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THE UNIVERSITY OF ALBERTA

THE IMPACT OF RISING PRICE LEVELS ON EXPENDITURES FOR SCHOOL OPERATION IN ALBERTA, 1957-1965

by

© PETER JOHN ATHERTON

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES

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FACULTY OF GRADUATE STUDIES

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled "The Impact of Rising Price Levels on Expenditures for School Operations in Alberta 1957-1965," submitted by Peter John Atherton in partial fulfilment of the requirements for the degree of Doctor of Philosophy.

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Date . October 7, 1968 . . .

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ABSTRACT

The purpose of this study was to investigate the effect of increasing price levels of educational inputs on expenditures on public school education in Alberta from 1957 to 1965.

The study was carried out in two stages. The first stage entailed the development of a set of price indexes to measure changes in the price levels of educational inputs. The second stage of the study consisted of an analysis of selected aspects of school board expenditures on operation making allowance for changes in price levels and enrollments. For the purpose of the study operational expenditures were defined so as to exclude expenditures for debt servicing and retirement.

For the first stage of the study three sets of price indexes were developed to measure changes in price levels of educational inputs as they affected all provincial school boards, urban school boards and rural school boards. The price indexes utilized fixed weights and a fixed base year and were compiled using Laspeyres' formula.

An attempt was made to assess the effect of changing levels of teacher qualification on estimates of price level change.

The price indexes suggested that the price levels of educational inputs increased by an average of some five per cent per year during the period 1957-1965. Analysis of the price indexes suggested that price levels for inputs other than teaching services and price levels for non-labour inputs had increased at a rate commensurate with price levels in the Alberta economy as a whole. The price levels of teaching services

increased by just over 60 per cent. Making allowances for changes in the level of teacher qualification resulted in a reduction of the estimate of price level increase to just over 51 per cent.

In the second stage of the study, the price indexes were used to deflate expenditures on operation. It was found that the increased price levels of educational inputs had a marked impact on expenditures for operation.

It was suggested that although current expenditures per weighted pupil had increased by some $135.00, increased price levels accounted for all but some $24.00 or $34.00 (82 or 74 per cent), depending on the estimate of changing quality in the teaching force. Further analysis found that the increases in real expenditures provided for increases in the quantity of inputs more closely associated with instruction than with supporting services. It was also suggested that the increase in the quantity of inputs provided had been of benefit mainly to urban secondary school pupils.

Estimates of income elasticity of demand for public education using expenditures per pupil and personal income per capita as variables showed that there was a marked change in coefficients for the two periods 1957-1960 and 1961-1965. The coefficient for 1957-1960 was found to be 3.0, whereas the coefficient for 1961-1965 was .9.

It was also found that the estimates of the impact of increased price levels have a close similarity to the finding of other studies undertaken in Great Britain and the United States.

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CHAPTER I

THE PROBLEM

I. INTRODUCTION

The purpose of this study was to make an assessment of the effects of inflation on expenditures on school operation in Alberta from 1957-1965, but before making a statement of the specific problem which was investigated, it was considered necessary to provide some general introduction to the problem of inflation, its impact on the Canadian economy, and on the problems of financing education.

For the purposes of this study, inflation is defined as a "rise in the general level of prices" (17, p. 97). Machlup has criticized this definition on the grounds that it is not sufficiently specific, but concedes that in spite of its weakness, many professional economists have come to accept it (12, p. 41).

Machlup goes on to point out that economists recognize two major types of inflation. The first is the result of excessive aggregate demand which, in the face of an inadequate supply of goods, forces prices to rise. The type of inflation which results from this type of situation is termed "Demand-Pull" inflation. Since World War II, a second type of inflationary pressure has been recognized. This type of inflationary pressure is seen as the result of increases in wages and profits without accompanying increases in productivity, and is called "cost-push" inflation. The extent to which these two types of

inflationary pressures interact is the subject of much debate among economists, but the effect of both sets of pressures is to produce an increase in the price levels of goods and services (12).

It should be noted that the definition of inflation is made in terms of the general level of prices. This definition does not preclude the stability of some prices or the downward movement of others. Nor does it preclude the rapid upward movement of yet other prices. The uneven movement of prices in a market economy may perform a useful function in directing production towards ensuring a more efficient allocation of resources. Thus, a rise in price of a commodity or factor may result in a consumer's or producer's choosing a close substitute at a lower price. The distinction between movements in the general level of prices and the movement of specific prices is important in the distinction between a price index and a cost index, a matter to be considered later.

The Measurement of Inflation

Price indexes are customary measures of rising price levels. A price index expresses the average of prices obtaining in a given period as a percentage of prices obtaining in another period termed the base period. Price indexes which measure the price movements of a number of goods and services, such as those discussed below, are compiled on the basis of weighted averages. The proportion of total expenditure devoted to the purchase of specific goods or services included in the index is the basis for weight determination and thus the greater the proportion of total expenditure devoted to the purchase of a specific good or

service, the greater will be the influence of price movements of that good or service on the overall index.

There are three major or general price indexes which may be applied to a consideration of inflation in the Canadian economy as a whole, although there are many other indexes which measure price movements in specific sectors of the economy. The three major indexes are: The Consumer Price Index, the Price Component of Gross National Product and the Industrial Selling Price Indexes which replace the Wholesale Price Index.

The Consumer Price Index. This index is prepared by the Prices Division of the Dominion Bureau of Statistics and is described by the Division:

> Specifically, the Consumer Price Index measures the percentage change through time in the cost of purchasing a constant "basket" of goods and services representing the purchases made by a particular population group in a specified time period. The basket is an unchanging or equivalent quantity and quality of goods and services (3, p. 7).

The Price Component of Gross National Product. This index, which is frequently referred to as the "implicit price deflator" of GNP, is the most comprehensive indicator available in Canada for the measurement of price change. It is prepared by the National Accounts Division of the Dominion Bureau of Statistics, and in addition to measuring changes in consumer prices, it includes prices of government expenditures, new housing construction, new non-residential construction, new machinery and equipment expenditures, inventory investment and the net effect of price changes arising out of transactions in the international sector (6,

p. 36). It is, in effect, a measure of price change in all goods and services produced by Canadians.

Industrial Selling Price Indexes. Originally, the wholesale prices of major groups of goods were compiled into a single composite price index, which was designated the Wholesale Price Index, but in 1956 a new series of separate Indexes were introduced. These Indexes, titled The Industrial Selling Price Indexes, are prepared by the Prices Division of the Dominion Bureau of Statistics and measure the selling price of some 3,500 commodities classified by the Standard Industrial Classification. It is pointed out that the Indexes refer only to manufacturing industries (4, p. 7), and that selling prices may differ from purchasers' prices because of the addition of freight, insurance, and other changes (4, p. 10). The publication of the Wholesale Price Index series has been continued however, and is still frequently used as an indicator of general wholesale prices.

Inflation in Canada

The Economic Council of Canada, in its third annual report (6), points out that the greater part of the 50 per cent increase in prices which has occurred in Canada since 1949, has been concentrated within three fairly short periods of time (6, p. 89). Well over half the increase has been concentrated into the period of the outbreak of the Korean War (June, 1950), the period during and shortly after the resource-based investment boom of the mid-1950's, and the period 1965-1966. Further analysis shows that apart from these three periods, the average

rates of increase of the Consumer Price Index have not exceeded 1.5 per cent per year, and the average rates of increase in the price deflator of GNP have not exceeded two per cent (6, p. 90). Although these rates of price increases are classified as reasonably stable by the Council, they are sufficient to suggest that the purchasing power of the dollar has been eroded by almost 50 per cent since 1949.

Furthermore, there is every indication that the secular upward trend of prices will continue. Post-war Canadian governments have come to accept the maintenance of a high level of employment as one of their prime responsibilities, but as the Council points out, "the most pervasive and recurrent goal conflict of modern industrial economies has proved to be that between full employment and reasonable stability of prices" (6, p. 35). Benson has observed that the structure of the North American economy, with its heavy concentrations of economic power in both industry and labour, is such that inflation is likely to be a persistent feature of the economy. He reasons "Since the causes of inflation appear to be deeply rooted in our economic system, it is to be expected that the stabilization of the price level will be a difficult task" (1, p. 515).

Inflation and Educational Finance

Having suggested that some degree of inflation has been a persistent feature of the economy, and that it will probably continue to be so, it is necessary to examine whether the financing of education is affected to the same degree as might be suggested by the price indicators in the economy.

First, it would appear that there are *a priori* reasons for

suggesting that indicators which measure price level increases in the economy as a whole, may not be applicable to education. As Vaizey points out, ". . .educational prices shift in a way which is not necessarily the same as that of prices in general" (22, p. 63).

The Consumer Price Index covers a wide variety of goods and services which have no counterpart in an education budget. Expenditures on food, clothing and housing account for some 70 per cent of the total weighting. Even so, it is worth noting that a more than proportionate share of the total increase in the index has been accounted for by increases in the price of consumer services with a high proportion of labour input: an increase of almost 80 per cent as against 45 per cent over the whole index (6, p. 125).

Doubts may also be raised in connection with the use of the other indicators. The implicit price deflator also includes many commodities not relevant to the educational budget although, as Hanson points out, it is useful for revenue considerations "since it tends to measure the number of dollars which have to be obtained from the income stream of the whole economy" (9, p. 11). The index for Government Expenditures on Goods and Services would appear to be a better indicator since it reflects changes in the costs of supplies and materials purchased by governments, as well as changes in the wages and salaries of government employees. Whether or not this indicator is appropriate will be one of the sub-problems investigated by the research.

The Industrial Selling Price Indexes are even less appropriate since they deal exclusively with manufactured goods. It may be that some

of the indexes are suitable for inclusion in an education price index however, and this too will be considered in the body of the thesis.

The lack of an appropriate indicator for educational inputs has been commented on by Mr. A. Alexander, Chief of the Finance Section of the Education Division of the Dominion Bureau of Statistics. He writes, "We have in our Division long-range plans to develop price indices (sic) (for elementary and secondary education and one for higher education). The realization of these plans at this time is very problematic and uncertain."[1]

Inflation and Educational Expenditures

One of the first examinations of post-war inflation on educational expenditures was made by Seymour Harris in 1949 (10). In his words, "Inflation is the termite that consumes the educational dollar" (10, p. 44). His analysis was made in the period immediately following the war, when the losses caused by inflation were aggravated by the low priority of educational bids for scarce resources. In a discussion of higher education, he estimates that the rise of costs associated with inflationary factors for the period 1939-1940 to 1946-1947 was in the order of 55 per cent (10, p. 49). He points out that the problems associated with inflation are compounded by the relationship of the property tax to education, noting that "The receipts in 1946 were little above what they had been in 1932 despite a national income gain of 300

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[1] Personal letter to the writer, dated July 29, 1967.

per cent (10, p. 95).

For Galbraith, "Social imbalance is the natural offspring of inflation" (7, p. 265). According to his theory of social balance, the maximum satisfaction from the output of the economy may be achieved only when the production and consumption of goods and services in the private sector is balanced by the production and consumption of goods and services in the public sector. He points out the reluctance of governments to increase expenditures in inflationary periods on the grounds that the expenditures are themselves inflationary and also notes the resistance of businessmen to increases in taxation during periods of prosperity on the grounds that they tend to restrict the expansion of the economy.

Hirsch, in a study for the U.S. Government, suggests that in spite of the 56-fold increase in expenditures on education, costs in real terms exhibited amazing stability for the period 1900-1958. He suggested that "over the 58 years an overall decline of about 3 per cent was registered in terms of daily expenditure per pupil" (11, p. 36). The techniques used by Hirsch will be the subject of later discussion, but his conclusions suggest that the increase in educational expenditures in the United States have, in fact, failed to match the increase in price levels of educational inputs.

Benson suggests that inflation has four major effects (1, Chapter 17). First, inflation affects local tax revenues. He points out that since property is not revalued each year, assessments tend to lag behind changes in the price level. To maintain the real value of local revenues, the tax rate must advance year by year with accompanying

resistance by taxpayers. That this problem is not peculiar to North America is demonstrated by Vaizey who generalizes, "The inelasticity of tax revenues is characteristic of systems subject to local control and finance with the result that the price effects of economic movements are accentuated" (23, p. 61). Studies of the elasticity of the property tax, such as the major studies conducted by Groves and Kahn (8) and Netzer (14) support the contention of inelasticity.

Secondly, Benson points out that inflation erodes the real value of educational grants. Where programs of support are based on unit costs, a typical feature of Canadian systems, increases in price levels may erode the real value of grants unless there is annual upward revision.

Thirdly, inflation affects borrowing. Since inflation tends to reduce both the effective yield and face value of the securities, school authorities attempting to raise money in the market may find themselves subject to the need either to raise the interest rate, or to discount the face value of their bonds. Additional difficulty is placed in the path of authorities attempting to raise money in the market during inflationary periods since one of the means normally used by central governments to combat inflationary pressures is a raising of the interest rate, thus increasing the difficulties of raising funds.

Finally, Benson sees inflation as one of the factors which inhibit the development of substantial programs of federal aid. He reasons that substantially increased federal aid would result either in increased tax levels or budget deficits. Increased tax levels are so unpopular that political pressures would probably result in at least

part of the aid program's being financed by borrowing or deficit. In either case the increased public spending would not be matched by a decrease in private spending and so added impetus would be given to inflationary pressures.

There is every indication therefore, that the steady rise in the price level in Canada may have served to offset a large part of the increased expenditures on education which have taken place in the last decade.

II. STATEMENT OF THE PROBLEM

This study was designed to investigate the following problem:

> What was the effect of increasing price levels of educational inputs on expenditures on public school operation in Alberta from 1957 to 1965?

The study was carried out in two stages:

1. The development of a set of price indexes appropriate to the measurement of price level increases of educational inputs.

2. The analysis of selected aspects of school board expenditures on operation, making allowances for increases in the price level and enrollments.

III. STATEMENT OF SUB-PROBLEMS

At each stage of the study a number of specific sub-problems were investigated.

Sub-Problems Relating to the Price Indexes

1. What influence do estimates of changing quality in the teaching

force make to rates of price level change as measured by the price indexes?

2. To what extent do the rates of change in price level, as measured by the price indexes, show differential effects on urban and rural school boards?

3. To what extent do measurements of change in price level of educational inputs coincide with measurements of price level change in the economy as a whole?

Sub-Problems Related to Expenditures

1. What would operating expenditures have been for school boards in the Province of Alberta for each year had enrollments and price levels remained at the 1957 level?

2. To what extent have per-pupil expenditures made by school boards kept pace with changing price levels?

3. To what extent have per-pupil expenditures made by urban and rural school boards, considered separately, kept pace with changing price levels?

4. To what extent have per-pupil expenditures by provincial school boards kept pace with increasing levels of personal income in the province?

IV. SIGNIFICANCE OF THE STUDY

An examination of theses in education, completed at the University of Alberta over the period 1929-1966, shows that relatively few studies of expenditures on education have been undertaken.

Of the studies which have been made, most have been concerned with selected aspects of school expenditure. For instance, Stringham (19) performed an analysis of factors affecting per pupil costs of instructional supplies in selected school districts in Alberta; Oeulette (15) made an analysis of patterns of public school expenditures and services in selected areas of Alberta; and Percevault (16), Ward (24) and Small (18) made studies of administrative costs in selected areas. None of the above studies was made on the basis of time series data, and the relevance of the analysis over time was not a consideration.

Uhlman (21) made a study of demographic and economic factors influencing expenditures on education. Although an analysis of expenditures was undertaken, the major emphasis was not on the expenditures themselves. An attempt was made to express expenditures in real terms, but the process entailed the use of the Consumer Price Index as a deflator--a procedure questioned in the introduction to this study. Hanson (9) made a study for The Alberta Teachers' Association in 1966 in which data relating to expenditures on education and their relationship to provincial-municipal expenditures and revenues were analysed. The focal point of this study was the projection of educational expenditures and revenues for the year 1971. There is some discussion of the influence of rising price levels, but no detailed analysis (9, p. 11). It would appear, therefore, that an attempt at such an analysis would be an appropriate contribution to the study of problems of educational finance in Alberta.

Estimates of the influence of rising price levels on educational expenditures have been made, but these attempts lack accuracy since there is no price index for educational inputs.

The Dominion Bureau of Statistics deflated total expenditures on education for the period 1954 to 1961 and suggested that in spite of a 162 per cent increase in expenditure in current dollars, an increase of 126 per cent was noted in terms of 1957 dollars (5, p. 11). It is worth noting that an accompanying note to the text emphasizes that the price index used for the purpose of deflating the expenditures was not specifically constructed for educational purposes, and that care should be exercised in the interpretation of the figures (5, p. 10).

In another study, the Canadian Teachers' Federation suggests that for the whole of Canada in the period 1953-1963, 29 per cent of the increased expenditures on education was due to increases in the price level (2, p. 22). The details of the calculation for this estimate were not supplied and so it is difficult to comment on the data. Mowat and Atherton, using a crude but specific price index for educational inputs, suggested that as much as 80 per cent of the increased per pupil expenditures in Alberta for the same period 1953-1963 might be accounted for by increases in the specific price levels of educational inputs (13). There is a clear indication that some more precise research into the effect of price level increases would be useful.

The development of an education Price Index could have additional significance for the conduct of programs of school finance. First, a specially constructed index of price levels might be utilized in making

adjustments to financial support systems as it was in the State of New York, when the $200 level of support applicable to the period 1946-1947 was adjusted to the price levels of the early 1950's (25, p. 20). A similar policy was recommended by the Sub-Committee on School Finance of the Nevada Legislature in 1964. Again a special price index was developed (19). Both indexes will be considered in detail later.

In addition, a special index of educational price levels would make it possible to observe which price levels had increased more sharply than others in the pattern of expenditures. Such information could be of use in deciding which aspects of the school grant programme needed more support than others.

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CHAPTER II

THE RESEARCH DESIGN

I. INTRODUCTION

The procedures used at each stage of this investigation are discussed fully in succeeding chapters and so it is necessary at this time to present only an outline of the methods of analysis which were used. It is necessary, however, to provide a general overview of the sources from which data were obtained and a discussion of the assumptions, delimitations and limitations of the study. The chapter concludes with a section which contains the definition of terms used in the study.

II. RESEARCH PROCEDURES

The Price Indexes

The first stage of the study involved the compilation of three sets of price indexes:

1. A set of price indexes to measure price level changes as they affected all provincial school boards,

2. A set of price indexes to measure price level changes as they affected urban, or small area, school boards,

3. A set of price indexes to measure price level changes as they affected rural, or large area school boards.

Each set of price indexes was compiled using the method of weighted price relatives. In this method weights reflect the importance

of each major group of inputs in the total expenditure pattern. A price relative is an expression of the percentage increase in price level for an input using the base year price level as 100.

Each set of price indexes was compiled on the basis of alternative assumptions about the relationship between years of training, as reflected in the certification level, and quality of teaching services.

The price indexes were analysed in order to compare rates of price increase among the three sets of price index and among the major categories of input.

The price indexes were also analysed to compare the effect of the assumptions of quality in teaching services on the rate of increase in price level.

Analyses of Expenditure

The analyses of expenditure were made with the effects of increasing enrollments removed. To remove the effects of increasing enrollments, expenditure data were expressed as weighted per pupil expenditure data. A weighted per-pupil measure was used in order to recognize the cost differential between educating elementary and secondary school students.

For reasons which are discussed later (infra, p.169) the results of the analyses were expressed in terms of the percentage change in rates of expenditure rather than in money equivalents.

Analyses were made of per weighted pupil expenditures in constant and real dollars.

III. SOURCES OF DATA AND METHODS OF COLLECTION

The data required for this study were of two major types:

1. Expenditure Data
2. Price Data.

Expenditure Data

Expenditure data were required for two purposes:

1. As a basis for weighting the price indexes.
2. As a basis for analysis.

The availability of expenditure data at a high level of aggregation made any major use of sampling techniques unnecessary. Most of the data required for subindex and component weighting and for analysis were taken directly from the Annual Reports of the Department of Education for the years 1957 to 1965 and refer to the total population of school authorities in the province.

It was originally intended to derive component weightings, the data for which were not provided in the financial statements contained in the Annual Reports, from Auditor's reports for a stratified sample of school authorities. An examination of a substantial number of such reports for the year 1957 and subsequent years revealed that there were inconsistencies in the manner of reporting some component expenditures which rendered them unsuitable for use. As a result, some component weightings were derived from secondary sources.

Component weightings for the Transportation Subindex were derived from a cost analysis of bus operation provided by the Alberta

School Bus Operators' Association. Component weightings for the Maintenance Component of the Plant Operation and Maintenance Subindex were derived from cost data supplied by the Maintenance Division of the Alberta Department of Public Works.

In order to derive component weightings for the Administration Subindex and the Caretaking Component of the Plant Operation and Maintenance Subindex, it was necessary to refer to the expenditure data contained in the Auditor's reports of a specially selected sample of school authorities.

The sample was selected to be representative of the expenditure patterns of urban and rural school authorities and included one large city system, and fifteen rural school systems. Together, the expenditures of these systems accounted for over 4 per cent of the total expenditures on operation of all school systems in Alberta in 1957 (Appendix A).

Price Data

The compilation of the price indexes required that the prices of thirty-nine different commodities or groups of commodities and eight different types of labour input be obtained for each year of the nine-year series. In the collection of these data two major sources were utilized:

1. Government publications.
2. Price lists of local companies engaged in school supply.

Government publications. Price data were obtained from both federal and provincial government publications.

Price data for teachers' salaries were obtained from the financial tables of the Department of Education Annual Reports. Price data for labour inputs other than teachers' services were taken from the Annual Salary and Wage Rate Survey of the Alberta Bureau of Statistics, Department of Industry and Development.

Published price index series of the Dominion Bureau of Statistics were used to provide price data for commodities for which the distribution system was so decentralized that large-scale sampling procedures would have been necessary to collect price data. Thus price relatives supplied directly by the Dominion Bureau of Statistics or taken from published series were utilized as price data for (a) tires and vehicle repairs in the Transportation Subindex; (b) the price of building materials and janitors' supplies in the Plant Operation and Maintenance Subindexes and (c) the miscellaneous expenditures components and Subindex.

Locally obtained price data. Locally obtained price data were used chiefly in the compilation of the Subindex for Instructional Aids and Supplies. The distribution system for Instructional Aids and Supplies is sufficiently centralized so that a small number of distributors control a very substantial proportion of the market.

The sales of the School Book Branch of the Department of Education, for example, in 1966 accounted for well over half of the total expenditure by all school boards on Instructional Aids and Supplies.[1]

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[1] See Department of Education, Annual Report, 1966, pp. 92, 128.

Thus it was considered that the prices of the School Book Branch would be representative of the prices paid by school boards for books.

From conversations held with officials of school supply houses and school systems, it was determined that Moyer Division of Vilas Industries held a dominating position in the market for school supplies and that the prices charged by Moyer were representative of prices in the field as a whole. Thus price data for instructional aids and supplies were derived in consultation with the manager of Moyer Division and on the basis of price lists for the nine-year period 1957-1965.

Locally obtained price data were also used in the compilation of the Utilities component subindex of the Plant Operation and Maintenance Subindex.

IV. ASSUMPTIONS

In order to compile the price indexes and to conduct the analyses of expenditures, it was necessary to make a number of assumptions.

1. It was assumed that rates of price increase for goods and services included in the price indexes were a reflection of a uniform rate of price increase which affected all school boards equally.

2. It was assumed that increases in prices paid by boards for goods and services other than teaching services were attributable to inflationary pressures and that the quality or productivity of the inputs remained unchanged.

Further assumptions were made concerning the relationship between years of training, as reflected in certification level, and the price and

quality of teaching services, but these assumptions were made in order to test their effect on the measurement of price levels of teaching services and were not essential to the basic framework of the study. They are discussed in that part of the study which reports the compilation of the Salary Subindexes.

The assumption of a relationship between increases in real expenditure and quantity, rather than quality, was deliberate and was intended to avoid controversy as to what constitutes a measure of quality in education. However, the comments of Mort, Reusser and Polley on the relationship between the level of expenditure and the quality of the school system are worth consideration. They conclude:

> On reviewing the studies of expenditure level and quality, it cannot be noted that the strong relationship found appears to be independent of the method used for measuring quality. If quality is measured in the simple ways used in the studies of the 1920's; if it is judged by extensive checklists like those used in the early 1930's; if it is measured by carefully developed instruments such as those used in the 1930's and 1940's; if it is measured by standardized tests; if it is measured by projections into adult life; if it is measured in any of these ways the relationship with expenditure level is strong. Here it would appear that we have at least one valid measure of the complex factors producing school quality which we can use as a key element in assessing the wholesomeness of conditions for producing good education. (1, p. 106)

V. DELIMITATIONS OF THE STUDY

The study was delimited to an examination of the effects of increasing price levels of educational inputs on current expenditures made by school boards in the Province of Alberta from 1957 to 1965 for the purposes of school operation.

Current expenditures have been defined in such a way as to

exclude expenditures made for debt servicing. Expenditures for debt servicing are a reflection of expenditures made for capital outlays in the past and as such they constitute fixed charges which are unaffected by current changes in price level.

The choice of the period 1957-1965 was influenced by considerations of data collection. The year 1957 was chosen as the base year for the study because 1957 was the first year in which the major source of price data for labour inputs other than teaching services, the Annual Salary and Wage Rate Survey of the Alberta Bureau of Statistics, was published.

The choice of the year 1965 as the final year of the series was dictated by the fact that this was the last year for which complete expenditure data were available.

The years to which the price indexes and analyses in this study refer are calendar years rather than school years.

The price indexes, which are based on an average of prices, do not refer to any specific point in time within any given year. The analyses of expenditure were made from the expenditures reported by school boards for the financial year January 1 to December 31.

VI. LIMITATIONS OF THE STUDY

The study was limited to the study of school systems in the aggregate. To apply the findings of this study to individual school systems without further analysis is therefore unjustifiable.

It is recognized that the accuracy of the analyses was dependent

on the degree to which the price indexes were a true reflection of the changing price levels of educational inputs. It may be pointed out, however, that teachers' salaries accounted for over seventy per cent of the total index, and that exact price and expenditure data were available for this input. Some error in the price data for other inputs would result only in slight distortions of the final indexes and make little difference to the estimates of real expenditure. The effect of such errors would be not to invalidate the conclusions but to modify them.

VII. DEFINITIONS OF TERMS

Although a full discussion of each major term used in this report is provided at an appropriate place in the report, brief definitions of some of the more commonly used special terms are set out below.

Operating expenditures. Operating expenditures are defined as total expenditures less expenditures for capital construction and outlay for debt service. Operating expenditures include expenditures on administration, instructional aids and supplies, instructional salaries and expenses, auxiliary services, plant operation and maintenance, conveyance and miscellaneous operation expenses.

Large area authorities. Large area authorities include School Divisions, Counties and Consolidated Districts providing school services in Alberta. Large area authorities are primarily rural school authorities for whom transportation expenses constitute more than fifteen per cent of operating expenditure.

Small area authorities. Small area authorities include City, Town, Village and Rural School Districts in Alberta. Small area authorities are primarily urban school authorities for whom transportation expenses constitute less than fifteen per cent of operating expenditures.

Inputs. Inputs are goods and services which are purchased and utilized in the provision of educational services.

Major categories of input are groups of goods and services which are combined to provide separate services. They include administrative services, teaching services, instructional aids and supplies, plant operation and maintenance services, transportation services, and auxiliary services.

Component inputs are individual goods and services which may be included in one or more of the major categories of input. Thus paper supplies is a component input which is included in both administrative services and instructional aids and supplies.

Price indexes. Price indexes are measures of the average price of goods and services at a given time or in a given place compared with the average price of the same quantity and quality of goods and services at a different time, or in a different place. In this study the terms Subindex and Component Subindex are used to refer to price indexes for major categories of input and component inputs respectively.

Expenditures in current dollars. This term is used to refer to expenditures which have been made without reference to the influence of changing price levels.

Expenditures in real dollars. This term is used to refer to expenditures which take into account the changing purchasing power of money as reflected by changes in price indexes. The term real is used to refer to the purchasing power of money in the base year of a price index series.

Elementary and secondary levels of education. Levels of education are defined in accordance with Dominion Bureau of Statistics practices. Elementary level is defined as Grades I to VIII inclusive; secondary level is defined as Grades IX to XII inclusive.

REFERENCES FOR CHAPTER II

1. Mort, Paul R., Walter C. Reusser and John W. Polley. Public School Finance. New York: McGraw-Hill Book Company Inc., 1960.

CHAPTER III

PRICE INDEXES IN EDUCATION

I. INTRODUCTION

It is the purpose of this chapter to provide a critical review of previous index number series which have been compiled for use in education. Before doing so however, it was considered appropriate that some more general discussion of the problems involved in compiling index number series should be undertaken.

Index numbers have a lengthy history. One of the first recorded index number series (9, p. 48, 27, p. 1), was compiled by Carli who attempted to measure changes in the purchasing power of money consequent upon the importation of silver into Europe, by comparing the prices of grain, wine and oil in 1500 and 1750.

Until relatively recently, the interest of index makers has been directed towards problems similar to that which occupied Carli: the measurement of changes in the purchasing power of money in the economy or across very wide sectors of it.

The technical problems associated with developing such highly aggregated measures are considerable and it is not surprising, therefore, that much literature has been devoted to the solution of these problems. Perhaps the most exhaustive work on the technical aspects of index making is Irving Fisher's The Making of Index Numbers, which, although published in 1923, is still considered to be a standard work (9).

Although some of the observations made by Fisher are still the subject of debate (18, p. 46), the influence of his work can be clearly traced in many textbooks of applied statistics and even though Fisher's analyses were directed towards the compilation of index number series at a very high level of aggregation there is much in his work which may be applied to the compilation of any index number series.

Interest in index numbers tends to increase in times of increasing prices, and it is not surprising therefore that there has been an increasing use of index numbers since 1946. Wasserman notes,

> Engineers, lawyers, members of government regulatory bodies, as well as accountants, have become interested in the use of index numbers as a means of quickly estimating the replacement cost of buildings, machinery and other capital equipment. Specialists in budgeting have begun to use index numbers increasingly as an aid in estimating current and future costs of projects on the basis of costs of similar projects in the past and indexes measuring price changes since then. (27, p. 2)

II. THE CONCEPT OF INDEX NUMBERS

The economic theory of index numbers is based on the conceptual apparatus of indifference curves and production isoquants, but as Wasserman points out,

> These concepts require measurements that can seldom be made even in the simplest of real world situations. Economists and statisticians who compile index numbers, on the other hand, tend to take a purely pragmatic approach to their subject. (27, p. 2)

The basic concept of an index number of prices is set out quite clearly by Fisher:

> An index number of prices, then, shows the <u>average percentage change</u> of prices from one point of time to another. The percentage change in the price of a <u>single</u> commodity from one time to another is, of course, found by dividing its price at the second time by

> its price at the first time. The ratio between these two prices is called the price relative of that one particular commodity in relation to those two particular times. An index number of the prices of a number of commodities is an average of their price relatives. (9, p. 3)

There would be few problems in measurement if all the prices of all the commodities and services which constitute the group under consideration moved between times in exactly the same ratio. In fact, the prices of individual goods and services move differently because of a number of factors which include changes in the conditions of supply of, and demand for the good, changes in the technological conditions of production, and changes in consumer taste.

III. PROBLEMS OF INDEX NUMBER CONSTRUCTION

It is the purpose of this section to examine some of the problems which may be posed by the uneven movement of prices and to examine some of the techniques which may be used to account for them. Included is a discussion of the problems which may result from changes in the quality of goods or services over time and the conditions which govern the choice of a base year, a formula, the selection of commodities to be included in the index, the weighting system for the commodities, and the price data for the commodities.

Problems of Quality Change

The analysis of the relative influence of price and quality change is perhaps the most difficult of problems in the construction of price indexes. The problem is not a new one. The Second International Conference of Labour Statisticians in 1925 adopted a resolution which reads:

> Care should be taken to ensure that the quality of each item for which prices are obtained at different dates, and the methods of collection and calculation remain unchanged during the period covered. (13, p. 70)

That progress to this end has not been substantial is suggested by Jaszi's comments in 1962:

> The difficulties involved in selecting the relevant quality characteristics, in finding good quantity indicators for them and in assigning appropriate weights to these indicators, tend to become unmanageable in most cases even of specific ad hoc analysis. (14, p. 335)

Gavett suggests that there are three standards which may be used to judge the change in quality which must be removed from a pure price index (10, p. 17).

1. Objective Value.
2. Subjective Value for the consumer.
3. Cost of producing the changed features.

Using the objective value approach entails judging the change in the product by some set of standards determined objectively. However, as Gavett points out, this standard must be rejected since it is not consistently measurable and has no economic meaning. He says, "In neither the case of consumer goods or services, or the case of goods purchased by a producer, is there any reason to suppose that objective value is the critical determinant of price" (10, p. 17).

The subjective value approach is equally problematic. Subjective value may be approached only through the price the consumer is prepared to pay for the commodity, although Gilbert does suggest the use of sampling opinion surveys (11, p. 996). Even so, the resulting value would not necessarily reflect the change in quality since it would

also reflect the quantity produced and be further influenced by the state of taste.

The cost of production may appear to provide a more satisfactory approach to the problem of judging standards and quality, but it is almost impossible to derive a satisfactory measure. Such a measure would require the index maker to obtain a complete list of changed characteristics together with a detailed analysis of costing each factor.

In the light of the conceptual difficulties to be faced in developing a measure of changing quality, it is not surprising that most compilers of index numbers have adopted what is described by Jaszi as the "conventional" method.

> The essence of the conventional method is to translate quality into quantity by reference to market price. If a new variety of good is introduced, one physical unit of the new good is not simply equated to one physical unit of the old one. Instead one physical unit of the new good is regarded as equivalent to one unit of the old one times the ratio of the price of the new good to that of the old good. (14, p. 333)

This method is normally described as linking or splicing, and may be used for purposes other than controlling for changes in quality. It may be used to combine two or more index series which do not extend over the whole period to be covered. Thus a series for 1936-1949 may be combined with a series 1939-1956 to provide a series 1936-1956.

The linking or splicing method is used by the Dominion Bureau of Statistics in compiling the Industry Selling Price Indexes (6, p. 11) and in compiling the durable consumer goods component of the Consumer Price Index (1, p. 379).

In spite of the use of methods of adjustment, it is recognized

that methods of adjusting for quality change pose severe problems. Gilbert summarizes this problem:

> . . .They rest on the assumption that intangible quality improvements can be brought into the sphere of quantitative measurement. In the end, they would make it impossible to construct measures of output and price change that are useful to the study of economic growth. (11, p. 992)

Accounting for changes in the quality of labour inputs is even more difficult. A productivity approach is next to impossible to adopt since the productivity of a teacher, for instances, is as much a function of the pupils that he teaches as his own abilities. A recent study performed for the U.S. Office of Education illustrates this problem. After investigating the performance of some 400,000 students in over 4,000 school districts on tests of educational achievement, and after statistically controlling for a number of socio-economic factors the writers conclude:

> The data suggests that variations in school quality are not highly related to variations in achievement of pupils. . . .The school appears unable to exert independent influence to make achievement levels less dependent on the child's background. (4, p. 297)

The use of Gavett's standards to judge quality is illustrative of the difficulties which may be encountered in judging the quality of the teaching force, one of the single most important components of an education index.

