cent in 1867 to about $1\frac{1}{4}$ per cent in 1896.

In the take-off stage, 1896–1914, population grew more rapidly and so did the gross national product in constant dollars, 2.4 per cent and 3.7 per cent respectively. Still, the proportion of the nation's output devoted to education rose only slowly, reaching about 2 per cent in 1914, with *per capita* educational spending of about \$7.

Prices had changed comparatively little between 1867 and 1896, but they rose significantly over the next stage, by about one-half between 1896 and 1914. Thus in terms of 1914 purchasing power the \$2.50 spent in 1896 was equivalent to about \$3.75, indicating that the improvement in educational spending in real terms was considerably less than is indicated in current dollar terms.

In the next stage, the drive to maturity, 1914–1950, Canada's population rose at an annual average rate of 1.5 per cent and gross national product in constant dollars by 3 per cent. During this period, education responded to technological changes and scientific requirements of a new age and expenditures increased fairly rapidly. Still in terms of the ratio of expenditures on formal

education to gross national product, there was remarkably little change over the long term though there were significant differences in the ratios at various points in the intervening period, largely affected by cyclical factors and the exigencies of World War II.

From about 2 per cent of gross national product devoted to education in 1914, the ratio rose to 2.7 per cent in 1926. By 1950, 24 years later, when Canada had reached the stage of industrial maturity, the ratio was almost unchanged, 2.6 per cent.

In the intervening period, the ratio varied little in the 1920's, but it moved to 4.2 per cent in 1933, the bottom of the great depression, as expenditures in education could not be cut back in line with the sharp decline of gross national product. As the economy expanded again in the latter part of the 1930's, the ratio returned to 2.7 per cent at the time World War II broke out. During the peak year of the war effort, the ratio reached its lowest point in the stage of drive to maturity, 1.5 per cent in 1944. After the war the ratio moved up gradually, to 2.6 per cent by 1950, still a shade below the 1926 ratio.

Per capita expenditures on education had increased from \$7 in 1914 to \$15 in 1926. Prices rose by about 55 per cent during this period. Thus in terms of 1926 purchasing power (based on the implied price index in gross national expenditure) *per capita* expenditures on education in 1914 were the equivalent of close to \$11, again suggesting a more moderate improvement in real terms than is indicated in current dollar estimates.

Over the next two decades, educational expenditures per capita moved in the \$14 to \$16 range. Since prices rose by about 12 per cent between 1926 and 1945, this meant that in real terms, Canadians were actually spending less on education when World War II ended than they had spent on a *per capita* basis during the middle of the 1920's.

The most rapid growth of the Canadian economy and the educational explosion commenced with the period of technological maturity in the middle of the twentieth century. Between 1950 and 1967, population grew at an annual rate of 2.4 per cent, and gross national product in real terms by 4.5 per cent. The ratio of expenditures on formal education rose from 2.6 per cent in 1950 to 5 per cent by 1961, to 6.8 per cent in 1966, and to 7.3 per cent in 1967.

Per capita expenditures rose from \$34 in 1950 to \$222 in 1967. Even allowing for the substantial increases in the general price level that took place during that period, about 63 per cent, the rate of growth in educational expenditures *per capita* is substantial indeed, involving an expansion of four times the former level in constant dollar terms.

The great difference in what a nation can afford on education, higher learning, research and training, once it reaches the stage of industrial maturity, compared with the preceding stage, is illustrated below.

The annual rates of economic growth reflected in total gross national product in real terms moves up only 1 percentage point, from $3\frac{1}{2}$ per cent during 1926-1950 to $4\frac{1}{2}$ per cent during 1950-1967. But total expenditures on formal education in constant dollars rises from an annual average rate of increase of 3.2 per cent to 11.1 per cent, a more than threefold improvement in terms of the rate of growth between the two periods.

ANNUAL AVERAGE PERCENTAGE RATE OF INCREASE^a

	Gross national product	Total Educational Expenditure
1926-1950	3.5	3.2
1950-1967	4.5	11.1

^aCompound rates in constant (1957) dollars.

One of the main reasons for the significant rate of growth in total educational expenditures was the need to expand rapidly the capital facilities which proved to be increasingly inadequate to cope with the growing volume of educational services required. Rates of growth were even more pronounced in building up university facilities than expanding primary and secondary schools, as indicated below.

TOTAL CAPITAL EXPENDITURES, ANNUAL AVERAGE PERCENTAGE RATE OF INCREASE^a

	Schools	Universities	Schools and Universities
1926-1950	3.8	2.8	3.6
1950-1967	9.0	16.5	10.7

^aCompound rates in constant (1957) dollars.

Educational capital expenditures as a proportion of total social capital formation declined from 7.7 per cent in 1926 to 6.8 per cent in 1950, but then rose rapidly in the ensuing period to 17.7 per cent in 1967. In terms of the ratio to business gross capital formation, educational capital expenditures over the same period rose from 2.6 per cent to 8.3 per cent.

This assessment of more recent rates of growth can be put in perspective of developments over the last century by comparing annual rates of growth in gross national product with revenues received by publicly supported elementary and secondary schools, with both series presented in deflated form, covering four of Rostow's stages.

ANNUAL AVERAGE RATE OF INCREASE^a

	Gross National Product	School Revenues ^b
1867-1896	2.3	3.5
1896-1914	3.7	3.7
1914-1950	3.0	1.9
1950-1967	4.5	7.5
1867-1967	3.5	3.6

^aCompound rates in constant (1957) dollars.

^bCovers publicly supported elementary and secondary schools.

The data suggest that during the stage of preconditions for take-off education expenditures rose more rapidly than total economic activity, 3.5 per cent compared with 2.3 per cent. In the following stage, the take-off, educational expenditures rose at about the same rate as the economy as a whole, 3.7 per cent. But the situation changed dramatically in the next two stages.

In the period of the drive to maturity, the economy expanded fairly rapidly at an annual growth rate of 3 per cent but education lagged behind, 1.9 per cent. In the following stage of technological maturity and high mass-consumption the situation was reversed. While the economy commenced expansion along a rapid growth path, educational expenditures rose considerably more quickly, 4.5 per cent, compared with 7.5 per cent.

Over the century as a whole encompassing four of Rostow's stages, the economy and education grew at about the same annual rate, with education only fractionally ahead, 3.5 per cent compared with 3.6 per cent. The following tentative conclusion is advanced on the basis of evidence available in Canada relating education to economic development over the last century.

During the first half of the century covering the period of the preconditions of take-off and the take-off stage, Canada devoted between 1 and 2 per cent of her gross national product to education. In the next approximately $3\frac{1}{2}$ decades, the drive to maturity stage, the proportion of the nation's resources devoted to education continued to rise slowly, to a little over $2\frac{1}{2}$ per cent by 1950. Only when Canada reached technological maturity and a period of high mass consumption was she able to respond in a substantial way to the need of devoting increasing resources to education (including higher learning, technical training and research), with the ratio rising to about $7\frac{1}{4}$ per cent by 1967.

Does this mean that Canada could not afford to devote during the first eight decades of her economic development as a nation more than between 1 per cent and about $2\frac{1}{2}$ per cent of her gross national product to education?

