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Teacher's Salary Differentials and the Quality of Educational Services : Recent Developments in Saskatchewan
Les écarts de salaire chez les enseignants et la qualité des services d'éducation : le cas de la Saskatchewan

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Article abstract

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Teachers' Salary Differentials and the Quality of Educational Services:

Recent Developments in Saskatchewan

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This paper examines the relationship between teacher wage determination and the distribution of teacher skill-mix, based on recent Saskatchewan data. The authors argue that while centralized bargaining produces more uniform wage scale throughout the Province, it does not necessarily lead to the uniform distribution of teacher skill-mix among municipalities which is one of the most important conditions for the achievement of equality in the provision of educational services ; rather, it is the ability to pay of the individual school boards which has crucial bearings upon the composition of teacher skill-mix.

In his study examining bargaining structure and geographical wage differentials of public school teachers in British Columbia, Alberta and Ontario, Douglas Muir observes that despite the decentralized bargaining structures, variations in the level of teachers' salaries between autonomous school units are generally quite small within these provinces, due to various financial, labour market and institutional factors ; local conditions have a very weak influence upon the level of salaries establish. [1] He suggests, therefore, that there is no economic rationale in decentralized bargaining and

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[1] T. Douglas MUIR, « Decentralized Bargaining : Its Problem and Direction in the Public Education Systems of Ontario and Western Provinces, » *Relations Industrielles – Industrial Relations*, Québec, Vol. 26, No. 1, January 1971, pp. 124-144.

that there is a definite trend towards greater centralization of teacher bargaining.

Using Muir's discussion as a point of departure this paper will analyse wage differentials of elementary and secondary teachers between autonomous school units in Saskatchewan and will then consider these data from the standpoint of the implications they have on the government's declared policy objective of achieving approximate equality in the provision of educational services throughout the various regions and localities of the province. This present paper is the first, and in a sense reports the pilot study phase, of a larger focus that hopefully will involve several related investigations into the impact of teacher wages, the structure of the compensation system, and the particulars of the collective bargaining process on the provision of educational services in Saskatchewan. Relatively little work of an empirical nature has been done in Saskatchewan which attemps to relate wages and the collective bargaining structures within which they are determined to the quality of educational services provided. Apart from raw, uninterpreted data, published mainly in government reports, the vast majority of the published material which concerns itself with such issues consists of polemical special pleadings from the two levels of government, provincial and municipal, and from organizations representing the interest of trustees or teachers.

There are certain unique features of the Saskatchewan situation that make it appealing as a justification for this type of investigation. In the relatively short period of less than a decade collective bargaining in Saskatchewan has moved from a decentralized system in which the local units were autonomous through « area » bargaining, to the present system in which bargaining on major economic issues is done provincially by a team consisting, on the one hand, of provincial government representatives and Saskatchewan School Trustees Association representatives, and on the other hand, of representatives of the Saskaktchewan Teachers Federation. Also, even though Saskatchewan is a small province — the active teaching population is approximately eleven thousand — there are a number of identifiable variations that provide useful and meaningful bases for internal comparisons. There exist, for example, very obvious differences as between rural and urban communities. The relatively small size of the teacher population and the availability, with few deficiencies, of an array of certain wage and employment data that go back for more than a decade is also of real practical usefulness in the furtherance of the series of studies in process and contemplated by the authors.

In examining the wage differentials, Muir used as his basic wage data minimum and maximum scale rates for each classification grade (teacher class) among the various jurisdictions. This study uses average wages as measured by the total wage bill divided by the total number of teachers in each jurisdiction. This distinction is important. It is possible for wages to be administered in such a way that average wages increase measurably less in a given period than scale increases in the same period by the use, within the system, of a higher proportion of lower grade teachers.

For individual teachers the salary schedule rather than the average wage level is significant because it indicates in an exact and fairly simple form the amount of salary due to each teacher in a given year, and allows each individual to see where he stands in the wage system relative to other individuals having different academic qualifications and years of experience. Such comparisons are of the type that individuals tend to be concerned about in a personal way. Therefore, the wage schedule is the basis generally used by teachers when they make what Arthur Ross has called « equitable comparison ». There is an attempt within the profession to eliminate scale differentials between geographical units as much as possible, so that teachers having the same qualifications obtain the same real wages regardless of the particular school unit in which they are employed. Professional teachers' associations especially tend to be committed to the principle that wage scale differences between locations, for given qualifications, should be eliminated or at most should not exceed an amount that could be justified by differences in living costs. In fact, elimination of geographical wage differentials has been one of the important goals of employee associations and trade unions generally. [2] Thus, comparison in terms of the wage scale tend to deal with equity problems associated with the supply side of the labor market.