The price of a teacher's services is determined by his position on a salary schedule. The position on the salary schedule is determined by a combination of years of training and experience. Hence salary schedules make an implicit assumption that years of training and experience are important determinants of teacher quality. Both provide

objective standards, but there are two major problems which may arise in using years of training and experience as bases for adjudging quality of the teaching force. First, there is the question of the extent to which years of training and experience may be demonstrated to be utility determining characteristics of teaching performance. Second, there is the question of the degree to which teaching performance is the basis for salary payment.

Research evidence on the first question is inconclusive. Although a great number of studies have been performed in this area, there is no great degree of agreement in the findings. A number of studies have been undertaken in Alberta with results similarly inconclusive. Bodnaruk (2), Strandberg (20), and Klufas (16) did not find significant relationships between pupil achievement and the total length of professional training of teachers. On the other hand, Lindstedt (17), Eddy (8) and Tetley (23) did find some significant relationships between pupil achievement and professional training when the training exceeded four years. Findings with regard to experience do not appear any more conclusive. On balance there would appear to be grounds for agreement with Swanson's findings in the United States that "Increased training generally carries with it increased competence; however, increased experience does not necessarily imply increased competence" (22, p. 2).

As has been suggested, any assessment of the relationship is made more difficult by factors concerning pupil background. Thus the assignment of a specific, quantifiable relationship which would be necessary to satisfy a really objective standard is extremely difficult.

Even if such a standard could be set it would have to be related to salary payments.

It may be argued that the differentials in salary payments, although based on years of training and experience are more determined by market factors, such as the scarcity of different levels of trained personnel, than their contribution to the education of pupils. It is certainly true that negotiations for salary increases are more frequently argued on the basis of a need to compete with other professions for skilled personnel and a need to keep up with increased costs of living. Negotiations also emphasize the competitive position of maxima and minima for different categories of training rather than the utility determined value of increments.

Similar difficulties attend the other two standards by which quality change may be judged. A measure of subjective utility is hardly possible since there is little evidence of any degree of consumer choice in the allocation of teachers to students although it is possible that school boards do exercise a measure of consumer choice when hiring teachers. Teacher salaries might better represent a measure of subjective utility on the part of boards if the market for the services of teachers approximated a perfect market. However, the continued shortage of teachers and the strong position of The Alberta Teachers' Association tend to restrict the operation of a free market so that employers are frequently given little opportunity to exercise complete choice as to the price they will pay for the services of a teacher. This problem is closely related to the issue of merit pay, but an exhaustive discussion

of this issue is not within the scope of this investigation.

The discussion of the possibility of isolating increases in price from increases in price due to increases in quality has suggested that no satisfactory method of doing so exists.

An alternative approach to the problem would be to conduct the analysis on two different assumptions. The first assumption would be that all increases in price were the result of inflationary factors; the second assumption would be that at least part of the increase in price was the result of an improvement in quality. Any differences which resulted in the analysis could then become a measure of the significance of determining the relationship between price and quality change.

Problems of Base Year Choice

The base year is important because it is the year with which all other years are to be compared. If a base year is chosen in which prices are extreme or unusual, comparisons may not be realistic. Tuttle has suggested that there are three major requirements for the choice of a suitable base year (24, p. 332).

1. A period in which the number of comparable commodities found in both base and current period are as great as possible.

2. A period in which economic conditions are not extreme or unusual.

3. A base period close to that chosen for use in other series.

There are actually two bases which must be considered. The Dominion Bureau of Statistics points out that one base is chosen to act as a departure for the comparison in percentages of prices, the time

base; the other base is the weight base which is the period from which the distribution of expenditures is derived (5, p. 9). It is not essential that both bases be the same period although it may be pointed out that the comparisons between periods lack precision if both bases are not identical (5, p. 9). In fact, the Consumer Price Index does use separate bases; the time base is 1949, and the weight base is 1957.

The choice of a fixed period as a base implies that the prices in each year will be compared with those obtaining in the base year, and only indirectly with those of the previous year. Fisher points out that to measure properly the price movements between two years, neither of which is the base, a system of chaining should be used (9, p. 19). Chaining entails expressing the prices for each year as a percentage of the previous year and relating this percentage back through each other year by means of simple multiplication. Karmel notes that the chain base approach helps to reduce errors which may result from changes through time in patterns of expenditure (15, p. 308). Later Fisher expresses a preference for the use of fixed bases because they are simpler to conceive and calculate and they have a clear and definite meaning for everyone. He also notes that there is no cumulative error and that the fixed base method is graphically indistinguishable from the chained base system (9, p. 312).

It is possible to change the time base of an index number, by a method of calculation similar to linking, without an appreciable distortion of the index. The same may be done with the weight base although it should be remembered that as the frequency with which bases are changed increases, so the meaning of the comparison, particularly in

analytic terms, tends to become more difficult to interpret.

Problems of Formula Choice

Choosing a formula can be an imposing task. Fisher provides an analysis of one hundred thirty-four different formulae which he reduces to a list of twelve acceptable formulae. The twelve are characterized as being "superlative" in relation to his own "Ideal" formula. The Fisher Ideal formula is the geometric mean of two commonly-used formulae: Laspeyres' and Paasche's.

Laspeyres' formula utilizes base year weights and compares the price of a base year collection of goods to the price of the same collection in another year. The Paasche formula utilizes the weights of the given year and compares the price of a collection of goods in the given year with that of the collection in the base year. Either formula may be computed on the basis of aggregate or average prices.

In the aggregative computation, the total cost of the collection of goods is compared with the total cost of the collection in another year or period. In the average computation, more attention is paid to the movement of individual commodities, and the index is an expression of the changing ratios of prices. Each ratio is, in this method of calculation, termed a price relative. A number of price relatives may be combined into an overall index by weighting each price relative in accordance with its significance in the total budget.

Karmel points out that the aggregative form is simpler to calculate and comprehend, but that the average form is more useful from an analytic point of view, since the characteristics of each commodity

may be investigated (15, p. 302). Wasserman considers the method of weighted price relatives most suitable for the compilation of education price indexes (27, p. 19). He also notes that this method permits base shifting without having to recalculate the index (27, p. 153). Both the Canadian Consumer Price Index and the Indexes of Industrial Selling Prices use this method.

It is worth noting that because of the base year weighting, and the tendency of consumers to spend less on goods, the prices of which are rising more than others, it is possible that the use of Laspeyres' formula will tend to show a slightly more rapid rate of increase in times of rising prices than would the Paasche formula. The resultant inaccuracy may not be significant in an educational price index, since it already has been suggested that administrators are not as free to alter their pattern of expenditures as the normal consumer. A study carried out for the Royal Commission on Banking and Finance in Canada concluded that there might have been an upward bias in the Consumer Price Index in the order of 1 to $1\frac{1}{2}$ points over the twelve-year period 1959-1961 (7, p. 81) but that this inaccuracy was due primarily to inadequacies of data rather than formula. Fisher concludes that in spite of the fact that the "Ideal" formula is demonstrably correct "within less than one-eighth of one percent," all index numbers which are not freakish or biased practically agree with each other (9, p. 306). His analysis finds that neither the Laspeyres nor the Paasche formula is biased or freakish.

Problems of Commodity Choice

The major problem in the choice of commodities is that of obtaining as representative a collection as possible. Since there are limitations to the practicability of obtaining the price quotations for every commodity to be included in the index, the tacit assumption is made that the prices of goods not included in the index move, on the average, in the same way as the prices of goods included. Karmel points out that the problems of data collection usually render the statistical procedure of random sampling inapplicable (15, p. 318). Fisher, however, suggests that this problem is not as serious as it might appear. He has computed that enlarging the sample of commodities does not increase the accuracy of the index in linear proportion. He suggests that in order to reduce the error by half, the number of commodities must be multiplied by thirty-five (9, p. 338). He cites as an illustration a comparison between the index of prices developed by the War Industries Board, using 1,474 quotations, and one developed by the U.S. Bureau of Labor Statistics, using three hundred commodities, which seldom shows a difference of more than one per cent (9, p. 338).

Most of the observations noted above, however, are directed towards the compilation of price indexes at a very high level of aggregation where the commodities and services must be representative of transactions in the whole economy as in the case of the Consumer Price Index or a Wholesale Price Index series.

The problems of selecting commodities for inclusion in an education price index are less severe. Because education is labour intensive,

the greatest proportion of inputs into education consists of easily identifiable labour services, such as those rendered by teachers, janitors, bus drivers, and clerical assistants. A high proportion of non-labour inputs are also readily identifiable because of the nature of the enterprise. Thus books and paper supplies are readily identified as inputs into the educational enterprise as gasoline, tires and buses are easily identifiable as inputs into school transportation.

It would appear that if the commodities chosen for inclusion can meet the assumption that they are representative of all inputs, the actual number of commodities chosen should not be a pre-eminent concern.

Problems of Weight Choice

The basic principle governing the choice of weights is that they should reflect the relative importance of each item in the total expenditure pattern or budget. In a system of index calculation using the weighted average of price relatives, weighting for a single input may be derived by expressing the relationship of expenditure on that unit to expenditures as a whole, as a proportion.

One of the major problems in weighting is that the mix of inputs may change over time and so render inaccurate weighting derived from base year patterns. To some extent this problem may be overcome by chaining bases or linking, but the caution must apply that too frequent changes in weighting may increase the accuracy of year to year comparisons, but reduce the analytic possibilities of the series as a whole.

Fisher does not stress the problem of weighting. He notes that

"If the data for any or all of the weights were wrong by 50 or 100 percent, the resultant error would seldom amount to more than one percent" (9, p. 447), and even suggests that rough estimates and even guesses are admissable procedures for determining weights (9, p. 448). However, he does caution later that where an item has a very heavy weight, errors may be more important (9, p. 449).

It should be noted that weighting is a matter of some importance in considering the applicability of an index number series.

For instance, because the Consumer Price Index for Canada is based on the expenditure patterns of a sample of families specified as to family size, income and place of residence it cannot automatically be held to represent the impact of rising price levels on all family groups in Canada. The Consumer Price Index applies to those families:

1. living in twenty-seven Canadian cities with over 30,000 population,
2. ranging in size from two adults to two adults with four children,
3. with annual incomes ranging from $2,500 to $7,000 (5, p. 9).

A Consumer Price Index based on the expenditure patterns of different family groups might show quite different measures of price level increase.

The same consideration should be applied to an Education Price Index. The expenditure patterns of rural and urban authorities might be expected to show differences because of the relative importance of expenditures on transportation to rural authorities. It would, therefore,

not be appropriate to use the same weighting pattern for both rural and urban price indexes.

Problems of Price Data Selection

The problem of accurate pricing is more important than that of weighting, although here too Fisher provides some qualifications. He estimates that in an index composed of one hundred commodities, if each of the one hundred commodities is subject to a price error of ten per cent in either direction at random, the net resultant error would probably not be over two and one-half per cent (9, p. 341).

The problems of obtaining price data are substantial. Wasserman, in commenting on the problems of price data collection, states:

> . . .A dependence on published series is a matter of necessity if not choice for individuals or small groups compiling indexes at a state or local level. The resources of a statistical agency would be required to collect price data from a sample of school districts on items in an extensive schedule of inputs. (27, p. 128)

The problems of obtaining accurate price data are compounded if the index is to be developed from a historical base. As will be illustrated in the review of previous indexes compiled for use in education, extensive reliance was placed on published series and data derived from secondary sources.

In view of these difficulties it would appear that one of the most important criteria for price data selection would be that the selected data reflect the period to period price change.

Problems of Distinguishing Between Cost and Price Indexes

Price index numbers are a useful tool in the analysis of changes in the purchasing power of money over time. They may also be used as a basis for making adjustments in wages, pensions and grants in order to take into account what may be called the "rising cost of living."

The extent to which price indexes are a valid measure of increases in the cost of living will depend on the extent to which the price index reflects the actual cost of maintaining a standard of living. It would be useful, therefore, to examine to what extent a price index of educational inputs could be used as a measure of the cost of education. In order to do this it is necessary to examine the difference between a cost index and a price index. The difference may best be explored by reference to what was, until 1949, called the "Cost-of-Living" Index of the Dominion Bureau of Statistics. In 1949, this index was officially redesignated the Consumer Price Index. The Bureau explains:

> In fact, the Consumer Price Index and its predecessor, the Cost-of-Living Index were specifically designed to measure only changes in retail prices of a fixed quantity of commodities and services bought by families. Consequently, both indexes measured changes in the cost of living, only insofar as they resulted from changes in retail prices. (5, p. 7)

The U.S. Bureau of Labour Statistics has defined what is meant by a cost-of-living index. It is one which "would hold the level of living constant, but allow the pattern of expenditures (or the market basket) to change as prices or consumer preferences and the market change" (25, p. 579). Asimakopulos points out that a price index and cost-of-living for the same population group and time period would be

different insofar as (1) The relative quantities of commodities purchased since the base period changed. (2) New products which do not have a counterpart in the constant basket are made available. These would be included in a cost-of-living index but not a price index. (3) Consumer tastes have changed since the base period. (4) The relative prices of new and used items have changed (1, p. 377).

It is possible that an increase in a price of some educational inputs would not necessarily mean that the cost of education had increased by the same amount. There are grounds, however, for suggesting that a price index of educational inputs would correspond quite closely to a cost of education index.

Within limits, the relative quantities of commodities purchased to provide a given level of educational service do not vary extensively. The components of educational expenditures, within the present state of educational technology do not permit a high degree of substitutability. Wasserman observes,

> Even where inputs serve the same functional purposes and are economic substitutes, constraints in the form of personnel policies, sunk costs in capital items, budgeting procedures and public relations considerations, prevent administrators from making short-term adjustments in the face of price shifts. (27, p. 18)

The inclusion of new items into the expenditure pattern would not appear to be of great significance in an educational index. The major component of educational cost is the provision of teaching services. While the advent of computers may alter this picture in the future, the appearance of new items would tend to be reflected in that part of the budget now described as Instructional Supplies. Although changes in this

category of expenditure might be considerable, the relatively small weighting for it would not distort the final index.

Changes in the quality of items included in an educational price index is likely to be of far greater significance since this change may be observed in one of the major categories of expenditure, labor inputs.

On the whole, therefore, it might be said that a price index of educational inputs would provide a good measure of changes in the cost of education.

Summary and Conclusions

A review of the basic problems confronting index makers has been presented. Among those problems most difficult to solve in a satisfactory manner are those connected with changes in quality where they cannot be easily separated from changes in price. This is obviously a major problem in the construction of an education index where one input is of such great importance in the total pattern.

Problems of data collection, formula and weighting are more easily overcome or of less significance.

The choice of the fixed base, weighted average of price relatives approach to index construction, using Laspeyres' formula would appear to be appropriate for an education price index. There are a number of reasons for this choice. First, when used over a relatively short period, there would be little distortion of weights. Secondly, it would be possible to incorporate other series into the index since all major Canadian price index series are indicators constructed by the same method. Finally, it will be apparent that this approach has been one

used in the development of previous education price indexes.

IV. PRICE INDEXES IN EDUCATION

A number of educational price indexes have been developed. Most of these have been compiled in the United States, although there is one notable British contribution. The indexes each have one of two main purposes: a basis of analysis of expenditures, or a basis for adjustment of state aid programs.

Indexes of the National Education Association

One of the first price indexes for use in education was compiled in 1926 by the research division of the National Education Association and was designed to study increases in school expenditures between 1914 and 1924. A similar study was made in 1932 for the period between 1914 and 1930 (27, p. 110). Both investigations used the Consumer Price Index published by the U.S. Bureau of Labor Statistics to deflate expenditures. It was suggested in the second study that the research findings could be refined by replacing the Consumer Price Index (then called the Cost-of-Living Index) by an index specially designed for educational inputs. In 1938 the research division compiled such an index and used it in a study of school costs between 1914 and 1930 (19).

The index was of the fixed base, weighted average of price relatives type. It consisted of eleven subindexes, each of which represented a major expenditure category of school systems. Each subindex was weighted by the proportion of total expenditure in each category. The subindexes were combined into one index with 1914 as the

base year. The expenditure categories and weights for this index are set out in Table I.

TABLE I

EXPENDITURE CATEGORIES AND WEIGHTS FOR N.E.A. INDEX OF 1938 (1914 = 100)

	Expenditure Category	Weight
1.	Salaries and Wages	.591
2.	Textbooks	.011
3.	Supplies	.021
4.	Construction	.094
5.	Sites	.033
6.	Equipment	.027
7.	Operation	.041
8.	Maintenance	.029
9.	Indebtedness	.105
10.	Transportation	.041
11.	Coordinating Activities	.007
	Combined Index	1.000

Source: Adapted from National Education Association, "Why Schools Cost More," Research Bulletin (May, 1938), p. 147.

Most of the data used in the compilation of this series were derived from two sources. The first source was the U.S. Office of Education from which actual school expenditure data were obtained; the second source was the Wholesale Price Index of the Bureau of Labor Statistics, from which data not available elsewhere were obtained.

The major subindex, that for salaries and wages, was constructed from a series on wages of unskilled labor. This approach was justified on the grounds that "if there had been no change at all in teacher qualifications between 1914 and 1930, the trend of average salaries of

teachers in those years would have been approximately the same as the trend of the average weekly wages paid to unskilled labor" (29, p. 145). The intention was to isolate the influence of changes in training and experience, but the approach neglected differences in the supply situation of laborers and teachers. It is possible that the approach may have been justified in the conditions of labour oversupply in the 1930's, but it would be difficult to justify using the approach as a general rule. However, it does represent one way of attempting to control for changes in the quality of the teaching force.

Other subindexes in the series are worth examining since the methodology has provided guidance for other series compiled in the United States. The subindex for textbooks was compiled on the basis of data supplied by publishers' houses on the prices for standard textbooks. The subindex for supplies was compiled from published wholesale price series, and quotations from wholesale houses when published series were thought to be inadequate. The subindex for Transportation was compiled from three available indexes: an index of motor vehicle prices, a wholesale price index for tires and tubes, and an index of gasoline prices.

It is worth noting that this index excluded consideration of prices both of sites and indebtedness. It is pointed out (19, pp. 150-51) that there was no information available on which to base index calculations, but that for purposes of methodology, both items were included at a constant value of 100.

The index was used in the analysis of expenditures on education

and included the finding that "Whilst the cost of maintaining the same cost of living increased 66 percent between 1914 and 1930, the cost of providing the same standard of schooling increased 71 percent during the same period" (19, p. 153). It also noted, "It would have cost $1,357 million in 1914 to support the same school program for which the schools paid $2,317 million in 1930" (19, p. 168).

Indexes Compiled by Lorne Woollatt

Lorne H. Woollatt, one-time Assistant Commissioner for Research of the State of New York Education Commission, has compiled a number of price indexes for education for school systems of different sizes, of which the most important were for New York State (30), and for Baltimore (28) and (29).

Woollatt's first index, covering the period 1939-1952 (30), included only items classified as current expenditure and is much simpler than the N.E.A. index. Woollatt divided annual expenditures into two categories: salary and non-salary. The salary index was compiled from the Consumer Price Index and a median salary figure for beginning teachers with four years of training beyond high school, in village superintendency districts in New York State. Each series was assigned a weighting of .5 in the salary index. The non-salary index was based on four subindexes from the wholesale price index network: pulp and paper (weighted .286), building materials (weighted .336), fuel and lighting materials (weighted .227), and home furnishings (weighted .151). The salary and non-salary indexes were assigned respective weights of .80 and .20 and combined into an index.

The most questionable of Woollatt's assumptions was that changes in the level of salaries were related to the Consumer Price Index. Woollatt himself later rejected this assumption in the Baltimore study of 1958 (29, p. 9). He also decided in this study that the salary index should contain a component for non-professional personnel.

Accordingly, the Baltimore studies included more components in both salary and non-salary subindexes.

The salary index included a component for professional employees (weighted .7) and non-professional employees (weighted .10). The professional component was based on the median salaries of beginning teachers with four years of training in eighteen large cities in the United States. The non-professional employees component was based on the census median income of clerical workers.

The non-salary index was extended to include paper (weighted .0572), prepared paint (weighted .0224), lumber and wood products (weighted .0224), concrete products (weighted .0224), household furniture (weighted .0302) and fuel, power and lighting materials (weighted .454). The weighting of the salary and non-salary index was the same as for the New York study: .80 and .20 respectively.

One of the major advantages of the series compiled by Woollatt is the ease with which currency may be maintained.

Later New York Studies

Later studies compiled by the New York State Education Department (3) utilized elements of both the N.E.A. index of 1938 and Woollatt's indexes. The components and weights, together with the published series

used in the compilation are set out in Table II.

TABLE II

SUBINDEXES, WEIGHTS AND PUBLISHED SERIES USED IN NEW YORK STATE DEPARTMENT INDEX

Subindex	Published Series	Weight
1. Professional Salaries	Median income of salaried professional and technical and kindred workers, 14 years and over	.7785
2. Service Workers	Median income of male service workers (other than in private households)	.0615
3. Clerical Workers	Median income of female clerical and kindred workers, 14 years and over.	.0371
4. Textbooks, Instructional Supplies	Wholesale Price Index for "Paper except Newsprint"	.0406
5. Upkeep and Maintenance	U.S. Department of Commerce, Composite Construction Cost Index	.0423
6. Utilities	Wholesale Price Index for "Fuel, Power, and Lighting materials	.0282
7. Miscellaneous	Wholesale Price Index for "All Commodities"	.0118

Source: Gerald J. Boyle, The Cost of Education Index. Albany: The State Education Department, 1959.

It will be noted that salary data for this index were not derived from data available to the Department. The claim was made that since the index was to be used as a basis for adjusting grants ". . .an indirect measure is necessary if self-generating effects are to be avoided"

(3, p. 7). The appropriateness of the indicator was verified by comparison with actual salaries paid.

The Nevada Price Index

A more recent index was developed by the Sub-Committee on School Finance of the Nevada Legislature in 1964 (34). The index has much in common with the New York index in that similar reliance is placed on published series and that every attempt is made to avoid the "self-generating" effects of locally-obtained data (21, p. 10).

The compilation of this index is summarized in Table III. It will be noted that the index is more comprehensive in that more component indexes are utilized. It will also be noted that there is a separate component for transportation, a component not considered by Woollatt or the New York index. Since the Nevada index is intended for use in the adjustment of school grants, the component subindexes are classified in accordance with the regulations of the basic support pattern.

Vaizey's Index

A much more comprehensive index was developed by John Vaizey for his analysis of the costs of education in Great Britain during the period 1920-1955 (26).

The salary index was compiled from twenty-two subindexes which represented different levels of training and responsibility for which additional salary was involved. In order to account better for the changing levels of qualifications, the technique of splicing was utilized. In effect, two separate indexes were computed; one for the period 1920 to 1930, and another for the period 1930 to 1948. The two

TABLE III

SUBINDEXES, WEIGHTS AND PUBLISHED SERIES USED IN NEVADA STATE DEPARTMENT INDEX

Subindex	Published Series	Weight
Professional Salaries Administration	Census median income of "Salaried Professional, Technical and Kindred Workers, Male Only."	.0111
Clerical Salaries	Census median income of "Clerical and Kindred Workers, Female."	.0072
Other Expenses	Wholesale Price Index of "Commodities Other Than Farm Products and Food."	.0042
Professional Salaries Instruction	Census median income of "Salaried Professional, Technical and Kindred Workers, Female Only."	.7052
Clerical Salaries	Same as Clerical Salaries, Administration.	.0214
Teaching Materials	Pulp, Paper and Allied Products Index, and Average Gross Weekly Earnings of Publishing and Allied Industries	.0552
Other Expenses	Same as Other Expenses, Administration	.0053
Transportation Salaries	Census median income of "Operative and Kindred Workers, Male Only."	.0120
Other Expenses	Motor Vehicles Index	.0215
Salaries, Plant Operation	Census median income of "Service Workers, Excluding Private Households, Male Only."	.0573
Heat Buildings	Wholesale Price Index of "Fuel, Power and Related Products Index."	.0137
Utilities Except Heat	Average Weekly Earnings, Telephone Communications, and Electric Power Index	.0221
Other Expenses	Same as Other Expenses (Administration)	.0068

TABLE III (Continued)

Subindex	Published Series	Weight
New Vehicles	Motor Vehicles Index	.0042
Salaries Attendance Workers	Census median income of "Unskilled Workers (Non-Extractive)."	.0030
Other Expenses, Attendance	Same as Other Expenses (Administration)	.0004
Salaries, Health Personnel	Same as for Professional Salaries, Instruction	.0077
Other Expenses, Health	Same as for Other Expenses (Administration)	.0007
Salaries, Maintenance Workers	Census median income of "Craftsmen, Foremen and Kindred Workers, Male Only."	.0161
Other Expenses, Maintenance	Same as for Other Expenses (Administration).	.0251

Source: Adapted from Sub-Committee on Educational Finance, Proposed Nevada Price Index. Reno: State Department of Education, 1964.

series were combined on the basis of the ratio between the index values in the overlap year, 1930.

The majority of other subindexes were derived from local government data (26, pp. 214-15) although the Cost of Living Index was utilized for the miscellaneous expenditures component.

After using the index to deflate expenditures on education in Great Britain in the period 1921-1955, Vaizey was able to estimate that the major part of the increase of from 84.6 million in 1921 to 410.6 million in 1955, was attributable to the rise in the price level.

> In terms of 1948 prices, the increase in expenditure was from £128.1 million in 1921 to about £300 million in 1955. This was a rise from an index of 59 (1948=100) to 141, or broadly speaking, of nearly two and a half times compared with nearly five times the 1921 figure in current money terms. The expansion in real expenditure from 1946 until 1955 was of the order of three-quarters at 1948 prices and of one and three-quarters at current prices. (26, p. 22)

Hirsch's Index

A much less comprehensive index was developed by Werner Hirsch for his analysis of education costs in the United States 1900-1958 (12). In order to deflate expenditures on education over this period, Hirsch used an index based solely on average teachers' salaries. He justifies his position as follows:

> Since by far the overwhelming part of all current expenditures take the form of salaries to the instructional staff, and since reasonably good data on the annual salaries of instructional personnel are available, these data are used as the main source of information on price level changes. (12, pp. 19-20)

The results of his analysis, based on the index, suggest that "While between 1900 and 1958 actual expenditures increased 56-fold, the increase of the salary adjusted series extends merely from about $2.3 million to $9 million--less than fourfold"(12, p. 35).

It may be held that the deflation is too gross on two counts. First, the use of an index compiled from average salaries conceals increases in remuneration which have resulted from increased qualifications. Although it has already been suggested that the quantification of the relationship between teacher qualifications and teacher quality is difficult, the use of the average salary may be questioned. Hirsch has used his index as a pure price index and the use might not be justified. On the other hand, the use of this index does not invalidate

the analysis; it serves only to limit the conclusions made in the study.

Secondly, the deflation may be held to be too gross on the grounds that whilst teaching salaries account for a large proportion of current expenditure, they do not constitute all expenditure. Although Hirsch later defines a unit of teaching so as to exclude consideration of almost all other inputs, his conclusions about total expenditures may overstate the deflation by the difference in price movements of those components which have not increased in price as much as the labour inputs.

Summary and Conclusions

From the review of index construction and indexes which have been compiled for use in education, the following generalizations would appear to be justified.

Index series developed for use in education use the weighted average of price relatives method and Laspeyres' formula. The fixed base may be questioned in the indexes which cover the longer periods, especially that used by Hirsch, but as has been suggested, the state of educational technology is such that no major changes in patterns of expenditure, particulary of current inputs, is likely.

Published series have been incorporated into all index series developed for use in education, and in most cases the basis of selection appears to have been logical consistency.

Series which have been developed for use primarily in making adjustments to programmes of financial aid avoid the use of local data so as to avoid "self-generating" effects. Those developed for the

purpose of analysis use locally derived data as much as possible.

Only Vaizey attempted to make allowances for changes in the quality of the teaching force. Hirsch deliberately ignored the problem and other indexes, such as the N.E.A. 1938 Index and Woollatt's Baltimore, sidestepped the issue by making the implicit assumption that no change had taken place.

All the series reviewed above were compiled for use at a high level of aggregation and consequently, little attempt was made to consider effects which might result from gross differences in patterns of expenditure such as might be found between rural and urban districts.

Vaizey's index is perhaps the most comprehensive of those discussed, but the resources which would be required to maintain the currency of such an index would be considerable. The 1948 N.E.A. approach and the 1964 Nevada approach probably constitute the best available model, and have the added advantage of being relatively easy to keep up to date.

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CHAPTER IV

THE ALBERTA EDUCATION PRICE INDEXES

I. INTRODUCTION

This chapter reports the first stage of the study, the construction of the Alberta Education Price Index.

The first section provides an overview of the guiding principles used in the construction of the Indexes. The second section provides a description of the methodology used, and stages in the construction of the Indexes. This section also includes an explanation of the approach used to assess the impact of changing levels of teacher qualification on the price levels of teaching services. The third and fourth sections contain the details of construction of the price indexes. The third section provides the details of construction of the major subindexes, and the fourth section shows how the major subindexes were combined into the network of price indexes which have been designated as the Alberta Education Price Indexes.

II. AN OVERVIEW

In order to analyse school board expenditures on operation during the period 1957-1965, it was necessary to compile three separate price indexes; the first to measure price level increases in inputs as they affected provincial school board expenditures, considered as a whole, the second to measure price level increases in inputs as they affected

small area school board expenditures, and the third to measure price level increases in inputs as they affected large area school boards.

The indexes have been designated:

The Provincial Index

The Small Area Index

The Large Area Index.

Each Price Index was compiled in the context of some general guiding principles.

The first of these principles was that all data should be obtained at the highest possible level of aggregation. Insofar as it was possible, weights were based on breakdowns of expenditure provided by the Alberta Department of Education in the financial statements which are part of each Annual Report. Where this breakdown was not provided, weighting was based on the sample of school district auditors' reports.

The same principle was adopted in the gathering of price data. In each case the price data were representative of prices obtaining at the provincial level, although there was some indication, as in the case of school supplies, for instance that price data gathered at even higher levels of aggregation would be appropriate.

Price data for labour inputs were also derived at the provincial level of aggregation. The main source of price data for labour inputs other than teachers' services was the annual Salary and Wage Rate Survey published by the Alberta Bureau of Statistics of the Department of Industry and Commerce of the Government of Alberta.

The specific wage and salary series selected for use were those which applied to persons employed in institutions in urban and rural centres throughout Alberta. A list of the institutions and centres from which wage and salary data are gathered by the Bureau is provided in Appendix B. In general, it may be pointed out that the centres listed are those which also contain the administrative centres of school authorities. The selection of a particular wage or salary series was governed by the correspondence between the job description associated with a wage rate and the actual duties performed by the school employee.

It is recognized that some discrepancies may have existed between a wage rate supplied by the Alberta Bureau of Statistics and an actual wage received by a school employee, but it should be pointed out that it was not the actual wage, but the year-to-year change in the level of wages that was important for index purposes.

If one grants to some extent the operation of a competitive market for special types of labour and some degree of labour mobility in the centres from which wage data were gathered, it will be seen that there are sound reasons for assuming that the rates used by the Alberta Bureau of Statistics would be representative of rates paid to similar classes of employee by school authorities.

A second general principle was that the system of input classification used by the Department of Education in reporting school expenditures should be followed wherever possible.

It is possible that adoption of this principle could lead to some apparent distortions. For example, expenditures on administration,

as classified by the Department of Education, constitute a very small proportion of total expenditure. Empirical studies of administrative costs in Alberta school systems by Percevault (8), Ward (11), and Small (9) suggest that if remuneration paid to personnel for all services other than classroom teaching is included in computing administrative cost, the proportion rises considerably. Small estimates that in 1965, administrative cost, defined in the wider context, amounted to 23.1 per cent of current expenditure in the Edmonton Public School District, and that the average proportion for rural areas was 19.7 per cent (9, p. 56). Such differences are not significant from the point of view of the index compiler since they are a reflection of a different system of classification rather than a difference in the inputs themselves.

III. METHODS OF CONSTRUCTION

The Alberta Education Price Indexes are similar in construction to the N.E.A. Index of 1938 (pp.48-51 supra), the Nevada Price Index (pp.54-55 supra) and Vaizey's Index (pp. 54 and 56 supra). Each index was compiled from a series of major subindexes each of which represented a major category of expenditure of school boards. Each major subindex was, in turn, compiled from a series of component subindexes which represented a homogeneous group of inputs within each major category.

The indexes are of the fixed base year, fixed weight variety and were compiled using Laspeyres' formula.

Major Subindexes

The system of input classification used by the Department of Education for reporting school expenditures made it possible to develop a number of subindexes which could be combined by means of different weighting patterns into the Provincial, Small Area and Large Area Indexes.

Thus, each of the Indexes is compiled from seven major subindexes:

1. A salary subindex,
2. An administration subindex,
3. An instructional aids and supplies subindex,
4. A plant operation and maintenance subindex,
5. A transportation subindex,
6. An auxiliary services subindex,
7. An other inputs subindex.

Each of the major subindexes is, in turn, compiled from a number of component subindexes.

Component Subindexes

Each major subindex reflects a major category of input as previously defined. However, each major category of input reflects a combination of a variety of goods and services, each of which might be expected to demonstrate a different pattern of price behaviour. As a result, it was first necessary to identify which specific goods and services were included in each major category of input, and to compile a number of subordinate price indexes which would measure the price behaviour of the specific goods and services.

These price indexes were designated component subindexes in order to distinguish them from the major subindexes.

Steps in Major Subindex Construction

Each major subindex was compiled in four steps.

Step I: Each component subindex was assigned a weight reflecting its importance in the pattern of expenditures on each major category of input.

Step II: Each component was priced for each year 1957-1965 and the resulting price data were expressed as price relatives.

Step III: Each component price relative was multiplied by the component weight to provide a weighted price relative for each year.

Step IV: The weighted price relatives were summed each year to provide major subindex values.

Before describing in detail the compilation of each component and major subindex, it is necessary to specify the procedures which were used in an attempt to control for changes in the level of qualification of teachers.

Training and Quality in Teaching Service

Although it was pointed out in the review of literature that there was no satisfactory method of determining an empirically-based relationship between years of training and the quality of teaching service, it is possible to provide an assessment of the effect that such a relationship would have on estimates of real expenditures on education.

Such an assessment would be possible if different assumptions were

made about the relationship between years of training and utility determining characteristics of the teaching force, and then tested in a subsequent analysis for significant differences.

This approach has been used in the compilation of the teachers' salary subindexes of the Alberta Education Price Indexes.

Assumptions. Two alternate assumptions were made:

1. Years of training are not a utility determining characteristic in the quality of teachers' services.

2. Years of training are a utility determining characteristic in the quality of teachers' services.

Although most Alberta salary schedules provide for salary entitlement on the basis of six different levels of training, one for each year of university training beyond Grade XII to a maximum of six years. it was considered that certification level, which is based on years of training as evaluated by the Alberta Department of Education would provide an adequate bases for differentiation.

The relationships between years of training and certification are set out in Table IV.

Table IV shows that although there are nine different certificates which are current in Alberta, there are three levels of training which qualify teachers for different types of certification: one year of training, two years of training and three or more years of training.

Three Salary Subindexes were compiled on the basis of the two assumptions; and the three different levels of teacher training:

TABLE IV

RELATIONSHIP BETWEEN ALBERTA CERTIFICATION AND LENGTH OF UNIVERSITY TRAINING

Certificate	Years of Training
Group I	
Professional	3+
Academic	3+
High School	3+
Group II	
Standard S	2
Standard E	2
Standard E and S	2
Group III	
Junior E	1
First Class	1
Elementary & Intermediate	1
Second Class	1

Source: Alberta Teachers' Association, A.T.A. Handbook (Edmonton: Alberta Teachers' Association, 1966), pp. 200-201.