Or does it mean that education in the political and social environment of that period was accorded a lower priority than some other requirements which were considered relatively more urgent, as for example the building up of a social and production infra-structure including transportation and communication services across the continent in the latter part of the 19th century, and large urban and public service facilities, together with industrial, commercial and financial institutions, in the first half of the 20th century?

Or was it a question of not recognizing earlier in Canada's history the importance of the economic consequences of education which may bring results in many instances only after a considerable time interval?

Or was it a question of waiting until the pressures of demand for better trained men and women to meet the needs of technological and scientific progress became so urgent that the nation had no alternative but to embark on a very large and broadly based educational expansion programme?

Or was it that emulation of American progress made in education and the results it was bringing in terms of greater productivity increases, leading to a "brain-drain" of professionally and technically trained personnel, that added new urgency to Canada making up for lost time in improving educational opportunities at home as well as economic rewards for the educated?

Or was it a widening in international orientation of the Canadian economy, accompanied by the growing recognition that expanding trade and other economic relations with the rest of the world involved increasing competition among the nations and that in order to keep in the forefront of advancing countries, Canada had to have an adequate supply of well-trained managers, scientists, technicians and other skilled personnel?

Probably, all these factors had something to do with the slow secular growth rates of educational expenditures as compared with rates of expansion of gross national product in real terms for the first eighty years of Canada's economic history as a nation, though the differentials in rates of growth were quite substantial for particular sub-periods, as explained earlier. Similarly, these factors are likely to have contributed to the significant speed-up in expanding educational facilities and the stock of educational capital by devoting a considerably greater proportion of the nation's resources to education in the more recent period.

Tentatively then, the suggestion can be put forward on the basis of Canadian experience that until a nation has become fully industrialized, it may not be able to accord or it may not wish to accord the high priority required to devote a large enough proportion of its limited resources to human improvements which may bring results in economic terms several decades hence. The pay-off for human investment involves a much longer period than the pay-off for physical investment whether in business or social capital, and this may be a factor in guiding priority allotments of the nation's resources.

The latter inference may be drawn from the Canadian experience over the first eight decades of her economic development as a nation. But public thinking and business and government orientation have been changing in the last two decades. The emphasis has shifted to longer term considerations and planning, and this change in orientation appears to have favoured growing emphasis on investment in human capital.

This is not to suggest that the Canadian experience is necessarily a guide to developments in other countries, for there are many cultural, traditional, political and other non-economic factors that have greatly influenced rates of growth in educational efforts and of national output in Canada.

Each country's environment and institutional factors and sources of growth will vary. Hence, without claiming that the Canadian experience will be applicable to other developing nations, all that can be said is that rates of general economic growth and increases in productivity appear to set certain limitations on the ability of a country to speed up the process of improving human resources through education. While progress can be telescoped as a result of a high priority attached to education and with help from abroad, the fact remains that the pay-off period of newly acquired learning and training is lengthy and it takes time to transform an economy from a traditional society to a highly industrialized nation that can absorb the products of education and reward them at satisfactory rates of pay.

The Canadian experience suggests that educational progress and economic growth go hand-in-hand during the first four stages of economic development, and that the take-off in education comes in the stage of technological maturity and high mass-consumption, something like 50 years after the industrial take-off.

The challenge which less developed countries face during the second half of the 20th century is to decide whether and how they can reduce a fifty-year gap between what they want to do and what they can do in the field of education and economic progress. In their labours to reconcile aspirations and reality, the less developed countries deserve the full understanding and support of the well-to-do nations.

EDUCATIONAL ATTAINMENTS AND THE LABOUR FORCE

What have been the results of devoting an increasing proportion of the economic resources of the nation to education over the last one hundred years?

This question is dealt with selectively, as far as the impact of expanding the stock of educational capital on the labour force is concerned, in the following terms:

1. The greater number of young and not-so-young people going to school.
2. The greater attendance as a result of increasing school enrolment of the school-age population.
3. The greater attendance in terms of increases in the number of years of formal education.
4. The greater attendance in terms of number of days per school year.
5. The greater shift to higher learning and technical training.
6. The greater quality of teaching including changes in student-teacher ratios.

1. *Greater school enrolment in aggregate.* Over the last century the number of pupils enrolled in publicly controlled elementary and secondary schools rose from 726,000 to 5.1 million, and the number of pupils enrolled per thousand population from 210 to 250. The annual average rate of increase of the total number of pupils enrolled for the period 1867–1967 was 2 per cent.

The rates of growth were comparatively low in stage 2, 1867–1896, pre-conditions for take-off, 1.3 per cent, and stage 4, 1914–1950, drive to maturity, 1.2 per cent. They were somewhat higher in the period of mass-immigration, following the turn of the century, which coincides with stage 3, 1896–1914, take-off, 2.2 per cent, and they reached the highest level in stage 5, the age of high mass-consumption, 1950–1967 (and continuing), 4.6 per cent.

The data suggest a quickening of the pace of school attendance as the nation moved from the period of precondition for take-off to the stage of the actual take-off, as the need for more educated personnel achieved much greater urgency, and in fact became a prerequisite for technological advances and a broadening of the economic base of the country.

In the following stage the efforts of bringing more young people to school and providing them with greater educational opportunities slackened off. This was in part associated with the slower rate of population growth and changes in the age distribution pattern, and in part because of lesser priority attached to devoting resources to the build-up of educational capital.

During this period, drive to maturity, the emphasis was on industrial development and the expansion of international trade, with the provision of

social capital being considered of secondary importance. This, among other things, affected the development of educational capital and the provision of educational services. As a result the pace of educational progress slackened even though, as the estimates presented earlier suggest, the proportion of gross national product devoted to education rose moderately, from about 2 per cent in 1914 to approximately $2\frac{1}{2}$ per cent in 1950.

2. *Greater school enrolment and school age population.* The greater number of young people attending schools in Canada was not just due to demographic factors, in the sense of changing age distribution. To a more important extent it was the result of increasing school attendance within each age group of the potential school population.

The rate of increase in school attendance per age group varied considerably, from 88.9 per cent of school population age 10–14 in 1921 to 97.2 per cent in 1961, as compared with increases over the same period from 3.1 per cent to 11.6 per cent age 20–24.

Between 1921 and 1961, school enrolment in the age groups 5–9 and 10–14 rose at an annual average rate of about 2 per cent, as compared with rates of increases for the 15–19 age group of 4 per cent and the 20–24 age group of 4.6 per cent. The trend for more education for every age group is apparent, with the main impetus coming from the older age groups that were desirous of obtaining greater and more intensive education.

3. *Greater number of school years.*²¹ The data shown below of the mean years of schooling of the male labour force age 25–64 indicate that Canadians have increased educational capital invested in their work force by about two fifths over the last half century in terms of years of education.

Mean Years of Schooling

1911	6.60
1921	7.06
1931	7.43
1941	8.02
1951	8.62
1961	9.15

The trend of extending schooling is continuing. This is illustrated by the data shown below of the greater number of mean years of school attendance of younger age groups in the more recent period.

Mean Years of Schooling

25–34	9.68
35–44	9.22
45–54	8.57
55–64	7.57
25–64	9.15

²¹The data in this and the following two sections are taken from *The Contribution of Education to Economic Growth, op. cit.*

The educational attainments of the younger age groups are notably ahead of the older age groups, about 2.1 years between the 25-34 year-olds and the 55-64 year-olds.