On the other hand, comparisons in terms of average wages, as we attempt in this study, are more valid when one intends to focus on the analysis of the cost aspect of a total system. Simply stated, an existence of geographical wage differentails measured this way implies that financial burden of education is different among municipalities. It would seem

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[2] Concerning union policy on various kinds of wage differentials, see Clark KERR, « Wage Relationships — The Comparative Impact of Market and Power Forces, » in John Dunlop, ed., *The Theory of Wage Determination*, New York, St. Martin's Press Inc., 1957, pp. 173-193.

reasonable to expect that differences in the average wages between communities would reflect a comparable difference in the average array of teaching skills in these communities. In other words, such differences in average wages imply inequality existing between municipalities in terms of the quality of education which school children receive. It has frequently been stated that the achievement of equality in public education is one of the fundamental goals sought by democratic governments. [3] The analysis we suggest should form a proper basis for an assessment of policies which address themselves to issues involving educational equality in the provision of elementary and secondary education in the province.

INSTITUTIONAL SETTING OF WAGE DETERMINATION

In 1973 there were 1,032 elementary and secondary schools in Saskatchewan with 11,140 teachers employed in those schools. In terms of the number of employees, elemeentary and secondary education is by far the largest industry in Saskatchewan. The lowest level in the administrative hierarchy of primary and secondary education is the school district. There were 4,047 school districts as of June 30, 1973. Virtually all school districts in rural areas have been integrated into school units. In 1973 there were 60 of these rural school units. School districts in urban areas have not been integrated into comparable units ; in each of the major eleven cities in the province there is at least one public school district and a Roman Catholic separate school district. In addition, there still remain a small number of school districts in both rural areas and in some small towns that have not as yet been incorporated into the larger units, but these are negligible in terms of the number of students enrolled and the number of teachers employed. [4]

In each of the 60 rural units and 22 city districts there is a board of education. For all practical purposes the board of education assumes the role of the employer and therefore is responsible for hiring and firing. These boards are affiliated with the Saskatchewan School Trustees Association (SSTA), which has a 100% membership even though it is

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[3] For a discussion of the social and legal implications of inequities in public education in the U.S., see Robert D. REISCHAUER and Robert W. HARTMAN, *Reforming School Finance*, Washington, D.C., The Brookings Institution, 1973, pp. 58-59.

[4] THE DEPARTMENT OF EDUCATION, Province of Saskatchewan, *Annual Report, 1972-73*, Regina, 1973, pp. 63-66.

maintened on a voluntary basis. Also, under the *Teaching Profession Act* in Saskatchewan all active teachers holding teaching certification are required to hold a membership in the Saskatchewan Teachers' Federation (STF). This association is organized into local units each of which operates at the level comparable to that of local boards.

Between 1949 and 1968 under the *Teachers' Salary Negotiation Act,* wages were determined at the local level, that is, between the local school board and the local unit of STF. In 1968 *the Teachers' Salary Agreement Act* was passed which established a negotiation procedure based on area-wide bargaining. Under the procedure outlined under that Act the entire gaining thereby integrating each local school board into one of the larger province was divided into 13 areas for the purpose of collective bargaining units. It should be pointed out that these area units had, as their function, the task of bargaining on behalf of all school boards in the area, but bargaining agenda items were limited to a narrow range of interest issues, namely wage scales and certain administrative allowances. What was created was not a real level of administration at the area because the control of budgets remained at the local school board level. Under the *Teachers Collective Bargaining Act* of 1973, area bargaining, which had been in effect for a period of five years, was replaced by a system of provincial bargaining. Therefore, in 1973, a limited number of bargaining items including salary scales and certain administrative allowances were negotiated at the Provincial level, while certain other issues were left to be negotiated between individual school boards and local units of the STF.

Thus, in Saskatchewan although a two-level bargaining structure has emerged, negotiations in respect of main wage items have been centralized. This development has inevitably narrowed differences in wage scales among the various units and city districts. In fact, except for the northern areas which are treated as a special case, salaries for all teachers in the Province are now determined within a single scale. As a result, teachers with the same qualifications and years of service will obtain the same wages regardless of which school board employs them.

The determination of the salary schedule for Saskatchewan teachers follows a rather simple formula. All teachers are classified into six classes ranging from Class I through Class VI. The classification criteria are based primarily upon the amount of post secondary education;

therefore, a teacher with one year of post secondary education is placed in Class I, a teacher with two years of post secondary education is placed in Class II, and so on. Additionally, each of the six classes is divided into eleven « cells » ranging from 0 to 10, which reflect the teacher's length of service in any acceptable jurisdiction. Put differently, automatic progression in the form of an increment is given to all teachers every year until they have completed ten years of teaching. After the tenth year, further increases can only come from upward shifts in the entire scale, payments in the form of administrative allowances or promotion to a higher class based on improved qualification. [5]

A comment here on the division of responsibility for the financing of primary and secondary education in the Province is warranted. In 1973 thee total operating expenditures of all school boards in Saskatchewan were approximately 185 million dollars, of which approximately 59% was allocated for teacher salaries. Also, of this amount, 85 million dollars was raised by local communities in the form of property taxes and 88 million dollars was given by the provincial government in the form of operating grants. The remaining 12 million dollars was raised in other ways including the income from fees. [6]

With this background we can now proceed to an examination of geographical wage differentials. All data used for the analyses in the subsequent sections have been obtained from various records kept by the Department of Education, Province of Saskatchewan.