Salary Subindex I. Salary Subindex I was compiled on the basis of the first assumption. Since years of training were not considered as utility determing characteristics in the quality of teachers' services, any increase in the average salary paid to teachers was regarded as an increase in price level.

Salary Subindex II. Salary Subindex II was compiled on the basis of the second assumption. It was considered that there were two levels of utility in teaching services. The first level was represented by teachers with three or more years of training and possessing the Professional Certificate, and the second level was represented by teachers with less than three years of training and possessing certification lower than the Professional. In Salary Subindex II the average salaries of the two groups of teachers were considered as indicative of the price level of two different components of the Salary Subindex.

Salary Subindex III. Salary Subindex III was also compiled on the basis of the second assumption. It was considered that there were three levels of utility in teaching services. The first level was represented by teachers with three or more years of training and possessing the Professional certificate, the second level was represented by teachers with two years of training and possessing certificates lower than the Standard. In Salary Subindex III the average salaries of each of the three groups were considered as indicative of the price levels of three different components of the Salary Subindex.

Stages in Computation

Since it was also necessary to compile three separate price indexes to measure price level increases in inputs as they affected school boards at three levels of aggregation, a total of nine different price indexes were compiled. They may be arranged in three groups of three each:

1. A Provincial Price Index compiled with Salary Subindex I.
   A Provincial Price Index Compiled with Salary Subindex II.
   A Provincial Price Index compiled with Salary Subindex III.
2. A Small Area Price Index compiled with Salary Subindex I.
   A Small Area Price Index compiled with Salary Subindex II.
   A Small Area Price Index compiled with Salary Subindex III.
3. A Large Area Price Index compiled with Salary Subindex I.
   A Large Area Price Index compiled with Salary Subindex II.
   A Large Area Price Index compiled with Salary Subindex III.

In order to simplify computation and to assist in the subsequent analysis, it was decided to distinguish between two major groups of inputs: teaching services and inputs other than teaching services. The first major group of inputs consisted entirely of teachers' salaries and the second major group of inputs consisted of the remaining six major subindexes.

This grouping permitted the development of the Alberta Education Price Indexes in four stages.

Stage 1. The three salary indexes were compiled.

Stage 2. The other six major subindexes were compiled.

Stage 3. The six major subindexes for inputs other than teaching

services were combined by means of different weighting patterns into three subindexes for other inputs: A Provincial Subindex for Other Inputs, A Small Area Subindex for Other Inputs and A Large Area Subindex for Other Inputs.

Stage 4. Each of the three subindexes for Other Inputs were combined with each of the three salary subindexes, to provide the three sets of price indexes specified above.

Weighting Patterns for Major Subindexes

The weighting patterns for compiling the major subindexes into the final indexes were based on the expenditure patterns of school systems at the three levels of aggregation.

Although the use of the base year weighting formula required that only the 1957 patterns be examined, it was considered that a more thorough analysis would provide a check on the appropriateness of the use of a base year weighting system.

Accordingly, the pattern of expenditure for each of the nine years was examined.

In order to determine the patterns of expenditure necessary for weighting the subindexes it was necessary to examine the financial tables provided in the Annual Reports of the Department of Education for the years 1957-1965.

These tables provide a report of total expenditures on each major category of input for each of the following types of school system in the province:

Divisions

Counties

City School Districts

Town School Districts

Village School Districts

Consolidated School Districts

Rural School Districts

The first stage in weight determination was to prepare a breakdown of total annual expenditure on each major category of input for school systems at each of the three levels of aggregation. The results of this breakdown are set out in Tables V, VI, and VII.

Table V presents a breakdown of operating expenditure of all provincial school authorities. Table VI presents a breakdown of the small area school authorities which include city school districts, town school districts, village school districts, and rural school districts. Table VII presents a breakdown for large area school authorities which include school divisions, counties and consolidated school districts.

Tables V, VI and VII show that for each level of aggregation the patterns of expenditure have remained relatively stable for the nine-year period and that the use of a base year weighting system is justified.

The second stage in the determination of the weighting patterns was the conversion of the percentage breakdowns by each major category of inputs into weights. The percentage of total expenditure on each major category of input in the base year 1957 was converted to a decimal to provide the weight for each major subindex in each of the three

TABLE V

OPERATING EXPENDITURES OF PROVINCIAL SCHOOL AUTHORITIES 1957-1965
(Thousands of Dollars)

Year	Administration	Teachers' Salaries	Instructional Aids & Supplies	Plant Operation & Maintenance	Transportation	Auxiliary Services	Other Expenditures	Total
1957	$1,578	$35,381	$2,396	$8,950	$7,842	$296	$1,028	$57,470
%	2.7	61.5	4.7	15.5	13.7	0.6	1.7	
1958	1,887	41,667	2,989	11,021	8,522	286	1,188	67,559
%	2.7	61.7	4.5	16.4	12.6	0.4	1.7	
1959	2,075	49,138	3,535	11,996	9,237	255	1,292	77,517
%	2.6	63.4	4.6	15.6	11.9	0.3	1.6	
1960	2,364	57,144	3,862	13,204	9,777	242	1,432	88,025
%	2.6	64.9	4.4	15.1	11.2	0.2	1.6	
1961	2,708	65,220	4,745	14,314	10,732	255	1,211	99,185
%	2.7	65.8	4.8	14.5	10.8	0.2	1.2	
1962	2,915	71,209	4,694	15,410	10,355	198	1,432	106,212
%	2.7	67.0	4.5	14.6	9.7	0.1	1.3	
1963	3,214	77,745	5,075	16,594	10,841	232	1,445	115,147
%	2.7	67.6	4.5	14.4	9.4	0.2	1.2	
1964	3,655	86,391	5,039	19,422	11,753	133	1,010	127,402
%	2.9	67.9	3.9	15.2	9.2	0.1	0.8	
1965	4,281	95,715	6,142	21,256	12,617	84	1,149	141,401
%	3.1	67.7	4.3	15.0	9.0	0.1	0.8	

Sources: Government of Alberta, Department of Education, Annual Reports for 1958-1966.

TABLE VI

OPERATING EXPENDITURES OF SMALL AREA SCHOOL AUTHORITIES 1957-1965
(Thousands of Dollars)

Year	Administration	Teachers' Salaries	Instructional Aids & Supplies	Plant Operation & Maintenance	Transportation	Auxiliary Services	Other Expenditures	Total
1957	$ 709	$17,385	$1,148	$4,433	$ 186	$ 56	$ 550	$24,467
%	2.8	71.0	4.6	18.1	0.9	0.2	2.4	
1958	920	21,098	1,388	5,709	224	54	636	30,028
%	2.0	70.3	4.7	19.1	0.7	0.1	2.1	
1959	1,035	25,583	1,694	6,394	297	36	761	35,798
%	2.8	71.5	4.7	17.8	0.8	0.1	2.2	
1960	1,250	30,585	1,976	7,143	321	30	798	42,104
%	3.0	72.6	4.6	17.0	0.7	0.1	1.9	
1961	1,471	35,841	2,611	8,029	396	79	793	49,220
%	3.0	72.8	5.3	16.4	0.8	0.1	1.6	
1962	1,624	40,758	2,687	8,716	503	66	1,017	55,372
%	3.0	73.6	4.8	15.7	0.9	0.1	1.8	
1963	1,821	45,529	2,951	9,650	634	82	995	61,661
%	3.0	73.9	4.7	15.6	1.0	0.1	1.6	
1964	2,166	51,895	2,985	11,704	900	66	581	70,297
%	3.0	73.8	4.2	16.7	1.2	0.1	1.0	
1965	2,688	58,308	3,729	12,936	1,110	22	772	79,566
%	3.4	73.3	4.7	16.2	1.3	0.1	0.9	

Sources: Government of Alberta, Department of Education, Annual Reports for 1958-1966.

TABLE VII

OPERATING EXPENDITURES OF LARGE AREA SCHOOL AUTHORITIES 1957-1965
(Thousands of Dollars)

Year	Administration	Teachers' Salaries	Instructional Aids & Supplies	Plant Operation & Maintenance	Transportation	Auxiliary Services	Other Expenditures	Total
1957	$ 870	$17,996	$1,248	$4,517	$7,656	$ 239	$ 478	$33,004
%	2.6	54.5	3.8	13.6	23.2	0.8	1.5	
1958	967	20,569	1,600	5,312	9,298	232	552	37,530
%	2.5	54.8	4.3	14.2	22.2	0.6	1.4	
1959	1,041	23,545	1,841	5,602	8,941	219	531	41,719
%	2.4	56.5	4.5	13.5	21.4	0.5	1.2	
1960	1,114	26,558	1,885	6,061	9,456	212	638	45,921
%	2.4	57.9	4.2	13.2	20.6	0.4	1.3	
1961	1,237	29,379	2,134	6,284	10,336	176	418	49,965
%	2.5	58.8	4.3	12.6	20.7	0.3	0.8	
1962	1,291	30,450	2,007	6,693	9,852	132	415	50,841
%	2.5	59.9	3.9	13.9	19.4	0.3	0.8	
1963	1,393	32,216	2,125	6,944	10,206	151	451	53,486
%	2.6	60.3	3.8	13.0	19.2	0.3	0.8	
1964	1,489	34,495	2,053	7,718	10,852	67	429	57,105
%	2.6	60.4	3.6	13.5	19.1	0.1	0.7	
1965	1,693	37,407	2,413	8,320	11,567	62	376	61,837
%	2.7	60.4	3.9	13.5	18.7	0.1	0.7	

Sources: Government of Alberta, Department of Education, Annual Reports, 1958-1966.

indexes.

Salary Subindex weights. Table V shows that expenditure on teachers' salaries accounted for 61.5 per cent of all operating expenditures in the base year 1957. Expenditures on teachers' salaries accounted for 71 per cent of all expenditures by small area school boards (Table VI) and for 54.5 per cent of all expenditures by large area school boards in the base year (Table VII).

The weights for Salary Subindexes which were used in the compilation of the overall price indexes were therefore:

Provincial Salary Subindex	.615
Small Area Salary Subindex	.710
Large Area Salary Subindex	.545

Administration Subindex weights. Table V shows that Administration, as a percentage of total operating expenditure remained very stable during the period 1957-1965, varying between 2.6 per cent in 1957 and 3.0 per cent in 1965. Tables VI and VII show that the percentage of expenditure devoted to administration by small and large area authorities also remained stable varying from 2.8 per cent to 3.4 per cent in the case of small area authorities and from 2.4 per cent to 2.7 per cent in the case of large area authorities.

Expressed as weights, the base year percentages were:

Provincial Administration Subindex	.027
Small Area Administration Subindex	.028
Large Area Administration Subindex	.026

Instructional Supplies Subindex weights. Table V, p. 75, shows that the percentage of total operating expenditures devoted to the purchase of Instructional Supplies has shown little variation over the period 1957-1965, ranging from a low of 3.9 per cent in 1964 to a high of 4.7 per cent in 1961 and with a mean of 4.4 per cent. Table VI, p. 76, shows that in small area authorities the percentage varied from a low of 4.1 per cent in 1960 to a high of 5.3 per cent in 1961 with a mean of 4.6 per cent. Table VII, p. 77, shows that for large area authorities, the percentage varied from 3.5 per cent in 1957 to a high of 4.4 per cent in 1958.

The percentages in 1957, the base year for the series, were 4.3 per cent for the province, 4.6 per cent for small area authorities and 3.8 per cent for large area authorities. Expressed as weights, the percentages were:

Provincial Instructional Aids and Supplies Subindex	.043
Small Area Instructional Aids and Supplies Subindex	.046
Large Area Instructional Aids and Supplies Subindex	.038

Plant Operation and Maintenance Subindex weights. The expenditure patterns set out in Tables V, VI, and VII, pp. 75-77, show that Plant Operation and Maintenance, as a proportion of total operating expenditures, remained relatively stable for the period, varying from a low of 14.3 per cent in 1961 and 1962 to a high of 15.5 per cent in 1957 with a mean of 15 per cent for the nine-year period. There has been a greater range for small area authorities where the percentage varied from 15.6 per cent in 1963 to 19 per cent in 1958. In the case of the large area

authorities there was more stability. If one neglects the unusually low percentage of 11.9 in 1962, one may see that in most years the percentage is very close to the 13.6 per cent which is the base year percentage.

Using the percentages for 1957, the base year weighting for the Plant Operation and Maintenance Subindexes were:

Provincial Plant Operation and Maintenance Subindex	.155
Small Area Plant Operation and Maintenance Subindex	.181
Large Area Plant Operation and Maintenance Subindex	.136

Transportation Subindex weights. Table V, p. 75, shows that Transportation as a percentage of total operating expenditures declined from 13.7 per cent in 1957 to 8.9 per cent in 1965. Table VII, p. 77, shows that this decline was largely the result of the decline in the percentage of expenditure by the large area authorities, for whom expenditure on transportation was reduced from 23.1 per cent in 1957 to 18.7 per cent in 1965. There was a slight increase in the percentage of expenditure on transportation for small area authorities as shown by Table VI, p. 76. An increase is shown from 0.7 per cent in 1957 to 1.3 per cent in 1965.

Using the percentage of expenditure on transportation in 1957 as the basis of weight determination, the weights for the Transportation Subindex were:

Provincial Transportation Subindex	.137
Small Area Transportation Subindex	.009
Large Area Transportation Subindex	.232

Auxiliary Services Subindex weights. Tables V, VI and VII, pp. 75-77, show that the percentage of expenditures devoted to auxiliary services never exceeded one per cent for the entire period of the series. Although the base year percentages are in fact the highest of any year, being 0.6 per cent in the case of the provincial aggregation, 0.2 per cent in the case of the small area aggregation, and 0.8 per cent for the large area aggregation, they were used to provide the weights for the Auxiliary Services Subindexes. The weights were:

Provincial Auxiliary Services Subindex	.006
Small Area Auxiliary Services Subindex	.002
Large Area Auxiliary Services Subindex	.008

Other Expenditures Subindex weights. Tables V, VI, and VII, pp. 75-77, show that there have been substantial decreases in the proportion of total expenditures devoted to other expenditures. At the provincial level the proportion dropped from a high of 1.7 per cent in 1957, to a low of 0.8 per cent in 1965. In the case of the small area aggregation, other expenditures dropped from 2.4 per cent of total expenditures in 1957 to 0.9 per cent in 1965. In the large area aggregation, other expenditures dropped from 1.5 per cent in 1957 to 0.7 per cent in 1965.

In view of the relatively small proportion of total expenditures devoted to other expenditures as a whole, however, it was not considered that the changes would have any effect on the final indexes and so the weighting for the Other Expenditures Subindex was based on the pattern of expenditures in 1957. The weights were:

Provincial Other Expenditures Subindex .017

Small Area Other Expenditures Subindex .024

Large Area Other Expenditures Subindex .015

Summary. The method of determining the weighting patterns for the major subindexes has been described. The summary below sets out in more concise form the weights to be used in compiling major subindexes into the Alberta Education Price Indexes:

	Provincial	Small Area	Large Area
Salary Subindexes	.615	.710	.545
Administration Subindex	.027	.028	.026
Instructional Supplies and Aids Subindex	.043	.046	.038
Plant Operation and Maintenance Subindex	.155	.181	.136
Transportation Subindex	.137	.009	.232
Auxilliary Services Subindex	.006	.002	.008
Other Expenditures Subindex	.017	.024	.015
Totals	1.000	1.000	1.000

IV. STAGES 1 AND 2: MAJOR SUBINDEX CONSTRUCTION

This section provides details of the construction of each of the seven major subindexes specified on pages 67 and 68, in accordance with the steps outlined on page 68.

Salary Subindexes

Component weights. The attempts to relate quality in the teaching force to level of certification meant that for the purposes of compiling

Salary Subindexes II and III, it was necessary to consider each level of certification as a separate component. It was thus necessary to develop a system of component weights which would reflect the proportion of the total salary bill paid to teachers in each of the different levels of certification. Since the compilation of Salary Subindex I did not involve the computation of component weights, further discussion of Salary Subindex I will be delayed until after the description of the method used to determine the component weighting system for Salary Subindexes II and III.

The Department of Education, in its Annual Report, provides an annual average salary figure for male and female teachers in each level of certification. These averages, together with the total number of teachers in each level of certification, were abstracted from the relevant Annual Reports and combined into Table of Appendix C.

The total salary paid to each of the relevant levels of certification was computed by multiplying the number of teachers by the appropriate average salary and summing each total into the distribution required for index purposes. Each total salary figure was then expressed as a percentage of computed total salary. The computed totals and percentages are set out in Table VIII.

The slight discrepancies between the totals of salary expenditure reported by Tables V, p. 75, and VIII, are not unexpected, since those reported in Table VIII are based on a computation of average salaries paid to those with teaching certificates, whereas the totals reported in Table V, p. 75, include all payments made for teaching services and

TABLE VIII

COMPUTED TOTAL SALARY, TOTAL AND PERCENTAGES OF TOTAL SALARY PAID BY CERTIFICATION IN ALBERTA 1957-1965

Year	Computed Total Salary (1)	Professional Certificate Amount (2)	Professional Certificate Per cent (3)	Standard Certificate Amount (4)	Standard Certificate Per cent (5)	Less than Standard Certificate Amount (6)	Less than Standard Certificate Per cent (7)	Less than Professional Certificate Amount (8)	Less than Professional Certificate Per cent (9)
1957	$33,945,873	$10,408,144	30.66	$5,475,974	16.16	$18,951,755	53.18	$23,537,729	69.34
1958	40,371,876	12,506,597	30.98	6,624,921	16.41	21,240,358	52.61	27,865,279	69.02
1959	48,433,613	15,542,513	32.09	8,010,593	16.54	24,880,507	50.22	32,891,100	66.76
1960	56,413,747	17,853,906	33.24	9,824,078	17.41	27,835,763	49.35	37,659,841	66.76
1961	64,832,260	22,587,081	34,84	11,883,748	18.33	30,361,431	46.83	42,245,179	65.16
1962	71,431,967	26,859,818	37.60	13,647,316	19.10	30,924,833	43.30	44,572,149	62.40
1963	77,374,151	31,534,543	40.76	14,859,528	19.21	30,920,080	40.03	45,839,608	59.24
1964	85,343,108	36,483,481	42.73	16,999,618	19.92	31,859,999	37.35	48,859,617	57.27
1965	93,799,899	42,581,412	45.37	19,379,582	20.64	31,838,905	33.99	51,217,487	54.63

Source: Computed from Appendix C.

include such other expenditures as sabbatical leave and internships.

Table VIII shows that in the base year of 1957, the percentage of the total salary figure paid to teachers with Professional Certificates was 30.66 per cent. The percentage paid to teachers with Standard Certificates was 16.16 per cent and 53.18 per cent was paid to teachers with certificates below the level of the Standard Certificate. Expressed as base year weights these percentages become:

Subindex II

Level of Certification	Weight
Professional	.3066
All Others	.6934

Subindex III

Level of Certification	Weight
Professional	.3066
Standard	.1616
All Others	.5318

Table VIII shows that there has been a steady increase in the percentage of total salary paid to those teachers with higher levels of certification. In 1965, teachers with Professional Certificates received 45.37 per cent of the total amount paid in salaries as against 30.66 per cent in 1957. To take this shift into account and to minimize any distortion which might result from it, Salary Subindexes II and III were each composed of two parts. The first part was calculated using the base year weights, and the second part was calculated using 1962 weights. The two parts were spliced together on the basis of the ratio between the

subindex values in the overlap year 1962, and expressed as a single series with base 1957.

The year 1962 was chosen as the splicing year because the percentage of total salaries paid to teachers with Professional Certificates in that year was 37.60 per cent, approximately half way between the base year percentage and the 1965 percentage.

The percentages for 1962 expressed as weights are:

Subindex II

Level of Certification	Weight
Professional	.3760
All Others	.6240

Subindex III

Level of Certification	Weight
Professional	.3760
Standard	.1910
All Others	.4330

Price Data

Because of the attempts to distinguish among levels of quality of teaching services, five sets of price data were required. They were:

1. The average annual salary for all teachers.
2. The average annual salary for teachers with the Professional Certificate.
3. The average annual salary for teachers with the Standard Certificate.
4. The average annual salary for teachers with less than the Standard Certificate.
5. The average annual salary for teachers with less than the Professional Certificate.

The average annual salary for all teachers is provided by the Department of Education in the Annual Report. Average annual salaries were abstracted from the reports for the years 1957-1965 and are set out in Column 1 of Table IX.

The Average salary data together with price relatives based on these average figures are set out in Table IX. For splicing purposes, it was necessary to recalculate the price relatives for the period 1962-1965. The recalculated price relatives are set out in Table X.

Salary Subindex I. Since Subindex I is based on an unweighted average of annual salaries, the subindex values will be identical to the price relatives in Column 2 of Table IX. These values have been transferred to Column 1 of Table XIII.

Salary Subindex II. Details of the construction of Subindex II are set out in Table XI. For the period 1957-1962, the price relatives for teachers with a Professional Certificate (Column 4, Table IX), and the price relatives for teachers with less than a Professional Certificate (Column 10, Table IX) were weighted by the base year weights of .3066 and .6934 respectively. The weighted price relatives of Columns 3 and 6 of Table X were summed for each year to provide the subindex values for 1957-1962, and appear in Column 7 of Table XI. Using the same method but using the price relatives of Columns 2 and 8 of Table X, and the 1962 weights of .3760 and .6240 respectively, a second set of subindex values for 1962-1965 was computed. The second set of subindex values is also set out in Column 7 of Table XI.

TABLE IX

AVERAGE SALARIES AND PRICE RELATIVES FOR ALBERTA TEACHERS BY CERTIFICATION LEVEL, 1957-1965

Year	All Teachers		Professional		Standard		Less than Standard		Less than Professional	
	Salary (1)	P. Rel.[x] (2)	Salary (3)	P. Rel. (4)	Salary (5)	P. Rel. (6)	Salary (7)	P. Rel. (8)	Salary (9)	P. Rel. (10)
1957	$3,661	100.00	$4,825	100.00	$3,503	100.00	$3,253	100.00	$3,307	100.00
1958	4,049	110.59	5,488	113,74	3,953	112.85	3,531	108.55	3,623	109.55
1959	4,446	121.14	6,105	126.53	4,305	123.00	3,863	118.75	3,958	119.69
1960	4,785	130.70	6,599	136.77	4,630	132.17	4,075	125.36	4,209	127.28
1961	5,143	140.48	7,056	146.24	4,923	140.54	4,342	133.48	4,491	135.80
1962	5,354	146.24	7,275	150.78	4,981	142.19	4,475	137.56	4,619	139.67
1963	5,487	149.88	7,392	153.20	5,034	143.72	4,576	140.67	4,714	142.55
1964	5,700	155.70	7,432	154.03	5,114	145.99	4,728	145.34	4,855	146.81
1965	5,860	160.06	7,505	155.54	5,146	146.90	4,849	149.06	4,957	149.89

Sources: Government of Alberta, Department of Education, Annual Reports, 1957-1965, and Appendix C.

[x]All price relatives are derived by expressing annual salaries for 1958-1965 as percentages of annual salaries in 1957.

TABLE X

AVERAGE SALARIES AND PRICE RELATIVES FOR ALBERTA TEACHERS BY CERTIFICATION LEVEL, 1962-1965

Year	Professional		Standard		Less than Standard		Less than Professional	
	Salary (1)	Price Relative (2)	Salary (3)	Price Relative (4)	Salary (5)	Price Relative (6)	Salary (7)	Price Relative (8)
1962	$7,275	100.00	$4,981	100.00	$4,475	100.00	$4,619	100.00
1963	7,392	101.61	5,034	101.06	4,576	102.25	4,714	102.06
1964	7,432	102.16	5,114	102.67	4,728	105.65	4,855	105.11
1965	7,505	103.16	5,146	103.31	4,849	108.36	4,957	107.32

Source: Appendix C.

TABLE XI

DETAILS OF CONSTRUCTION OF SALARY SUBINDEX II

Year	Level of Certification: Professional Price Relative (1)	Professional Weight (2)	Professional Wtd. P. Rel. (3)	Less than Professional Price Relative (4)	Less than Professional Weight (5)	Less than Professional Wtd. P. Rel. (6)	Subindex Values (7)	Spliced Subindex (8)
1957	100.00	.3066	30.66	100.00	.6934	69.34	100.00	100.00
1958	113.74		34.87	109.55		75.96	110.83	110.83
1959	126.53		38.79	109.67		82.99	121.78	121.78
1960	136.77		41.93	127.28		88.25	130.18	130.18
1961	146.24		44.84	135.80		94.16	139.00	139.00
1962	150.78		46.23	139.67		96.85	143.08[x]	143.08
	100.00	.3760	37.60	100.00	.6240	62.40	100.00[x]	
1963	101.61		38.20	102.06		63.68	101.88	145.77
1964	102.16		38.41	105.11		65.88	104.29	149.22
1965	103.16		38.79	o07.32		66.97	105.74	151.31

[x] Splicing Ratio = $\frac{\text{Subindex Value (Base 1957)}}{\text{Subindex Value (Base 1962)}}$

Source: Computed from Table IX, page 88.

TABLE XII

DETAILS OF CONSTRUCTION OF SALARY SUBINDEX III

Year	Level of Certification: Professional Price Rel. (1)	Professional Weight (2)	Professional Wtd. P. Rel. (3)	Standard Price Rel. (4)	Standard Weight (5)	Standard Wtd. P. Rel. (6)	Less than Standard Price Rel. (7)	Less than Standard Weight (8)	Less than Standard Wtd. P. Rel. (9)	Subindex Values (10)	Spliced Subindex Values (11)
1957	100.00	.3066	30.66	100.00	.1616	16.16	100.00	.5318	53.18	100.00	100.00
1958	113.74		34.87	112.85		18.23	108.55		57.72	110.82	110.82
1959	126.53		38.79	123.00		19.87	118.75		63.15	121.81	121.81
1960	136.77		41.93	132.17		21.36	125.36		66.66	129.95	129.95
1961	146.24		44.84	140.54		22.71	133.45		70.98	138.53	138.53
1962	150.78		46.23	142.19		22.98	137.56		73.15	$\frac{142.36^{x}}{100.00^{x}}$	142.36
	100.00	.3760	37.60	100.00	.1910	19.10	100.00	.4330	43.30		
1963	101.61		38.30	101.06		19.30	102.25		44.27	101.77	144.87
1964	102.16		38.41	102.67		19.61	105.85		45.74	103.76	147.11
1965	103.16		38.78	103.31		19.73	108.36		46.92	105.43	150.09

$$\text{Splicing Ratio} = \frac{\text{Subindex Value (Base 1957)}}{\text{Subindex Value (Base 1962)}}$$

Source: Computed from Table IX, page 88.

TABLE XIII

TEACHERS' SALARY SUBINDEXES

Year	Subindex I[1]	Subindex II[2]	Subindex III[3]
1957	100.00	100.00	100.00
1958	110.59	110.83	110.82
1959	121.14	121.78	121.81
1960	130.70	130.18	129.95
1961	140.48	139.00	138.53
1962	146.24	143.08	142.36
1963	149.88	145.77	144.87
1964	155.70	149.22	147.71
1965	160.06	151.31	150.09

[1]Column 1, Table IX, page 88.

[2]Column 8, Table XI, page 90.

[3]Column 11, Table XII, page 91.

The two sets of subindex values of Column 7 of Table XI were spliced by multiplying each value for the years 1962-1965 by the ratio between the values of 1962, 1.4308.

The spliced series covering the combined period is displayed in Column 8 of Table X and Column 2 of Table XIII.

Salary Subindex III. Details of the construction of Subindex III are set out in Table XII. The method of construction was identical to that used for the construction of Subindex II, using appropriate data from Columns 4, 6 and 8 of Table IX, and Columns 4, 6, and 8 of Table X, with weights of .3066, .1616, and .5318 for the 1957-1962 series and weights of .3760, .1910, and .4330 for the 1962-1965 series.

The ratio between the two subindex values in 1962 is 1.4236, and each subindex value in the 1962-1965 series was multiplied by this factor to splice the two series.

The spliced series covering the combined period 1957-1965 is set out in Column 11 of Table XII, and in Column 3 of Table XIII.

Table XIII shows that there has been a continued and substantial rise in the level of teachers' salaries since 1957 and that the assumptions of quality, which were incorporated into the construction of the Salary Subindexes, do make a difference to the rate of price increase as measured by the Subindexes.

Salary Subindex I shows an increase of 60.06 in the price level of teaching services over the nine-year period. Salary Subindex II shows an increase of 51.31 per cent in price level and Salary Subindex III shows an increase in price of 50.09 per cent.

Further discussion of the price level increase, however, will be deferred until after the construction of the complete network of subindexes and indexes has been reported.

Administration Subindex

Administration, as defined for the purpose of financial reporting, consists of expenditures made for central office administration. They include official and clerical salaries, auditors' fees, trustees' expenses, legal expenses, A.S.T.A. fees, elections and annual meeting expenses, advertising, office supplies and expenses, and a miscellaneous item for other expenditures.[1]

Component weights. Annual Reports of the Department of Education do not provide any further breakdown for Administration. In order to identify the major inputs for the subindex, the auditors' reports from the school authorities in the sample were examined.

This examination showed that it was possible to identify four main components of expenditure on Administration: salaries and expenses of officials, salaries of clerical assistants, rent and fuel, and office supplies. A fifth component was added to cover miscellaneous expenses, the largest of which is trustees' expenses.

To derive weights for the five components, a sample of school authorities was selected and the auditors' reports for those school authorities for the year 1957 were analysed.

The Edmonton Public School District, which in 1957 accounted for

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[1] Auditors' Report Form, Department of Education.

over 50 per cent of the expenditure of small school authorities, was considered representative of the pattern of expenditures on Administration in small area authorities. Since Counties do not break down administrative expenditures into components, the large area authorities are represented by the school divisions in the sample which showed some expenditure on each component.

Table XIV shows the breakdown of total expenditures on Administration by component. It will be noted that the pattern of expenditures for the small area authorities differed considerably from that of the large area authorities. It might be considered that such differences in weighting would justify the construction of two separate subindexes for Administration. However, the weighting of the Administration Subindex in the overall index is such that the different weights result in a difference of only 0.1 of one index point for the final year in the series, and considerably less for the other years in the series.

Component weights were therefore based on an unweighted average of the percentage of expenditure on components by small and large area authorities and were:

Component	Percentage	Weight
Officials' Salaries	25.20%	.2520
Clerical Salaries	45.42	.4542
Office Supplies	4.47	.0447
Utilities	5.46	.0546
Other Expenditures	19.44	.1944

TABLE XIV

1957 EXPENDITURES ON ADMINISTRATION COMPONENTS BY SMALL AND LARGE AREA SCHOOL AUTHORITIES

Authority	Component					Total
	Officials	Clerical	Utilities	Supplies	Other	
Edmonton Public S.D.	$52,237	$170,988	$10,191	$10,078	$26,270	$269,864
Percentage	19.35	63.36	3.77	3.73	9.77	
Lac Ste. Anne	4,232	3,328	610	965	4,704	13,839
Sturgeon	4,700	5,266	871	1,343	4,872	17,052
Vegreville	5,025	2,009	525	1,410	4,486	13,455
Lamont	5,725	1,842	1,123	1,019	4,548	14,257
Fort Vermilion	650	1,258	503	246	394	3,051
Three Hills	5,375	3,075	753	896	5,018	15,117
Red Deer	4,825	8,205	370	988	5,417	19,605
Acadia	3,750	3,155	725	482	907	9,019
Lacombe	4,800	6,461	1,023	1,719	6,313	20,376
Total	$39,082	$34,599	$ 6,503	$ 9,068	$36,659	
Average	$ 4,342	$ 3,844	$ 722	$ 1,007	$ 4,073	$ 13,988
Percentage of Total	31.04	27.48	5.16	7.19	29.11	

Source: Computed from Auditors' Reports, 1957

Price data. Other index series developed for use in education, and which have included separate subindexes for administration, have tended to incorporate aggregated series at the national level to reflect salary changes of labour inputs. Thus, both the New York State and the Nevada State series incorporated census median income of female clerical workers. However, as has been pointed out, in Alberta there existed local data at the provincial level of aggregation which were incorporated into the series.

The salary series chosen to represent movements in the price level of officials' salaries is the Alberta Bureau of Statistics series for "Non-Professional Accountant-Office Supervisors" employed in Alberta institutions.

The selection of this series is based on the correspondence between the job description and actual duties performed. The job description prescribes that the incumbent,

> Prepares balance sheets and financial statements. Sets up new accounts and ledgers, prepares budgets, supervises a group of clerical workers engaged in accounting and bookkeeping duties. Incumbent does not possess a recognized accounting qualification, but due to experience, performs duties closely related to those of a professional accountant (1, p. 18).

Sections 192 and 193 of The School Act[2] set out the duties of secretary-treasurers of school boards. Included are the provisions that the secretary-treasurer shall keep the records of the board, receive and account for all monies of the board, make payments approved by the board and keep accounts and prepare financial statements. Hyrnyk, in an

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[2]The School Act, R.S.A. 1955, Chapter 297, S. 192, and 193.

analysis of the duties of secretary-treasurers in school divisions found that "keeping accounts and records was the most consuming item in the secretary's duties" (7, p. 72).

Other index series have used salary series for professional workers to reflect changes in salary levels of officials. Both the New York State and the Nevada State series used census median incomes of salaried professional and kindred workers. However, it would be more difficult to justify the use of a professional accountant's salary series for the Alberta series. Hrynyk notes that whilst almost half the secretaries reporting had some form of formal accounting training, only three out of thirty-two had received university degrees (7, p. 45). For this reason it was decided to incorporate an appropriate non-professional series.

The average monthly salaries of non-professional accountants for the years 1957-1965 are contained in Appendix D. The price relatives and weighted price relatives developed from these data are set out in Columns 1 and 2 of Table XV.

Two salary series were selected as representative of the salaries of clerical assistants. They were the Alberta Bureau of Statistics series for "Clerk (Beginning Level), Female," and Clerk (Intermediate Level), Female," employed in institutions in Alberta. These two series have been combined into an unweighted average to represent the wage movements of clerical workers in Alberta school systems. These data are contained in Appendix D.

The selection of the two series is justified by the correspondence

TABLE XV

DETAILS OF CONSTRUCTION OF ADMINISTRATIVE SUBINDEX

	Officials' Salaries		Clerical Salaries		Office Supplies		Utilities		Other Expenses		Sub-Index
Weight	.2520		.4542		.0447		.0547		.1944		
Year	P.Rel.[1] (1)	Wtd.P.R. (2)	P.Rel. (3)	Wtd.P.R. (4)	P.Rel.[2] (5)	Wtd.P.R. (6)	P.Rel. (7)	Wtd.P.R. (8)	P.Rel. (9)	Wtd.P.R. (10)	(11)
1957	100.00	25.20	100.00	45.42	100.00	4.47	100.00	5.47	100.00	19.44	100.00
1958	106.71	26.89	102.09	46.36	100.00	4.47	100.00	5.47	100.16	19.47	102.66
1959	106.47	26.83	102.62	46.61	133.89	5.98	100.00	5.47	101.55	19.74	104.63
1960	109.83	27.68	109.95	49.93	137.28	6.13	100.00	5.47	101.80	19.78	108.99
1961	111.99	28.22	116.75	53.03	137.28	6.13	100.00	5.47	102.77	19.97	112.82
1962	116.06	29.25	113.61	51.60	137.28	6.13	100.00	5.47	104.66	20.34	112.79
1963	116.30	29.31	118.85	54.03	137.28	6.13	100.00	5.47	106.85	20.77	115.71
1964	122.54	30.88	112.56	51.12	137.28	6.13	100.00	5.47	107.78	20.95	114.55
1965	117.98	29.73	126.18	57.31	137.28	6.13	100.00	5.47	109.83	21.35	119.99

Sources: [1]Appendix D.