Another way of illustrating the trends towards more education in Canada is to consider the proportion of those in the male labour force who have completed university education, by age groups.

	Percent of Total
25-34	6.0
35-44	6.3
45-54	5.0
55-64	4.2
25-64	5.6

The data indicate a difference of 1.8 percentage points between the 25-34 age group and the 55-64 group. This differential implies that there exists a desire about 43 per cent greater to obtain a full university education today, as compared with the situation thirty years ago.

4. *Greater number of school days.* Average daily school attendance amounted to 53 per cent in 1867. It rose to 93 per cent by 1967.

Over the century, progress varied, with rates of increases rising only slowly in stages 2 and 4, 1.7 per cent and 1.9 per cent respectively, increasing more rapidly in stage 3, 2.8 per cent and very rapidly in stage 5, about 5 per cent. The average annual rate of improvement over the century was 2.4 per cent. Thus the data on school attendance support the observation made earlier that educational progress in Canada during the last one hundred years was uneven, with the period of slow progress followed by one of more rapid progress, with the situation again changing, a reduction and then a speed-up in the rate in the subsequent two stages of economic development.

Available evidence suggests that the average school year in Canada during most of the twentieth century consisted of 200 school days. On that basis, average daily school attendance consisted of 136 days in 1914, 174 days in 1950, and 186 days in 1967.

At the time of Confederation average school attendance per pupil was less than 100 days. The data suggest that the average young person in Canada spent in 1967 about twice as many days in school as did his great-grandfather when he was a child a hundred years ago. Presumably, increasing school attendance has been a factor in improving the output of the school system, thus adding to educational capital.

Gordon W. Bertram estimates that between 1911 and 1961 the average number of days of school attendance per year of school completed by the male labour force increased by about 50 per cent. He observes:

“Particularly important in explaining this considerable rise in the actual time spent in school was the continuing shift in the population from rural to urban areas. This movement, clearly discernible in Canada from the 1870’s onward, represented the process of urbanization as commercial and industrial

localization and specialization developed in the economy. In a predominantly rural society, the real cost of sending children continuously to school for the entire term consisted of the work which they could otherwise do on the farm. The shift to urban communities, however, did not end the competing opportunity of employment, for in the cities, industrial employment was still a possible alternative to attending high school in the early part of this century. Provincial legislation restricting the employment of children and establishing compulsory school attendance laws was a significant source of increases in the average days of school attended.”

5. *Greater emphasis on higher learning.* Reference has already been made to the fact that as the number of school years increased, the emphasis shifted from primary and secondary to post-secondary education. This more advanced type of education took various forms, including attendance at universities and colleges, teacher and nursing training, attendance at technical and vocational schools, and the taking of courses at business colleges. Between 1911 and 1961, the total number of the male labour force age 25–64 increased at an annual average rate of 1.8 per cent. The rate of increase of those that had completed 8 years of elementary schooling or less, was less, 0.8 per cent, while the rate of increase of those with secondary schooling, 1–4 years, was greater, 3 per cent. Those with some university training show the greatest rate of increase, 5.7 per cent, followed by those who completed their university education, 3.5 per cent.

Demographic factors have so far delayed the full impact on Canadian institutions of higher learning of the large numbers seeking university entrance. School enrolment in public and secondary schools more than doubled between 1950 and 1967, as compared with an increase of approximately one-half for university enrolment. But with the much larger number of young persons reaching university age and with the much greater facilities becoming available including many new universities, junior colleges, and technical and vocational institutions established in Canada during the last decade, the shift towards greater emphasis on increasing further the stock of educational capital in Canada’s labour force is well underway.

The point deserves emphasis that this is a recent trend, in part encouraged by the incentives for greater economic rewards offered to those obtaining higher education and training, and in part facilitated by the expanding capacity of society to provide young people with opportunities for obtaining a more extensive education, including the ability of the economy to carry these young people for a longer period before they reach the productive stage.

6. *Greater quality of teaching.* The quality of teaching, as far as its economic impact is concerned, is not easily measured. Usually it is associated with better-trained teachers who are presumably better paid, greater teaching facilities and aids, and improved curricula and student participation.

One limited way of looking at possible improvements in the quality of teaching over the longer term is to consider the ratio of pupils to teachers on the assumption that the smaller classes make it possible for teachers to do a better job by giving pupils more individual attention. This may not be the case

in a number of instances because of the many other variables affecting teaching quality. But to the extent that smaller classes per teacher do affect quality, the following trends may be noted.

The number of teachers in publicly supported primary and secondary schools in Canada rose from about 12,000 in 1867 to 215,000 in 1967. The average class dropped in size from 60 in 1867 to 40 in 1896, to 34 in 1914, to 27 in 1950, and to about 24 in 1967.

The improvements were more notable in stages 2 and 3 with an annual average rate of decrease in the number of pupils per teacher of 1.4 per cent and 1 per cent respectively. The improvement slowed down in stages 4 and 5 to about 0.6 per cent and 0.8 per cent respectively on an annual average basis.

This pattern of change differs from that suggested by data on total number of pupils enrolled and increases in the rate of average daily attendance which indicated somewhat greater progress being made in stages 3 and 5 as compared with stage 2.

One possible explanation would be the process of urbanization in the eastern parts of Canada contrasted with the thinly spread out settlements in western Canada in the latter part of the nineteenth century and in the early part of the twentieth century requiring an increasing number of teachers to serve a large number of small communities in the one-room log school.

By relating data on the number of teachers to the total number of persons employed, a measure becomes available of the resources devoted by the nation to education. In 1867, teachers comprised 1.14 per cent of the total number of persons working, rising to 1.54 per cent in 1896, to 1.60 per cent in 1914, to 1.75 per cent in 1950 and to 2.88 per cent in 1967. The dramatic improvement in the ratio in the stage of high mass-consumption, 1950–1967, is quite apparent.

The improvement of 1.3 percentage points in the latter period comprising 17 years exceeds by a considerable margin the rate of improvement in the preceding stage, 0.15 percentage points over 34 years. During these two periods the number of pupils per teacher in publicly controlled primary and secondary schools, an annual average rate of 0.6 per cent and 0.8 per cent respectively, were lower than in the preceding stages.

It appears that it was not just the pressure to reduce size of classes that contributed to increasing the number of teachers—though such demands were a factor—but rather it was the necessity of increasing the supply of teachers in line with the growing numbers of young people seeking greater educational opportunities, requiring specialized attention and appropriately qualified teachers, and also in line with changing location factors, particularly the result of the rapid rate of urbanization.

The data presented above are indicative of the notable progress made in upgrading the educational stock of the Canadian people, and particularly of its labour force. But this progress has been uneven, at times taking place only after intervals of slow-down, and accompanied by considerable lags between the time new educational developments took place and the time their economic impact became felt. The Economic Council of Canada explained the reasons for the uneven rates of progress of building up educational capital in Canada in these terms:

Such factors include the “changing age distribution patterns in the total population resulting in temporary bulges or dips in the numbers of new entrants to the labour force; stepped-up or lagging efforts to promote higher educational attainments; changes in legal school-leaving ages, legislation limiting the employment of children and other such institutional factors; marked changes in the availability of new job opportunities; the movement of population from rural to urban areas (children of urban families generally spend more years in school than children of farm families); and a host of additional influences.”