HISTORICAL TRENDS IN GEOGRAPHICAL WAGE DIFFERENTIALS

Data on total salary costs and number of teachers have been obtained for 78 units of analysis and for the 12 years between 1960 and 1964, and between 1966 and 1972. [7] Data for 1965 were not available. Among the 78 boards, 56 are rural units and 22 are city units. As mentioned

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[5] The structure of the salary system is such that a teacher who achieves higher qualifications and therefore is promoted would move, for example, from cell five in Class IV in June to cell six in Class V the following September.

[6] THE DEPARTMENT OF EDUCATION, op. cit., p. 68.

[7] « Total salary cost » includes total wage bill and administrative allowances paid to the teachers in a supervisory position. Prior to 1970 both salary and employment figures include those of part-time teachers ; thereafter, those figures include those of full-time teachers only.

above there are 11 cities in Saskatchewan and in each of those cities there are public schools and Roman Catholic separate schools. Therefore, 11 of the 22 units cover public schools and the remaining 11 cover separate schools. [8] By dividing the total salary cost by the total number of teachers we can obtain the average wage figure for each unit.

First, we will examine the historical trend in wage differentials among 78 boards which will give us an overall picture. As the index of the geographical wage differentials we will use the coefficient of variation which can be obtained by dividing the standard deviation of 78 wages by the mean. Naturally, when the coefficient of variation is large, the geographical wage differentials are large. Table 1 shows the historical trend in overall differentials measured this way.

TABLE 1

**Geographical Wage Differentials Among 78 Boards
for 1960-1974, 1966-1972**

Year	Coefficient of Variation (%)	Year	Coefficient of Variation (%)	Year	Coefficient of Variation (%)
1960	12.1	1964	11.0	1969	7.5
1961	12.4	1966	8.8	1970	7.7
1962	11.5	1967	8.5	1971	7.1
1963	11.2	1968	8.6	1972	7.4

It is apparent from Table 1 that the overall geographical wage differentials have narrowed during the twelve years selected. The index has declined from 12.1% in 1960 to 7.4% in 1972. The table indicates that the declining tendency has been rather steady. The change in the locus of bargaining from the local to the area level which took place in 1968 appears to have had little if any effect on geographical wage differentials.

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[8] Actual number of boards among the cities is greater than 22 because in some cities there are more than one public and/or separate school boards, for example, one for elementary schools and one for secondary schools. For the purpose of this analysis, if there are more than one board, figures for those boards are combined into one so that for each city there is one unit of analysis covering public schools and one unit of analysis covering separate schools respectively.

Next, we will examine differentials between three sub-groups, that is, rural unit boards, city public boards, and city separate boards. For each of those three sub-groups an employment weighted average wage cost is calculated by dividing the total wage bill paid to teachers in each sub-group by the number of teachers in the respective sub-group. The wage differentials are calculated as percentage ratios of average wage cost of city separate schools to that of city public schools, and average wage cost of rural unit schools to that of city public schools respectively. Table 2 shows historical trends in wage differentials among three sub-groups thus calculated.

Table 2 indicates that among the three sub-groups city public school boards have been paying the highest wages for the entire period. Between city separate school boards and rural unit school boards the latter used

TABLE 2

Geographical Wage Differentials Between Three Sub-Groups
(City Public Schools, City Separate Schools and Rural Unit Schools)
for 1960-1974, 1966-1972

AVERAGE WAGE COST

Year	City Public (1)	City Separate (2)	Rural Units (3)	$\frac{(2)}{(1)} \times 100$	$\frac{(3)}{(1)} \times 100$
1960	$ 5111	$ 3447	$ 4209	67.4%	82.4%
1961	5321	3659	4318	68.7%	81.1%
1962	5405	3820	4484	70.6%	82.9%
1963	5589	3952	4616	70.7%	82.6%
1964	5976	4378	4858	73.3%	81.3%
1966	6721	5874	5677	87.3%	84.4%
1967	7482	6591	6292	88.0%	84.1%
1968	7576	6774	6524	89.4%	86.1%
1969	8518	7775	7246	91.2%	85.0%
1970	8713	7982	7530	91.6%	86.4%
1971	9692	8892	8292	91.7%	85.6%
1972	10615	9937	9387	93.6%	88.4%

to pay higher wages between 1960 and 1964; thereafter, however, their relationship has been reversed. Also, while differentials between city public and rural schools have narrowed rather moderately during the period, differentials between city public and city separate schools have narrowed substantially (from 67% in 1960 to 94% in 1972).