[2]Table LIII, page

between the job description and the actual duties of clerical assistants.

Clerk (Beginning Level).

> Performs simple and elementary level clerical work of a routine nature, under close supervision sorts and distributes mail, addresses, stuffs and stamps envelopes. Keeps simple records, operates standard office equipment such as adding machines, cash registers, mimeograph and ditto machines. Makes simple arithmetic computations and performs other routine duties requiring a minimum of judgment. (1, p. 1)

Clerk (Intermediate Level).

> Performs a variety of moderately complex clerical duties under general supervision which require a knowledge of office procedures and methods. Gathers source material for reports, maintains and balances various types of ledger accounts, posts records of moderate complexity, may explain policies and procedures to the public. May assign routine work to others in work-leader capacity, with limited responsibility for disciplinary supervision. (1, p. 2)

The decision to combine the two series was made on the grounds that in small offices there would be some overlapping of duties and that the above job descriptions include a description of almost all the clerical duties which are performed in an office. The average monthly salary for the combined classifications, together with the price relatives developed from them, are set out in Columns 3 and 4 of Table XV.

Other index series developed for use in education have tended to incorporate a wholesale price index to reflect changes in the price levels of other inputs into the Administration Subindex. The New York State Index and the Nevada Index utilize the U.S. Wholesale Price Index for "all commodities other than Farm Products and Food." Vaizey included a stationery component in his subindex for books and supplies, which he derived from prices of local materials (11, p. 215).

Since price data were being obtained for a paper supplies component of the Instructional Supplies Subindex of this index, it was decided to utilize the same data for the Office Supplies component of the Administration Subindex.

The basis of choice for representative materials to be included in the Instructional Supplies Subindex will be discussed later (108 ff.), but the item selected to represent price movements of office supplies was $8\frac{1}{2}$ x 11 inch duplicating paper (18 lb. weight). The price of this paper, per thousand, for the years 1957-1965, together with the price relatives developed from the price data, are set out in Columns 5 and 6 of Table XV, page 99.

A fuller discussion of the reasons for holding the price level for utilities constant is undertaken in the section dealing with the utilities component of the Plant Operation and Maintenance Subindex (115 f.f.), but this component has been included at a constant value of 100 and is set out in Column 7 of Table XV, page 99.

Inputs included in the component for other expenditures are not homogeneous and account for slightly more than .05 of the weighting of the total index. In spite of the small weighting, it may not be assumed that there have been no changes in the price level of inputs. In 1959, for example, The School Act (Section 189, was amended to provide an increase in the level of payments to trustees of five dollars per day, an increase of some 50 per cent.

To reflect the increases in price which may be assumed to have taken place in the other expenditures component, it was decided to use the Wholesale Price Index for "Fully and Chiefly Manufactured Goods," of the Dominion Bureau of Statistics.

The base years for this series are 1935-1939 and so the base year was shifted to 1957 before the price relatives were included in Column 9 of Table XV, page 99.

Subindex construction. Table XV shows the details of the construction of the Administration Subindex. The price relatives have been weighted in accordance with the component weighting system and summed for each year in the series to result in the subindex values of Column 11.

Table XV shows that the price level increase in administrative services has been 19.99 per cent over the course of the nine-year period. Salaries of officials have increased by 17.98 per cent, the salaries of clerical assistants have increased by 26.18 per cent, the price of office supplies have increased by 37.28 per cent and the price of other expenses have increased by 9.83 per cent.

The rise in price level of officials' salaries has been more even than that of clerical salaries. Clerical salaries remained relatively stable for 1957, 1958, and 1959, and the greater part of the increase in price level has been concentrated into the period 1960 to 1965.

Instructional Supplies Subindex

The Auditors' Report forms supplied by the Department of Education provide for the classification of instructional supplies into four

separate components: correspondence courses, library, reference and text books, instructional supplies and other instructional supplies. The Dominion Bureau of Statistics in A Manual of Accounting for School Boards, suggests that the basis of distinction between instructional supplies and other instructional expenditures is that instructional supplies are materials used in teaching subject fields whereas other instruction expenses are those incurred in such activities as field trips, commencement exercises, exhibitions and festivals (2, p. 24). However, it will be suggested that this distinction is not necessarily made in the financial reporting practices of Alberta school boards.

Component weights. Annual Reports of the Department of Education provide a breakdown for instructional supplies identical to that provided by the Auditors' Report forms. It is thus possible to derive weightings for components at the highest level of aggregation.

Expenditures on the four components, correspondence courses, books, instructional supplies and other instructional supplies, were averaged for the three-year period 1956-1958 and expressed as a proportion of total expenditures on instructional supplies. Since the expenditure on other instructional supplies is small compared with expenditure on instructional supplies and since it was not possible to ascertain from the Department of Education what the basis of distinction between instructional supplies and other instructional supplies is, it was decided to combine the items and treat them as a single component.

This decision was supported by Stringham's observation, made on the basis of an analysis of the cost of instructional supplies in

fifty-six urban and rural school districts in Alberta, that:

> Perhaps the assumption that there was at least some consensus among Secretary-Treasurers of the meaning of the term "instructional supplies," as was assumed at the outset of the study, had no basis in fact. It may be that this figure in the financial report was merely used to balance the expenditures section. (10, p. 100)

The analysis of expenditure on components is set out in Table XVI and on the basis of this analysis, component weights which reflect the percentage of total expenditure on each component, are as follows:

Component	Weight
Correspondence Courses	.0137
Books	.3714
Supplies and Aids	.6149

Price data. Price data for correspondence courses were supplied by the Correspondence School Branch of the Department of Education, and are set out in Appendix E.

The prices of correspondence courses have increased twice during the period under study, in 1958 and again in 1961. The increase in price has been greatest for courses at the elementary and junior high school level, but at the same time enrollments for courses at these levels have been decreasing steadily. In 1957, 2,091 of 9,453 students enrolled in correspondence courses were in grades I to IX (3, p. 60), but by 1965 only 1,919 students out of 14,934 were in those grades (5, p. 77). In view of this emphasis on courses at the high school level, an average price for correspondence courses was computed from the price data on courses at the grades X-XII level. The average prices have been converted

TABLE XVI

EXPENDITURES OF ALL SCHOOL AUTHORITIES ON INSTRUCTIONAL SUPPLIES BY COMPONENT, AVERAGE EXPENDITURE AND AVERAGE EXPENDITURE AS A PERCENTAGE OF TOTAL EXPENDITURE 1956-1958

Year	Correspondence Courses	Books	Supplies & Equipment	Other Expenditures
1956	$35,647	$ 644,795	$1,229,762	$111,396
1957	29,762	905,545	1,325,108	135,771
1958	34,827	1,162,947	1,636,567	154,246
Total	$100,236	$2,713,287	$4,191,437	$401,413
Average	$ 33,412	$ 904,429	$1,397,145	$133,804
Percentage	1.37	37.14		61.49[x]

[x]Supplies and equipment and other expenditures combined.

Sources: Compiled from Annual Reports of the Department of Education, 1956-1958.

into price relatives and are set out in Column 1 of Table XVII.

Price data for the book component were obtained from the School Book Branch of the Department of Education which handles most of the school book business of Alberta school authorities. Mr. Fedorak, Assistant Manager of the Branch, notes that the total sales of the Branch are made up of approximately 80 per cent in sales of text books and 20 per cent in sales of library books.[4] This breakdown has been used as the weight for combining the price relatives of text books and supplementary readers into a single index.

To develop the book index, two "market baskets" of books were selected from the price lists distributed by the Book Branch each year from 1957-1965. Each "market basket" was priced for each year in the series and the total cost of each market basket expressed in price relative form. The two sets of price relatives were then combined into a single book index in the manner of weighted price relatives.

The "market baskets" and details of construction of the book index are set out in Appendix E.

The text book "market basket" consists of eleven text and reference books which have been authorized for use in the elementary, junior high and senior high school levels as primary references.

The supplementary reader "market basket" consisted of five books, the titles of which were selected from Department of Education lists of authorized supplementary reading.

Mr. Fedorak notes that, "The titles on your list are a good

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[4]Personal conversation with Mr. Fedorak.

representation of the pattern of purchases by school boards over the period 1957-1966," and that "the prices of these books represent a fair average price change in books as a whole."[5] It should be pointed out that the index will not be distorted by the sometimes substantial discounts which are offered by the Book Branch, since discounts influence the total expenditure for books but not changes in their price level. The price relatives developed in Appendix E are set out in Column 3 of Table XVII.

The compilation of price relatives for instructional supplies was made difficult by the great variety of goods which may be included in this component, and by the apparent lack of consensus as to what constitute instructional supplies.

In view of the difficulties, it was decided to approach Mr. M. F. Dean, Manager of Moyer Division, Vilas Industries, for assistance. Moyer Division Vilas Industries is a leading distributor of school supplies in Alberta, and it was on the basis of discussions with Mr. Dean and data supplied by him that price relatives for instructional supplies were developed.

The price relatives are compiled on the basis of a breakdown of the company's total sales into major categories of furniture, chalkboard, maps and globes, machines and general supplies. The data supplied by Moyer Division are set out in Appendix E. Details of the construction of the component index for instructional supplies are set out in Table LIII of this Appendix.

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[5] Personal letter to the writer, Appendix E.

TABLE XVII

DETAILS OF CONSTRUCTION OF INSTRUCTIONAL SUPPLIES SUBINDEX

	Correspondence Courses[1]		Books[2]		Supplies & Equipment[3]		
Weight	.0137		.3714		.6149		
Year	Price Rel. (1)	Wtd. Price Rel. (2)	Price Rel. (3)	Wtd. Price Rel. (4)	Price Rel. (5)	Wtd. Price Rel. (6)	Sub-Index (7)
1957	100.00	1.37	100.00	37.14	100.00	61.49	100.00
1958	126.00	1.72	103.10	38.30	100.07	61.53	101.55
1959	126.00	1.72	103.10	38.30	110.57	67.98	108.00
1960	126.00	1.72	107.32	39.86	111.63	68.64	110.22
1961	126.00	1.72	110.09	40.89	112.09	68.92	111.63
1962	177.00	2.42	114.08	42.37	112.75	69.33	114.12
1963	177.00	2.42	118.29	43.93	113.20	69.61	115.96
1964	177.00	2.42	119.82	44.50	118.41	72.81	119.73
1965	177.00	2.42	121.61	45.16	118.50	72.86	120.44

Sources: [1]Table LI, Appendix E.

[2]Table LII, Appendix E.

[3]Table LII, Appendix E.

The approximate percentage of total sales attributable to each major category was determined, and two commodities representative of the categories selected. These commodities were priced for each year of the series and the prices expressed as price relatives. Using the category percentages as weighting data, the price relatives for each year were combined into a weighted price index for instructional supplies and are shown in Column 6 of Table XVII.

Subindex Construction

The component indexes developed in Appendix E have been transferred to Table XVII and are combined into a Subindex for Instructional Supplies by weighting each component subindex by the component weights set out on page 104. The weighted price relatives were summed for each year and the Instructional Supplies Subindex is set out in Column 7 of Table XVII.

Table XVII shows that the price level of instructional aids and supplies have increased by 20.44 per cent in the nine-year period 1957 to 1965. The price of correspondence courses increased by some 77 per cent but the influence of this component on the subindex was slight. The overall price level increase is much more closely related to the price level changes for books and supplies and equipment. Books increased in price by a total of 21.62 per cent and supplies and equipment by 18.5 per cent.

Plant Operation and Maintenance Subindex

Component inputs of the Plant Operation and Maintenance Subindex were identified by examination of the auditors' report forms supplied

by the Department of Education. They include: caretakers' salaries, caretakers' supplies, utilities, repairs and maintenance to buildings, grounds, furniture and equipment, insurance, rents, taxes, operation of and repair of trucks, and repairmen's salaries and benefits.

Component weights. Annual Reports of the Department of Education provide a breakdown of total expenditures for plant operation and maintenance into four major components: caretaking, fuel and utilities, repairs to buildings, grounds, furniture and equipment, and other expenditures. In accordance with the general principle of determining weights at the highest possible level of aggregation, this breakdown has been used as the basis for calculating component weights.

The total expenditures for the years 1956-1958, under each main group, were averaged and expressed as a percentage of the total as shown in Table XVIII.

In order to arrive at a more detailed breakdown of component expenditures, auditors' reports of the school authorities in the sample were examined.

The examination revealed that there was overlapping in the reporting of expenditures for repairs and other expenditures. For example, some school authorities, notably the Edmonton Public School District, do not specify any expenditure for repairmen's salaries, including this expenditure in the category for repairs. Other school authorities do not distinguish among the different types of repair, but include a single item for repair. In most cases, the relative proportions of expenditure devoted to repairs and repairmen's salaries suggest

TABLE XVIII

DETAILS OF COMPONENT BREAKDOWN FOR PLANT OPERATION AND MAINTENANCE

Year	Caretaking	Fuel and Maintenance	Repairs	Other Expenditures
1956	$2,956,585	$1,764,279	$2,324,345	$1,116,609
1957	3,431,651	2,046,183	2,280,760	1,199,174
1958	3,923,184	2,306,518	2,924,774	1,328,271
Total	101,311,420	6,116,980	7,529,789	3,644,054
Average	3,437,140	2,038,993	2,509,929	1,214,684
Percentage	37.35	22.16	27.28	13.21

Source: Department of Education, Annual Reports, 1956, 1957, 1958.

that repairs extend to include a labour component.

Since the purpose of breaking down categories of expenditure into components is to group homogeneous inputs, and since the auditors' reports do not provide a basis for such a grouping, it was decided to combine expenditures for repairs and other expenditures.

A breakdown of expenditures on caretaking was accomplished by abstracting expenditures on salaries and supplies from the auditors' reports of the school authorities in the sample. These expenditures were averaged and expressed as a percentage of the total expenditures on caretaking. The distribution of expenditures on caretakers' salaries and supplies was 91.21 per cent and 8.79 per cent respectively.

By incorporating the results of this analysis into the component weights developed in Table XVII, it was possible to arrive at the set of weights which were used for the components of the Plant Operation and Maintenance Subindex. These weights are set out in Table XIX.

TABLE XIX

COMPONENT WEIGHTS FOR PLANT OPERATION AND MAINTENANCE SUBINDEX

	Component			
	Salaries	Supplies	Utilities	Repairs
Percentage	34.05	3.30	22.16	40.49
Weights	.3405	.0330	.2216	.4049

Price data. The price data chosen to represent movements in the level of janitors' wages were the average wage series of the Alberta Bureau

of Statistics for Male Janitors employed in institutions in Alberta. The duties described for this position are:

> Under close supervision sweeps, mops, dusts, scrubs and waxes floors. Washes walls, woodwork, windows, and mirrors. Cleans washbowls and fixtured, arranges, moves and polishes furniture. May also operate a heating system not requiring a stationary engineer's certificate. (1, p. 31)

The description of duties corresponds quite closely to the list of duties which school janitors perform, and it is on this basis that the series is included.

The wage data provided by the Alberta Bureau of Statistics are in monthly figures based on a forty-hour week. Although it is realized that the methods of determining janitors' remuneration varies from authority to authority, it is emphasized that for index purposes it is the movement of wage levels over time that is important rather than the amount of the wage itself. The average salary data together with the price relatives developed from them, are set out in Columns 1 and 2 of Table XX.

Caretakers' supplies consist primarily of soaps, washing compounds and cleaners, according to Mr. E. F. Stemshorn of Mid-West Supplies Limited of Edmonton, one of the leading distributors of caretakers' supplies in the province. He also notes that the prices of caretakers' supplies are quoted on a national basis, the costs of transportation being averaged across the nation. For this reason it was decided that price data at the national level would be representative of prices paid by Alberta school authorities for cleaning supplies. The most appropriate price data were considered to be the Industry

TABLE XX

DETAILS OF PRICE DATA FOR SUBINDEX OF PLANT OPERATION AND MAINTENANCE

Year	Caretakers' Wages Average Wage[1] (1)	Caretakers' Wages Price Relative (2)	Supplies Price Relative[2] (3)	Utilities Price Relative (4)	Repairs Price Relative[3] (5)
1957	$235.00	100.00	100.00	100.00	100.00
1958	240.00	102.13	104.10	100.00	103.82
1959	240.00	102.13	108.40	100.00	103.82
1960	243.00	103.40	110.40	100.00	112.70
1961	248.00	105.53	110.70	100.00	113.82
1962	258.00	109.78	110.60	110.00	117.78
1963	264.00	112.34	110.90	100.00	120.58
1964	280.00	119.15	111.80	100.00	125.42
1965	302.00	128.51	114.40	110.00	131.86

[1]Alberta Bureau of Statistics, Annual Salary and Wage Rate Survey, 1957-1965.

[2]Computed from D.B.S., Industry Selling Price Indexes, "Soaps, Washing Compounds and Cleaning Preparations, Industry," 1957-1965.

[3]Appendix F.

Selling Price Index of the "Soaps, washing compounds and cleaning preparations Industry" compiled by the Dominion Bureau of Statistics, Prices Division. Since the Industry Selling Price Indexes have a base year of 1956, it was necessary to shift the base of the chosen index to 1957 by multiplying each index value by the ratio between the index values in 1956 and 1957. The price relatives with base shifted are set out in Column 3 of Table XX.

The construction of a component subindex for utilities presented considerable problems. School authorities, in reporting to the Department of Education, do not distinguish among the various types of utility, and thus it was not possible to determine appropriate weights for gas, coal, electric power, and water. Furthermore, it was not possible to distinguish among schools using alternate sources of fuel for heating purposes.

Fortunately, the price levels of utilities have demonstrated considerable stability during the index period. Telephone rates remained stable for the period under study.[6] Calgary Power Limited notes that the price of power remained stable from 1957 to 1963, and that in February of that year, there was a reduction of 15 per cent in power rates (Appendix F). Northwestern Utilities state "Aside from a major increase in rates in 1959 for the communities of Edmonton, Calgary, Lethbridge, Red Deer, Vegreville and Lamont, the rates for natural gas have remained stable" (Appendix F). According to the Consumer Price Index for Canada, the price of coal also remained stable

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[6] Telephone conversation with Consumer Service Division of Alberta Government Telephones, Edmonton.

from 1957-1965 when it increased by some 15 per cent.

If the movements in price are taken together, it would appear that the increases in price of coal and gas were offset by the reduction in the price of power. Because of this picture of relative stability, it was possible to justify the inclusion of the component for utilities at a constant price relative of 100. The price relatives are set out in Column 4 of Table XX, page 114.

The types of inputs used in repairing buildings, grounds and equipment are common to the construction industry as a whole. They are basically of two types: labour and materials. Mr. H. W. Bretelle, Director of Maintenance for the Public Works Department of the Government of Alberta suggests that the proportions of cost attributable to labour and materials is three-fifths and two-fifths respectively.[7]

Because of the great variety in the type of inputs used in construction it was decided that it would be preferable to follow the example set by the New York State Department of Education Index and use a composite construction index. (See page 53). The price data used in this case were derived from the Dominion Bureau of Statistics Non-residential Building Materials Index and the Dominion Bureau of Statistics Construction Wage Index. Since the base year for these series is 1949 the bases were shifted to 1957. The price relatives were combined into a single index by weighting the wage series by .66, and the materials index by .33. The details of the construction of the index are set out in Appendix F. The price relatives for the component repairs

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[7]Personal conversation with Mr. Bretelle.

are set out in Column 5 of Table XX, page 114.

Subindex construction. The price relatives from Table XX were weighted in accordance with the weighting system set out in Table XIX, page 112, and summed for each year. Details of the compilation of the Subindex are shown in Table XXI.

Table XXI shows that the increase in price level for inputs into plant operation and maintenance increased by 23.08 per cent over the nine-year period 1957 to 1965. Caretakers' wages increased by 28.51 per cent, caretakers' supplies increased by 14.4 per cent, and the price level of repairs increased by 31.86 per cent. The stability of price levels of fuel and utilities was an important factor in keeping down to the 23.08 per cent level the overall price level increase.

Transportation Subindex

Examination of the auditors' report forms supplied by the Department of Education reveals that totals of expenditure reported under this category include expenditures for dormitories and boarding allowances. Expenditures under these classifications have been neglected since they account for a very small proportion of total expenditure.

In 1957, only six dormitories were in operation in the province (3, p. 48), and by 1965 this number had shrunk to two (5, p. 47). Since a proportion of the cost of operating dormitories is paid by parents, the burden of operating dormitories is a very small one compared to total operating costs. Consequently, the category reported by the Department of Education as conveyance and maintenance of pupils

TABLE XXI

DETAILS OF CONSTRUCTION OF SUBINDEX FOR
PLANT OPERATION AND MAINTENANCE
(1957 = 100)

	Caretakers' Wages		Caretakers' Supplies		Fuel and Utilities		Repairs		
Weight	.3405		.0330		.2216		.4049		
Year	P.Rel. (1)	Wtd. P.R. (2)	P. Rel. (3)	Wtd. P.R. (4)	P. Rel. (5)	Wtd. P.R. (6)	P.Rel. (7)	Wtd. P.R. (8)	Subindex[1] (9)
1957	100.00	34.05	100.00	3.30	100.00	22.16	100.00	40.49	100.00
1958	102.13	34.48	104.10	3.43	100.00	22.16	103.82	42.03	102.10
1959	102.13	34.48	108.40	3.58	100.00	22.16	108.02	43.74	103.96
1960	103.40	35.21	110.40	3.64	100.00	22.16	112.70	45.63	106.64
1961	105.53	35.93	110.70	3.65	100.00	22.16	113.82	46.09	107.83
1962	109.78	37.38	110.60	3.65	100.00	22.16	117.78	47.69	107.58
1963	112.34	38.25	110.90	3.66	100.00	22.16	120.58	48.82	112.89
1964	119.15	40.57	111.80	3.69	100.00	22.16	125.42	50.78	117.20
1965	128.51	43.75	114.40	3.78	100.00	22.16	131.86	53.39	123.08

Source: Table XX.

[1]Total of Columns 2,4,6, and 8.

has been retitled transportation and expenditures made on dormitories have been neglected.

Component weights. Transportation services are provided by both publicly-owned bus systems and contracted bus services. It would, therefore, have been more desirable to compile two separate subindexes: one for publicly-owned bus systems and one for contracted services. Each subindex could then have been combined into a single subindex by weighting each index in proportion to the total expenditure devoted to each service. An examination of auditors' reports from all divisions and counties in Alberta revealed that in 1966, contracted bus services accounted for 65 per cent of all expenditures on transportation by school divisions and for 66 per cent of all expenditures on transportation by counties. That this percentage is smaller than was the case in the earlier years of the series is suggested by the observation in the 1958 Annual Report of the Department of Education that there was "A trend toward division or county ownership of school buses" (p. 24). No mention is made in the Annual Reports of following years that there was any reversal in the trend.

It was intended to derive component weightings for the subindex for publicly-owned bus services from a breakdown of expenditure provided by auditors' reports and to use data provided by the Alberta School Bus Operators' Association for weighting components of the contracted services subindex. It was also decided to use the year 1966 as a base year for component weightings since this was the first year for which the Alberta School Bus Operators' Association was able to supply

detailed cost breakdowns.

An examination of auditors' reports for a substantial number of school authorities in the sample revealed some apparent inconsistencies in reporting component expenditures. For instance, the County of Mountain View reported a total expenditure for transportation in 1966 of $241,508, of which $92,736 was reported as expenditure on bus repairs but nothing was reported as expenditure for gas and lubricants. The County of Paintearth, in the same year, reported an expenditure of $109,679 for county-owned transportation of which $47,129 was for tires and tubes. Some divisions and counties would appear to include a sum for depreciation of buses under the heading of "Other Expenses" whereas the majority do not appear to include depreciation in reporting current expenditures. Although there is no reason to doubt the validity of the figures reporting total expenditures for transportation, it may well be that the apparent inconsistencies in reporting itemized expenditures are a reflection of the varied systems of accounting in use.

However, in view of these problems, it was not considered advisable to develop a system of weights based on the reporting practices of the school authorities in the sample. This decision meant that only one Transportation Subindex would be compiled and that reliance would be placed on the data supplied by the Alberta School Bus Operators' Association for weighting data. It is not expected that this decision will distort the Subindex since further examination of the auditors' reports for all school divisions and counties in 1966 shows that only four school divisions and three counties report no expenditure for

contracted bus services. Such a finding implies that there is no radical difference between the costs of operating public systems and the costs of contracted services.

Component weights were developed from a cost breakdown of operating a forty-eight-passenger bus for sixty miles per day supplied by the Alberta School Bus Operators' Association and included in Appendix G. Component weights based on these data are set out in Table XXII. It will be noted that the items for wages and return on investment have been combined to render the system more applicable to publicly- and privately-owned buses.

Price data. Price data required for the compilation of the Transportation Subindex were of two major types: data for drivers' wages and data for the cost of operating buses.

In the absence of published wage series for school bus drivers, it was decided to approach the Alberta School Bus Operators' Association for assistance. On the basis of discussion with the Association's President and Executive, it was decided that the hourly rate for medium truck drivers as reported by the Alberta Bureau of Statistics was most appropriate to measure changes in the level of remuneration of school bus drivers. These rates for the period 1957-1965 were converted to monthly averages in accordance with the practice of the Bureau (1, p. iii), and price relatives based on them are set out in Columns 1 and 2 of Table XXIII, p. 123.

Price data for the depreciation component are based on the cost of a new forty-eight-passenger bus in each year of the series. The

TABLE XXII

TRANSPORTATION SUBINDEX COMPONENTS AND WEIGHTS

Component	Cost per Year	Percentage of Cost	Weight
Depreciation	$1,000	17.77	.1777
Insurance and Fees	88	1.56	.0156
Wages and Employees Benefits	2,540	45.13	.4513
Gas and Oil	950	16.88	.1688
Tires and Tubes	250	4.44	.0444
Repairs	800	14.21	.1421
Totals	$5,628	100.00	1.0000

Source: 1966 cost data supplied by Alberta Bus Operators' Association, Appendix G.

TABLE XXIII

PRICE DATA AND PRICE RELATIVES FOR COMPONENTS OF TRANSPORTATION SUBINDEX

Year	Drivers' Wages[1] Rate (1)	Drivers' Wages[1] Price Rel. (2)	Depreciation[2] Price (3)	Depreciation[2] Price Rel. (4)	Gas and Oil[2] Price (5)	Gas and Oil[2] Price Rel. (6)	Tires[2] Price Rel. (7)	Repairs[2] Price Rel. (8)	Fees Price Rel. (9)
1957	$1.40	100.00	$8,000	100.00	28.1c	100.00	100.00	100.00	100.00
1958	1.30	92.85	8,075	100.93	27.6	98.2	99.7	105.0	100.00
1959	1.66	92.85	8,150	101.87	26.8	95.3	102.1	108.5	100.00
1960	1.81	129.28	8,225	102.81	26.8	95.3	107.4	110.0	100.00
1961	1.79	127.85	8,300	103.75	28.8	102.5	111.5	111.1	100.00
1962	1.86	132.86	8,375	104.68	28.6	101.7	106.6	111.5	100.00
1963	1.86	132.86	8,450	105.62	29.0	103.2	109.4	109.5	100.00
1964	2.00	142.86	8,525	106.56	29.3	104.2	111.7	109.8	100.00
1965	2.00	142.86	8,600	107.50	28.8	102.5	113.9	113.5	100.00

[1] Alberta Bureau of Statistics, Annual Salary and Wage Rate Survey, 1957-1965.

[2] Appendix G.

price information was supplied by Blue Bird Bus Sales (1964) Limited. The price of a bus in 1957 and in 1965 was supplied (Appendix G), and these two prices have been converted to annual rates of increase by prorating the difference between the 1957 and 1965 prices. The prices and price relatives based on them are set out in Columns 3 and 4 of Table XXIII.

Price data for gasoline and lubricants were obtained from Imperial Oil Limited and are set out in Appendix G. The prices quoted are net averages per gallon including provincial road tax but after discounts. The price data and associated price relatives are set out in Columns 5 and 6 of Table XXIII.

Price data for tires, tubes and repairs were derived from the Edmonton-Calgary automobile operation component of the Consumer Price Index. The required information was supplied by the Dominion Bureau of Statistics in the form of price relatives which are set out in Appendix G.

The price relatives for tires were transferred directly to Column 7 of Table XXIII. Price relatives for repairs are based on the price of common repair operations, and include chassis lubrications, fender repairs, brake linings and muffler replacement. The price relatives were combined into an unweighted average and are set out in Column 7 of Table XXIII.

Discussions with numerous insurance companies suggested that the rate structure of school bus insurance remained stable during the period, although there were some increases in premiums as a result of an

increase in the mandatory minimum coverage for passengers and as a result of a shift to larger buses. The Motor Vehicle Branch of the Department of Highways reports that fees and licenses also remained unchanged during the period. Consequently, price relatives for the insurance component were included at a constant value of 100, and are set out in Column 9 of Table XXIII, page 123.

Subindex construction. Table XXIV shows details of the construction of the Transportation Subindex. The price relatives from Table XXIII were transferred to Table XXIV and multiplied by the appropriate component weights. The weighted price relatives were summed for each year to give the subindex values of Column 13 of Table XXIV.

Table XXIV shows that the overall price level increase in transportation inputs was 23.60 per cent for the nine-year period 1957 to 1965. Wages of bus drivers which accounted for just over 45 per cent of the price level increase, increased by 42.86 per cent. Other inputs into transportation showed a smaller price level increase. Depreciation price levels increased by 7.5 per cent, gas and oil increased by 2.5 per cent, tires increased by 13.5 per cent while fees and insurance price levels remained stable.

Auxiliary Services Subindex

Auxiliary services are primarily health services, and although they have taken up an insignificant percentage of operating expenditures, they were included to maintain consistency in construction.

TABLE XXIV

DETAILS OF CONSTRUCTION OF
TRANSPORTATION SUBINDEX

Weight	Wages .4543		Depreciation .1777		Gas & Oil .1688		Tires .0444		Repairs .1422		Fees .0156		
Year	P.Rel. (1)	Wtd. (2)	P.Rel. (3)	Wtd. (4)	P.Rel. (5)	Wtd. (6)	P.Rel. (7)	Wtd. (8)	P.Rel. (9)	Wtd. (10)	P.Rel. (11)	Wtd. (12)	Subindex (13)
1957	100.00	45.13	100.00	17.77	100.00	16.88	100.00	4.44	100.00	14.22	100.00	1.56	100.00
1958	92.85	41.90	100.93	17.93	98.2	16.57	99.7	4.42	105.0	14.92	100.00	1.56	97.30
1959	118.57	53.51	101.87	18.10	95.3	16.08	102.1	4.53	108.5	15.41	100.00	1.56	109.19
1960	129.28	58.34	102.81	18.27	95.3	16.08	107.4	4.76	110.0	15.63	100.00	1.56	114.64
1961	127.85	57.69	103.75	18.44	102.5	17.30	111.5	4.95	111.1	15.78	100.00	1.56	115.72
1962	132.86	59.95	104.68	18.60	101.7	17.16	106.6	4.73	111.5	158.4	100.00	1.56	117.84
1963	132.86	59.95	105.62	18.76	103.2	17.42	109.4	4.85	109.5	15.55	100.00	1.56	118.09
1964	142.86	64.47	106.56	18.94	104.2	17.58	111.7	4.95	109.8	15.60	100.00	1.56	123.10
1965	142.86	64.47	107.50	19.10	102.5	17.30	113.9	5.05	113.5	16.12	100.00	1.56	123.60

Price data. Expenditures on auxiliary services consist overwhelmingly of expenditures on salaries. Consequently, the Auxiliary Services Subindex consists of an unweighted index of nursing salaries, the data for which has been drawn from the nurses' salaries series of the Alberta Bureau of Statistics. The construction of the subindex is shown in Table XXV.

TABLE XXV

MONTHLY SALARIES OF NURSES, PRICE RELATIVES AND AUXILIARY SERVICES SUBINDEX

Year	Average Monthly Salary	Price Relatives
1957	$247.00	100.00
1958	257.00	104.05
1959	271.00	109.72
1960	289.00	117.00
1961	301.00	121.86
1962	297.00	120.24
1963	316.00	127.94
1964	317.00	128.34
1965	341.00	138.05

Source: Alberta Bureau of Statistics, Annual Wage and Salary Survey, 1957-1965.

Table XXV shows that the price level increase in auxiliary services amounted to 38.05 per cent over the nine-year period 1957 to 1965.

Other Expenditures Subindex

The inputs included in this subindex are many and varied. As a result it was decided to use the Wholesale Price Index for "Fully and

Chiefly Manufactured Goods," of the Dominion Bureau of Statistics.

The base years for this series are 1935-1939 and so the base year was shifted to 1957. The price relatives used in this subindex are identical to those of column 9 of Table XV, page 99, and have been transferred directly to column 11 in each of Tables XXVI, XXVII, and XXVIII.

V. STAGES 3 AND 4--FINAL INDEX CONSTRUCTION

Stage 3

Stage 3 of the construction of the Alberta Education Price Indexes, outlined on page 72 above, was the combination of the major subindexes for inputs other than teaching services into three subindexes for other inputs:

A Provincial Subindex for Other Inputs

A Small Area Subindex for Other Inputs

A Large Area Subindex for Other Inputs.

The method for compilation was identical in each case. Each of the major subindexes developed in the previous section, with the exception of the Salary Subindexes, was weighted by the subindex weighting patterns set out on page 82 and summed to provide the annual values.