Concluded the Council: “The dominating fact about changes in the education stock is that an extremely powerful combination of factors is probably required to bring about any substantial short-term or medium term change in this stock. At the same time, basic factors may have prolonged and cumulative effects stretching over many decades. For example, . . . the higher school retention rates and the increased enrolment ratios in the 1950’s did not have much effect in that decade but will tend to have longer term effects on the rising stock of education in the 1960’s and 1970’s and beyond.”²²

Having established that significant progress has been made in raising the stock of educational capital in Canada in quantitative and qualitative terms and in instilling a new orientation that stems from increasing knowledge into the labour force, the question arises: What are some of the economic consequences of this growing investment in Canada’s human resources? Three particular aspects are examined in the sections that follow: the effect on individual income, the return on educational investment, and the social impact in terms of economic growth and rising levels of national income.

EFFECTS ON PAST EARNINGS

Education is one of the main factors affecting the level of annual earnings. There are many other factors as well and they may be grouped into five categories:

1. *Economic factors—short run.* These include the state of the economy, levels of employment, full-time and part-time, and unemployment, wage and salary rates, illness and other reasons for non-working besides unemployment, number of hours worked per week, the degree of overtime pay or underemployment, seasonal factors, etc.

2. *Economic factors—long run.* These include sex of persons employed, their age, occupation, education, training, experience and place of residence (higher wages being paid in cities and lower wages in rural areas), changes in structure of industry, differentials in productivity, etc.

3. *Human factors.* These include native ability, intelligence, health, the will to work, emulation, ability to grasp opportunities, etc.

4. *Institutional and social factors.* These include the effectiveness of unions in management-labour negotiations, minimum wage laws, employment practices

²²*Towards Sustained and Balanced Economic Growth, op. cit., pp. 77 and 78.*

based on different attitudes towards sex and age, community, cultural and family influences, etc.

5. *Statistical factors.* These include the difficulties of measuring net income for self-employed personnel, separating income earned from work from other sources of income, particularly distinguishing returns for labour from returns for capital, say in the case of a working proprietor, etc.

How important are differentials in educational attainment in influencing earnings? Available data support the following conclusions:

First, the higher the educational attainment, the higher the income. The average income of males with university degrees in Canada in 1961 was \$8,866 or 165 per cent higher than the average income of persons having completed elementary school (eight years) and 84 per cent higher than that of persons having completed an additional four to five years of secondary schooling.

Second, irrespective of educational levels reached, experience and training add to income over time until the age level of 45–54 years is reached. After that, during the last decade of active life, the average level of income declines, in part as a result of a drop in labour productivity in some occupations and greater difficulties of older workers finding and obtaining employment, and in part as a result of the hazards of living, e.g., the incidence of ill-health, etc. The relative decline is greatest for the least educated and smallest for the highest educated.

Third, annual earnings of females are about one-half of those of males, with the greater incidence of part-time employment a major factor, besides the practice of unequal pay for equal work in many occupations. The differentials in earnings depending on education are quite similar for both females and males, 165 per cent between those completing elementary school and those with a university degree, and 68 per cent between those completing secondary school and those with a university degree. But in one respect female income earners do not follow the pattern of males. For females who have completed secondary schooling or obtained a university degree, incomes rise in the age category 55–64, rather than fall as is the case for males.

The question arises, what proportion of the higher incomes that Canadians enjoy has been due to greater educational attainments? A study prepared by Gordon W. Bertram throws some light on this question, using techniques similar to those developed by Edward F. Denison.²³

Bertram's estimates provide an indication of what the real income of male income earners would have been in 1961 if the quality of those working had not changed since 1911, as far as their educational attainments are concerned. The meaningfulness of the estimates depends to an important extent on the validity of the assumptions underlying them. The Economic Council of Canada, which used these estimates in its Second Annual Review, suggested that they should be regarded as "minimum" estimates. It reasoned:

²³*The Sources of Economic Growth in the United States and the Alternatives Before Us*, by Edward F. Denison, Supplementary Paper No. 13, Committee for Economic Development, New York, January 1962.

“It (the estimate) takes no account, for example, of the increased education and training outside the elementary and secondary schools and universities, or of the increased quality of education over time. Nor does it, of course, reflect the indirect impact of higher education on such factors as the development of improved research and technology, better organization for production, and the general advance of knowledge.”²⁴

Bearing these qualifications in mind, the Bertram estimates are as follows:²⁵

Rise in Mean Income Per Man Due to Increases
in Years of Schooling, 1911–1961

1911	100.0
1921	102.2
1931	103.8
1941	106.5
1951	109.5
1961	112.0

According to these estimates, the average income per man in the male labour force, 25–64 years of age, rose by about 12 per cent due to improved education over the last fifty years. The index of improvement in real earnings due to education for the period 1911–1951 (which approximates Rostow’s stage of the drive to maturity, 1914–1950) shows an increase of 9.5 percentage points while the rise in the decade 1951–1961 which forms part of Rostow’s stage of high mass consumption, is 2.5 percentage points. In other words, the improvement in real earnings due to education during the last decade has not been very different from the average for the previous four decades.

How can this finding be reconciled with the observation made earlier that during the period of industrial maturity Canada stepped up considerably the ratio of resources devoted to education, from 2.6 per cent of the gross national product in 1950 to 5 per cent in 1961 (and to an even greater extent in the period following 1961)?

One possible explanation has been mentioned earlier: It may take a considerable period of time until the results of investment in human resources are reflected in higher productivity and hence in higher national income. The implication is that the large amounts that Canadians have been spending on education in the last decade or two may not show up in tangible form to any significant extent for another decade or two.

EFFECTS ON ANTICIPATED EARNINGS

So far, the discussion has been concerned with the effects of education on past earnings. What about the effects of education on future earnings?

²⁴*Towards Sustained and Balanced Economic Growth, op. cit.*, p. 92.

²⁵*The Contribution of Education to Economic Growth*, by Gordon W. Bertram, prepared for the Economic Council of Canada, Queen’s Printer, Ottawa, 1966, p. 51.

A study prepared by Miss J. R. Podoluk of the Dominion Bureau of Statistics throws some light on this question by presenting estimates of future life-time earnings of male members of the non-farm labour force by degree of schooling.²⁶

The estimates of life-time earnings are based on the 1961 census with certain modifications. The data suggest that average life-time earnings rise with each occupational category as educational attainments increase. Labourers with elementary schooling of eight years or less have the lowest earning prospects, \$114,000 over their life of gainful employment while the managerial occupations with university degrees have the highest average expectation, \$423,000. The expectations of the latter group are greater than those of the professional occupations with university degrees whose average life-time earnings are placed at \$354,000.

There are great differences within each occupational category, even with similar educational attainments. For example, the professional category lists physicians and surgeons as potentially the highest income earners in that group, \$584,000, and members of the clergy with the lowest income, \$133,000. Professional engineers and university professors occupy a middle position with estimated career earnings of \$337,000 and \$358,000 respectively.