Finally we will examine wage differentials within each of the three sub-groups. In Table 3 differentials are expressed in terms of the coefficient of variation.

TABLE 3

Geographical Wage Differentials Within 11 City Public School Systems, 11 City Separate School Systems, and 56 Rural Unit School Systems, for 1960-1974, 1966-1972

	Coefficient of Variation (%)		
Year	*City Public*	*City Separate*	*Rural Units*
1960	4.7	14.1	4.9
1961	3.7	17.8	4.5
1962	5.6	15.1	4.9
1963	3.4	14.2	5.2
1964	4.6	13.8	5.4
1966	8.5	14.4	4.7
1967	7.6	12.7	5.2
1968	7.4	14.3	4.9
1969	7.4	11.4	5.1
1970	5.7	11.8	4.6
1971	5.0	9.5	4.4
1972	4.5	10.7	4.4

Table 3 shows several things : in the city public boards wage differentials were almost constant between 1960 and 1964, suddenly increased in 1966 and gradually declined after that. Among the city separate boards there is a rather consistent narrowing tendency, and

among the rural unit boards the differentials have been almost constant over the entire period. The magnitude of differentials has been the biggest among the city separate boards and the smallest among the rural unit boards since 1966 ; prior to that the differentials are smallest among the city public boards. An obvious reason for the fact that the differentials are wider among city separate boards is that some boards include only elementary schools within their jurisdiction. To the extent that the average wage level of secondary school teachers is higher reflecting their higher qualifications, an inclusion of those boards covering only elementary schools will bias the result by increasing the differential index.

At this section we have attempted to identify the historical trends in geographical wage differentials. Our findings will be summerized as follows :

(1) Overall geographical wage differentials have been narrowing.

(2) Differentials between city public and rural unit systems have been narrowed moderately.

(3) Differentials between city public and city separate systems narrowed substantially around 1966 and since then have been narrowed consistently.

(4) Within the rural unit system differentials have been constant and the magnitude of the differentials has been small.

(5) Within the city public system differentials widened suddenly around 1966 and thereafter the magnitude of differentials has been narrowing.

(6) Within the city separate system differentials have been consistently narrowing although the magnitude of differentials has been the biggest among the three sub-groups.

In conclusion, wage differentials have been narrowing both between the three sub-groups and within each of those sub-groups over the entire period, especially since 1966. However, the fact that the narrowing tendencies in the various types of geographical wage differentials since 1966 tend to be rather gradual and small in magnitude seems to suggest that the change in the structure of collective bargaining from the local to area level which took place in 1968 has not contributed substantially to those narrowing tendencies. In the subsequent section, then, we will attempt to identify and analyse those factors which have bearings on geographical wage differentials of Saskatchewan teachers.

DETERMINING FACTORS OF GEOGRAPHICAL WAGE DIFFERENTIALS

The direct method to examine the reasons for the narrowing tendencies in various forms of geographical wage differentials, which we observed in the previous section, would be as follows : to derive theoretically the critical factors involved in wage determination ; to construct a differential index, coefficient of variation, for example, for each of those variables and for each of the twelve years ; and to regress the dependent wage variable against a group of independent variables. Put differently, multiple regression analysis using a set of time series data will give us a direct answer to the question of what were the determining factors of geographical wage differentials between 1960 and 1972.

Unfortunately, however, time series data for the entire period are not readily available for the independent variables. [9] Most data are available only for the recent years. In the following analysis, therefore, we will use the cross-sectional data rather than the time series data. Each variable is expressed in terms of the level that is the actual value rather than in terms of the differential index.

We have stated several times that geographical differentials in teacher wages are largely a reflection of the differentials in their quality. This is based upon the so-called « competitive hypothesis » which states that under perfect competition both in the product market and in the labor market, any employer will pay the same price as any other employer for a given grade of labor. In other words, wage differentials are possible only among what J. S. Mill calls « noncompeting groups, » or to paraphase Melvin Reder, wage differentials among different groups of people are a reflection of differences in their « skill-mix ». [10] In the first place, therefore, we would like to examine to what extent geographical wage differentials are affected by the skill-mix of teachers in each board.

As discussed earlier teacher job classification is made based upon only two factors, i.e., the length of post-secondary education and the length of service of the teachers. It may well be that in addition to these two factors several factors including innate ability and motivation affect

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[9] A discussion on the nature of independent variables will be done shortly.