Provincial Other Inputs Subindex. Table XXVI shows details of the construction of the Provincial Other Inputs Subindex. Table XXVI shows that non-teaching input price levels increased by 22.31 per cent over the nine-year period. The annual rate of price level increase was 2.78

TABLE XXVI

DETAILS OF CONSTRUCTION OF OTHER INPUTS
SUBINDEX OF PROVINCIAL INDEX

	Administration		Instructional Aids		Plant Operation		Transportation		Auxiliary Services		Other Inputs			
Weight	.027		.043		.155		.137		.006		.017		Sum of Wtd.	
Year	P.Rel. (1)	Wtd. (2)	P.Rel. (3)	Wtd. (4)	P.Rel. (5)	Wtd. (6)	P.Rel. (7)	Wtd. (8)	P.Rel. (9)	Wtd. (10)	P.Rel. (11)	Wtd. (12)	Price Rel. (13)	Subindex (14)
1957	100.00	2.70	100.00	4.30	100.00	5.50	100.00	13.70	100.00	0.60	100.00	1.70	38.50	100.00
1958	102.66	2.77	101.55	4.36	102.10	15.83	97.30	13.33	104.05	0.62	100.16	1.70	38.61	100.28
1959	104.63	2.82	108.00	4.64	103.96	16.11	109.19	14.96	109.72	0.65	101.55	1.72	40.90	106.23
1960	108.99	2.94	110.22	4.74	106.64	16.53	114.64	15.71	117.00	0.70	101.80	1.73	42.35	109.99
1961	112.82	3.05	111.53	4.79	107.83	16.71	115.72	15.85	121.86	0.73	102.77	1.74	42.87	111.35
1962	112.79	3.05	114.12	4.91	107.58	16.67	117.84	16.14	120.24	0.71	104.66	1.77	43.25	112.33
1963	115.71	3.12	115.96	4.99	112.89	17.48	118.09	16.17	127.94	0.77	106.85	1.82	44.36	115.22
1964	114.55	3.09	119.73	5.14	117.20	18.16	123.10	16.86	128.34	0.77	107.78	1.83	45.85	119.09
1965	119.99	3.23	120.44	5.18	123.08	19.07	123.60	16.93	138.05	0.82	109.83	1.86	47.09	122.31

TABLE XXVII

DETAILS OF CONSTRUCTION OF OTHER INPUTS
SUBINDEX OF SMALL AREA INDEX

Weight / Year	Administration .028		Instructional Aids .046		Plant Operation .181		Transportation .009		Auxiliary Services .002		Other Inputs .024		Sum of Wtd. Price Rel.	Subindex
	P.Rel. (1)	Wtd. (2)	P.Rel. (3)	Wtd. (4)	P.Rel. (5)	Wtd. (6)	P.Rel. (7)	Wtd. (8)	P.Rel. (9)	Wtd. (10)	P.Rel. (11)	Wtd. (12)	(13)	(14)
1957	100.00	2.80	100.00	4.60	100.00	18.10	100.00	0.90	100.00	0.20	100.00	2.40	29.00	100.00
1958	102.66	2.87	101.55	4.67	102.10	18.48	97.30	0.87	104.05	0.21	100.16	2.40	29.50	101.72
1959	104.63	2.93	108.00	4.96	103.96	18.82	109.19	0.98	109.72	0.22	101.55	2.43	30.34	104.62
1960	108.99	1.05	110.22	5.07	106.64	19.30	114.64	1.03	117.00	0.23	101.80	2.44	31.12	107.31
1961	112.82	3.16	111.53	5.13	107.83	19.52	115.72	1.04	121.86	0.24	102.87	2.46	31.55	108.79
1962	112.79	3.16	144.12	5.25	107.58	19.47	117.84	1.06	120.24	0.24	104.66	2.51	31.69	109.27
1963	115.71	3.23	115.96	5.33	112.89	20.43	118.09	1.06	127.84	0.25	106.85	2.56	32.86	113.31
1964	114.55	3.20	119.73	5.51	117.20	21.21	123.10	1.11	128.34	0.26	107.78	2.58	33.87	116.79
1965	119.99	3.35	120.44	5.54	123.08	22.27	123.60	1.12	138.05	0.27	109.83	2.63	35.18	121.31

TABLE XXVIII

DETAILS OF CONSTRUCTION OF OTHER INPUTS
SUBINDEX OF LARGE AREA INDEX

	Administration		Instructional Aids		Plant Operation		Transportation		Auxiliary Services		Other Inputs			
Weight	.026		.038		.136		.232		.008		.015		Sum of Wtd.	
Year	P.Rel. (1)	Wtd. (2)	P.Rel. (3)	Wtd. (4)	P.Rel. (5)	Wtd. (6)	P.Rel. (7)	Wtd. (8)	P.Rel. (9)	Wtd. (10)	P.Rel. (11)	Wtd. (12)	Price Rel. (13)	Subindex (14)
1957	100.00	2.60	100.00	3.80	100.00	13.60	100.00	23.20	100.00	0.80	100.00	1.50	45.50	100.00
1958	102.66	2.66	101.55	3.85	102.10	13.89	97.30	22.57	104.05	0.83	100.16	1.50	45.30	99.56
1959	104.63	2.72	108.00	4.1-	103.96	14.14	109.19	25.33	109.72	0.87	101.55	1.52	48.68	106.98
1960	108.99	2.83	110.22	4.18	106.64	14.50	114.64	26.59	117.00	0.93	101.80	1.53	50.56	111.12
1961	112.82	2.93	111.53	4.23	107.83	14.66	115.72	26.84	121.86	0.97	102.77	1.54	51.17	112.46
1962	112.79	2.93	114.12	4.33	107.58	14.63	117.84	27.34	120.24	0.96	104.66	1.56	51.75	113.73
1963	115.71	3.00	115.96	4.40	112.89	15.35	118.09	27.39	127.94	1.02	106.85	1.60	52.76	115.95
1964	114.55	2.97	119.73	4.54	117.20	15.94	123.10	28.55	128.34	1.03	107.78	1.61	54.64	120.08
1965	119.99	3.12	120.44	4.57	123.08	16.74	123.60	28.67	128.05	1.10	109.83	1.64	55.84	122.72

per cent and the table suggests that the increase was spread evenly over the period.

Small Area Other Inputs Subindex. Table XXVII, page 130, shows details of the construction of the Small Area Other Inputs Subindex. This table shows that non-teaching input price levels increased by 21.31 per cent over the nine-year period. The annual rate of price level increase was 2.66 per cent but the table suggests that the increase in price level was concentrated into the last two years of the series.

Large Area Other Inputs Subindex. Table XXVIII, page 131, shows details of the construction of the Large Area Other Inputs Subindex. Table XXVIII shows that non-teaching input price levels have increased by 22.72 per cent over the nine-year period. The rate of increase has been uneven, with the greater part of the price level rise being accounted for by changes in the 1962-1965 period.

Comments on stage 3. It should be pointed out that the differential rates of price level increase noted in the three subindexes above occur as a result of differential patterns of weighting rather than as a result of differences in price level increase. It should also be pointed out that the subindexes were compiled in order to simplify computation rather than as an analytic tool.

Stage 4

Stage 4 of the construction of the Alberta Education Price Indexes, outlined on page 73 above, was the combination of each of the three subindexes for other inputs with each of the three Salary

Subindexes to provide the three sets of Price Indexes specified on page 72.

The method used was identical in each case and also identical to that used in compiling Other Inputs Subindexes.

The weighted Other Inputs Subindex value was added to the appropriate Salary Subindex Value for each year to provide three different Price Indexes at each of the three levels of aggregation.

Provincial Education Price Indexes. Details of the construction of the Provincial Education Price Indexes are set out in Table XXIX. Column 8 of Table XXIX shows that if it is assumed that there is no relationship between years of teacher training and quality in the teaching force, the price level of educational inputs, in the province as a whole, increased by 45.52 per cent. Column 9 of Table XXIX shows that if it is assumed that there are two utility levels in teaching services, the price level of educational inputs increased by 20.15 per cent. Column 10 of Table XXIX shows that if it is assumed that there are three utility levels in teaching services, the price level of educational inputs increased by 39.39 per cent.

Small Area Education Price Indexes. Table XXX provides details of the construction of the Small Area Education Price Indexes. Column 8 of Table XXX shows that if it is assumed that there is no relationship between years of teacher training and quality in the teaching force, the price level of education inputs for city, town, village and rural school districts increased by 48 per cent. Column 9 of Table XXX shows that if

TABLE XXIX

DETAILS OF CONSTRUCTION OF PROVINCIAL EDUCATION PRICE INDEXES

Year	Other Inputs (1)	Salary Subindexes (Weight .615) I Subindex (2)	I Wtd. (3)	II Subindex (4)	II Wtd. (5)	III Subindex (6)	III Wtd. (7)	Index I (8)	Index II (9)	Index III (10)
1957	38.50	100.00	61.50	100.00	61.50	100.00	61.50	100.00	100.00	100.00
1958	38.61	110.59	68.01	110.83	68.16	110.82	68.15	106.62	106.77	106.76
1959	40.90	121.14	74.50	121.78	74.89	121.81	74.91	115.40	115.79	115.81
1960	42.35	130.70	80.38	130.18	80.06	129.95	79.91	122.74	122.41	122.26
1961	42.87	140.48	86.39	139.00	85.48	138.53	85.19	129.26	128.35	128.06
1962	43.25	146.24	89.93	143.08	87.99	142.36	87.55	133.18	131.24	130.80
1963	44.36	149.88	92.17	145.77	89.64	144.87	89.09	136.53	134.00	133.45
1964	45.85	155.70	95.75	149.22	91.77	147.71	90.84	141.60	137.62	136.69
1965	47.09	160.06	98.43	151.31	93.06	150.09	92.30	145.52	140.15	139.39

TABLE XXX

DETAILS OF CONSTRUCTION OF SMALL AREA
EDUCATION PRICE INDEXES

Year	Other Inputs (1)	Salary Subindexes (Weight .710) I Subindex (2)	I Wtd. (3)	II Subindex (4)	II Wtd. (5)	III Subindex (6)	III Wtd. (7)	Index I (8)	Index II (9)	Index III (10)
1957	29.00	100.00	71.00	100.00	71.00	100.00	71.00	100.00	100.00	100.00
1958	29.50	110.59	78.51	110.83	78.68	110.82	78.68	108.00	108.18	108.18
1959	30.34	121.14	86.00	121.78	86.46	121.81	86.48	116.34	116.80	116.82
1960	31.12	130.70	92.79	130.18	92.42	129.95	92.26	123.91	123.54	123.38
1961	31.55	140.58	99.74	139.00	98.69	138.53	98.35	131.29	130.24	129.90
1962	31.69	146.24	103.83	143.08	101.58	142.00	101.07	135.52	133.27	132.76
1963	32.86	149.88	106.41	145.41	103.49	144.87	102.85	139.27	136.35	135.71
1964	33.87	155.70	110.54	149.22	105.94	147.71	104.87	144.41	139.71	137.74
1965	35.18	160.06	113.64	151.31	107.43	150.09	106.56	148.82	142.61	141.74

it is assumed that there are two utility levels in teaching services, the price level of educational inputs increased by 42.61 per cent. Column 10 of Table XXX shows that if it is assumed that there three utility levels in teaching services, the price level of educational inputs increased by 41.74 per cent.

Large Area Education Price Indexes. Table XXXI provides details of the construction of the Large Area Education Price Indexes. Column 8 of Table XXXI shows that if it is assumed that there is no relationship between years of teacher training and quality in the teaching force, the price level of educational inputs for divisional, county and consolidated school authorities increased by 43.07 per cent. Column 9 of Table XXXI shows that if it is assumed that there are two utility levels in teaching services, the price level of educational inputs increased by 38.30 per cent. Column 10 of Table XXXI shows that if it is assumed that there are three utility levels in teaching services, the price level of educational inputs increased by 37.63 per cent.

Comments on stage 4. A fuller discussion of the Alberta Education Price Indexes is presented in the following chapter, at which time the interrelationships of the indexes and subindexes will be considered.

TABLE XXXI

DETAILS OF CONSTRUCTION OF LARGE AREA
EDUCATION PRICE INDEXES

Year	Other Inputs (1)	Salary Subindexes (Weight .545) I Subindex (2)	I Wtd. (3)	II Subindex (4)	II Wtd. (5)	III Subindex (6)	III Wtd. (7)	Index I (8)	Index II (9)	Index III (10)
1957	45.50	100.00	54.50	100.00	54.50	100.00	54.50	100.00	100.00	100.00
1958	45.30	110.59	60.27	110.83	60.40	110.82	60.39	105.57	105.70	105.69
1959	48.68	121.14	66.02	121.78	66.37	121.81	66.38	114.70	115.05	115.06
1960	50.56	130.70	71.23	130.18	70.94	129.95	70.82	121.79	121.50	121.38
1961	51.17	140.48	76.56	139.00	75.75	138.53	75.49	127.73	126.92	126.66
1962	51.75	146.24	79.70	143.08	77.87	142.36	77.58	131.45	129.72	129.33
1963	52.76	149.88	81.68	145.77	79.44	144.87	78.95	134.44	132.20	131.71
1964	54.64	155.70	84.85	149.22	81.32	147.71	80.50	139.49	135.96	135.14
1965	55.84	160.06	87.23	151.31	82.46	150.09	81.79	143.07	138.30	137.63

REFERENCES FOR CHAPTER IV

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CHAPTER V

DISCUSSION OF THE ALBERTA EDUCATION PRICE INDEXES

I. INTRODUCTION

The purpose of this chapter is to consider questions which arise in connection with the three sets of Education Price Indexes compiled in the previous chapter.

Included among the questions which may be asked are:

1. What effect do the quality assumptions have on the rates of price increase as measured by the Price Indexes?

2. What are the sources of error in the Indexes and what effect do they have on the rates of price increase as measured by the Indexes?

3. To what extent do the rates of price increase, as measured by the Indexes, show differential effects on Small and Large Area School authorities?

4. To what extent do measurements of price levels of educational inputs coincide with measurements of price levels in the economy as a whole?

II. THE SALARY SUBINDEXES

Table XXXII shows that there are substantial differences among the three salary subindexes in both the annual rate of increase and in the subindex values. These differences suggest that making assumptions about the relationship between teacher quality and price level increase

TABLE XXXII

EFFECTS OF QUALITY ASSUMPTIONS ON TEACHERS' SALARY SUBINDEX VALUES

Year	Salary Subindex I	Salary Subindex II	Difference (I and II)	Salary Subindex III	Difference (I and III)	Difference (II and III)
1957	100.00	100.00		100.00		
1958	110.59	110.83	+0.24	110.82	+0.23	+0.01
1959	121.14	121.78	+0.64	121.81	+0.67	+0.03
1960	130.70	130.18	-0.52	129.95	-0.75	+0.23
1961	140.48	139.00	-1.48	138.53	-1.95	+0.47
1962	146.24	143.08	-3.16	142.36	-3.88	+0.72
1963	149.88	145.77	-4.11	144.87	-5.01	+0.90
1964	155.70	149.22	-6.48	147.71	-7.99	+1.51
1965	160.06	151.31	-8.75	150.09	-9.97	+1.22

Source: Computed from Table XXII.

can have considerable influence on the conclusions reached after any analysis of the effect of rising price levels on educational expenditure.

Effects of quality assumption. Salary Subindex I, which is based on the average annual salaries of teachers, shows the highest average rate of increase with an increase of 7.5 per cent per year and indicates that since 1957, the price level of teaching services has increased by just over 60 per cent.

If it is assumed that there is a relationship between years of training as reflected in certification level, and the quality of teaching service, the increase in price level is not as sharp.

Salary Subindex II, which is compiled on the assumption that there are two levels of utility in teaching services, shows an average increase of 6.4 per cent per year and a total increase of 51.31 per cent for the nine-year period.

Salary Subindex III, which is compiled on the assumption that there are three levels of utility in teaching services, shows an average increase of 6.2 per cent per year and a total increase of 50.08 per cent in rhe price level of teaching services.

It will be noted that the values for Salary Subindex I are not always greater than the values for the same years in Salary Subindexes II and III. For the years 1958 and 1959, the values of Salary Subindexes II and III are fractionally greater than those for Salary Subindex I.

The positive difference in these two years may be attributed to the fact that whilst greater salary increases were paid to teachers in

the higher levels of certification, the greater part of the teaching force was in the group to which lower rates of increases were paid. Because of this distribution, the rate of increase of Salary Subindex I, the average salary index, has been dampened.

However, it may be noted that the differences between values for Subindex I and Subindexes II and III tend to increase as the series progresses. This trend is the result of the movement towards improved certification on the part of the teaching force. An example will demonstrate why this should be so.

It is assumed that there is an education system which consists of three teachers. In this system there is a single salary schedule which pays $4,000 per year to teachers without a university degree, and $5,000 per year to teachers with a university degree, but which does not have provision for increments. In the first year there are two teachers without university degrees and one with a university degree. The average salary paid in this system will be $4,333.

In the following year the schedule remains unchanged but the distribution of the teaching force changes so that two teachers have university degrees and one does not. In this year the average salary paid will increase to $4,666.

An index based on average salary data will show an increase over the two-year period. An index which is based on the assumption that each of the two levels of training constitute a utility determining stratum will show no increase over the two years, since the average salary paid in each stratum remains the same.

One factor which accounts for the smaller differences to be found between Salary Subindexes II and III is that in both Salary Subindexes, the average salaries of teachers with professional certificates account for 30.66 per cent of the total, and that for this proportion of each Salary Subindex, the values are identical.

Table XXXII, page 140, shows that in all three Salary Subindexes there are two fairly well defined periods of rate increase. The most rapid rates of increase in the price level of teaching services occurred in the early years of the series from 1957 to 1961, where the average rates of increase amounted to slightly over 10 points per year in all subindexes. After 1961, the rates of increase slow down to just under 5 points in Salary Subindex I and to less than 3 points in the case of Salary Subindexes II and III.

Teaching salaries and wages of the Alberta labour force. Because of the two rates of increase noted above, it was decided to examine the rate of increase in teachers' salaries over a longer period of time in order to decide which rate, the 1957-1960 or the 1961-1965, best followed the trend over a longer period of time. Figure 1 shows the curve followed by average teachers' salaries over the period 1946-1965. For comparative purposes the annual average wage or salary curve for the Province of Alberta is plotted on the same axes. The curves suggest that until 1958 the rate of increase of average teachers' salaries was very close to that of the average wage or salary of all employees in Alberta. From 1958 until 1961, teachers' salaries increased at a more rapid rate than did the salaries of employees, but after that year the rates of

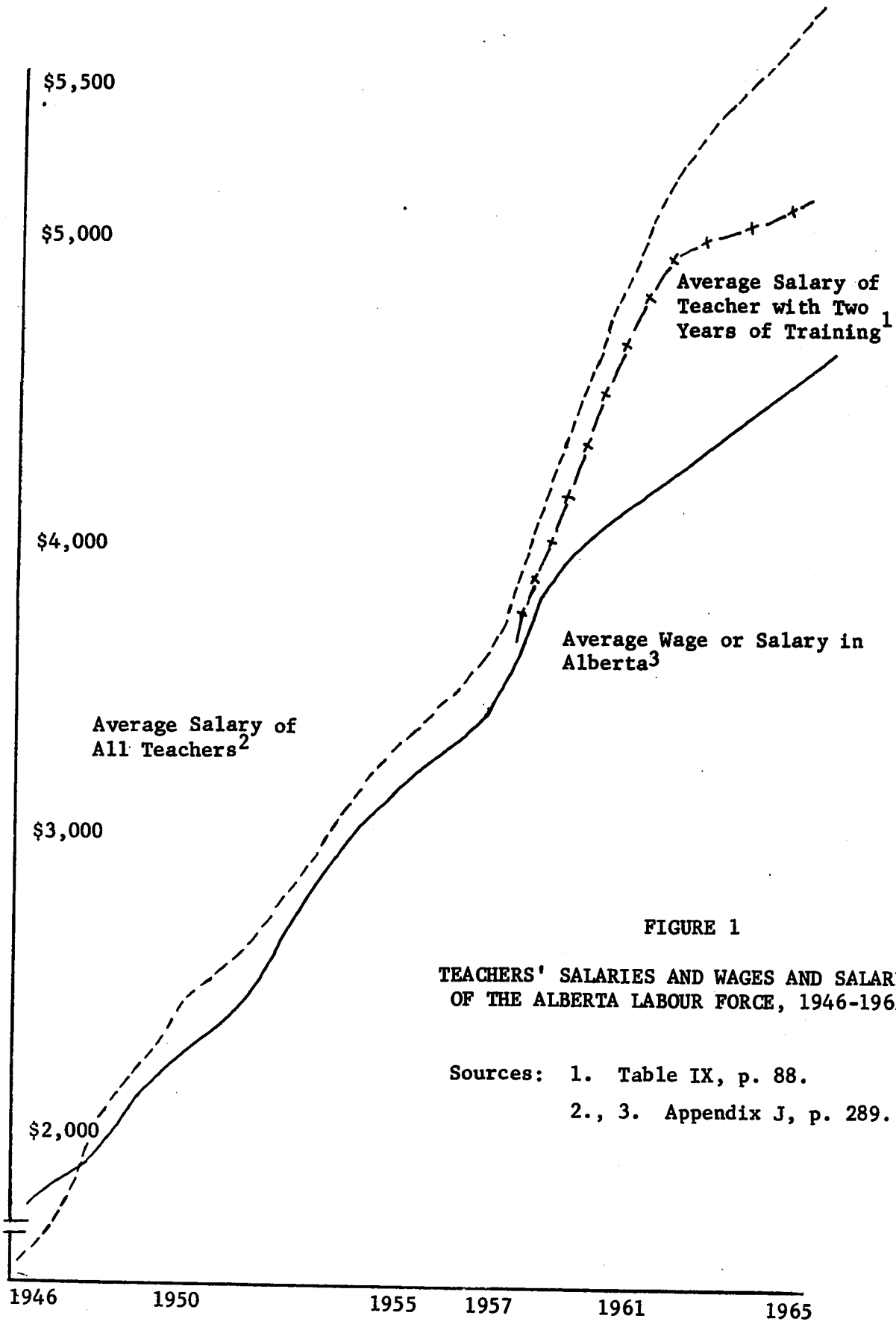

FIGURE 1

TEACHERS' SALARIES AND WAGES AND SALARIES OF THE ALBERTA LABOUR FORCE, 1946-1965

Sources: 1. Table IX, p. 88.

2., 3. Appendix J, p. 289.

increase are more alike. When the annual average salaries of teachers with standard certificates are plotted on the same axes for the period 1957 to 1965, the flattening of the curve becomes more obvious, and in fact suggests that the rate of increase of average salaries for teachers with standard certificates has barely kept pace with the rate of increase in wages and salaries of the Alberta labour force. Hanson has commented on the tendency for the salaries of teachers to move differently from the salaries of the remainder of the labour force:

> During the economic boom since 1961, teachers' salaries have fallen somewhat relative to the average earnings of the labour force. In prosperous periods there is a tendency for teachers' salaries to increase less rapidly than the rate of remuneration of the whole labour force. (6, p. 63)

In general, it might be concluded that the introduction of assumptions regarding the relationship between the quality of teaching service, as reflected by the level of teacher certification, makes a considerable difference to conclusions which might be drawn about the increasing level of teachers' salaries. Furthermore, the difference will be increased if there is any marked trend towards a change in levels of qualification of the teaching force.

III. SUBINDEXES FOR OTHER INPUTS

Table XXVI, page 129, shows that the rates of increase of price levels for inputs other than teaching services have increased less than the price levels of teaching services.

The average annual rate of increase in price levels, as measured by the subindexes, has been:

Subindex	Column of Table XXVI	Average Annual Rate of Increase
Administration	1	2.5 Index points
Instructional Supplies	3	2.5
Plant Operation	5	2.8
Transportation	7	2.9
Auxiliary Services	9	4.7
Other Expenditures	11	1.2

Expenditures on inputs other than teaching services are of two types: expenditures on labour services and expenditures on goods. By using the component weights developed in the last chapter as a basis for aggregation, it was computed that expenditures on labour services in the base year accounted for some 45 per cent of the total expenditures for inputs other than teaching services. Expenditures on goods, therefore, accounted for almost 46 per cent of expenditures on inputs other than teaching services.

Examination of the rates of increase in price levels of non-teaching labour services, as revealed by the component subindexes, suggest that these services have increased in price by almost four per cent. The rate of increase in wages and salaries for employees in the Alberta labour force has been just over three and one-half per cent (Figure 1, page 144). The closeness of the relationship between the rate of increase of wages in the labour force as a whole is not unexpected since, as Hanson points out, "The salaries and wages of non-teaching staff also have to be related to earnings in the whole economy" (6, p. 63).

Comparison between Provincial, Small and Large Area Authority Subindexes for inputs other than teaching services would be misleading since it was assumed initially that the rates of price level increase on which all subindexes are based would be uniform throughout the province. The differences among the subindexes (Tables XXVI, XXVII, and XXVIII, pages 129-131) are a reflection of the weighting patterns. Thus, whilst it might appear that the price levels of inputs other than teaching services for large area authorities have risen more than the price levels for the same inputs for small area authorities, it should be remembered that other inputs account for some 45 per cent of total expenditures for large area authorities, whereas other inputs account for only 29 per cent of expenditures for small area authorities.

In general, it would appear that although there have been substantial price increases in the price levels of inputs other than teaching services, the increases in price have not been significantly greater than the increases in price which have been general throughout the rest of the economy.

The effect of the different assumptions of quality is to bring about a slight decrease in the rate of increase in price level as measured by the overall price indexes.

Table XXXIII summarizes the differences among the rates of average annual increase in price level which result from the different assumptions.

The assumptions of three levels of quality has the effect of slowing down the rate of increase by just over one-half per cent per year

TABLE XXXIII

EFFECTS OF QUALITY ASSUMPTIONS ON AVERAGE RATES OF PRICE LEVEL INCREASE

Index	Salary Subindex	Average Annual Increase[1]
Provincial	I	5.69
	II	5.01
	III	4.92
Small Area	I	6.10
	II	5.32
	III	5.21
Large Area	I	5.38
	II	4.78
	III	4.70

[1] Computed from Tables XXIX, XXX, and XXXI.

in the Provincial and Large Area Indexes, and by almost one per cent per year in the Small Area Index. The effect of the assumption that there are two levels of quality is not greatly different to the effect of the assumption that there are three levels of quality. In each case, the difference amounts to less than 0.1 per cent in the average annual rate of price level increase.

IV. SOURCES OF ERROR

There are two types of error which could affect the Alberta Education Price Indexes.

The first type of error is that which would result from inaccuracy in the basic price data. The second type of error would result from changes in the patterns of expenditure. The second type of error is common to all fixed based index series and thus should be considered as a distortion rather than as an error.

Errors in Basic Data

Errors in the basic data may arise through inaccurate pricing or through the sampling techniques used in the selection of commodities. In the case of the Alberta Education Price Indexes the single most important commodity is teachers' services. Since the price data for this commodity were drawn from the total population of teachers in each year, the problem of sampling error does not arise. Furthermore, since teachers were paid on the basis of an annual salary, there is little possibility that the average salary data will be distorted by fluctuation within any given year. As a result it must be considered that the basic price data referring to teachers' salaries are almost error free.

Any errors in basic price data would therefore be restricted to the six subindexes for inputs other than teaching services. The six subindexes include a total of thirty-eight different commodities as groups of commodities, the price data for which have been obtained from

different sources. The weighting of each of these commodities is such that even a substantial price error in one commodity would influence the overall indexes little. Only if all the components in any subindex were biased in the same direction would the influence on the subindex be noticeable.

Similarly, only if all the subindex for inputs other than teaching services were biased in the same direction would the influence on the overall indexes be noticeable.

Table XXXIV sets out the required error in annual average rates of increase for each subindex which would be necessary to result in an error of one index point for the final year of the Provincial Index.

TABLE XXXIV

REQUIRED ERROR IN ANY SUBINDEX RATE OF INCREASE TO PRODUCE A ONE-POINT ERROR IN FINAL INDEX

Subindex	Actual Rate of Increase[1]	Required Error in Annual Rate of Increase
Administration	2.5 points	7.0 points
Instructional Aids & Supplies	2.5	5.4
Plant Operation & Maintenance	2.8	3.7
Transportation	2.9	3.8
Auxiliary Services	4.7	37.9
Other Expenditures	1.2	8.5

[1] Supra, page 146.

Even if it is conceded that the basic price data may contain slight inaccuracies, it is unlikely that price data for all components in each subindex would be biased in the same direction. It appears, therefore, that it would be unlikely for the final indexes to be in error by more than one point as a result of errors in basic data.

Distortions Arising from Formula or Weighting Inaccuracy

It has been noted previously that indexes compiled using Laspeyres' formula tend to overstate price level increases, since it is to be expected that patterns of expenditure will change in such a way as to reduce the proportion of total expenditure devoted to the purchase of goods and services, the price of which is rising more rapidly than others.

Although the price levels of teachers' services have tended to increase more rapidly than the price levels of other inputs, an increasing proportion of total expenditures has been devoted to the purchase of teaching services, particularly by the Large Area Authorities (Tables V, VI, and VII, pages 75-77). Furthermore, the trend towards improving levels of qualification has also been accompanied by a trend towards a greater proportion of the total salary bills being devoted to the payment of teachers with higher levels of certification (Table VIII, page 84).

As a consequence of these changes in expenditure patterns it is to be expected that Laspeyres' formula, used without correction, will result in an understatement of price level increase in the Alberta Education Price Indexes.

The splicing technique used in the compilation of Salary Subindexes II and III has acted to correct understatement as a result of changing weights within the pattern of salary expenditures, but it is conceivable that the failure to correct for changes in the overall pattern of expenditure has served to conceal some increase in the price level as measured by the overall indexes.

Each of the Alberta Education Price Indexes has been conceived as being composed of two major subindexes: a subindex for teachers' salaries and a subindex for other inputs. Consequently, any change in the proportion of expenditure or weight devoted to teachers' salaries will be compensated for by a corresponding increase or decrease in the proportion of expenditure or weight devoted to other inputs. If the Salary Subindexes and Other Inputs Subindexes were identical in values, the change in weights would not influence the overall index values. Since the Salary Subindexes have increased by more than the Other Inputs Subindexes, the amount of price increase concealed by the failure to adjust for the changes in expenditure will depend on two factors: the difference between the true weight for any given year, and the base year weight, and the difference between the Salary Subindex value and Other Inputs Subindex value for the same year.

The relationship between the amount of distortion of an index in any given year and the changes in weights and subindex values may be expressed in the form

$$D, = (W, - W_o)\ (I^t - I^o)$$

Where:

D_t = Distortion in a given year

W_t = True Weight in a given year

W_o = Base year weight

I^t = Salary Subindex value in a given year

I^o = Other Inputs Subindex Value in a given year

Examination of Tables V, VI, and VII, pages 75-77, show that the amount of distortion due to changes in the pattern of expenditures will be greatest for the year 1965 in all indexes. An estimate of the amount of distortion to the index values in this year is provided in Table XXXV.

TABLE XXXV

ESTIMATE OF DISTORTION TO INDEX VALUES IN 1965 AS A RESULT OF CHANGES IN EXPENDITURE PATTERNS

Index	Distortion (Index Points)
Provincial Index compiled with:	
Salary Subindex I	2.2
Salary Subindex II	1.7
Salary Subindex III	1.6
Small Area Index compiled with:	
Salary Subindex I	0.8
Salary Subindex II	0.6
Salary Subindex III	0.6
Large Area Index compiled with:	
Salary Subindex I	2.2
Salary Subindex II	1.6
Salary Subindex III	1.6

In each case the amount of distortion is a reflection of the extent to which the price indexes understate the increased price levels.

In each case the amount of distortion is greatest when the index is compiled using Salary Subindex I. In the case of the Provincial and Large Area Indexes, the distortion is 2.2 index points. The distortion of the Small Area Index is less, amounting to 0.8 index points. Compiling the indexes with Salary Subindexes II and III reduces the amount of distortion considerably. In the case of the Provincial and Large Area Indexes the distortion is reduced to 1.6 points, and in the case of the Small Area Index, the distortion is reduced to 0.6 points.

It will be necessary to bear in mind the distorting effect of the changes in the pattern of expenditures in the subsequent analysis since this is a biased distortion.

V. DIFFERENTIAL EFFECTS ON SMALL AND LARGE AREA AUTHORITIES

Differences among the Alberta Education Price Indexes are primarily the result of differences in patterns of expenditure. However, Tables XXX and XXXI, pages 135 and 137, do suggest that the effect of rising price levels have been felt more by the small area authorities than by the large area authorities.

Table XXXVI shows the annual average rates of price level increase for small and large area authorities.

The annual average rate of increase in price level for small area authorities is almost one per cent greater than that for large area authorities if the indexes are compiled with Salary Subindex I, and just less than 0.5 per cent if the indexes are compiled with Subindexes II and III.

TABLE XXXVI

ANNUAL AVERAGE RATES OF PRICE LEVEL INCREASE FOR SMALL AND LARGE AREA AUTHORITIES

	Annual Average Increase in Index Points		
	Index I	Index II	Index III
Small Area	6.10	5.32	5.21
Large Area	5.38	4.78	4.70

If the weighting patterns are rearranged so that transportation is excluded from the Large Area Indexes, the differences become smaller. If expenditures on transportation by Large Area Authorities are omitted from the total pattern of Large Area expenditures, the proportion of expenditures devoted to teachers' salaries becomes 70 per cent, which is very close to the 71 per cent proportion expended by small area authorities.

Since some 70 per cent of both sets of indexes have identical values, any differences must be the result of differences in the rate of price level increase for other inputs. There is very little evidence to suggest that the price levels of commodities have any differential effect on small or large area authorities and thus any differences in the effects of price level increases must be the result of different rates of increase in the price levels of labour inputs. Since labour inputs other than teaching services account for less than 14 per cent of the total index, differences in the rates of increase would have to be very substantial in order to have any differential effect.

Comparisons of the rate of increase in average teachers' salaries suggest that the average salary in divisions and counties has increased by 7.25 per cent per year and that the average salary in cities and towns has increased by 7.0 per cent.[1] This differential rate of increase serves to reduce the differential effects of increasing price levels.

It would appear, therefore, that there is little evidence to suggest that increasing price levels have had any marked differential effects on small and large area authorities, especially when transportation is excluded from the consideration.

VI. THE ALBERTA EDUCATION PRICE INDEXES AND OTHER INDICATORS OF PRICE LEVEL

Table XXXVII shows Provincial Education Price Index I and three major price level indicators: the Consumer Price Index, the Implicit Price Index for current government expenditure on goods and services and the Wholesale Price Index.

For comparative purposes the Subindex for Prepaid Medical Care, of the Consumer Price Index has also been included. Since the base year of the Consumer Price Index is 1939, and the base year of the Wholesale Price Index is 1939, it has been necessary to shift bases for each of these indexes and for the Medical Care Subindex of the C.P.I.

A comparison of the indexes revealed that neither the Consumer

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[1] Computed from Department of Education, Annual Reports, 1958 and 1966.

TABLE XXXVII

THE ALBERTA EDUCATION PRICE INDEX AND COMMONLY-USED INDICATORS OF PRICE LEVEL

Year	Alberta Education Price Index I[1]	Consumer Price Index[2]	Prepaid Medical Care Subindex[3]	Implicit Price Index[4]	Wholesale Price Index[5]
1957	100.00	100.00[6]	100.00[6]	100.00[6]	100.00[6]
1958	106.6	102.7	105.4	104.0	100.1
1959	115.4	103.7	109.8	107.4	101.5
1960	122.7	105.0	107.4	112.0	101.8
1961	129.2	105.9	109.5	116.7	102.7
1962	133.1	107.2	110.0	120.5	104.6
1963	136.5	109.1	115.9	125.1	106.8
1964	141.6	110.0	122.4	129.4	107.7
1965	145.5	113.7	136.3	134.4	109.8

[1]Table XXVIII.

[2,3,4,5]Government of Canada, Dominion Bureau of Statistics, Canada Year Book, 1958-1966.

[6]Bases shifted to 1957.

Price Index nor the Wholesale Price Index are appropriate measures to use tostudy the effect of price level increases in education in Alberta. To the extent that the Consumer Price Index can be interpreted as a cost of living index, it might be said that whilst it cost 13.7 per cent more in 1965 to maintain the 1957 standard of living, it cost 45.5 per cent more to provide the 1957 standard of education.

The Prepaid Medical Care component of the C.P.I. shows an increase of 36.3 per cent over the same period. Since the prime component of the cost of prepaid medical care is doctors' fees, it is not surprising that movement of this subindex is closer to the movements of the Education Price Index. The Implicit Price Index for current government expenditures on goods and services shows a rate of increase similar to that of the Medical Care Subindex and the Education Price Index.

It will be noted that the rate of increase of the Implicit Price Index is even, averaging almost four per cent per year throughout the period. The increase in the Education Price Index is less even, averaging almost seven per cent per year in the period 1957-1961 but averaging some four per cent for the period 1961-1965.