The difference in life-time earnings between the average for all occupations with eight years of elementary schooling or less, \$131,000, and the average with a university degree, \$354,000, is 170 per cent. At the rate of 5 per cent discount, life-time earnings of persons having completed between 5 and 8 years of elementary schooling in the 15-64 age group are estimated at \$48,000 and this compares with \$92,000 for those with university degrees, a difference of about 92 per cent.

Whatever method of comparison is used, persons with greater education can expect considerably higher career earnings than persons with less education. The difference varies, depending on the method of measurement, with university educated males probably earning between double and two and a half times as much as their less successful compatriots who have completed only elementary schooling.

The author of the estimates offers these qualifications: "The criticism of this method of relating earnings and education is that it ignores the costs involved in obtaining the education and that it does not take into account the fact that age-earnings profiles differ for different groups. As a result, such unadjusted lifetime earnings show much greater differences between the earnings accruing to persons with higher levels of education and to those with lower levels of education than alternative methods of estimations."

The Economic Council of Canada in using these estimates has made the further comment that there appear to be some offsetting factors relating to the differences in income of those with lower levels of education compared to those of higher levels: "At least under post-war conditions of general scarcity of many of the more highly educated occupational groups, the average incomes for individuals in these groups have been rising more rapidly than the average

²⁶*Earnings and Education*, by J. R. Podoluk, Dominion Bureau of Statistics, Ottawa, December 1965, pp. 54-60.

of all incomes, and much more rapidly than the average incomes of the groups of individuals with generally lower educational attainments.”²⁷

RETURN ON EDUCATIONAL INVESTMENT

Does it “pay” to get a higher education? The data presented in the preceding two sections indicate that the answer is: “Yes”. The higher real earnings of individuals are reflected in higher national income. And rising aggregate income contributes to increases in the rate of economic growth.

But the assessment so far is incomplete because no account has been taken of the costs incurred in acquiring the added education. For, if the costs involved were to exceed the ultimate benefits, no net gain would have resulted if the measurement is limited to economic considerations only. Or if the return from such additional investment in education were to be less than the return obtainable from alternative investment possibilities, say investment in physical capital, then a case could be made purely on the ground of maximizing returns on resources used for devoting limited factors of production to more profitable investment rather than to less profitable investment.

This is a purely hypothetical question. In real life, quite apart from the greater profitability of investment in human resource development than investment of other types indicated below, large and increasing expenditures on education would likely continue to be made whatever the results of statistical or economic analysis because of over-riding social and human considerations and because of strong public pressures, a real factor in the democratic decision-making process.

Miss Podoluk has extended her estimates of life-time earnings to include also rates of return on investment in education. These are defined as the benefits derived from additional income flows which accrue from obtaining more education. The technique used was to estimate average earnings “for each group and education group . . . on the assumption of a cohort of persons starting a career at some specific age. The anticipated average earnings estimated are the average earnings per initial entrant . . . For some particular level of schooling, for example, completion of a university degree, the returns to extra education would be the difference between the average earnings per person with a university degree minus the average earnings per person with a high school diploma in each age group.”²⁸

The resulting estimates represent rates of return for private investment and they are shown in two different forms. One method “is to treat the costs of schooling as negative income during the years of school attendance.” The other method follows the techniques developed by W. Lee Hansen of treating costs as investment instead of negative income.²⁹ The estimates show that returns based on earnings before taxes are higher on investment in university education

²⁷*Towards Sustained and Balanced Economic Growth, op. cit.*, p. 87.

²⁸*Earnings and Education, op. cit.*, p. 60.

²⁹“Total and Private Rates of Returns to Investment in Schooling”, by W. Lee Hansen, *Journal of Political Economy*, Vol. LXXI, April 1963.

than for investment in high school education, 20 per cent as compared with 16 per cent.

Relating the additional earnings per year at each age resulting from further schooling, assuming a working life between 23 and 64 years, to private costs of elementary school graduates from completing elementary school to completing university, indicates a return on investment of 17 per cent.

These estimates are based on the assumption that all education costs are investment. If a part of these costs were considered consumption, the rates of return would be higher. The Economic Council of Canada, in using these estimates, made the point that they support the claim that investment in human capital may bring significantly higher returns than most investments in physical capital. To quote:

“These rates of return . . . are rates of return to individuals. The calculations have not taken public costs of education into account—either capital or operating costs. These costs, however, are probably small in relation to the private costs to individuals, including foregone income. This would imply that even the over-all rates of return to the economy for total investment in education would be relatively high—perhaps in the range of 10 to 15 per cent. Indeed, such rates would appear to compare favourably with the rates of return (even on a pre-tax basis) which typically accrue to total capital investment in physical and financial assets.³⁰

The estimates are subject to certain limitations. For one, they relate to the situation in 1961. Since then substantial increases have occurred in earning potential associated with rising educational attainments. Further, the estimates are based on gross earnings and thus they do not take account of differentials in higher marginal tax rates. From a social point of view, they do not reflect the impact of education on advancing knowledge, technology, management techniques, and a better understanding of the working of the economic system which in turn may affect rates of economic growth.

The validity of the estimates is sometimes questioned on the ground that “the inaccuracies and imperfections inherent in a price system render such calculations of little value for the whole economy though they may, of course, be of interest for any one individual.”³¹

Other comments relate to the fact that the rates of return are private rather than social rates. In the case of education, the latter rates may be higher than the former rates. Thus any decisions that are made on the basis of individual rates could result in an under-investment on the basis of social returns.³²

The preceding economic analysis has been based on quantifying returns on educational investment on an aggregate basis, that is by treating educational expenditures as a homogenous entity, which, of course, they are not. Just as there are different returns on investment in different types of physical capital, so presumably returns differ on investment in educational capital.

³⁰*Towards Sustained and Balanced Economic Growth, op. cit.*, p. 91.

³¹*Investment in Education, op. cit.*, p. 384.

³²This subject is examined in “Relationships of Education to Economic and Social Goals,” by C. H. Williams, *Working Papers, Interprovincial Conference on Education and the Development of Human Resources*, Montreal, September 8–10, 1966, issued by the Ontario Department of Education, Toronto, 1966, pp. 16 ff.

NET GAINS OF EDUCATIONAL CAPITAL FROM IMMIGRATION AND EMIGRATION

So far the discussion has been in economic terms of what education may do for individuals and for society as a whole without regard to where the education takes place. There is now need to take account of the fact that knowledge knows no boundaries and that man can learn not only from his compatriots but can also obtain at times even greater knowledge from abroad. This sharing of the progress of knowledge on an international plane takes many forms, from students studying abroad to importing educators, from obtaining the results of foreign research to immigration of professionals and skilled technicians.

Two aspects are considered in this paper. The first is the flow of educational attainments from abroad and the economic benefits obtained by Canada from the costs of educational investment incurred by foreign countries, as well as Canada's contribution to other nations in what has become known as the "brain-drain." The second is the effect of U.S. educational attainments on Canadian development.

Over the last one hundred years, 8.6 million immigrants came to Canada's shores and 6.9 million emigrants left this country. Thus Canada obtained a net flow of 1.7 million immigrants during this period.

During the nineteenth century, while Canada struggled to build up a viable nation, this country lost close to 700,000 people (net). But in the twentieth century, Canada more than made up for this outward flow, with net immigration totalling 2.4 million, with the inward movement largely concentrated in the first and in the last decade.