[10] Melvin REDER, « Wage Differentials : Theory and Measurement, » National Bureau of Economic Research, *Aspects of Labor Economics*, Princeton, N.J., Princeton University Press, 1962, p. 276.

the actual teaching performance. However, in the absence of readily available data on those behavioral variables, we will use only education and length of service variables. For the purpose of computation these two variables are measured by the percentage of teachers with a four-year degree and above, and the average length of service of the teachers in each board respectively. [11] If we stipulate a linear relations among the variables we have the following multiple regression equation :

$$W = a + b_1E + b_2S + e \dots\dots\dots (1)$$

where W = average wages

   E = percentage of degree teachers

   S = average length of service

   e = an error term.

The above equation (1) is estimated for a set of cross-sectional data for each of the three years, 1970, 1971 and 1972. Cross-sectional data are available both at the local administrative units and for the area bargaining units. Although collective bargaining was done at the area level in these years, it does not determine the distribution of the teachers among different boards; it is the individual board which does the hiring and firing. Also, disaggregated data are superior to aggregated data in that variations with a sub-group may be cancelled out by each other when the data are aggregated and each sub-group becomes the data unit. For these reasons, analyses are done at the local board level. Data are organized to cover (1) total boards, (2) rural unit boards, (3) total city boards, (4) city public boards only, and (5) city separate boards only. The total number of boards is 82 including among them 60 rural unit boards and 22 city boards. Of the city boards 11 are public and the remaining 11 are separate boards. Table 4 summarizes the findings.

It is evident from the above table that no matter how the data are grouped, the two independent variables, taken together, explain a substantial portion of variations in the average wage level in each of the three years ; R^2 values, ranging from 0.73 to 0.96, are all significant at

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[11] The average length of service of the teachers in each board is based upon the ten service increments that form the part of the structure of the salary schedule as discussed earlier. This means that the maximum years of service identified in this study is ten.

TABLE 4

Regression Testing for Effects of Education (E) and Service (S) for Different School Boards in 1970, 1971 and 1972

Year	Case	Const.	Education (E)	Service (S)	R^2
1970	1	3123.3	46.6 (2.0)	342.6 (35.7)	0.76
	2	3144.9	36.1 (2.7)	383.1 (33.0)	0.84
	3	3684.0	51.8 (3.9)	247.5 (99.7)	0.91
	4	2748.7	55.0 (11.0)	228.1* (212.7)	0.77
	5	4543.5	46.4 (3.9)	142.0* (103.8)	0.95
1971	1	3839.4	43.5 (2.0)	387.1 (38.7)	0.74
	2	3442.5	35.2 (2.9)	472.8 (37.4)	0.82
	3	4587.4	44.6 (3.0)	298.0 (75.9)	0.95
	4	5308.8	52.8 (9.7)	152.4* (154.9)	0.86
	5	4882.4	38.8 (3.5)	274.4 (79.8)	0.95
1972	1	3750.2	46.3 (2.4)	520.0 (46.4)	0.87
	2	3707.0	42.9 (4.0)	535.7 (54.4)	0.73
	3	4063.3	42.6 (3.4)	528.0 (84.1)	0.96
	4	3809.9	53.4 (6.2)	471.1 (77.2)	0.94
	5	3750.6	41.4 (5.8)	583.9 (159.0)	0.92

Figures in ( ) are standard errors.

* means no statistical significance at the 5% test level; all others are significant at the 1% level.

the 1% test level. This means that those boards characterized by a relatively high portion of degree teachers and also a high average length of service tend to have a high wage level.

Between the two independent variables the education variable seems to have a stronger explanatory power throughout the years ; the length of service variable has turned out to be non-significant at the 5% test level in three out of fifteen cases. However, over the three years the length of service variable seems to have increased its explanatory power so that in 1972 it is significant at the 1% test level in each of the five cases. To the extent that these two variables represent teaching skills the above results confirm our contention that geographical wage differentials imply an existenc of inequality in the quality of education between municipalities.

Further to the above analysis, relationships between average wages, education and the length of service have been compared between the three sub-groups, that is, rural unit boards, city public boards, and city separate boards. The following Table 5 shows the mean values of these three variables for the three groups in 1970, 1971 and 1972.

TABLE 5

Average Wages, Education and Length of Service for City Public Boards, City Separate Boards and Rural Unit Boards in 1970, 1971 and 1972

		Wages ($)	Education (%)	Service (yrs)
1970	City Public	8713	54.7	7.7
	City Separate	7982	50.2	7.3
	Rural Unit	7530	34.9	7.9
1971	City Public	9692	60.3	7.6
	City Separate	8892	50.5	6.9
	Rural Unit	8292	36.9	7.4
1972	City Public	10615	63.6	7.6
	City Separate	9937	51.9	6.7
	Rural Unit	9387	39.2	6.9

In all three years average wages are the highest in the city public boards followed by the city separate boards ; average wages in the rural unit boards are the lowest. Exactly the same relationship exists for the amount of education, while the length of service shows a different tendency. Rural unit boards, which are the lowest in wages in all three years, are the highest in the length of service in 1970 and the second highest in 1971 and 1972. These figures suggest that wage differentials among these three groups are largely a reflection of differentials in degree teacher ratio ; length of service does not seem to play any significant role.