If this phenomenon is viewed in the context of Hanson's observation that there is a tendency for changes in the level of teachers' salaries to lag behind changes in the wage level of the labour forces as a whole (6, p. 63), but that changes in the level of teachers' salaries may run ahead of changes in the wage level of the labour force as a whole at the end of economic upswings and during recessions, it is

possible that the Implicit Price Index for current government expenditures would provide a good indication of changes in the price level of educational inputs over a longer period. However, whilst the Implicit Price Index shows an increase of 68 per cent since 1949, the average teacher's salary increased by some 157 per cent (Table IX, page 88). These differences suggest that comparisons based on the uses of the Implicit Price Index should be approached with caution and in the context of the relationship between salary levels in education and in the economy as a whole. The similarity between price level movements of other inputs and general price levels as measured by the Wholesale Price Index has been commented on previously (page 146).

The examination of the Alberta Education Price Index in relation to other indicators of price level in the economy suggested neither the Consumer Price Index nor the Wholesale Price Index are appropriate as indicators of price level change in educational inputs.

The Implicit Price Index for current government expenditures is more appropriate but for short period comparisons the problems of lag associated with changes in the level of teachers' salaries must be taken into account.

In general, the comparison with other indicators of price level indicates the need for special Education Price Indexes. It is possible providing special care is taken in establishing appropriate sub-indexes for teachers' salaries, to utilize the Wholesale Price Index as an appropriate measure for the price levels of commodities.

VII. SUMMARY AND CONCLUSIONS

The compilation and analysis of the Alberta Education Price Indexes make it possible to report the following general conclusions:

(1) The price levels of educational inputs increased during the period 1957-1965 by an average of some five per cent per year.

(2) The assumptions of different levels in the quality of the teaching force made a difference in the rate of price increase by slowing down the overall rate of price increase just over one per cent per year.

(3) The rate of increase in the price level of teaching services exceeded the rate of increase in average wages and salaries in Alberta for the period 1957-1965. The average rate of price increase was accelerated by the rapid rise in teachers' salaries in the late 1950's but until that time there were indications that the rates of increase in teachers' salaries lagged behind those of the general work force.

(4) The rate of price level increase of inputs other than teaching services have, on the whole, not increased at a rate more rapid than the price level of goods and services in the Alberta economy as a whole.

(5) Because of the weight placed on teachers' salaries in the Education Price Indexes it is unlikely that minor inaccuracies in price data for other inputs would have significant effects on the rate of price increase as measured by the Indexes.

(6) Distortion of the price indexes because of changes in the expenditure patterns were limited to an estimated .25 points per year.

(7) There is little to suggest that the rates of price increase have had any differential effects on small and large area authorities, considered in the aggregate.

(8) The Consumer Price Index and the Wholesale Price Index are not appropriate indicators of the price level increase of educational inputs. The Implicit Price Index for current government expenditures is an appropriate indicator of the price level increase in educational inputs provided that allowance is made for the different pattern of salary increases for the teaching force.

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CHAPTER VI

PRICE LEVELS AND EXPENDITURES

I. INTRODUCTION

The second stage of the investigation consisted of an examination of the effects of price level increases, as measured by the Alberta Education Price Indexes, on school board expenditures in Alberta during the period 1957-1965.

The examination was directed towards the answering of the following three questions:

1. What would operating expenditures have been for public schools in the Province of Alberta for each year, 1957 to 1965, had price levels and enrollments remained at the 1957 levels?

2. To what extent have per pupil expenditures made by Alberta school boards on the major categories of input, kept pace with increasing price levels?

3. To what extent have per pupil expenditures made by small and large area school boards in the Province of Alberta, by major categories of input, kept pace with increasing price levels?

For the purpose of this examination, it was necessary to develop an expenditure unit which would remove from the expenditure data the effect of changing enrollments.

Weighted Pupil Data

The most obvious method of removing the effect of changing enrollments would be to divide the annual expenditures on operation by the total enrollment in each year. The resulting figure would provide an estimate of the annual expenditure per pupil enrolled.

However, this expenditure figure would tend to overstate any increases in expenditures per pupil since it would be based on the implicit assumption that there are no differences between the costs of educating elementary and secondary school students, and that the distribution of elementary and secondary school students had remained the same.

In the school year 1957-1958, 20.66 per cent of all students enrolled in the public schools of Alberta were in Grades IX to XII; by 1965 the percentage had increased to 25.53 per cent (5, p. 213). Furthermore, as Wasserman has pointed out,

> Neither data on pupil enrollment nor on average daily attendance relate to the fact that a student day or a student year in a school system may require different amounts of educational inputs--and different pupil costs--at different levels of schooling. (13, p. 96)

In order to reduce the effect of the cost differential which could be attributed to the increasing proportion of secondary school students, it was decided to weight the enrollment figures so that they would reflect the additional costs of educating secondary school students.

Studies of cost differential have tended to identify two major sources of additional cost in educating secondary school students:[1]

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[1] For a summary of some of the major studies, see Paul R. Mort and John W. Polley, Public School Finance (New York: McGraw-Hill, 1960), pp. 108-10.

differences in average salary between elementary and secondary school teachers, and differences in pupil-teacher ratios in elementary and secondary classes.

It is important, moreover, to distinguish between cost differentials which are the result of circumstances over which school boards can exercise little or no control, and differentials which may result from school board policies.

It would be hypothetically possible for school boards to employ sufficient numbers of teachers at any level of qualification so that there would exist no differentials in the cost of educating elementary and secondary school students. On the other hand, given the conditions of insufficient supply of teachers and the increasingly specialized nature of the secondary school programme which have been characteristic of the Alberta educational scene during the period under study, it is recognized that school boards will have tended to employ teachers with higher levels of qualification at the secondary school level. It was considered, therefore, that cost differentials arising out of the difference between the average salaries of elementary and secondary school teachers were the result of circumstances over which local boards could exercise little control.

Cost differentials arising out of differences in pupil-teacher ratios in elementary and secondary schools could, in part, be attributed to the desire of school boards to provide for smaller groups of students by offering a greater choice of courses at the secondary level.

It was decided, therefore, that to reflect the additional costs of educating secondary school students, secondary school enrollments

should be weighted by a figure reflecting the differentials in salaries between elementary and secondary school teachers only. As a result, any differences in cost which may be attributed to differences between pupil-teacher ratios in elementary and secondary levels will be reflected in the analysis as an overall increase in the level of per pupil expenditures.

Table XXXVIII shows the average annual salaries paid to elementary and secondary school teachers in Alberta for the years 1957-1965. The ratio between each of the average salaries has remained relatively stable at 1.3:1 and this ratio was used to reflect the additional costs attributable to secondary school enrollments.

Enrollment data were obtained directly from records of the Department of Education. Details of the data, and methods used to compile the enrollment data are provided in Appendix H. These data have been transferred to Table XXXIX.

The weighted enrollment data were used to convert the total expenditure data for each year into annual per weighted pupil expenditures on operation. The annual per weighted pupil expenditures on operation were used as the basis on which to examine the influence of increasing price levels.

Constant Dollars and Real Expenditures

The analyses of the effects of increasing price levels were conducted in terms of "constant" or "real" dollars.

The term "constant" dollar is used to refer to the purchasing power in the base year of a series. As price levels increase over time,

TABLE XXXVIII

AVERAGE SALARIES OF ELEMENTARY AND SECONDARY TEACHERS IN ALBERTA 1957-1965

Year	Average Salaries Elementary	Secondary	Ratio Col.1/Col.2
1957	$3,704	$5,126	1.3/1
1958	3,966	5,534	1.4/1
1959	4,300	5,932	1.3/1
1960	4,497	6,058	1.3/1
1961	4,747	6,349	1.3/1
1962	4,908	6,515	1.3/1
1963	5,073	6,611	1.3/1
1964	5,268	6,778	1.3/1
1965	5,512	7,029	1.2/1
Average Ratio			1.3/1

Source: Dominion Bureau of Statistics, Appendix H.

TABLE XXXIX

WEIGHTED ENROLLMENTS FOR SCHOOL AUTHORITIES
IN ALBERTA 1957-1965

Year	Small Area	Large Area	Total
1957	132,594	132,057	264,651
1958	144,089	135,803	279,892
1959	158,071	139,483	297,554
1960	170,533	145,392	315,925
1961	187,060	149,100	336,160
1962	201,042	150,888	351,930
1963	212,437	154,702	367,139
1964	226,654	158,559	385,253
1965	239,656	158,995	398,651

Source: Abstracted from Department of Education records and Appendix H.

the quantity of goods which may be purchased with a dollar declines. The decline in purchasing power is in inverse proportion to the increase in the price level.

An expenditure which is made in terms of constant dollars is designated a real expenditure in order to distinguish it from an expenditure made in current dollars; that is, an expenditure made without reference to changing price levels.

Wasserman (13, p. 106), has expressed the relationship between current dollars and real dollars in the form of a formal ratio:

$$\frac{\text{Real expenditure in year X}}{\text{Index value in base year}} = \frac{\text{Current expenditure in year X}}{\text{Index value in Year X}}$$

Since the value of the index number in the base year is 100, this ratio may also be expressed in the form:

$$\text{Real expenditure} = \frac{\text{Current expenditure in year X}}{\text{Index number in year X}/100}$$

This expression was used throughout the analyses to convert current expenditures per weighted student into real expenditures per weighted student.

Since the Alberta Education Price Indexes use the year 1957 as a base year, real expenditures are expressed in terms of the purchasing power of the dollar in 1957.

It is in the conversion of current expenditure data to real expenditure data that the significance of the choice of a base year becomes apparent. In a period of increasing prices, the further the base year is from any given period, the greater will be the difference between current and real expenditures. Thus, estimates of real

expenditure must be interpreted primarily in terms of relative change. Wasserman comments on the problems which may arise as a result of interpreting real expenditures without reference to the base period. He says,

> If some other base period had been used in these subindexes, the yearly subindex values would differ and a different set of constant dollar data would have been obtained. However, the relative--e.g., per cent--period to period changes in the subindexes and in the constant dollar data would have not been affected by the choice of the base period. (13, p. 107)

Significance of Changes in Real Expenditure Data

Wasserman also points out that constant dollar figures must be regarded as approximations because of the degree of imprecision that is intrinsic in the methodology used to compile index numbers. He comments,

> Limitations in price indexes are carried over into constant dollar data derived by the use of the indexes. Consequently, individual period to period fluctuations of one or two per cent in constant dollar data seldom would have any significance, and in particular cases, even changes of several per cent would be well within the margin of error inherent in the data. (13, p. 109)

It was shown in the previous chapter that the fixed base formula used in the compilation of the Alberta Education Price Indexes had resulted in an understatement of some two index points at the greatest point of distortion (page 153). Such a distortion would result in a distortion of just over one per cent in the estimates of constant dollar expenditure for all provincial school boards in 1965, and in a smaller distortion for all other years. It may be assumed, therefore, that distortions due to imperfections in the methodology used are not significant.

Because the differences between the indexes compiled with Salary Subindexes II and III are less than one point (page 140), the constant

dollar data derived by using both subindexes in the analyses would also not differ significantly. It was decided that the analyses of expenditure would be conducted with Salary Subindexes I and III only, thus testing the assumption that quality in the teaching force is related to years of training as reflected in certification level, but without attempting to distinguish among levels of certification.

II. ANALYSES OF EXPENDITURES

Total Real Expenditures on Operation

In order to provide an estimate of the annual real expenditure on school operation in Alberta, total operating expenditures were first deflated by an index of enrollment, then by Provincial Price Indexes I and III.

This approach was utilized by Hirsch in his analysis of daily expenditures on instruction in the United States from 1900-1958, prepared for the Joint Economic Committee of the United States Senate (7). Although his results have been the subject of critical comment in the review of literature (page 57), it may be recalled that criticism was directed more towards the limitations of data than of methodology.

The details of this analysis are set out in Table XL. Column 1 shows the total expenditures on operation for each year, 1957-1965. It shows that total operating expenditures increased by 146 per cent from 1957 to 1965, at an annual average rate of 18.25 per cent.

Column 2 shows the enrollment index, which was computed from the enrollment data shown in Table XXXIX, page 168. The index shows that

TABLE XL

TOTAL EXPENDITURES ON SCHOOL OPERATION IN ALBERTA 1957-1965
WITH ADJUSTMENTS FOR ENROLLMENT AND PRICE LEVEL

Year	Total in Current Dollars (Thousands) (1)	Enrollment Index[x] (2)	Total in Current Dollars Adjusted for Enrollment (3)	Provincial Price Index I (4)	Total in Real (1957) Dollars (5)	Percentage Change (6)	Provincial Price Index III (7)	Total in Real (1957) Dollars (8)	Percentage Change (9)
1957	$57,470	100.0	$57,470	100.0	$57,470		100.0	$57,470	
1958	67,559	105.8	63,735	106.6	59,788	+0.4	106.7	59,733	+0.4
1959	77,517	112.4	69,212	115.4	60,184	+0.5	115.8	59,665	-0.2
1960	88,025	119.4	73,971	122.7	60,139	-0.1	122.2	60,631	+1.6
1961	99,185	127.0	79,098	129.2	61,316	+2.0	128.0	61,795	+1.9
1962	106,212	133.0	79,858	133.1	60,043	-2.0	130.8	60,960	-0.2
1963	115,147	138.7	83,440	136.5	61,352	+2.0	133.4	62,736	+2.9
1964	127,402	145.6	87,863	141.6	61,874	+1.0	136.7	64,133	+2.2
1965	141,402	150.6	94,268	145.5	65,012	+5.0	139.3	67,819	+5.7
Percentage Increase (Total)	146.0		64.0		13.0			18.0	
Percentage Increase (Annual)	18.25		8.0		1.6			2.2	

Sources: (1) Table V; (2) Table XXXIX; (4) Table XXIX; (7) Table XXIX.

[x]Enrollment Index computed by expressing weighted total enrollment for each year 1958-1965 as a percentage of weighted total enrollment in 1957.

weighted enrollments increased by 50.6 per cent during the period 1957-1965.

Column 3 shows the total operating expenditures in current dollars after adjustment by the enrollment index. The overall increase in current dollars is reduced to 64.0 per cent and the average annual rate of increase is reduced to 8.0 per cent. These adjusted figures suggest that just over half of the increased expenditure on operation between 1957 and 1965 may be attributed to increases in enrollment.

Columns 5 and 8 show what total annual expenditures on operation would have been for each year had enrollments and price levels remained at the 1957 level.

The annual expenditures in Column 5 were adjusted by Provincial Price Index I compiled with Salary Subindex I and therefore represent expenditures in constant dollars assuming no change in the quality of the teaching force. The figures show that in terms of 1957 prices and enrollments, expenditures on operation increased from $57,470 thousand in 1957 to $65,012 thousand in 1965, an overall increase of 13 per cent and an average annual increase of 1.6 per cent.

The annual expenditures in Column 8 were adjusted by Provincial Price Index III, compiled with Salary Subindex III, and therefore represent expenditures in constant dollars, assuming that part of the increase in the price level was the result of an improvement in the quality of the teaching force. These figures show that in terms of 1957 prices and enrollments, expenditures on operation increased from $57,470 thousand in 1957 to $67,819 thousand in 1965, an overall increase

of 18.0 per cent and an average annual increase of 2.25 per cent.

Examination of Columns 6 and 9 reveals that the increase in real expenditures was spread unevenly throughout the period. Until 1961 there were only fractional increases in the annual rate of increase of real expenditures, suggesting that until that year, increases in expenditures were sufficient only to keep pace with increased price levels and enrollments. After 1961 there is evidence that there was some increase in the level of real expenditures, suggesting that expenditures not only were adequate to keep pace with increasing enrollments and price levels, but also to provide for some increase in the quantity of services supplied.

The change in the level of real expenditures in 1961 is significant, since in that year a new system of school finance was introduced into Alberta.[1]

The new system, which was financed by a combination of grants from provincial revenue and the yield from a compulsory and uniform property tax levy on all municipalities based on equalized assessment, provided for uniform grants to all school authorities in the province in accordance with the level of teacher qualification and the number of pupils enrolled, together with grants for other services.

Since 1961, grants to school boards under this system have accounted for some 85 per cent of total operating revenue of provincial

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[1]For a good, brief discussion of the systems of financing education in Alberta during the period 1957-1965 see K. Grant Crawford, Provincial School Grants 1941 to 1961 (Toronto: Canadian Tax Foundation, 1962), pp. 189-210.

school boards. The remainder of the revenue needed for operation is raised locally by a supplementary property-tax levy.

The evidence supplied by this analysis suggests that the inception of the new system of educational finance was accompanied by a trend towards increasing the level of real expenditure on operation.

The analysis did not reveal into which inputs the increases in real expenditure had been directed, and so a second analysis of total operating expenditure was performed.

Real Expenditures by Major Category of Input

This analysis was designed to reveal to what extent expenditures on the major categories of input had kept pace with increased price levels.

The weighted enrollment data for each year were divided into the total annual operating expenditures of provincial school boards, as set out in Table V, page 75, to provide an annual per weighted pupil expenditure figure. The annual per weighted pupil totals were then prorated in accordance with the percentage distribution by major categories of input to provide a series of expenditures per weighted pupil on major categories of input for each year. These expenditure data are set out in Table XLI.

Current expenditures per weighted pupil. Total expenditures per weighted pupil increased from $219.32 in 1957, to $354,70 in 1965, an increase of 61.7 per cent overall and an annual average increase of 7.8 per cent.

TABLE XLI

EXPENDITURES PER WEIGHTED PUPIL BY MAJOR CATEGORIES OF INPUT, ALBERTA 1957-1965
(Current Dollars)

Year	Administration (1)	Teachers' Salaries (2)	Instructional Aids and Supplies (3)	Plant Operation and Maintenance (4)	Transportation (5)	Auxiliary Services (6)	Other Expenditures (7)	Total (8)
1957	$5.92	$134.88	$ 9.43	$33.99	$30.04	$1.31	$3.72	$219.29
1958	6.52	148.93	10.86	39.59	30.41	0.96	4.10	241.37
1959	6.78	165.16	11.98	40.64	31.00	0.79	4.16	260.51
1960	7.24	180.83	12.26	42.07	31.21	0.56	4.46	278.63
1961	7.96	194.15	14.16	42.78	31.87	0.59	3.54	295.05
1962	8.14	202.50	13.58	44.06	29.28	0.30	3.93	301.79
1963	8.47	212.02	14.12	45.16	29.48	0.62	3.76	313.63
1964	9.59	224.55	12.90	50.26	30.42	0.33	2.64	330.69
1965	10.99	240.14	15.26	53.20	31.92	0.35	2.84	354.70

Sources: Computed from Table V and Table XXXIX.

By major category of input, the greatest increases in weighted per pupil expenditure have been in administration. Expenditures rose from $5.92 per weighted pupil, to $10.99 per weighted pupil, an increase of 85 per cent.

Teachers' salaries have shown the next greatest increase from $134,88 to $240.14 per weighted pupil, an increase of 78 per cent. Increases in expenditure on other major categories of input were less, with instructional supplies increasing by 62 per cent, plant operation and maintenance increasing by 57 per cent, and transportation increasing by six per cent. Expenditures on auxiliary services and other inputs declined during the period.

Expenditures on auxiliary services are primarily for health services, and there has been a tendency, noted in Department of Education Annual Reports, for such services to be increasingly supplied by local government health units. It is possible that the decrease in the small proportion of expenditure devoted to other inputs may be a reflection of improved accounting procedures, whereby expenditures previously classified as miscellaneous, had been classified under other headings.

The current expenditures per weighted pupil on major categories of input were then converted to real expenditures by deflating the expenditure on each of the major categories of input by the relevant subindex value for each year.

Real expenditures per weighted pupil. Details of the estimated real expenditure by major categories of input per weighted pupil are set out in Table XLII.

TABLE XLII

REAL EXPENDITURES PER WEIGHTED PUPIL BY MAJOR CATEGORIES OF INPUT, ALBERTA 1957-1965
(1957 = 100)

Year	Administration (1)	Teachers' Salary Salary Subindex I (2)	Teachers' Salary Salary Subindex III (3)	Instructional Aids & Supplies (4)	Plant Operation & Maintenance (5)	Transportation (6)	Auxiliary Services (7)	Other Expenditures (8)	Totals Using Salary Subindex I (9)	Totals Using Salary Subindex III (10)
1957	$5.92	$134.88	$134.88	$9.43	$33.99	$30.04	$1.31	$3.72	$219.29	$219.29
1958	6.35	134.67	134.38	10.69	40.68	31.25	0.92	4.05	228.61	228.32
1959	6.48	136.33	135.58	11.09	37.21	28.58	0.72	4.11	224.52	223.77
1960	6.64	138.35	139.15	11.12	36.69	27.22	0.47	4.37	224.76	225.56
1961	7.06	138.20	140.18	12.69	36.96	27.54	0.48	3.43	226.36	228.34
1962	7.21	138.47	143.24	11.89	37.38	24.83	0.25	3.78	223.81	227.57
1963	7.32	141.46	146.35	12.17	38.24	24.96	0.48	3.51	228.14	223.03
1964	8.37	144.21	152.02	10.77	40.82	24.71	0.25	2.44	231.57	239.38
1965	9.15	150.03	159.99	12.67	43.04	25.82	0.23	2.59	243.51	253.47
Increase	54.5%	11.1%	18.6%	34.3%	36.6%	-14.1%	-82.5%	-69.3%		

Sources: Computed from Table XLI and Table XXIX.

Total real expenditures per weighted pupil, after adjustment by Provincial Index I increased from $219.29 in 1957 to $243.52 in 1965 (Column 9), an overall increase of 12.2 per cent and an average annual increase of 1.5 per cent.

Another way of looking at the difference between increases in current and real dollars is to say that of the increase in current expenditures of $135.38 (Column 8, Table XLI, page 175), all but $24.19, or 82 per cent, was taken up by increases in the price level. If the Provincial Index is compiled with Salary Subindex III (Column 10), the overall increase in real expenditure per weighted pupil amounts to $34.20 and the estimate of the impact of increasing price levels is reduced to taking up 74.7 per cent of the increased expenditures per weighted pupil.

Real expenditures on administration. Real expenditures on administration (Column 1) showed a substantial increase, from $5.92 in 1957 to $9.15 in 1965. The overall increase was 54.5 per cent with an average annual increase of 6.8 per cent. It was noted that prior to 1960, the annual rate of increase was just over five per cent, but that after 1960 the rate of increase in real expenditure amounted to over eight per cent annually. The increases in real expenditure were more than adequate to keep pace with increasing price levels, and there is a strong indication that the quantity of administrative service supplied increased substantially.

Real expenditures on teaching services. Real expenditures per weighted pupil on teaching services (Table XLII, Columns 2 and 3) also

increased. When Salary Subindex I was used to deflate expenditures on teaching services, an increase from $134.88 in 1957 to $150.03 in 1965 was noted. This is an overall increase of 11 per cent and an average annual increase of 1.4 per cent.

When Salary Subindex III was used to deflate expenditures on teaching services, an increase from $134.88 to $159.99 was observed. This is an overall increase of 18.6 per cent and an average annual rate of increase of 2.3 per cent.

The rate of increase prior to 1961, however, is very slight, suggesting that increases in expenditures on teaching services were barely adequate to meet the increases in salary level.

After 1961, there were marked increases in real expenditures, suggesting that there was an increase in the quantity of teaching services supplied.

The increase in the quantity of teaching service supplied is reflected in the steady reduction of the pupil-teacher ratio. Hanson shows that the pupil-teacher ratio in Alberta public schools has declined steadily over the period, from 24.8 in 1957 to 22.1 in 1965 (6, p. 63), with the decline becoming more marked since 1962. However, it is quite possible that this reduction in pupil-teacher ratio has taken place at the secondary level, and at the expense of the elementary pupil-teacher ratio. The figures provided in Table XLIII are based on data supplied by the Dominion Bureau of Statistics and tend to support this observation.

Whilst the elementary pupil-teacher ratio has increased slightly over the nine-year period, the secondary pupil-teacher ratio has

TABLE XLIII

ELEMENTARY AND SECONDARY PUPIL-TEACHER RATIOS
IN ALBERTA 1957-1964

Year	Pupil-Teacher Ratios	
	Elementary	Secondary
1957	28.2:1	21.6:1
1958	27.7:1	21.3:1
1959	27.0:1	20.0:1
1960	29.2:1	16.6:1
1961	29.0:1	16.7:1
1962	28.9:1	16.4:1
1963	29.3:1	16.2:1
1964	29.4:1	15.4:1

Source: Dominion Bureau of Statistics, Appendix I.

decreased dramatically from 21.6 to 15.4.

The sudden drop in the secondary pupil-teacher ratio noted for 1960 appears unlikely, but correspondence with the Dominion Bureau of Statistics has failed to reveal any change in definition, or method of data collection, which would explain the drop. Mr. Wicks, Chief of the Elementary-Secondary Section of the Education Division, states:

> . . .I can point out that reductions in pupil-teacher ratio similar to those for Alberta were observed for several other provinces in 1960-61. This suggests a change of definition, either for secondary teachers or secondary enrollment, but I can find no record for any such change for the year in question.[2]

Real expenditures on instructional aids. Real expenditures per weighted pupil on instructional aids and supplies (Column 2, Table XLII) show a steadier rate of increase. The increase was from $9.43 in 1957 to $12.67 in 1965. The overall increase amounted to 34.3 per cent, an average annual rate of increase of 4.3 per cent. The increase in real expenditure per weighted pupil indicates that there has been a steady increase in the quantity of instructional aids and supplies provided by school boards.

Real expenditures on plant operation and maintenance. Real expenditures per weighted pupil on plant operation and maintenance (Column 4, Table XLII) increased from $33.04 in 1957 to $43.04 in 1965. The overall increase of 26 per cent is somewhat distorted by the atypical figures for 1957 and 1965. Apart from these two years, real expenditures remained relatively stable. The average real expenditure per

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[2]Personal letter to the writer contained in Appendix I.

weighted pupil for the years 1958-1964 is $38.28, with a range of less than $2.00.

There is little reason to expect any substantial increase in the level of real expenditures for plant operation and maintenance. Mort, Reusser and Polley support this contention when they suggest that provided that there are regular maintenance schedules, the maintenance budget may be kept fairly stable from year to year (11, p. 469).

It might also be expected that the trend towards larger plants would result in some economies of scale which might again serve to stabilize the operation budget.

Real expenditures on transportation. Real expenditures per weighted pupil on transportation (Column 5, Table XLII, page 177) have declined steadily during the period from $30.04 in 1957 to $25.82 in 1965. Such a decline would normally imply that the quantity of transportation supplied had decreased and that expenditures were not adequate to meet increasing price levels.

It is possible, however, that a partial explanation for the decline in real expenditures may be found in the efforts of rural school boards to economize in the operation of transportation services, whilst still maintaining levels of service.

For instance, the Annual Report of the Department of Education for 1963 notes:

> It was reported, however, that most boards became more aware of transportation costs, and that many made efforts to effect economies through the systematic removal of old buses, reduction of private contracts, more careful study of bus sizes required for the future, and improved supervision of busing arrangements. (p. 16)

In the Annual Report for 1962 it was noted that:

> . . .Boards were becoming more deliberate and economy minded in arranging bus routes, and that there appeared a definite trend towards larger buses and longer routes. (p. 16)

The use of larger buses over longer routes would tend to reduce the number of buses and drivers required for the maintenance of transportation services and these economies would tend to offset increases in the price levels of transportation inputs.

There is little indication that there has been any decline in the quality of service provided, although the 1962 Annual Report does comment, "As a result of the recent changes in financing, a few boards decided to forego possible plans to provide gate service for all pupils" (p. 16).

The reduction in per pupil expenditures in current dollars has been commented on previously (p. 177). The effect of controlling for increases in price level is to reduce the estimates of expenditure per weighted pupil.

Summary. The analysis of real expenditures per weighted pupil on the major categories of input indicated that some 75 or 82 per cent of the increased expenditures since 1957 have been taken up by increases in price levels of inputs. However, there have been differential rates of increase in real expenditures which have been greater for those inputs which are more directly related to the instructional processes. The average annual rates of increase in real expenditures per weighted pupil were:

Major Category of Input	Average Annual Rate of Increase (%)
Administration	6.8
Teaching Services	
(a) no change in quality	1.4
(b) allowing for quality change	2.3
Instructional Aids and Supplies	4.3
Plant Operation and Maintenance	1.6
Transportation	-1.8
Auxiliary Services	-10.3
Other Inputs	-8.6

The rates of change have not been steady throughout the period, but in all cases there is an indication that real expenditures increased after the inception of the Foundation Program of educational finance. The effect of the increase was most marked in the case of administration, teaching services, and instructional supplies and aids. Real expenditures on transportation, which declined steadily until 1961, tended to stabilize at the 1962 level.

In all categories of input a sudden increase in real expenditures was apparent for the final year of the series, 1965.

A further analysis was undertaken in order to determine whether increasing price levels affected real expenditures per weighted pupil enrolled by small and large area authorities differently.

Real Expenditures of Small and Large Area Authorities

This analysis was designed to reveal to what extent expenditures by small and large area authorities had kept pace with increasing price levels.

Annual expenditures on operation per weighted pupil enrolled by small and large area school boards were derived by dividing total operating expenditures for each year by the weighted enrollment for each year. The total expenditures per weighted pupil on operation were then prorated in a manner similar to that used in the previous analysis (page 175) to provide an annual expenditure per weighted pupil in current dollars for each of the major categories of input. These expenditure data are set out in Tables XLIV and XLV.

Each current expenditure figure was deflated by the relevant subindex value for the appropriate year to provide an estimate of real expenditure per weighted pupil for each major category of input. These estimates are set out in Tables XLVI and XLVII.

Total expenditures per weighted pupil. For comparative purposes the total expenditure per weighted pupil enrolled by large and small area school boards contained in Tables XLIV, XLV, XLVI, and XLVII, have been transferred to Table XLVIII.

Table XLVII (Columns 1 and 4) shows that although current expenditures per weighted pupil enrolled by small area boards were consistently lower than current expenditures per weighted pupil enrolled by large area school boards, there was a tendency for the gap to narrow during the period. Thus, although in 1957 expenditures per weighted pupil enrolled by large area boards were 1.3 times as great as expenditures made by small area boards, by 1965 the ratio had been reduced to 1.1:1.

Total real expenditures per weighted pupil enrolled by large area

TABLE XLIV

EXPENDITURES ON OPERATION PER WEIGHTED PUPIL ENROLLED
BY SMALL AREA SCHOOL BOARDS, 1957-1965
(Current Dollars)

Year	Administration (1)	Teachers' Salaries (2)	Instructional Aids and Supplies (3)	Plant Operation and Maintenance (4)	Transportation (5)	Auxiliary Services (6)	Other Expenditures (7)	Total (8)
1957	$5.17	$131.00	$ 8.49	$33.39	$1.67	$0.36	$4.43	$184.52
1958	6.25	146.49	9.79	39.81	1.46	0.21	4.38	208.39
1959	6.34	161.93	10.87	40.31	1.81	0.23	4.98	226.47
1960	7.41	179.25	11.36	41.97	1.98	0.24	4.69	246.90
1961	7.89	191.55	13.95	43.15	2.11	0.26	4.21	263.12
1962	8.26	202.71	13.22	42.51	2.48	0.28	4.96	275.42
1963	8.71	214.51	13.64	45.28	3.19	0.28	4.64	290.26
1964	9.30	228.88	13.03	51.79	3.73	0.31	3.10	310.14
1965	11.29	243.36	15.60	54.12	4.32	0.33	2.98	332.00

Source: Computed from Table XXXIX and Table VI

TABLE XLV

EXPENDITURES ON OPERATION PER WEIGHTED PUPIL ENROLLED
BY LARGE AREA SCHOOL BOARDS, 1957-1965
(Current Dollars)

Year	Administration (1)	Teachers' Salaries (2)	Instructional Aids & Supplies (3)	Plant Operation & Maintenance (4)	Transportation (5)	Auxiliary Services (6)	Other Expenditures (7)	Total (8)
1957	$6.51	$136.22	$ 9.49	$33.98	$57.98	$2.00	$3.74	$249.92
	6.91	151.45	11.98	39.24	61.34	1.66	3.87	276.35
1959	7.18	169.00	13.46	40.37	64.00	1.49	3.59	299.09
1960	7.58	182.87	13.27	41.69	65.06	1.26	4.11	315.84
1961	8.38	197.04	14.42	42.22	69.37	1.00	2.68	335.11
1962	8.42	201.83	13.14	44.48	65.36	1.01	2.70	336.94
1963	8.99	208.47	13.15	44.94	66.37	1.03	2.79	345.72
1964	9.36	217.48	12.96	48.61	68.76	0.36	2.52	360.05
1965	10.50	234.92	15.16	52.51	72.72	0.39	2.72	388.92

Source: Computed from Table XXIX and Table VII.

TABLE XLVI

REAL EXPENDITURES ON OPERATION PER WEIGHTED PUPIL ENROLLED BY SMALL AREA SCHOOL BOARDS 1957-1965
(1957 = 100)

Year	Administration (1)	Teachers' Salaries: Salary Subindex I (2)	Teachers' Salaries: Salary Subindex III (3)	Instructional Aids & Supplies (4)	Plant Operation & Maintenance (5)	Transportation (6)	Auxiliary Services (7)	Other Expenditures (8)	Totals Using Salary Subindex I (9)	Totals Using Salary Subindex III (10)
1957	$5.17	$131.00	$131.00	$ 8.49	$33.39	$1.67	$0.38	$4.43	$184.52	$184.52
1958	6.09	132.46	132.19	9.64	38.99	1.49	0.20	4.42	192.95	192.63
1959	6.06	133.67	132.93	10.06	38.77	1.65	0.21	4.31	208.23	193.86
1960	6.80	137.15	137.93	10.30	39.35	1.72	0.20	4.60	199.25	200.11
1961	6.99	136.35	138.27	12.50	40.01	1.82	0.21	4.10	200.41	202.50
1962	7.31	138.61	142.39	11.58	40.43	2.10	0.23	4.73	203.23	207.46
1963	7.52	143.12	148.07	11.76	40.10	2.70	0.22	4.34	208.42	213.88
1964	8.12	147.00	154.95	10.88	44.18	3.03	0.24	2.87	214.76	223.54
1965	9.40	152.04	162.14	12.95	43.97	2.41	0.24	2.72	223.08	234.23
Increase	82.0%	16.0%	23.8%	52.5%	31.6%	44.3%	-36.0%	-38.7%		

Sources: Computed from Table XLIV, and Table XXX.

TABLE XLVII

REAL EXPENDITURES ON OPERATION PER WEIGHTED PUPIL ENROLLED BY LARGE AREA SCHOOL BOARDS 1957-1965
(1957 = 100)

Year	Administration (1)	Teachers' Salaries Salary Subindex I (2)	Teachers' Salaries Salary Subindex III (3)	Instructional Aids & Supplies (4)	Plant Operation & Maintenance (5)	Transportation (6)	Auxiliary Services (7)	Other Expenditures (8)	Totals Using Salary Subindex I (9)	Totals Using Salary Subindex III (10)
1957	$6.51	$136.22	$136.22	$ 9.49	$33.98	%57.98	$2.00	$3.84	$249.92	$249.92
1958	6.73	136.94	136.66	11.69	38.43	63.04	1.59	3.86	261.77	261.47
1959	6.86	139.51	138.73	12.46	38.83	58.62	1.35	3.53	260.75	259.94
1960	6.95	139.91	140.72	12.03	39.09	56.75	1.08	4.04	259.33	260.20
1961	7.42	140.26	142.23	12.92	39.15	59.94	0.82	2.60	262.35	264.57
1962	7.46	138.01	141.77	11.47	41.35	55.46	0.84	2.58	256.32	260.52
1963	7.76	139.09	143.90	11.34	39.80	56.20	0.81	2.59	257.15	262.48
1964	8.17	139.67	147.24	10.82	41.47	55.85	0.28	2.33	258.11	266.42
1965	8.75	146.77	156.51	12.58	42.66	58.83	0.28	2.47	271.83	282.58
Increase	34.4%	7.7%	14.8%	32.5%	25.5%	1.4%	-86.0%	-35.8%		

Sources: Computed from Table XLV and Table XXXI.