How have these flows of immigrants and emigrants affected the stock of education in Canada? This was one of the subjects of enquiry by the Economic Council of Canada which found that while immigration added significantly to increasing the stock of knowledge it did not produce "any major or decisive shifts in the stock of education in Canada over the past half century."³³

One of the main reasons has been that the educational level of the immigrating labour force has not been substantially different from the average level of the Canadian labour force. This can be illustrated by data available for the decade 1951-1961 when net immigration to Canada was particularly heavy. During this period, the median years of schooling of both male immigrants coming into the labour force and male emigrants leaving the labour force was about 9.6 years. This compares with the median years of schooling of the total Canadian force of 8.8 years in 1961 and 9.4 years in 1961.

In terms of immigrants with university degrees, Canada turned out to be a net gainer. In 1961, about 5.6 per cent of the Canadian male labour force had university degrees. Of male immigrants entering the Canadian labour force during 1951-1961, some 6.3 per cent had a university degree, while male emigrants with university degrees comprised a lesser proportion, 5.8 per cent. In terms of total numbers, the former were four times as numerous as the latter.

Accepting the premise that there exists a correlation between improvement in education and improvement in productivity, the data, even in this brief exposition, are suggestive of four general conclusions:

³³*Towards Sustained and Balanced Economic Growth, op. cit.*, pp. 78-79.

1. That in the period of industrial maturity, Canada's capacity to offer challenging and rewarding opportunities expanded greatly, notably for people with higher educational attainments and skills, leading to the greatest net inflow in the country's history.

2. That as Canada prospered and offered greater opportunities for economic advancement at home, the outflow of skilled persons, the "brain-drain," lost some of its momentum and thus Canada's growing stock of educational capital was less adversely affected.

3. That the loss in educational capital that did occur particularly through the emigration of professional and technical personnel to the United States, was more than made up by a gain of educational capital through an inflow of well-trained professional and technical personnel, fourfold the size of the outflow, with educational attainments which on an average were slightly higher than that of the outflow.

4. That the net gain in educational capital accruing to Canada took the form not only of an increase in quantity but also of increases in quality. The latter is reflected in the somewhat increased educational attainments of the Canadian labour force as a whole as a result of higher standards of education and greater training abroad by immigrants joining the labour force.

How can these net additions to Canada's stock of educational capital be measured? Bruce W. Wilkinson has prepared estimates for the decade 1951-1961 of the years of educational attainment and the costs involved covering both immigrants and emigrants separately for members of the labour force and the non-labour force.³⁴

These estimates are subject to a number of limitations. One of these is the lack of adequate statistics of emigration. The author has presented estimates of emigration of Canadian-born persons to the United States only, and these represent the bulk of Canadian emigrants. Two emigration estimates are presented. The high estimate is based on the gross number of Canadian-born immigrants to the United States as reported by the U.S. Immigration and Naturalization Service for the period July 1, 1951 to June 30, 1961, less the number of Canadians recorded as having returned to Canada during this period. The low emigration estimate is based on the decline of Canadian-born residents in the United States between 1950 and 1960, as recorded in the population censuses, adjusted for deaths of Canadian-born residents based on mortality tables.

During 1951-1961, Canada added to the stock of educational capital of her labour force the results of 6.3 million years of learning. This country contributed to the United States between $\frac{3}{4}$ million and 1.3 million years of education. Thus Canada's net gain exceeded 5 million years of education.

If other members of households are added, including wives and children, Canada's total gross gain was 10.1 million years of education, her loss was between 1.3 million and 2.2 million, and her net gain was approximately 8 million years of education (or better, even after allowing for non-coverage of emigrants going to countries other than the United States).

³⁴*Studies in the Economics of Education*, by Bruce W. Wilkinson, Occasional Paper, Economics and Research Branch, No. 4, Department of Labour, Queen's Printer, Ottawa 1965, pp. 56 ff.

It cost the countries which educated the people leaving subsequently for Canada some \$5.9 billion during 1951–1961. Over the same period, Canadians spent on the education of emigrants and their families going to the United States between \$1 billion and \$1.7 billion. Hence, Canada's net gain exceeded \$4 billion during the decade.

Taking one-tenth of the \$5.9 billion of costs of education of immigrants for the decade as representing the average for 1960, the resulting \$590 million is equivalent to 1.6 per cent of the gross national product and 36 per cent of total expenditures on formal education spent in that year.

Taking the average in the net value of education for the decade, that is allowing for a half-way estimate of the educational costs of emigrants between the low and high estimates, yields a total of \$4,544 million. This amount is "nearly 52 per cent of the monetary capital inflow to Canada during this ten-year period. One-tenth of this average net value (544 millions), is 102 per cent of new issues of Canadian securities during 1960, and 70 per cent of total foreign, direct investment in Canada for the same year."³⁵

Seen in perspective, Canada has gained greatly by drawing on educational capital generated abroad and this gain has been particularly marked in the period after Canada reached industrial maturity. This suggests that there is no time limit as to the stages of economic development during which a nation may benefit from drawing on education from abroad, and that the benefits from international sharing of knowledge are continuing and universal.

EFFECTS OF U.S. EDUCATIONAL ATTAINMENTS ON CANADA

The United States reached the stage of technological maturity and high mass consumption at the turn of this century. And this led to a much earlier take-off in educational progress in that country, preceding Canada by about half a century.

Considering that the United States has a population about ten times and a gross national product about fourteen times Canada's, and that the two countries enjoy close trade and other economic relations, it is quite understandable that the much earlier and more rapid advances made in educational attainments in the United States could significantly affect Canadian economic and educational development. This in fact is what has happened. While evolving in many respects an indigenous educational system, the shape of progress in Canada was greatly influenced by forces of emulation, a free flow of students and professors, access to and participation in research and many other related factors.

During most of the twentieth century, gross national product *per capita* in Canada has been running about one-quarter below that of the United States. In terms of output per person, the differential is somewhat less, below one-fifth in the more recent period. Among the reasons are differences in the labour force participation rate between the two countries, differences in age distribution of the population and a lesser ratio of women working.

³⁵*Ibid.*, p. 73.

Of the many factors that can be cited to explain differentials in productivity rates between the two countries, the factor of particular concern in this paper is the difference in the quality of the labour force to the extent that this is a result of variations in educational input. Research work initiated by the Economic Council of Canada led it to the following conclusion:

“The relatively much higher level of education attainment in the United States than in the Canadian labour force . . . has been calculated in very rough terms to account for well over a third of the productivity difference between the two countries. Two elements are involved in the income difference associated with differences in education—the relatively much larger share of the labour force in the United States which has completed high school or acquired a university degree, and the significantly higher average incomes accruing to those with higher education.”³⁶

These two key variables can be quantified as follows:³⁷

1. During the period 1910 to 1960, years of education per person in the male labour force in the United States rose at an average rate per decade of between 9 per cent and 10 per cent, as compared with a range between 5 and 8 per cent for the Canadian male labour force.

2. By 1961–1962, median years of schooling of the male labour force in the United States were between one-fifth and one-quarter higher than in Canada, covering the age group 25–54, with the proportion somewhat smaller for the age group 55–64.

3. In 1960–1961, about 11 per cent of the U.S. male labour force had university degrees, as compared with about $5\frac{1}{2}$ per cent for Canada.