Table 5 also indicates that there is a substantial amount of difference in the degree teacher ratio between urban and rural boards ; teachers with a university degree are heavily concentrated in the city boards, especially the city public boards. Also, the skewed distribution of the degree teachers does not seem to have improved over the years. If we compare the city public boards and the rural unit boards, for example, the percentage degree teacher ratio increased by 8.9 percentage points in the former between 1970 and 1972, while it increased by only 4.3 percentage points in the latter. The same thing can be said about the length of service which has a declining tendency over the years in all three groups. In the rural unit boards the average length of service declined by one year between 1970 and 1972, while in the city public boards it declined by only one-tenth of a year.

The above finding suggest that educational inequality does exist between municipalities in general and between rural and urban (public) schools in particular and that the rural-urban inequality has not been improved over the years. Our next task, then, would be to examine the reasons for the skewed distribution of teacher skill-mix among municipalities.

TEACHER SKILL-MIX AND SCHOOL FINANCE

From our experience with the private sector it may be hypothesized that an employer's ability to pay determines the skill-mix of the labor force which he employs. That is, firms with a higher ability to pay should find it advantageous to employ superior personnel because these personnel are more productive thus contribute more to the firm's profits. [12] By the

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[12] Melvin REDER, *op. cit.,* p. 292.

same token, the board having higher ability to pay may employ teachers who are, on the average, more qualified and experienced, thereby providing better education for the students within its jurisdiction, while the board having a lower ability to pay simply cannot afford to do so.

In order to test the above hypotheses both education and the length of service variables are regressed against two alternative proxies of the ability to pay, the total operating revenue per pupil and the local school taxes per pupil in each board. If we assume a linear relation between the dependent and independent variables, we have the following simple regression equations :

$$E = a_1 + b_1R + e_1 \quad\quad (2)$$
$$E = a_2 + b_2T + e_2 \quad\quad (3)$$
$$S = a_3 + b_3R + e_3 \quad\quad (4)$$
$$S = a_4 + b_4T + e_4 \quad\quad (5)$$

where W = average wages

E = percentage ratio of degree teachers

S = average length of service

R = total operating revenue per pupil

T = local school taxes per pupil

e_i = an error term.

The above four equations are estimated for cross-sectional data covering (1) 60 rural unit boards, and (2) 22 city boards for each of the three years, 1970, 1971 and 1972. The following Table 6 summarizes

TABLE 6

**Coefficient of Determination (R^2) for Correlations
Between Skill-Mix and Ability to Tay**

Year	Equation (2) Rural	City	Equation (3) Rural	City	Equation (4) Rural	City	Equation (5) Rural	City
1970	(−).036	.367**	(−).006	.441**	.014	.194*	(−).005	.351**
1971	(−).083*	.435**	(−)0.10	.616**	.032	.045	.000	.200*
1972	(−).106*	.411**	(−).003	.548**	.061*	.087	(−).001	.357**

(−) means negative b-coefficient.
  * means statistical significance at the 5% test level.
 ** means statistical significance at the 1% test level.

the results. Table 6 gives us an overall picture where ability to pay is significantly correlated to teacher skill-mix among the city boards while it is not among the rural boards.

More specifically, among the city boards local school taxes per pupil seems to be a better proxy of the ability to pay than operating revenue per pupil. In every case the local school tax proxy causes a higher R^2 value; in two out of three cases the operating revenue proxy is not significantly correlated to the length of service variable. This means that boards which can raise high education taxes locally tend to hire more qualified and more experienced teachers.

Why is it that local school taxes is a better proxy than operating revenue? Here, we have to discuss the role of the government grant. As mentioned earlier, responsibility for the financing of primary and secondary education is, on the average, almost evenly shared by the local board of education and the provincial government. The stated government's grant policy is to promote equity in financing and equality of opportunity in education by subsidizing boards with limited financial resources. [13] Therefore, we should expect a high negative correlation between the amount of the government grant and the amount of local school taxes which in turn is significantly correlated to skill-mix. Since the government grant occupies on the average close to one-half of the total operating revenue, it is quite reasonable that the total operating revenue has a lower correlation with skill-mix than local school taxes.

In order to substantiate the above reasoning simple correlation has been calculated between local school taxes and government grants. The simple correlation coefficient is $-.35$ in 1970, $-.52$ in 1971 and $-.57$ in 1972. As expected all have negative values, although the magnitude is not as large as one might expect them to be.