TABLE XLVIII

CURRENT AND REAL EXPENDITURES PER WEIGHTED PUPIL ENROLLED BY SMALL AND LARGE AREA SCHOOL BOARDS, 1957-1965

Year	Small Area Boards			Large Area Boards		
		Real Expenditures			Real Expenditures	
	Current (1)	Index I (2)	Index III (3)	Current (4)	Index I (5)	Index III+ (6)
1957	$184.52	$184.52	$184.52	$249.92	$249.92	$249.92
1958	208.39	192.95	192.63	276.35	261.77	261.47
1959	226.47	208.23	193.86	299.09	260.75	259.94
1960	246.90	199.25	200.11	315.84	259.33	260.20
1961	263.12	200.41	202.50	335.11	262.35	264.57
1962	275.42	203.23	207.46	336.94	256.32	260.52
1963	290.26	208.42	213.88	345.72	257.15	262.48
1964	310.14	214.76	223.54	360.05	258.11	266.42
1965	332.00	223.08	234.23	388.92	271.83	282.58
Percentage Increase	79%	21%	27%	55%	20%	13%

Source: Tables XLIV, XLV, XLVI, and XLVII.

boards were also greater than those for small area boards and a similar narrowing of the gap between the two sets of expenditures is observed. However, the gap between the real expenditure estimates did not decline by as much. In 1965, large area school boards spent 1.2 times as much per weighted pupil as did small area boards in terms of real dollars (Table XLVIII, Columns 2 and 5).

Real expenditures per weighted pupil enrolled by small area boards increased from $184.52 in 1957, to $223.08 or $234.23 in 1965, depending on whether Small Area Index I or III is used as the deflator. The overall increase was 21 or 27 per cent, depending on which index was used as the deflator.

Real expenditures per weighted pupil enrolled by large area boards increased from $249.92 in 1957, to $271.83 or $282.58, depending on whether Large Area Index I or III was used as the deflator. The overall increase was 20 or 13 per cent depending on which index was used as the deflator.

The difference in the overall increase between small and large area school board real expenditures when Index III is used as the deflator are marked, and suggest that assumptions about quality in the teaching force have considerable significance in this analysis.

Real expenditures per weighted pupil enrolled by large area school boards increased very little over the period and, in fact, declined during the years 1960, 1962, 1963 and 1964.

Real expenditures per weighted pupil enrolled by small area school boards showed a small but steady increase of some 2.5 per cent annually,

although it is apparent that the increase was slight during the period 1957-1962.

Real Expenditures by Major Categories of Input

Tables XLVI and XLVII, pages 188 and 189, show that both small and large area school boards increased real expenditure per weighted pupil enrolled on all major categories of input with the exceptions of auxiliary services and other inputs.[3]

Administration. Both small and large area school boards increased real expenditures on administration. The increase was most marked in the case of the small area boards where an overall increase of 82 per cent was registered. However, until 1961, there is very little evidence of an increase in real expenditure and most of the increase in real expenditure was registered in the period 1963-1965.

The increase in real expenditure by large area school boards was 34.4 per cent. Again the greater part of the increase was registered during the period 1962-1965.

It is worth noting that the Foundation Program makes provision for a grant of two and one-half per cent of total expenditure towards the cost of administrative services. It is possible that this provision made it possible for school boards to provide substantial increases in the quantity of administrative services provided, since the quantity of administrative service supplied would, to a large extent, be a function

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[3] See page 176 for a discussion of possible reasons for the decline in expenditures.

of total expenditure on teaching services. It has already been shown that the rate of price level increase is greater for teaching services than for administrative services.

Another factor which would make possible the provision of increased quantities of administrative service is the structuring of the Foundation Program regulations in such a way as to make it possible to receive grants for supervisory personnel, provided that they hold teaching certificates, both as teachers and as administrators.

Teaching services. It is in the provision of teaching services that price level increases appear to have had significant differential effects.

Real expenditures per weighted pupil enrolled by small area boards on teaching services increased by 16.0 per cent if Salary Subindex I is used as the deflator, and by 23.8 per cent if Salary Subindex III is used as the deflator.

Real expenditures per weighted pupil enrolled by large area boards increased by 7.7 per cent if Salary Subindex I is used as the deflator, and by 14.8 per cent if Salary Subindex III is used as the deflator.

These findings imply that the quantity of teaching services supplied by large area boards has increased less than that supplied by small area boards. However, it should be pointed out that whilst secondary enrollments of large area boards have increased by 37.5 per cent, secondary enrollments of small area boards have increased by 126 per cent (Table LV, Appendix H). It would appear that a substantial

proportion of the increase in real expenditures by small area boards has been directed towards the provision of teaching services at the secondary level.

Instructional aids and supplies. Real expenditures per weighted pupil enrolled by both small and large area school boards increased. Small area board expenditures per weighted pupil increased by some 6.5 per cent per year, and large area board expenditures increased by just over four per cent.

Plant operation and maintenance. There is very little difference between the average annual rates of increase in real expenditures per weighted pupil on plant operation and maintenance by small and large area school boards. The average annual rates of increase are four and three per cent respectively.

Transportation. Real expenditures per weighted pupil on transportation by large area school boards have remained stable supporting the suggestion made above (page 184) that increases in price level have been offset by economies in operation of pupil transportation services.

Real expenditures on transportation by small area boards remained stable until 1961 when they began to increase substantially by some 15 per cent per year. It is possible that the introduction of more widespread vocational education in cities following the introduction of the Federal-Provincial Technical and Vocational Training Agreement of 1961 was followed by the growth of urban transportation services in order to move students to the new vocational schools, thus increasing the quantity

of transportation services necessary.

It is also possible that the rate of increase of expenditures on transportation services is slightly understated since there is little reason to assume that the cost differentials on which the weighted pupil enrollments were based, apply to inputs such as transportation.

Summary. In general, the analysis of weighted per pupil expenditures by small and large area boards revealed that both types of authority had increased expenditures sufficiently to keep pace with increasing price levels. There were indications that, until 1961, the large area school boards did not increase expenditures sufficiently to provide for a significant increase in the rate of real expenditures, but that after 1961, a trend towards an increasing rate of real expenditure became apparent.

The analysis of weighted per pupil expenditure by major categories of input revealed that there had been some differences in the rate of increase of real expenditures by small and large area school boards:

Major Category of Input	Average Annual Rates of Increase	
	Small Area	Large Area
Administration	10.0	4.3
Teaching Services		
(a) no change in quality	2.0	0.9
(b) allowing for quality	2.9	1.8
Instructional Aids and Supplies	6.5	4.0
Plant Operation and Maintenance	4.0	3.0
Transportation	5.5	0.2
Auxiliary Services	-4.8	-10.0
Other Inputs	-4.9	-4.5

Real expenditures on teaching services showed the greatest degree of difference. Real expenditures by large area school boards were stable until 1961 and showed some increase thereafter, but real expenditures on teaching services by small area boards tended to show an increase each year of the series.

Real expenditures on transportation by large area school boards remained relatively stable, suggesting that increases in expenditure were adequate to keep pace with price levels. Real expenditures on transportation by small area school boards also remained stable until 1961, but showed a considerable increase thereafter. It has been suggested that the extension of vocational education facilities in urban areas might have contributed to the sudden increase in transportation expenditures.

III. THE INCOME ELASTICITY OF DEMAND FOR EDUCATION IN ALBERTA 1957-1965

An examination of expenditures on education should be conducted in the context of the revenues available to finance them. Such an examination would be beyond the scope of this study, since it would entail a consideration of the whole system of provincial and municipal finance of which the system of educational finance is a sub-system.

It is possible, however, to provide an estimate of the willingness of the people of Alberta to finance educational expenditures, by examining the relationship between educational expenditures and personal income, using the concept of income elasticity of demand for education.

The Concept of Income Elasticity

The income elasticity of demand for a good or service is an expression of the relationship between the change in the quantity demanded of any good or service, and a one per cent change in income. The coefficient of income elasticity is an expression of the ratio between the percentage change in the quantity demanded and the percentage change in income over a given period.

Measurement of the income elasticity of demand serves the function of classifying consumption goods as inferior, normal or superior, depending on whether the coefficient of income elasticity is negative, positive and equal to, or less than unity, or positive and greater than unity (2, p. 86).

A good which is classified as inferior is one for which the coefficient is negative. It is a good or service on which the individual will spend less as his income increases.

A good which is classified as normal is one for which the coefficient is positive but less than one. In this case, the consumer will spend an increasing amount of money in the purchase of the good but not in the same proportion as income increases. Such a coefficient implies that as income increases, a smaller proportion of the total budget will be spent on the commodity.

When the coefficient is greater than one, there is every indication that the consumer regards the good as superior and that he will seek to expand his consumption of the good or service as his income increases.

Problems of Computation

In order to compute the coefficient of income elasticity of demand for education it is necessary to make assumptions.

In computing income elasticities for goods and services provided in the market, one may go directly to the consumer for data, since he exercises his preference directly through the market. In the public sector, the consumer must exercise his preferences indirectly through elected officials. In all probability the patterns of expenditure decided upon by the elected officials will not coincide with the express preferences of any individual consumer. It therefore becomes necessary to assume that the level of expenditure is, through the political processes, representative of consumer preference.

It is also necessary to assume that the level of expenditure is representative of the quantity of service provided.

Personal Income as a Measure of Willingness

Selecting a measure of income is not without difficulty. It has been argued that the measure of income selected for this examination of willingness to pay, personal income per capita, is not an adequate measure of ability to pay, since it does not take into account the distribution of personal income or the proportion of income earners to total population, and it is a measure of income before taxes.[4]

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[4]See, for instance, Roe L. Johns and Edgar Morphet, Financing the Public Schools (Englewood Cliffs: Prentice Hall Inc., 1960), p. 151 ff., or Paul R. Mort, Walter C. Reusser and J. W. Polley, Public School Finance (New York: McGraw Hill, 1960), pp. 118-23 and C. T. F. Research Division, Financing Education in Canada (Ottawa: C.T.F., 1965), pp. 86-87.

In spite of these objections, investigations of the relationship between personal income and expenditures on education have found the relationship to be consistently high in both Canada and the United States.

A recent study by Paterson, for example, has suggested that for Canada in the census years 1951 and 1961, differences in personal income per capita among the provinces account for some 87 per cent of the variations in per pupil expenditures (11). Miner, in a United States study, found, after an analysis of expenditures and twenty-three variables, "The levels of State per capita income are the most important determinants of total per capita expenditures" (10, p. 100).

Previous Studies of Income Elasticity

Although relatively little attention has been paid to the measurement of income elasticity of demand for education in Canada, a number of studies have been made in the United States.

Hirsch, in an analysis of the costs of education in the United States, covering the period 1900 to 1958, estimated an overall elasticity coefficient of 1.09 (7), and a coefficient of .42 for instruction. Hirsch's elasticity estimates were based on time series data, but an analysis based on cross-section data, performed by Brazer (3) showed a somewhat lower estimate.

Brazer studied forty large cities and used as data 1949 median incomes and 1953 per capita costs. He estimated an elasticity coefficient of .73.

H. Thomas James (8) investigated the response of educational

expenditures to changes in personal income over time. He used data for the period 1946-1958 for the States of Washington, California, New Jersey, Wisconsin and Nebraska. The results of the analysis provided relatively high estimates of income elasticity ranging from a high of 2.12 for Nebraska to a low of 1.49 for New Jersey. The expenditure data included expenditures for higher education, and thus allowance should be made for the possible difference in elasticity between public and higher education.

Another study by McLoone (9) estimated state by state elasticities and an average for the United States in four different periods: 1929-1930 to 1957-1958; 1929-1930 to 1943-1944; 1943-1944 to 1957-1958; and 1947-1948 to 1957-1958. The overall elasticity estimated for the longest period, 1929-1930 to 1957-1958 was .99. There was a definite indication that the elasticity estimates increased in the more recent periods. In the period 1947-1948 to 1957-1958 the national average was 1.34 with three states showing elasticities of more than 2.0.

In Canada, Paterson computed elasticities for the Canadian provinces on the basis of current expenditure data only and found coefficients of .926 in 1941, .99 in 1951 and 1.11 in 1961 (11). Another Canadian study by Atherton (1) provided estimates of income elasticity for Canadian provinces for the period 1951-1961. The estimates were based on linear regression between per capita income and total expenditures on education. The coefficient of income elasticity for Alberta for this period was estimated at 2.62.

Income Elasticity in Alberta 1957-1965

The estimates of income elasticity for this study were computed from data on personal income per capita in Alberta and expenditures on operation per weighted pupil enrolled in Alberta school systems.

Because of the change in the system of financing education in 1961, it was decided to compute one estimate of income elasticity for the period 1957-1960 and another for the period 1961-1965.

Personal income data were obtained from Dominion Bureau of Statistics, National Accounts: Income and Expenditure for the years 1957 to 1965, and are set out in Appendix J. Expenditure data were obtained from Table V, page 75.

The method of computation was that outlined by Benson (2, p. 86) where

$$E_y = \frac{\text{Relative change in quantity demanded}}{\text{Relative change in income}}$$

For the period 1957-1960, personal income per capita in Alberta increased from $1,426 to $1,554, an increase of nine per cent. At the same time expenditures per weighted pupil on operation increased from $219 to $279, an increase of twenty-seven per cent. Expressing these changes in ratio form provides an estimate of a coefficient of income elasticity of 3.0. This estimate suggests that during the period 1957-1960, education in Alberta was regarded as a superior good. It is also worth noting that this estimate is somewhat higher than those made in other studies.

For the period 1961-1965 personal income per capita increased from $1,595 to $1,976, an increase of some twenty-three per cent. At

the same time expenditures on operation increased from $295 to $335, an increase of twenty per cent. The coefficient of income elasticity is reduced dramatically to .9.

The lack of provincial support for expenditures on education during this period cannot be held to be of too great a significance in the change, since Hanson shows that the proportion of provincial support to education has increased during the period under study from 43 per cent of total operating revenue to 48 per cent of total operating revenue (6, p. 69).

The two estimates of income elasticity suggest that in the period 1957-1961, strong efforts were made to ensure that expenditures on education increased even though the level of personal incomes remained almost stationary. The change in the coefficient of income elasticity for the period 1961-1965 suggests that the efforts to increase expenditures on education were not proportional to increases in personal income.

IV. SUMMARY OF THE ANALYSES OF EXPENDITURES

This chapter has reported the result of three separate analyses of expenditures on operation with the effects of increasing price levels on enrollments removed, and has provided an estimate of the income elasticity of demand for education in Alberta for 1957-1965.

The effects of increasing price levels were removed by deflating expenditure data by the price subindexes and indexes developed in Chapter III. The effects of increasing enrollments were removed by converting expenditure data to per pupil expenditure units based on weighted

enrollment data.

1. The first analysis was designed to show what operating expenditures would have been for each year of the series had price levels and enrollments remained at the 1957 levels. It revealed that although an increase of $83,932 thousand had been registered for the nine-year period, the impact of increasing enrollments and price levels had reduced the increase to $7,542 thousand in constant 1957 dollars. That is to say, some 80 per cent of the increased expenditures on education had been taken up by increases in enrollment and price levels.

2. The second analysis was designed to show the extent to which expenditures on major categories of input had kept pace with increasing price levels. The analysis of weighted per pupil expenditures by major categories of input revealed that some 75 or 82 per cent of the increased expenditures per weighted pupil since 1957 had been taken up by increases in the price levels of educational inputs.

Real expenditures on those categories of input more directly related to the instructional processes, including administration, teaching services and instructional aids and supplies tended to increase more rapidly than did expenditures on plant operation, which remained stable, and transportation, which declined slightly. Expenditures on auxiliary services and other inputs declined sharply.

3. The third analysis was designed to reveal the differential effects of price level increase on small and large area school authorities. The analysis revealed that until 1961, large area boards appeared to have difficulty in increasing the level of expenditures beyond that

which was necessary to keep pace with increasing price levels.

Real expenditures per weighted pupil enrolled by small area boards showed some increase for each year.

Differences in real expenditures on teaching services were especially marked as were differences in real expenditures on transportation.

4. The estimates of income elasticity showed a decided change in willingness to support expenditures on education for the two periods 1957-1960 and 1961-1965. The coefficient of income elasticity for the period 1957-1960 was 3.0 as against the estimate of .9 for the period 1961-1965.

A discussion of the implications of the findings in this chapter will be undertaken in Chapter VII.

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CHAPTER VII

SUMMARY, DISCUSSION AND IMPLICATIONS OF THE FINDINGS

I. INTRODUCTION

This chapter will begin by reviewing the purposes of the study and the methods of investigation used. It will continue with a summarized statement of the major findings as they relate to each of the sub-problems. The chapter will conclude with a discussion of the implications of the findings and some suggestions for further research.

II. PURPOSE OF THE STUDY

The study was designed to assess the impact of increasing price levels of educational inputs on expenditures for public school operation in Alberta from 1957-1965.

It was carried out in two stages, and at each stage of the investigation a number of sub-problems were investigated.

Stage 1 consisted of the compilation of three sets of price indexes designed to measure changing price levels of educational inputs. At this stage of the investigation, three sub-problems were investigated:

1. The effects, on the measurement of price level increase of teaching services, of making assumptions about changes in the quality of the teaching force.
2. The differential effects of increasing price levels on urban and rural school boards.

3. The relationship between measurements of price level increase of educational inputs and measurements of price level increase in the economy as a whole.

Stage II consisted of the analysis of selected aspects of school board expenditure, controlling for increases in price level and enrollment. At this stage of the investigation, four sub-problems were investigated:

1. The effect of increasing price levels and enrollment on total expenditures for school operation.
2. The effect of increasing price levels on per pupil expenditures.
3. The effect of increasing price levels on per pupil expenditures made by urban and rural school boards.
4. The relationship between expenditures and provincial personal income per capita.

III. RESEARCH PROCEDURES

The Price Indexes

The first stage of the investigation entailed the compilation of three sets of price indexes:

1. A set of Provincial Price Indexes.
2. A set of Small Area Price Indexes.
3. A set of Large Area Price Indexes.

Each set of price indexes consisted of three different indexes differentiated by assumptions regarding the relationship between years of

training, as reflected in certification level, and increases in the price level of teachers' services.

Method of index construction. Each set of price indexes was conceived as being composed of two major subindexes:

(a) A subindex for teachers' services.

(b) A subindex for inputs other than teaching services.

Each subindex was compiled by the method of weighted averages of price relatives.

Most of the weights for subindexes and components of the subindexes were derived from a breakdown of school board expenditure patterns available from the financial tables contained in the Annual Reports of the Department of Education for each year of the series.

Price relatives were derived from the prices of thirty-nine commodities and eight different types of labour inputs over a nine-year period and were obtained from a variety of sources.

Price data for teaching services were obtained from Alberta Department of Education Annual Reports. Price data for labour inputs other than teaching services were derived from wage scales for workers providing services similar to those provided in education and published by the Alberta Bureau of Statistics in the Annual Salary and Wage Rate Survey. Price data for commodities were obtained from local organizations engaged in school supply or derived from appropriate published price series.

Teachers' salary subindexes. Although a review of literature suggested there was no conclusive evidence of a relationship between years of training and quality of teaching service, it was decided to compile the Teachers' Salary Subindexes on two alternate assumptions in order to test the effect of such assumptions on the measures of price level increase.

Alternate assumption 1. There is no relationship between years of training and the quality of teaching service.

The Salary Subindex based on this assumption, Salary Subindex I, treated all increases in salary as the result of inflationary pressures without change in quality, and was based on the average salaries of all teachers.

Alternate assumption 2. There is a relationship between years of training, as reflected in certification level and the quality of teaching service.

Two Salary Subindexes were compiled under this assumption. The first of these, Salary Subindex II, distinguished between two levels of training and the second, Salary Subindex III, distinguished among three levels of training. To compile Salary Subindexes II and III, teachers possessing different levels of certification were considered as providing different services and the average salaries paid to teachers in each level of certification were used as price data.

IV. THE FINDINGS

In general, the study found that the increased price levels of educational inputs had a marked impact on expenditures on operation in Alberta during the period 1957-1965.

Although expenditures per weighted pupil during the period in current dollars increased by some $135, increased price levels accounted for all but some $24 or $34, depending on the assumption of quality in the teaching force.

Expressed in percentage terms, it could be said that increasing price levels accounted for 82 or 74 per cent respectively of the increased expenditures on operation per weighted pupil enrolled in the public schools of Alberta from 1957-1965.

The findings related to the investigation of sub-problems specified on pages 10 and 11 are summarized below.

Sub-Problems Related to the Price Indexes

Effect of quality assumptions. It was found that assumptions about the level of training of the teaching force and the quality of teaching services, made considerable differences to the measures of price level increase for teaching services as measured by the Alberta Education Price Indexes. The assumption that there was no relation between years of training and quality in teaching services resulted in an estimate of a 60 per cent increase in the price of teaching services. The assumption that there was a relationship between years of training and quality in the teaching force resulted in an estimate of a 50 or 51

per cent increase in the price of teaching services depending on whether Salary Subindex II or III was used.

The effects of the assumptions of quality on the overall measures of price level increase were less marked. The assumption that there was no relation between years of training and quality in teaching services resulted in an estimate of an overall price increase of 45.5 per cent for all provincial school boards, 48.8 per cent for small area school boards and 43.0 per cent for large area school boards.

The assumption that there was a relationship between years of training and quality in teaching services resulted in an estimate of increase in overall price levels of 40.1 or 39.3 per cent for small area school boards and 38.3 or 37.6 per cent for large area school boards depending on whether the Salary Subindex II or III was used.

Differential effects of price level increase. It was found that because of different patterns of expenditures, price level increases had affected urban or small area boards more than large area or rural boards by some three or four per cent a year.

Educational price levels and price levels in the economy. It was found that neither the Consumer Price Index nor the Wholesale Price Index were appropriate as measures of the price level increase of educational inputs.

The Implicit Price Index for Current Government Expenditures was found to be more appropriate, although it was noted that the pattern of increases in teachers' salaries was different to that of changes in

salary levels in the economy as a whole. It was suggested that whilst it cost 13.7 per cent more in 1965 to maintain the 1957 standard of living, it cost 45.5 per cent more to provide 1957 standard of education.

Sub-Problems Related to the Analysis of Expenditures

In order to investigate the effects of increase in price levels on expenditures on operation, it was necessary to control for increasing enrollments, by developing a weighted pupil measure which reflected the cost differential between the average salary of elementary and secondary school teachers.

Price level increases and total expenditures. Total expenditures on operation increased during the period 1957-1965 by 146 per cent in current dollars, an average annual rate of increase of 18.25 per cent.

When the total expenditures for each year were adjusted to remove the effects of increasing enrollments and price levels, it was found that total expenditures, in real terms, had remained relatively stable.

An average annual rate of increase in real expenditure of 2.25 per cent was registered when it was assumed that there was a relationship between years of training and the quality of teaching service. The average rate of increase in real expenditure was reduced to 1.6 per cent when the analysis incorporated the assumption that there was no relationship between years of training and quality of teaching service.

The estimates of the rate of increase in real expenditure were increased by the sudden rise in real expenditure of over five per cent recorded for the year 1965.

Price levels and weighted per pupil expenditures. The analysis of real expenditures per weighted pupil showed that some 82 per cent of the increased expenditures per weighted pupil had been accounted for by increases in the price level. However, the analysis revealed that expenditures per weighted pupil enrolled did keep pace with increasing price levels and had been sufficient to provide for a moderate increase in the quantity of inputs provided.

The rates of increase were not steady during the period and there were indications that until 1961, difficulties had been experienced in maintaining the level of real expenditures per weighted pupil.

It was found that increases in real expenditure had provided for an increase in the quantity of inputs more closely associated with instruction, including administration, teaching services, and instructional supplies. It was also found that expenditures on plant operation and maintenance, and transportation had increased sufficiently to keep pace with increasing price levels and that expenditures on auxiliary services and miscellaneous items had decreased in current and real terms.

Small and large area board expenditures. It was found that although the price indexes showed that price level increases had affected small area boards more than large area boards, large area boards had found it more difficult to increase the level of real expenditures per weighted pupil enrolled.

Small area boards increased real expenditures per weighted pupil by an annual average rate of two or three per cent, depending on the

assumption of quality in teaching services, whereas large area boards increased real expenditures by an average annual rate of one or two per cent, depending on the assumption of quality.

It was found that the differential rates of increase were particularly marked in the provision of teaching services, and that the difference between expenditures per weighted pupil enrolled by small area school boards and large area boards had steadily decreased during the period in both current and real terms.

Expenditures and personal income. Two estimates of the income elasticity of per weighted pupil expenditures in current dollars were made. It was found that whilst per capita income increased during the period 1957-1960 by nine per cent, expenditures per weighted pupil had increased by 27 per cent. For the period 1961-1965, personal income per capita increased by 22 per cent, whilst expenditures per weighted pupil increased by 20 per cent.

The coefficients of income elasticity were 3.0 for 1957-1960 and .9 for 1961-1965. These coefficients indicated a radical change in the willingness of Albertans to support educational expenditures during the period under study.

Findings not related to the sub-problems. A number of findings, not directly related to any of the sub-problems, were made during the course of the analyses.

(1) The price levels of educational inputs other than teaching services increased at a rate roughly commensurate with the rate of price

level increase for goods and services in the Alberta economy. Thus, the rate of price level increase for labour inputs was similar to the rate of wage and salary increase in Alberta as a whole. The price levels of commodities used in education increased at similar rates to those for all goods commodities as measured by the Wholesale Price Index.

(2) The inception of the Foundation Programme of Educational Finance in 1961 was associated with the beginning of a period of increased levels of real expenditure.

(3) Patterns of expenditure of school boards do not change rapidly nor do they change in such a way as to reduce the proportion of total expenditure devoted to the purchase of goods and services, the price of which rise more rapidly than others. Because of this phenomenon, the use of the fixed base, Laspeyres' formula, tends to understate rather than overstate price level increases.

V. DISCUSSION AND IMPLICATIONS OF THE FINDINGS

In general, the findings of this study tend to agree with the estimates of the impact of inflation on education expenditures undertaken in different countries, over different time periods and using different techniques.

Vaizey's study, undertaken in Great Britain, suggested that real expenditures per elementary pupil increased by some 16 per cent during the period 1946-1955 (3, p. 98), and that real expenditures per secondary pupil did not increase at all (3, p. 101). In the United States,

Hirsch's study suggested that expenditures per pupil in real terms increased by less than one per cent in the period 1946-1958 (1, p. 34).

It would be interesting to explore whether the similarity of these estimates is coincidental or a reflection of a more general pattern, but such an exploration would be dependent on further studies conducted at a higher level of aggregation than the study reported above.

The Price Indexes

The lack of correspondence between the measures of price level of educational inputs as quantified by the Alberta Education Price Indexes and other indicators of price level in the economy suggests that the compilation of special price indexes for use in education is justified.

However, the influence of changes in the level of teachers' salaries on the special indexes would be so great that there exists some doubt as to the need to obtain highly detailed information on the changes in price levels of other inputs, especially where the index is to be used for analytical purposes at high levels of aggregation. It may be recalled that the results of the analyses of real expenditure reported in this study do not differ greatly from estimates of the impact of price level increase on per pupil expenditures provided by Mowat and Atherton (2), using cruder price indexes.

In both studies, price data for teachers' salaries were obtained from the same source, the Annual Reports of the Alberta Department of Education, but the sources of price data for all other inputs were different. Mowat and Atherton used price data derived from published price index series compiled at the national level, and their subindexes

did not distinguish among components of input.

It would appear possible that price data for inputs other than teaching services might be derived from published series at higher levels of aggregation than those used for this study.

The assumptions of quality in teaching services do not appear to make substantial differences in the estimates of price level increase or real expenditure increase. In both cases the effect is limited to approximately one per cent per year. However, it should be pointed out that even this slight difference is sufficient to provide an indication of increase in the level of real expenditures. It is considered important, therefore, that efforts be made to allow for changes in qualification, particularly where there are indications of substantial change in the level of qualification during the period under study.

This change suggests an additional reason for making attempts to distinguish between salary increases which result from inflationary pressures and those which result from increases in the level of training of teachers.

If the greater part of the teaching force is possessed of two years of training, the average salary will tend to reflect the average salary of those wage earners with similar training. However, if the greater part of the teaching force becomes possessed of levels of training up to and beyond the graduate level, the average salary will tend to reflect the average salary of wage earners with higher levels of education, provided that teachers' salaries are to be competitive. Thus an increase in the average salary of teachers could reflect not only

improvements in the quality of the teaching force and inflationary pressures but also the movement of teachers into a higher socio-economic group.

Analyses of Expenditure

The analyses of expenditure have suggested that in spite of the increases in current expenditure over the period, the increases in real expenditure have not been as dramatic.

The increases in real expenditure indicate that an increased quantity of inputs was made available and, to the extent that an increase in quantity may be indicative of an increase in quality, the quality of education offered has improved. However, it is necessary to make some qualifications to this assessment.

First, the sharp reduction of the pupil-teacher ratio at the secondary level compared with the stability of the pupil-teacher ratio at the elementary level suggests that the increased quantities of inputs were applied to the secondary, rather than to the elementary level.

It is possible that real expenditures on elementary education may well have remained stable or even declined.

Second, the differences in rates of increase in real expenditure between urban and rural school authorities suggest that the urban school authorities increased the quantities of educational inputs more than rural authorities, and this in spite of the demographic and geographic factors which force rural school systems to operate with lower pupil-teacher ratios.

Thus, provided that the changes in pupil-teacher ratio reflect a

similar pattern for both urban and rural areas, it may be implied that urban secondary education has benefited most from the increases in real expenditure and that rural elementary education has benefited least.

The change in the coefficient of income elasticity suggests that any rapid increase in the level of real expenditure is unlikely. The coefficient of income elasticity of less than unity for the period 1961-1965 suggests that the increase in personal income enjoyed by the community as a whole was not shared proportionately by those who work in the educational sector. If this tendency continues, it is likely that it will become more difficult to attract and retain the suitably skilled personnel needed to maintain the quality of educational services.

VI. RECOMMENDATION FOR FURTHER RESEARCH

This study could provide a model for similar studies of real expenditure on education in Canada. It is suggested that a series of similar studies for the different provinces could provide a basis on which to assess real expenditures on education for Canada as a whole.

Since this study did not include a study of revenue, it would be interesting to examine the results of this study in relation to the sources of provincial and local government revenues.

Because this study was conducted at a high level of aggregation it is possible that some specific effects of rising price levels were overlooked. It is suggested that indexes similar to those compiled for this study could be compiled for individual school districts and used in the analysis of specific problems.

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APPENDIX A

SAMPLE OF SCHOOL AUTHORITIES USED FOR COMPONENT SUBINDEX WEIGHTING

SAMPLE OF SCHOOL AUTHORITIES USED FOR COMPONENT SUBINDEX WEIGHTING

Small Area School Authorities

Edmonton Public School District Number 7

Large Area School Authorities

Lethbridge School Division Number 7

Acadia School Division, Number 8

Lac Ste. Anne School Division, Number 11

Lamont School Division, Number 18

Vegreville School Division, Number 19

Sturgeon School Division, Number 24

Red Deer School Division, Number 35

Lacombe School Division, Number 56

Three Hills School Division, Number 60

County of Grande Prairie, Number 1

County of Vulcan, Number 2

County of Ponoka, Number 3

County of Newell, Number 4

County of Warner, Number 5

County of Stettler, Number 6

County of Thorhild, Number 7

Criteria of Selection

Selection of the school authorities was based on the size of the total expenditure.

Edmonton Public School District was selected because it accounted

for over fifty per cent of the total operating expenditures of all small area school authorities.

The large area authorities selected, accounted for almost forty per cent of the total operating expenditures for all large area school authorities.

APPENDIX B

RURAL AND URBAN CENTRES REPORTING TO THE ALBERTA BUREAU OF STATISTICS

The following list shows the rural and urban centres from which wage and salary data on institutional wages and salaries are obtained by the Alberta Bureau of Statistics for the purpose of compiling the annual wage and salary survey. The number of institutions reporting is shown in brackets.

Urban Centres

Edmonton (19)
Calgary (13)
Lethbridge (9)
Medicine Hat (2)
Red Deer (4)
Grande Prairie (2)

Rural Centres

Lamont (1)
Olds (1)
Camrose (3)
Ponoka (1)
Drumheller (2)
High Prairie (1)
Hanna (1)
Lac La Biche (1)
Lacombe (1)
Edson (1)
Lloydminster (1)
St. Paul (1)
Manning (1)
Two Hills (1)
Banff (1)
Wainwright (1)
Wetaskiwin (1)

APPENDIX C

TEACHERS' SALARY DATA

TABLE XLIX

NUMBER OF TEACHERS AND AVERAGE SALARIES FOR MALE AND FEMALE TEACHERS BY CERTIFICATION LEVEL IN ALBERTA 1957-1965

Year		Professional		Standard		Elementary		Junior 'E'		Secondary		Letter of Authority		Qualification Statement	
		No. (1)	Av. (2)	No. (3)	Av. (4)	No. (5)	Av. (6)	No. (7)	Av. (8)	No. (9)	Av. (10)	No. (11)	Av. (12)	No. (13)	Av. (14)
1957	Male	1,351	$5,116	355	$3,995	463	$4,775	383	$3,026	50	$3,550	93	$3,237	26	$2,229
	Female	806	4,338	1,211	3,359	1,579	3,521	1,896	2,823	527	3,290	444	2,922	89	2,168
	Total	2,157		1,566		2,042		2,279		577		537		115	
1958	Male	1,437	5,855	393	4,518	441	5,358	448	3,358	48	3,962	115	3,579	22	2,368
	Female	842	4,861	1,283	3,780	1,495	3,866	2,194	3,112	572	3,591	588	3,137	92	2,319
	Total	2,279		1,676		1,936		2,642		620		703		114	
1959	Male	1,615	6,440	405	4,891	418	5,821	525	3,728	47	4,333	161	3,533	15	2,520
	Female	931	5,523	1,454	4,147	1,373	4,284	2,624	3,432	542	3,951	693	3,317	52	2,637
	Total	2,546		1,859		1,791		3,149		589		854		67	
1960	Male	1,731	7,014	494	5,159	364	6,303	573	3,964	41	4,721	207	3,866		
	Female	1,111	5,922	1,028	4,469	1,338	4,555	2,897	3,698	575	4,226	830	3,661		
	Total	2,842		2,122		1,702		3,470		616		1,037			
1961	Male	1,979	7,409	612	5,314	349	6,680	617	4,244	40	4,996	219	4,247		
	Female	1,222	6,485	1,802	4,790	1,304	4,774	3,162	4,002	533	4,530	768	3,890		
	Total	3,201		2,414		1,653		3,779		573		987			
1962	Male	2,294	7,635	726	5,338	333	6,903	646	4,429	35	4,869	242	4,294		
	Female	1,398	6,683	2,014	4,852	1,195	4,996	3,249	4,159	448	4,606	762	3,949		
	Total	3,692		2,740		1,528		3,895		483		1,004			
1963	Male	2,663	7,669	768	5,377	296	7,158	693	4,500	29	4,972	228	4,392		
	Female	1,603	6,932	2,184	4,913	1,152	5,101	3,251	4,288	419	4,728	702	3,988		
	Total	4,266		2,952		1,448		3,944		448		930			
1964	Male	3,017	7,711	874	5,482	269	7,388	675	4,716	32	5,194	217	4,603		
	Female	1,892	6,987	2,450	4,483	1,142	5,205	3,328	4,472	407	4,807	669	4,097		
	Total	4,909		3,324		1,411		4,003		439		886			
1965	Male	3,492	7,785	958	5,545	243	7,541	608	5,023	25	5,238	226	4,844		
	Female	2,182	7,056	2,809	5,008	1,106	5,298	3,283	4,633	394	4,901	681	4,003		
	Total	5,674		3,767		1,349		3,891		419		907			

Source: Department of Education, Annual Reports, 1957-1965. Qualification Statement omitted after 1958.