4. In 1960–1961, the gap between the two countries was widening further, with 45 per cent of the age group 25–34 having a secondary school education or better in the United States, as compared with 24 per cent for Canada.

5. Over the last half century, the total stock of education in the male labour force in the United States rose by better than one-third more than that of the Canadian labour force, taking account of changes in years of schooling and average daily attendance.

6. Accompanying the more rapid build-up of the stock of educational capital in the United States, increases in incomes attributable to education were more marked in that country than in Canada. “Over the period 1911–1961, income per man, considering only years of schooling, increased almost twice as much as in the United States (21.2 per cent) as in Canada (12 per cent). The percentage change in average years of schooling in the same period was 58.5 per cent in the United States and 38.6 per cent in Canada—the Canadian achievement being two-thirds of the U.S. achievement.”³⁸

The cumulative effect of differentials is particularly marked in the decade 1951–1961. Over this period, labour income per man, considering only years of education, rose by 4.7 per cent in the United States as compared with 2.3 per cent in Canada, or more than twice.

³⁶*Towards Sustained and Balanced Economic Growth, op. cit.*, p. 58.

³⁷*Ibid.*, pp. 80–90, based largely on the study undertaken for the Economic Council of Canada by Gordon W. Bertram, *op. cit.*

³⁸*The Contribution of Education to Economic Growth, op. cit.*, p. 52.

7. Average incomes of the more highly educated rose in the United States, as it did in Canada. But with relatively more people receiving more education per person, the dynamic effect on raising income levels due to education was more marked in the United States than in Canada. The pattern of differentiation in income levels by educational attainments is not uniform. Special factors affect average incomes of university graduates in Canada and in the United States.

MEDIAN INCOMES OF MALE LABOUR FORCE^a

	Canada	United States	United States as percent of Canada
Elementary school, 8 years or less	\$3,074	\$3,262	106
High school, 1-3 years	4,233	4,936	117
High school, 4-5 years	4,941	5,520	112
Some university	5,368	6,045	113
University degree	7,956	7,693	97

^aCovers persons age 25 years and over of the non-farm male labour force. The data for Canada relate to 1960 and for the United States to 1959 and they are expressed in Canadian and U.S. dollars respectively. The data are from the *Census of Canada 1961* and the *United States Census of Population 1960*.

Generally speaking, the above figures indicate that incomes for comparable levels of education are on an average between 6 and 13 per cent higher in the United States than in Canada. In the case of university graduates, Canadian incomes were about 3 per cent higher in 1960 than corresponding incomes in the United States.

The following three reasons have been suggested as partial explanation for the differentials observed in the case of university graduates.

First, there are more university graduates in the United States labour force than there are in Canada. The relatively greater scarcity of highly educated personnel has led to premium payments in Canada.

Second, there is a greater concentration in Canada of university graduates in occupations with higher incomes, e.g., professional and technical occupations, and relatively fewer graduates in such occupations as sales.

Third, there is a heavy concentration of young university graduates in the male labour force in the United States, more so than is the case in Canada. The incomes of these young graduates would initially be lower than those of older graduates, with the situation changing significantly as the younger graduates grow older.

In broad perspective, the United States has made more rapid progress in educational attainments than Canada and this has brought greater benefits to their people in terms of higher incomes, to the extent that such higher incomes flow from higher education. Hence, educational differentials have widened rather than narrowed differences in income and productivity between the two countries.

Fortunately for Canada, other factors contributed to offset the slow economic progress resulting from lagging educational efforts. Among these

are the availability of abundant natural resources that Canada could develop economically and the products of which could be sold in world markets at generally rising prices over the longer term. Another important factor is the higher capital per worker ratio in the non-farm sector in the Canadian economy as compared with the United States. In 1961, for example, capital per employed person in Canada was about one-eighth higher in manufacturing and over two-fifths higher in other non-farm sectors than in the United States.

As a result of such offsetting factors, the gap in income differentials between Canada and the United States did not change materially during the twentieth century and Canada was able to keep pace with American progress in raising levels of real income and standards of living. The data support the conclusion that given the existence of other favourable factors including the endowments of nature, greater reliance on international trade and the degree of capital intensity of her industries, Canada could have exceeded the rate of economic progress of the United States if her educational efforts had not lagged behind those of the United States in relative terms. But there were, as suggested earlier, good reasons for the lag.

This presentation of differentials in educational attainments and economic rewards associated with them between Canadian and American income earners is quite limited and study in greater depth than has been attempted here would be required to probe the basic causes of the differentials observed.

What the data illustrate is that a country with a smaller economic base and younger in age of industrial maturity, like Canada, cannot expect to make as great progress in educational attainments with corresponding economic rewards as the wealthy United States, though it can with appropriate efforts and priority allocation of resources narrow the gap that exists.

It could be reasoned that there is no need for a smaller country like Canada to keep pace with educational advances in the United States and that it would be more appropriate for Canada to grow at her own pace. While such an argument can be made rather persuasively, it does not take full account of certain implications of the effects of U.S. educational attainments on Canadian development. These may be both negative and positive.

The negative implications are in the "brain-drain," the falling behind in research efforts and scientific progress, and a lessening in the rate of potential productivity improvement.

As long as educational facilities remain inadequate in Canada in comparison with those in the United States, Canadian students will continue to go to that country in increasing numbers to take up graduate studies. Many of them find jobs and then stay there, if permitted to do so by the U.S. authorities. Greater research opportunities and higher incomes attract many scientists and other professional and technical personnel to the United States, reducing Canada's stock of educational capital in one of the most vital areas affecting economic development.

To the extent that education contributes to increasing productivity, a lesser relative educational effort on the part of Canada reduces the economy's potential for competing with the United States on the basis of approximate equality of productivity improvements over the longer term. Canada depends on

expanding world trade for economic development and growth to a much greater extent than the United States. In a situation like this what matters is that Canada must remain competitive in world markets if she is to prosper. And this in turn means keeping up with productivity increases of other major trading nations with which Canada competes in foreign markets.

The positive implications are the "demonstration" effect of educational attainments, the sharing of knowledge resulting from research, both basic and applied, and the opportunities provided for many Canadians to benefit directly from U.S. educational progress.

The "demonstration" effect refers to the desire on the part of Canadians to emulate U.S. educational advances, realizing the many benefits that education brings in economic as well as in non-economic terms, the latter including human, social and political values. American scientists share their growing knowledge freely with the rest of the world and Canadians as neighbours have particularly close relationships among the professions of the two countries.

Further, many Canadian firms, being subsidiaries of American corporations, have ready access to new discoveries and innovations taking place in the United States and so have many other Canadian firms which manufacture and distribute products under license from American companies. Thousands of students at the undergraduate and graduate levels attend American institutions of higher learning and a large number of scholars participate in U.S. research projects or obtain financial grants from American sources.

The net impact of these influences, moving in opposite directions, varies from time to time, with Canada's gain greater at one stage and less at another stage. But such forces exist and their impact cannot be overlooked in an assessment of the effect of education on economic development. For the Canadian experience suggests that the international spread of knowledge, enhanced by greater educational attainments abroad, has a direct bearing, and in recent decades an increasing impact on national economic development.