In summary, our hypothesis concerning the relationship between skill-mix and ability to pay has been supported for the city boards. For the rural boards we have an entirely different picture; generally, there seems to exist a weakly negative relationship between skill-mix and ability to pay. Of course, this is contrary to our expectation. Why is it possible that « poor » communities appear to be equally or even more

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[13] THE DEPARTMENT OF EDUCATION, *op. cit.*, p. 41.

able to hire more qualified and experienced teachers than « rich » communities ? Two explanations seem plausible.

The first one is that there may be a trade-off relationship between skill-mix and the class size. Put differently, school boards may be able to control, to a certain extent, teacher skill-mix by manipulating pupil-teacher ratio. Therefore, some schools might prefer to hire more qualified and experienced teachers simply by increasing class size, while some other schools especially in rural areas may have no alternative other than to hire less qualified and experienced teachers due to small class size. The second explanation is that there may be a trade-off relationship between wage cost and other costs of education. Therefore, by allocating a high proportion of the total operating revenue to the wage cost, even a poor community might be able to hire more qualified and experienced teachers.

In formulating a hypothesis we need not treat these two trade-off relationships in the either/or sense. They can be combined into one equation so that we can examine the relative importance of these two factors. If we assume a linear relationship among the variables, the following multiple regression equations can be formulated :

$$E = a_1 + b_{11}Pr + b_{12}Wr + e_1 \dots\dots\dots (6)$$

$$S = a_2 + b_{21}Pr + b_{22}Wr + e_2 \dots\dots\dots (7)$$

where Pr = percentage pupil teacher ratio

Wr = percentage wage cost ratio.

The above two equations are estimated for cross-sectional data covering 60 rural unit boards for each of the three years, 1970, 1971 and 1972. The following Table 7 summarizes the results. Taken together, the pupil-teacher ratio and the wage cost ratio are significantly correlated to the education variable at the 1% level in each of the three years and to the length of service variable at the 1% level in 1971 and at the 5% level in 1970 and 1972. Generally speaking, these findings seem to be consistent with the hypothesis. In closer examination, however, when education is taken as the dependent variable, the sign of the partial correlation coefficient of the pupil-teacher ratio variable turns out to be

TABLE 7

Regression Testing for Effects of Pupil-Teacher Ratio and Wage Cost Ratio

for Rural Unit Boards in 1970, 1971 and 1972

Dependent Variable	Year	Const.	P–T Ratio	WC Ratio	R^2
Education	1970	14.586	− 0.076	0.432**	0.170**
			(0.763)	(0.126)	
	1971	47.948	− 1.472*	0.408**	0.213**
			(0.816)	(0.112)	
	1972	52.876	− 1.752*	0.419**	0.242**
			(0.893)	(0.116)	
Service	1970	4.045	0.169**	0.003	0.111*
			(0.063)	(0.011)	
	1971	2.741	0.236**	− 0.005	0.193**
			(0.064)	(0.009)	
	1972	4.040	0.170**	− 0.010	0.116*
			(0.071)	(0.009)	

Figures in ( ) are standard errors.

 * means statistical significance at the 5% test level.

** means statistical significance at the 1% test level.

negative in every case ; in fact, in two out of three cases they are « significantly » negative at the 5% test level. The wage cost ratio variable is positive and highly sifnificant in every case, as originally expected. Also, the pupil-teacher ratio variable is significantly correlated to the dependent length of service variable at the 1% test level in every case, while the wage cost ratio variable has no significant correlation in any year.

These findings suggest that the boards having a higher degree teacher ratio are able to hire more expensive teachers, who on the average teach smaller size classes, by allocating a higher proportion of the total operating revenue to the wage cost. Also, the boards having more experienced teachers are able to hire those teachers by increasing class size. When teacher skill-mix is measured by a combination, in one way or another, of education and the length of service, the pupil-teacher ratio, which is negatively correlated to education and positively correlated to the length of service, would tend to cancel each other. Overall, then, wage cost ratio rather than pupil-teacher ratio seems to be a better explanatory variable of teacher skill-mix for the rural boards.

A closer examination of the raw data tends to support the above findings. As mentioned earlier, teacher salaries are the biggest expenditure item which occupies approximately 60% of the total operating revenue. Other items include plant operation, debt charges, pupil transportation, and payments to other systems. [14] Among these items the last two need special attention. That is, there is a large variation in the amount of these two items among rural unit boards. Some boards spend a considerable portion of their total operating revenue on these two items, while others do not spend much.