APPENDIX D

DATA FOR ADMINISTRATION SUBINDEX

SALARY DATA FOR NON-PROFESSIONAL ACCOUNTANTS

The salary series for non-professional accountants employed in public institutions provided by the Alberta Bureau of Statistics in the Salary and Wage Rate Survey for the years 1957-1965 was used to represent changes in the level of school officials' salaries.

The average monthly salaries, together with the price relatives developed by expressing the average salaries for 1958-1965 as a percentage of the 1957 salary, are set out below:

Year	Average Salary ($ per month)	Price Relatives
1957	$417.00	100.00
1958	445.00	106.71
1959	444.00	106.47
1960	458.00	109.83
1961	467.00	111.99
1962	484.00	116.06
1963	485.00	116.30
1964	511.00	112.54
1965	492.00	117.98

SALARY DATA FOR CLERICAL ASSISTANTS

The salary series for "Clerk (Beginning Level), Female," and "Clerk (Intermediate Level), Female" provided by the Alberta Bureau of Statistics in the Salary and Wage Rate Survey for the years 1957-1965 were used to represent changes in the level of clerical assistants.

The salary series were combined into an unweighted mean. The combined means together with the price relatives developed by expressing the average salaries as a percentage of the 1957 salary are set out below:

Year	Combined Average Salary ($ per month)	Price Relatives
1957	$191.00	100.00
1958	195.00	102.09
1959	196.00	102.62
1960	210.00	109.95
1961	223.00	116.75
1962	217.00	113.61
1963	227.00	118.85
1964	215.00	112.56
1965	241.00	126.18

APPENDIX E

DATA FOR INSTRUCTIONAL AIDS AND SUPPLIES SUBINDEX

PRICE DATA FOR CORRESPONDENCE COURSES

GOVERNMENT OF THE PROVINCE OF ALBERTA
Department of Education
Correspondence School Branch

Edmonton, Alberta,
December 15, 1967

Mr. P. J. Atherton
Department of Educational Administration
Faculty of Education
University of Alberta
EDMONTON, Alberta

Dear Mr. Atherton:

In reply to your telephone call of December 13, the following information about Correspondence School Branch fees from 1957 to 1966 is supplied.

	High School	
1957-58	Grade X	$6.00 per course
	Grade XI	$7.00 per course
	Grade XII	$8.00 per course
1958-61	Grade X	$8.00 per course
	Grade XI	$9.00 per course
	Grade XII	$10.00 per course
1961-67	Grades X and XI	$11.00 per course
	Grade XII	$14.00 per course

	Junior High School	
1957-60	Grades VII and VIII	$2.00 per course
	Grade IX	$4.00 per course
1960-61	Grades VII, VIII and IX	$6.00 per course
1961-67	Grades VII, VIII, and IX	$8.00 per course

Elementary Section

1957	Registration fee	$5.00 per course
1958-60	Registration fee	$8.00 per course
1961-67	Registration fee	$12.00 per course

Yours sincerely,

Mrs. K. J. Doeling
ASSISTANT DIRECTOR

KJD/mb

TABLE L.

DETAILS OF PRICE RELATIVE CONSTRUCTION FOR CORRESPONDENCE COURSE COMPONENT OF INSTRUCTIONAL SUPPLIES SUBINDEX

Year	Price of Course				Av. Price	Price Rel.
	Junior High	Grade X	Grade XI	Grade XII		
1957	$ 4.00	$ 6.00	$ 7.00	$ 8.00	$ 6.00	100
1958	4.00	8.00	9.00	10.00	7.00	126
1959	4.00	8.00	9.00	10.00	7.00	126
1960	4.00	8.00	9.00	10.00	7.00	126
1961	8.00	11.00	11.00	14.00	11.00	177
1962	8.00	11.00	11.00	14.00	11.00	177
1963	8.00	11.00	11.00	14.00	11.00	177
1964	8.00	11.00	11.00	14.00	11.00	177
1965	8.00	11.00	11.00	14.00	11.00	177

Source: Department of Education, Correspondence School Branch.

DATA FOR BOOK COMPONENT

SCHOOL BOOK BRANCH
Public Works Building--121 Street at 104 Avenue
EDMONTON, ALBERTA

December 11, 1967

Dear Mr. Atherton:

This is in reply to your letter dated December 7th.

(1) The titles on your list are a good representation of the pattern of purchases by school boards over the period 1957 to 1966.

(2) The prices of these books represent a fair average price change in books as a whole. Over the past few years the average increase has been approximately six percent.

(3) The School Book Branch normally purchases textbook stock from forty-nine Canadian publishers and eight Foreign publishers. The books on your list come from nine Canadian publishers.

(4) (a) Over-stocking may occasionally have a bearing on our selling price to school boards. Normally, this would reduce the cost of texts to school boards. This does not happen too often. There are a few instances where this occurred with the titles on your list.

(b) Subsidies as a rule do not have any reflections on price changes. However, school boards who enter the rental scheme will find that their total net cost of books purchased will be lower because of the government subsidy by way of forty percent discount.

(c) Official policy sometimes affects price changes, e.g., in 1957-58 the Minister of Education held selling prices firm in spite of the fact that the majority of publishers increased their prices.

I trust this is the information you require. Please phone or write if I can be of any further assistance.

Yours very truly,

M. S. Fedorak,
Assistant Manager.

MSF:rmg

TABLE LI

DETAILS OF CONSTRUCTION OF PRICE SUBINDEX FOR BOOK COMPONENT OF INSTRUCTIONAL SUPPLIES SUBINDEX

Title of Book	Price of Book in Each Year of Series								
	1957	1958	1959	1960	1961	1962	1963	1964	1965
Textbooks									
Friends and Neighbours	$1.70	$1.75	$1.75	$1.90	$1.90	$1.90	$2.00	$2.10	$2.20
Streets and Roads	1.85	1.95	1.95	2.10	2.10	2.10	2.20	2.30	2.35
Canada and Her Neighbours	3.00	3.00	3.00	3.10	3.20	3.20	3.20	3.20	3.30
Canada in the Western World	2.75	2.75	2.75	3.00	3.50	3.50	3.50	3.50	3.50
Business Fundamentals	2.60	2.60	2.60	2.85	2.85	3.00	3.00	3.00	3.10
Canada in the Modern World	2.95	2.95	2.95	3.20	3.25	3.30	3.30	3.40	3.45
Thorndike-Barnhart H.S. Dictionary	4.95	4.95	4.95	5.15	5.30	5.40	5.70	5.75	5.80
Webster's Elementary Dictionary	3.65	3.65	3.65	3.60	3.60	3.60	3.60	3.60	3.60
Pupils Own Vocabulary Speller	1.45	1.45	1.45	1.60	1.60	1.65	1.75	1.75	1.75
Words and Ideas, Book II	2.00	2.00	2.00	2.00	2.10	2.10	2.25	2.35	2.50
Cost of Collection	26.90	27.05	27.05	28.50	29.40	29.75	30.50	30.95	31.55
Price Relatives	100.0	100.6	100.6	105.9	109.2	110.5	113.4	115.1	117.3
Supplementary Readers									
"B" is for Betty	3.50	3.50	3.50	3.50	4.25	4.25	4.25	4.25	4.25
Little Toot	3.00	3.00	3.25	3.50	3.50	3.75	3.75	4.10	4.10
Beau Geste	1.65	1.95	1.95	1.95	2.00	2.00	2.25	2.25	2.25
My Friend Flicka	2.00	3.05	2.50	2.50	2.50	3.00	3.75	3.50	3.50
Cost of Collection	10.15	11.50	11.20	11.45	11.50	13.00	14.00	14.10	14.10
Price Relatives	100.0	113.3	110.3	112.8	113.3	128.0	137.9	138.9	138.9
Weighted Price Relatives	80.0	80.4	80.4	84.7	87.4	88.5	90.7	92.0	93.8
Weighted Price Relatives	20.0	22.7	22.7	22.6	22.7	25.6	27.6	27.8	27.8
Price Subindex	100.0	103.1	103.1	107.3	110.1	114.1	118.3	119.8	121.6

TABLE LII

DETAILS OF CONSTRUCTION OF PRICE SUBINDEX FOR SUPPLIES AND EQUIPMENT COMPONENT OF INSTRUCTIONAL SUPPLIES SUBINDEX

Item and Weight	Price Relatives for Each Year of Series 1957	1958	1959	1960	1961	1962	1963	1964	1965
Furniture (Weight .18)									
Teachers' Desks	100.0	100.0	100.0	100.0	104.9	112.2	112.2	112.2	112.2
Students' Desks	100.0	100.0	100.0	100.0	100.0	100.0	100.0	84.8	84.8
Average	100.0	100.0	100.0	100.0	102.5	106.1	106.1	98.5	98.5
Weighted Price Relative	18.0	18.0	18.0	18.0	18.4	19.1	19.1	17.7	17.7
Chalkboard (Weight .09)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Weighted Price Relative	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
Maps and Globes (Weight .04)									
Maps	100.0	100.0	100.0	100.0	100.0	100.0	100.0	102.5	102.5
Globes	100.0	100.0	100.0	100.0	100.0	100.0	108.5	108.5	112.8
Average	100.0	100.0	100.0	100.0	100.0	100.0	104.3	105.5	107.6
Weighted Price Relative	4.0	4.0	4.0	4.0	4.0	4.0	4.2	4.2	4.3
Machines (Weight .07)									
Duplicators	100.0	102.0	102.0	102.0	102.0	102.0	110.0	110.0	110.0
Projectors	100.0	100.0	100.0	100.0	100.6	100.6	100.6	110.0	110.0
Average	110.0	101.0	101.0	101.0	101.3	101.3	105.3	110.0	110.0
Weighted Price Relative	7.0	7.0	7.0	7.0	7.0	7.0	7.4	7.7	7.7
Supplies (Weight .62)									
Paper	100.0	100.0	133.9	137.3	137.3	137.3	137.3	137.3	137.3
Charts	100.0	100.0	100.0	100.0	100.0	100.0	100.0	120.0	120.0
Average	100.0	100.0	116.9	118.6	118.6	118.6	118.6	128.6	128.6
Weighted Price Relative	62.0	62.0	72.5	73.6	73.6	73.6	73.6	79.8	79.8
Sum of Weighted Price Relatives	100.0	100.0	110.6	111.6	112.1	112.8	113.2	118.4	118.5

DATA FOR INSTRUCTIONAL SUPPLIES COMPONENT SUBINDEX

Moyer Division
Vilas Industries Limited
10924 - 119 Street,
Edmonton, Alberta,
December 13, 1967.

Mr. Peter Atherton,
Department of Educational Administration,
University of Alberta,
Edmonton, Alberta.

Dear Mr. Atherton:

We will endeavour to answer your questions in the same order as presented:

1. Category Breakdown - (1) Furniture
(2) Chalkboard
(3) Maps and Globes
(4) Machines
(5) General Supplies

2. Proportion of Purchases in Each Category -
(1) Furniture - 18%
(2) Chalkboard - 9%
(3) Maps & Globes - 4%
(4) Machines - 7%
(5) General Supplies - 62%

3. Representative Commodities -
(1) Furniture - (a) Teacher's Desks #22
(b) Students Desks #13-110
(2) Chalkboard - (a) Chalkboard
(b) Corkboard
(3) Maps & Globes - (a) Maps
(b) Globes
(4) Machines - (a) Duplicators
(b) Projectors
(5) General Supplies - (a) Duplicating Paper
(b) Place Value Charts #755

4. Commodity Price - 1957 - 1966 -

Continued

Mr. Atherton, December 13, 1967

Year	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966
Furniture										
a) Teach.Dk.	81.00	81.00	81.00	81.00	85.00	91.00	91.00	91.00	91.00	104.5
b) Stud. Dk.	28.00	28.00	28.00	28.00	28.00	28.00	28.00	23.75		
Chalkboard										
a) Hylo. sf.	.75	.75	.75	.75	.75	.75	.75	.75	.75	.75
b) Cork. sf.	.60	.60	.60	.60	.60	.60	.60	.60	.60	.60
Maps & Globes										
a) LSR Maps	19.75	19.75	19.75	19.75	19.75	19.75	19.75	20.25	20.25	20.25
b) Chlg.Glb.	11.75	11.75	11.75	11.75	11.75	11.75	12.75	12.75	13.25	13.25
Machines										
a)Duplicat.	250.00	255.00	255.00	255.00	255.00	255.00	275.00	275.00	275.00	275.00
b)Project.	89.95	89.95	89.95	89.95	90.50	90.50	90.50	99.00	99.00	107.00
Gen. Supp.										
a)Dup. Paper 8½x11,18#	2.95	2.95	3.95	4.05	4.05	4.05	4.05	4.05	4.05	4.05
b)Place Value chart	4.50	4.50	4.50	4.50	4.50	4.50	4.50	5.40	5.40	5.40

5. With slight fluctuations, I would consider these prices representative of school authority purchases,

Yours very truly,

M. F. Dean
Manager

/w

APPENDIX F

DATA FOR PLANT OPERATION AND MAINTENANCE SUBINDEX

DATA FOR UTILITIES COMPONENT SUBINDEX

Calgary Power Ltd.,
Head Office,
110-12th Avenue S.W.,
Calgary, Alberta,
December 8, 1967.

Mr. Peter J. Atherton,
Faculty of Education,
Department of Educational Administration,
University of Alberta,
EDMONTON, Alberta.

Dear Mr. Atherton:

Regarding your recent letter to G. A. Engbloom inquiring about the price of power to school boards, we are pleased to supply the following information.

It is only in thelast two years that we have kept statistics for schools as a group. Currently the average price to schools (including both large and small, urban and rural) is about 2.2 c per Kilowatt Hour (KWH). To approximate the price in earlier years, the appropriate rates for the larger towns were applied to a typical size school, resulting in the following average prices:

2.87c/KWH from 1957 to February 1963.
2.43c/KWH from March 1963 to August 1965.
2.14c/KWH from September 1965 to date.

The rates that apply in some of the smaller towns and villages indicate even greater percentage reductions, where the current average price could be about one-half of the price in 1957. Furthermore, a substantial rate reduction to schools was instituted in 1955. There were also some rate reductions given during the period 1957 to 1962, however, these have been ignored since the changeover to standard rates was of a gradual nature.

To be on the safe side, your power price index might be as follows:

1957 to February 1963	100
March 1963 to August 1965	85
September 1965 to date	75

Calgary Power Ltd. serves directly about 540 schools but does not sell retail in Calgary, Edmonton, Red Deer, Lethbridge, Medicine Hat, etc., so it might be advisable for you to contact some of these cities to obtain a more accurate picture of the whole province.

If we can be of further assistance, please let us know.

Yours very truly,

CALGARY POWER LTD.,

T. W. Crowe,
Cost and Market Analyst.

TWC/ls

Northwestern Utilities, Limited,
10040 - 104 Street,
Edmonton, Alberta,
December 12th, 1967.

Mr. P. J. Atherton,
Dept. of Education Administration,
University of Alberta,
Edmonton, Alberta.

Dear Sir:

As you requested, I am enclosing information on the comparison of annual heating costs between 1957 and 1966 for schools of various sizes in certain communities in the province of Alberta.

Aside from a major increase in rates in 1959 for the communities of Edmonton, Calgary, Lethbridge, Red Deer, Vegreville and Lamont the rates for natural gas have remained stable. We do not foresee another increase of this magnitude.

I trust that this is the information you require for your study. If I can be of any further help, please do not hesitate to let me know.

Yours truly,

B. M. Dafoe, P. Eng.,
Manager,
Sales & Industrial Development.

BMD:sjo.
Encl.

TABLE LIII

DETAILS OF CONSTRUCTION OF PRICE RELATIVES FOR
REPAIRS AND OTHER EXPENDITURES COMPONENT
PLANT OPERATIONS SUBINDEX

Year	Construction Wage Index (1949=100)	Construction Wage Index (1957=100)	Construction Weighted Price Relative	Building Materials (1949=100)	Building Materials (1957=100)	Materials Weighted Price Relative	Repairs Subindex
1957	162.9	100.00	60.00	130.0	100.00	40.00	100.00
1958	173.6	106.5	63.90	129.8	99.8	39.92	103.82
1959	183.4	112.5	67.50	131.7	101.3	40.52	108.02
1960	195.5	120.0	72.00	132.3	101.7	40.70	112.70
1961	199.7	122.5	73.5	131.1	100.8	40.32	113.82
1962	209.7	128.7	77.22	131.9	101.4	40.56	117.78
1963	214.6	131.7	79.02	135.1	103.9	41.56	120.58
1964	224.0	137.5	82.50	139.6	107.3	42.92	125.42
1965	235.5	144.5	86.70	146.8	112.9	45.16	131.86

Sources: Government of Canada, Dominion Bureau of Statistics, Canada Year Books, 1958-1966.

APPENDIX G

DATA FOR TRANSPORTATION SUBINDEX

Alberta School Bus Operators' Association,
R. R. 1, Westerose,
November 10, 1967

Mr. Peter J. Atherton,
Dept. of Educational Administration,
University of Alberta,
Edmonton, Alberta.

Dear Mr. Atherton:

Received your letter of Nov. 3 and request for information in regards to school bus drivers' wages. I have some information on hand from a survey I conducted in 1963, which I can make available to you. On Saturday November 18, the Alberta School Bus Operators' Association will be holding an Executive meeting in Edmonton at the King Edward Hotel. Most of the persons listed on the letter head should be in attendance at this meeting. If it is possible for you to attend this meeting for a portion of the afternoon, I believe you could pick up a considerable amount of the information you need. The people in the Provincial Executive have been in the school bus business for years and could give you their first hand information.

Please let me know if this idea meets with your approval. If it does I will put you on the agenda for 2 o'clock. I think that in a half hour or so we can give you a good amount of information.

Yours truly,

Don Jackson,
Pres. A.S.B.O.A.

DJ/mtf

TYPICAL COST BREAKDOWN OF 48 PASSENGER SCHOOL BUS RUNNING 60 MILES PER DAY:

In this example it is assumed that a new 48 passenger bus can be purchased for $7,500.00. It is also assumed that after five years operation the bus would have a trade in value of $1,500.00 Consequently depreciation expense is computed on a straight line basis to write off the $6,000.000 in five equal annual amounts. Wages are based on the suggested minimum wage rates as set forth on the front of this sheet. All other figures are self explanatory. All costs shown are annual costs.

Fixed Costs:	Depreciation	$1,200.00	
	Insurance	75.00	
	License	3.00	
	Return on Investment	450.00	(6% on $7,500.00)
	Total Fixed Costs	1,728.00	
Variable Costs:	Wages	$1,600.00	
	Gas, Oil, Grease	800.00	
	Tires, Tubes	200.00	
	Bus Repair	500.00	
	Storage	300.00	
	Administration	300.00	
	Total Variable Costs	$3,700.00	
Summary:	Fixed Costs	$1,728.00	
	Variable Costs	3,700.00	
	Total Cost	$5,428.00	

APPLICATION OF MINIMUM RATE FORMULA AS SET FORTH ON FRONT OF THIS SHEET:

A 48 passenger bus operating 60 miles per day would earn the following daily rate...

.....Basic Daily Rate for first 20 miles $17.50

plus 24 cents per mile for mileage in excess of basic 20 (24 x 40)..... 9.60

Daily rate earned $27.10

This bus would therefore earn an annual rate of $5,420.00 based on a 200 day school term. (200 x $27.10) and it will be seen that this closely approximates operating costs as developed above.

NOTE: IN SUGGESTING THESE RATES THE ASSOCIATION POINTS OUT THAT THESE ARE MINIMUM RATES AND THEY DO NOT REFLECT UNUSUAL CONDITIONS THAT MIGHT BE PRESENTED BY BAD ROADS ETC.

Blue Bird Bus Sales (1964) Ltd.
8857 - 63 Avenue,
Edmonton, Alberta.

Mr. P. J. Atherton
Dept. of Education Administration
University of Alberta,
Edmonton, Alberta.

Subject: Retail Prices 1957 to 1965 on 48 pass school bus.

Dear Sir:

Further to our phone conversation of the 16th the following will serve to cover your request on the above subject.

The retail prices on a 48 pass School Bus in 1957 through to 1965 would range from $8,000.00 to $8,600.00 for these period.

We trust this is the information you wanted.

Yours Truly,

R. G. MacGregor

Imperial Oil Limited,
11140 - 109 Street,
Box 2356, Edmonton, Alberta,
December 12, 1967.

Mr. Peter J. Atherton,
Department of Educational Administration,
Faculty of Education,
University of Alberta,
Edmonton, Alberta

Dear Mr. Atherton:

I am attaching information which I believe covers the points raised in your letter.

Number one and number three points are covered in the first attachment. The net price shown is our best estimated average and includes the provincial road tax. You will note that the size of discounts has increased in the ten year period and this reflects the growth of the "fleet" bus operators buying increasing volumes.

Basis for arriving at the gasoline/motor oil ratio of 143:1 was taken from "A Study of Gasoline Truck Fleets," done by Ethyl Corporation in 1964. We made the assumption that most school buses would operate similar to a local delivery truck and that servicing should be comparable.

I hope that this is the information you are seeking. If we can further assist you in your project, please feel free to contact us.

Yours very truly,

G. L. Iveson

GLI/m
Attachments

Average Prices to School Bus Operators

Regular grade Motor Gasoline (Incl. Road Tax)

	Posted Price	Av. Discount	Net Price
1956	31.1	3.0	28.1
1957	31.1	3.0	28.1
1958	30.6	3.0	27.6
1959	30.3	3.5	26.8
1960	30.3	3.5	26.8
1961	32.3	3.5	28.8
1962	32.6	4.0	28.6
1963	33.0	4.0	29.0
1964	33.3	4.0	29.3
1965	33.3	4.5	28.8
1966	33.3	4.5	28.8
1967	33.5	4.5	29.0

Essolube HDX (in barrels)

1956	$1.09	15.0c	.94
1957	1.14	15.0	.99
1958	1.14	15.0	.99
1959	1.14	15.0	.99
1960	1.15	15.0	1.00
1961	1.17	15.0	1.02
1962	1.17	20.0	.97
1963	1.21	20.0	1.01
1964	1.21	20.0	1.01
1965	1.21	20.0	1.01
1966	1.31	20.0	1.11
1967	1.32	20.0	1.12

1. Crankcase capy 6 qts.
   Filter 1 qt.
   Total 7 qts.

2. 80% Local Delivery Fleets change filter each oil change

3. Oil change interval 2,000 miles (50%)

4. Oil consumption 1 qt./400 miles (50%)

5. Gasoline consumption 8.0 miles/gallon

   . . a. 2,000 miles, gasoline consumed 250 gals.

   b. Oil consumed 2,000 M - 7 qts. ± 4 qts. = 11 qts. = 1.75 g.

   Motor Oil ratio = $\frac{250}{1.75}$ = 143:1

Source: "A Study of Gasoline Truck Fleets" Ethyl Corporation 1964

Dominion Bureau of Statistics,
Ottawa, Canada,
December 14, 1967.

Mr. P. J. Atherton,
Dept. of Educational Administration,
University of Alberta,
Edmonton, Alberta.

Dear Mr. Atherton:

This will acknowledge your letter of December 8, 1967, regarding the construction of a price index for school bus operations in Edmonton and Calgary.

I have enclosed a table which gives the item content, weights and latest month's indexes for the Edmonton and the Calgary Automobile Operation components. Corresponding detail for each month, 1957-67 inclusive, as per attached table is <u>not</u> available in either reproducible or manageable form; therefore, <u>computed yearly averages</u> will be forwarded to you as soon as resources are available. Because of tight scheduling problems, receipt of this material may take two to three weeks.+

I trust the enclosed information will meet your present needs; if I can be of any further help to you please do not hesitate to write again.

Yours very truly,

H. Segal,
Assistant Director,
Prices Division.

+Computations completed today. ASG.

Automobile Operation Index
and Components (Calgary and Edmonton - November 1967)

	Weight	[x]Calgary	Edmonton
		1957=100	
Auto purchase	28.27	97.1	96.4
Gasoline	25.59	105.2	107.3
Motor Oil	2.22	125.7	117.0
Tires	3.99	126.3	135.2
Licenses	2.78	106.0	106.0
Insurance	8.55	212.3	186.0
Chassis Lubrication	2.63	110.4	109.6
Fender replacement	2.44	155.5	159.3
Brake relining	2.44	126.6	125.1
Muffler replacement	2.44	115.5	119.4
Battery	.87	101.9	93.9
Automobile operating costs	100.00	113.9	112.0

[x]If Calgary-Edmonton indexes are required, the following 1957-based weights may be used: Calgary 44.35
Edmonton 55.65

PRICE DATA FOR REPAIR COMPONENT OF TRANSPORTATION SUBINDEX

The price data for the repair component of the transportation subindex was based on the price relatives for automobile operation component of the Canadian Consumers Price Index for Edmonton and Calgary supplied by the Dominion Bureau of Statistics.

Operation	Year								
	1957	1958	1959	1960	1961	1962	1963	1964	1965
Chassis Lubrication	100.0	102.9	102.9	102.9	102.9	102.9	102.6	99.2	100.8
Fender Repair	100.0	107.0	110.5	115.8	115.3	116.9	122.4	124.6	131.2
Brake Lining Replace.	100.0	102.2	104.6	105.5	106.2	108.3	107.2	108.0	110.2
Muffler Replacement	100.0	104.6	107.7	110.7	110.9	107.2	97.5	95.0	95.0
Average	100.0	105.0	108.8	110.0	111.1	105.5	104.3	104.0	107.6

APPENDIX H

SCHOOL ENROLLMENT DATA

TABLE LIV

GROSS AND WEIGHTED ENROLLMENT DATA FOR LARGE AND SMALL AREA SCHOOL AUTHORITIES IN ALBERTA 1957-1965

Year	Large Area Authorities				Small Area Authorities				
	Elementary (1)	Secondary (2)	Weighted Secondary[1] (3)	1 + 3 Total (4)	Elementary (5)	Secondary (6)	Weighted Secondary[1] (7)	7 + 8 Total (8)	4 + 8 Gr. Total (9)
1957	97,284	26,145	34,773	132,057	99,420	24,943	33,174	132,594	264,651
1958	98,810	27,814	36,993	135,803	107,174	27,756	36,915	144,089	279,892
1959	103,753	26,865	35,730	139,483	114,664	32,638	43,407	158,071	297,554
1960	104,443	30,789	40,949	145,392	124,903	34,309	45,630	170,533	315,925
1961	105,794	32,422	43,121	149,100[x]	130,546	38,719	51,496	187,060[x]	336,160[x]
1962	106,533	32,643	43,415	150,888[x]	138,502	44,549	59,250	201,042[x]	351,930[x]
1963	108,513	33,763	44,904	154,702[x]	145,319	49,057	65,245	212,437[x]	367,139[x]
1964	109,920	35,259	46,894	158,599[x]	152,463	52,264	69,511	226,654[x]	385,253[x]
1965	110,156	35,969	47,839	158,995[x]	159,533	56,500	75,145	239,656[x]	398,651[x]

[x]These totals include a correction for changes from net to gross enrollments made necessary by a change in reporting periods in the fall of 1961.

[1]Secondary enrollment multiplied by ratio of salary between secondary and elementary teachers, Table XXXVIII.

APPENDIX I

CORRESPONDENCE WITH THE DOMINION BUREAU OF STATISTICS

Dominion Bureau of Statistics,
Ottawa, Canada,
February 23, 1968.

Mr. Peter J. Atherton,
Department of Educational Administration,
Faculty of Education,
The University of Alberta,
Edmonton, Alberta.

Dear Mr. Atherton:

I have for reply your letter of February 2, which asks a series of questions concerning the data on pupil-teacher ratios and average salaries which we sent to you on December 6, 1967.

As a general answer, I can point out that reductions in pupil-teacher ratio similar to those for Alberta were observed for several other provinces in 1960-61. This suggests a change of definition, either for secondary teachers or secondary enrolment, but I can find no record of any such change for the year in question. Since I was not employed in D.B.S. in 1960-61, I can only refer to the published definitions and the written records in the office. These indicate quite clearly that uniform definitions have been applied since 1957-58.

Now to answer each of your questions in the order in which you asked them.

1. Data on teachers are compiled from reports submitted by each teacher to the Department of Education and duplicates of which are forwarded to this office. Enrolment data are compiled by the Department from school principals' annual reports on enrolment by age, grade and sex. The summary for the province is submitted to D.B.S. and is used by us as the official enrolment for Alberta.

2. All sources do not refer to the same point in time, or at least in the past they did not. Teachers' reports are collected "as soon as possible after the opening of school", so that the reporting may be anytime between, say, September 1 and November 30. An attempt is made to get complete coverage, and hence all reports received before the end of December are used.

   The date for reporting on enrolment has changed several times in the last decade. Prior to 1961-62, enrolment was counted at the end of the school year; in 1961-62 to 1963-64, it was counted on the last school day in October; beginning with 1964-65 and continuing to the present, the last school day in September has been used as the reporting date.

   One would assume, from the changes in reporting dates, that the

pupil-teacher ratio might show significant variations for 1961-62, Such, however, was not the case.

Since descriptive statistics normally describe a situation at some point in time, they do not actually refer to any particular school, calendar or fiscal year. Salaries, for example, are according to scales in effect in September although in some cases (notably in B.C.) new scales come into effect in January.

One might keep in mind that the Alberta Department considers, for grant purposes, the September enrolment as the official enrolment. D.B.S. considers the data gathered in the fall, as official statistics for the school year.

3. Changes in dates of collection have been described above. As far as I can determine from publications and office records, there have been no changes in sources or computation since 1957 with the exception to be noted in #3. Certainly since 1961-62 there have not been any changes in procedures.

4. I refer you to the D.B.S. publication on teachers' salaries and qualifications (any edition since 1957-58) re the definition of "elementary" and "secondary" teachers. Teachers in over-lapping categories (i.e. those who teach both elementary and secondary grades) are designated as elementary if they teach in rural schools of less than 6 rooms, otherwise they are counted as secondary. This definition is completely arbitrary and perhaps a little unrealistic. However, it has been applied consistently since 1957-58 and it should not have any effect on pupil-teacher ratios. Prior to 1957-58, teachers of both elementary and secondary grades were classified as elementary.

5. Not all administrative, supervisor and pupil-personnel service "teachers" who report to use are included in the D.B.S. figures as "teachers." For example, superintendents and board-employed supervisors and consultants. Board employees who are engaged in teaching or in direct supervision of certain grades are included and are classified according to the grades taught or supervised. If they fall within the over-lapping category, they are classified as elementary when employed by rural boards.

6. The D.B.S. definition of "teacher" is best explained by the positions which are included. The following are included:
   a) Principals and vice-principals of all sorts.
   b) Department heads and assistant department heads in secondary schools.
   c) Classroom teachers of regular academic subjects.
   d) Teachers of non-academic subjects (such as industrial arts, commercial, technical, etc.)
   e) Full-time substitute teachers, i.e. those employed on a yearly basis and receiving a full annual salaries.

f) Non-teaching professional staff employed in one school, or providing services shared by more than one school (such as full-time guidance counsellors).
g) Certain school board employees who are actually involved in teaching or direct supervision of specific grades.

According to our listing of the various positions or functions, the following are not counted by D.B.S. as teachers:

a) Superintendents and assistant superintendents.
b) Board employed supervisors and consultants.
c) Those involved in pupil-personnel services at the school board level - psychologists, attendance officers, etc.

7. The annual discrepancy between the number of teachers reported by D.B.S. and that reported by the Alberta Department is accountable by three conditions. First, the Department counts as teachers almost all of the school board professional employees, while our definition excludes most of them. Secondly, the Department counts all teachers employed for 20 days or more at any time during the school year and establishes full-time equivalents, while we count only full-time teachers so employed. Thirdly, the Department obtains its figures from an accumulation of the reports of school boards, while we count individual teachers reporting.

8. There would most definitely be a change in the pupil-teacher ratio if we re-defined "secondary" for either teachers or pupils. Teachers who teach, say, Grades VII to IX are now counted as secondary under certain conditions whereas if Grade IX were considered as elementary then these teachers would also be classified as elementary. We have no way of measuring what effect such a change would make because we cannot identify teachers of Grade IX, but it is reasonable to suggest that it would result in ratios higher than those quoted for secondary teachers in my previous letter.

9. I can find nothing in the data to explain the change in pupil-teacher ratio from 20.0 in 1959-60 to 16.6 in 1960-61. In considering the validity of the statistics, however, one should keep in mind that since 1960-61 the ratios have remained fairly constant, showing gradual decreases consistent with the practices of hiring "additional" teachers and with the trend towards smaller classes.

It is possible that your colleague, Mr. Husby, will be interested in reading this letter because most of the "statements" concerning Alberta apply also to the provinces for which he received data. There are some

notable exceptions which I will indicate for him if he so desires.

Yours sincerely,

J. E. Wicks,
Chief, Elementary-Secondary Section
Education Division.

JEW/ds

APPENDIX J

INCOME AND SALARY DATA FOR ALBERTA 1945-1965

INCOME AND SALARY DATA FOR ALBERTA 1945-1965

Year	Average[1] Annual Salary of Teachers	Average[3] Weekly Wage and Salary in Alberta	Personal Income[2] per Capita	Annual Wage and Salary (Weekly x 52)
1945	$1405	$33.00	$692	$1716
1946	1526	34.02	854	1768
1947	1652	37.19	884	1934
1948	2001	41.18	1030	2157
1949	2261	44.40	1008	2309
1950	2410	45.61	1007	2372
1951	2534	50.37	1308	2619
1952	2708	54.90	1365	2855
1953	2936	59.04	1357	3070
1954	3172	60.17	1239	3129
1955	3330	62.30	1292	3240
1956	3430	66.93	1456	3480
1957	3661	69.62	1426	3620
1958	4049	72.88	1534	3790
1959	4446	75.63	1548	3933
1960	4785	77.83	1555	4047
1961	5143	80.45	1608	4183
1962	5354	82.00	1703	4264
1963	5487	84.2	1747	4374
1964	5700	86.67	1795	4507
1965	5860	89.88	1976	4674

[1]Alberta Department of Education, Annual Reports 1946-1966.

[2]Dominion Bureau of Statistics, National Accounts: Income and Expenditure, 1948-1967.

[3]Department of Trade and Commerce, Canadian Statistical Review. December Issues 1949-1967.