EFFECTS ON ECONOMIC GROWTH

In dealing in conclusion with the effects of education on economic growth, development, and progress as evidenced by Canadian experience over the last century, let it be said at the outset that such an assessment deals only with one side of the coin. For not only does education affect economic development, but economic development also affects education since the latter can be both a cause and a consequence of economic advancement.

The duality of the interrelationship between education and economic growth, development and progress has been mentioned previously but the point cannot be emphasized strongly enough. For what social scientists can observe is the end result of this duality and attempts to isolate quantitatively the two flows of effects moving in opposite directions are still in their infancy. The point was made earlier that high priority considerations for production and social capital, other than education, were one contributing factor to generally limiting the proportion of the nation's resources going to the education industry during the first eight decades, with the situation changing markedly in the last two decades.

Further, changes in industrial structure, scientific and technological advances, and growing international competition in the stage of industrial maturity, the stage Canada experienced her most rapid rate of economic growth, put much greater pressures on expanding the facilities of and the services provided by the education industry.

In Canada, studies of the contribution of education to economic growth have followed in the main the pattern developed by the pioneering efforts of a number of American economists including Robert M. Solow,³⁹ John W. Kendrick,⁴⁰ Solomon Fabricant,⁴¹ Edward F. Denison,⁴² and Theodore W. Schultz.⁴³

Among Canadian scholars, Gordon W. Bertram, in a study sponsored by the Economic Council of Canada has provided some estimates of the contribution of education to Canada's economic growth following the techniques employed by Denison, which makes it possible to compare in broad terms the two sets of estimates as being indicative of the differentials in economic effects of education in Canada and the United States.

For the period 1911 to 1961, the Bertram estimates indicate for Canada:

1. Output per employed person or total productivity per man grew by 1.67 per cent.
2. Labour share in net national output amounted to some 76 per cent.
3. Labour productivity rose by 0.52 per cent per annum as a result of improved education.
4. Total production per man rose by 0.40 per cent per annum as a result of improved education.
5. Educational improvements accounted for almost one-quarter of the rise of productivity per employed person.

Denison prepared estimates for the United States covering the contribution of education to economic growth for two periods, 1909–1929 and 1929–1957. Having completed the estimates for Canada for the period 1911–1961, Bertram then proceeded to provide roughly comparable rates for Canada for the period 1929–1957 (see below):

Contribution of Improvements in Education,
1929–1957
(percent)

	<i>Canada</i>	<i>United States</i>
Productivity per employed person	20.0	42.0
Real national income	11.4	23.0

³⁹“Technological Change and the Aggregate Production Function,” by Robert M. Solow, *Review of Economics and Statistics*, Vol. XXXIX, No. 3, August 1957.

⁴⁰*Productivity Trends in the United States*, by John W. Kendrick, National Bureau of Economic Research, Princeton University Press, Princeton, 1961.

⁴¹*Basic Facts on Productivity Change*, by Solomon Fabricant, Occasional Paper 63, National Bureau of Economic Research, New York, 1958.

⁴²See footnote 24.

⁴³See footnote 6.

The estimates suggest that the lesser resources devoted by Canada to the development of education referred to earlier has resulted in education making a smaller contribution to economic growth in this country than in the United States, about one-half of the American figure over approximately three decades. Comparing the situation between Canada and the United States, the Economic Council of Canada observed that the “greater contribution of education to growth in the United States indicates that education has apparently been a factor tending to widen rather than narrow differences in income and productivity between the two countries.”⁴⁴

The Council concluded: “Very considerable scope would appear to exist in Canada to promote the growth of average *per capita* income by improving the educational stock of the labour force. The accumulating evidence and analysis suggest that the benefits from such improvements can be substantial for both the individuals and the economy as a whole.”

The evidence presented supports the further conclusion that Canada has reached the stage of development where economic advancement in the future depends to a greater extent than ever before on increasing the stock of educational capital. This country has now the resources to devote a much greater proportion of its productive capacity to education if it recognizes the necessity to do so and has the will to do so. Failure to expand the stock of educational capital at an *adequate* rate is likely to stunt Canada’s economic growth rate, as well as affect the quality of the growth process.

The point is that a country can only achieve full development in industrial terms if it also achieves full development in human terms. Hence, educational underdevelopment is a major retarding factor in the economic growth process, and growth and development policies without appropriate educational programmes and priorities are bound to bring less than the desired results.

Denison’s estimates have been subject to a number of critical assessments. Denison himself admitted that he had no illusions that specific estimates are other than crude while Bertram emphasized the “preliminary” character of his estimates.

Nevertheless the Denison estimates for the United States and eight west European countries and the Bertram estimates for Canada, the latter covering a more limited area, present a significant step forward in the search to finding ways and means to quantify the effects of education and other factors on economic growth and development. The hope is that future progress in this field can be telescoped so that social scientists can come forward with an answer on a systematic and theoretically consistent basis to the pressing question: What contribution can education make to change the age of scarcity to the age of abundance—for the individual, for the nation and for the world community?

Note:

The original paper included statistics relating to Canadian economic development and educational progress for the period 1867–1967, together with an explanation of the sources of the data and methods of estimation, as well

⁴⁴*Towards Sustained and Balanced Economic Growth, op. cit.*, p. 93.

as qualifications attached to the data. The interested reader will find this material in the book by the author *Industry and Education, A Century of Canadian Development*, University of Ottawa Press, Ottawa, 1968.

Cette étude analyse les relations entre l'éducation et la croissance, le progrès et le développement économiques, en termes d'agrégats, de structure et de micro-économique, en se basant sur cent ans d'expérience canadienne. L'éducation est considérée ici comme un intrant. D'une part, le savoir résultant d'un supplément de scolarité accroît la capacité de production, et, d'autre part, il intensifie la demande de biens et services et le désir de plus grands loisirs. La double influence de l'éducation est soulignée ici, tant sur l'offre que sur la demande. L'éducation est analysée non seulement comme un effet, mais aussi comme une cause de croissance et de développement économiques, par son influence sur la qualité de l'effectif ouvrier, sur la capacité d'accroissement du revenu à l'échelle nationale et individuelle, sur la productivité, le taux de croissance et l'orientation de développement économique.

L'expérience canadienne révèle que l'éducation et le développement économique se sont développés au même rythme pendant les huit premières décades, mais le décollage véritable ne s'est produit qu'au cours des deux dernières décennies alors que le pays avait atteint le stade de maturité technologique et de consommation massive. Les raisons suivantes peuvent expliquer pourquoi une proportion plus faible du produit national brut fut affectée à l'éducation au cours des 8 premières décennies de l'histoire canadienne: faible priorité accordée à l'éducation, accent mis sur l'investissement dans le capital réel à cause de son rendement à plus brève échéance que l'investissement dans le capital humain, et la tendance à se fier fortement à l'apport d'immigrants nombreux éduqués à l'étranger. Il s'est produit cependant dans les dernières décennies un changement considérable, dû, en partie, à la nécessité de faire face aux exigences du développement technologique et, en partie, à un revirement dans l'attitude des individus et des gouvernements. La prise de conscience de l'importance de l'éducation pour l'avancement personnel et le progrès social est la cause de la tendance à affecter une proportion croissante des ressources nationales à l'investissement dans le capital humain, malgré son rendement à long terme.