Probably, such factors as the density as well as distribution of student population, and the closeness to cities and towns affect the amount of expenditure on these two items. This tends to understate the « true » ability to pay of those boards which do not have to spend much on these two items. In view of this, the original ability to pay hypothesis is re-tested with the percentage degree teacher ratio as the dependent variable and the total operating revenue net of pupil transportation costs and payments to other systems, which might be called « net ability to pay », as the independent variable. This simple regression equation is estimated for cross-sectional data covering 60 rural unit boards for each of the three years, 1970, 1971 and 1972.

Obtained R^2 values are .085 for 1970, .079 for 1971 and .114 for 1972. Corresponding F values are 5.38, 4.96 and 7.49 respectively. These findings suggest that although the new (or net) ability to pay

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[14] « Payments to other systems » are made by one board to another when some students in the first board opt to attend a school under the jurisdiction of the second board, which usually is a city board.

proxy « explains » on the average only 10% or even less of the total variation in the dependent education variable, it is statistically significant at the 5% test level in 1970 and 1971 and at the 1% test level in 1972. Overall then, we can say that boards' ability to pay, when measured properly, does affect their teacher skill-mix not only among the city boards but also among the rural unit boards.

Finally, net ability to pay also explains a large discrepancy in degree teacher ratio between rural and urban boards. For example, in 1972 the total operating revenue per pupil of the unit boards is higher than that of the urban boards ; however, in terms of the net ability to pay, the city public boards are the highest ($764) followed by the city separate boards ($684) and the rural unit boards are the lowest ($634) among the three. [15] These figures match very well to those of the degree teacher ratio in the same year in Table 5. This tendency is consistent for the earlier two years, 1971 and 1970.

SUMMARY

As Muir predicted in his article, for the past several years there has been a definite trend towards greater centralization of the determination of teachers' salary in Saskatchewan. As a result of the statutory change in 1973, we now have only one province-wide bargaining as far as major salary items are concerned. This means that an equity objective of the teachers' associations has now been achieved in Saskatchewan at least in respect of the bargaining format. We have attempted in this study to demonstrate that equity in the wage rates does not necessarily lead to education equality among localities.

First, geographical wage differentials have been measured for the past twelve years. Since geographical wage differentials are partially a reflection of skewed distribution of teacher-skill mix and partially a reflection of wage scale differentials, we expect wage differentials to narrow over the years reflecting increased unification of wage scales. If

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[15] This is so because city boards spend, on the average, little on pupil transportation and payments to other systems. For one thing, city schools are located within a walking distance of students, and then, there is rarely a transfer of students from a city school to a rural school. Thus, total operating revenue per pupil tends to understate the « true » ability to pay of the city boards relative to the rural boards.

wage differentials have been widening in spite of the institutional setting favorable for wage uniformity, that is a reason enough to believe that distribution of teacher skill mix has become more skewed. As expected, various kinds of geographical wage differentials have been found to be narrowing over the years. The fact that the narrowing tendencies are gradual suggest that throughout the entire period there was an increasing practice of the so-called « pattern bargaining » among the bargaining units.

Next, an analysis has been done to examine the extent to which teacher skill-mix, measured by the degree teacher ratio and the length of service, affects average wages. Based upon cross-sectional data of 1970, 1971 and 1972 it has been found that a substantial portion of the total variation in average wages can be explained by these two factors, especially by the education variable. Also, the distribution of the degree teacher ratio between rural and urban boards is far more skewed than the comparable wage figures suggest. Between 1970 and 1972 rural-urban differentials in the degree teacher ratio have not been narrowed. Although data for earlier years is not available we may be able to infer from the above that during the twelve-year period geographical differentials in teacher skill mix have not been narrowed as much as the comparable wage differential figures. From the standpoint of educational equality, this large discrepancy in teacher skill-mix, rather than wage differentials per se, is a more important issue.

Therefore, the last section of this paper has been devoted to the examination of the reasons for the uneven distribution of teacher skill-mix. It has been hypothesized that teacher skill-mix is determined largely by boards' ability to pay. For the city boards ability to pay, measured by local school taxes, has a significantly high correlation with both education and length of service variables. For the rural boards « net » ability to pay, measured by the total operating revenue minus pupil transportation costs and payments to other systems, is significantly correlated to the education variable. The net ability to pay also explains a large discrepancy in degree teacher ratio between rural and urban boards. These findings support the hypothesis that the boards' ability to pay has important bearings upon their teacher skill-mix.

The policy implication of this study is clear : In order to achieve more uniform distribution of teacher skill-mix, which in turn will contribute to the universal goal of educational equality, ability to pay of

the individual boards has to become more uniform. Indeed, under the province-wide bargaining, local conditions do not affect the level of salaries established. But they do affect teacher skill-mix so long as the individual boards raise school taxes and do hiring and firing of teachers. The Provincial Government is in a position to mitigate local differences in ability to pay by manipulating its grants policy in such a way that more grants are given to the boards which employ teachers with lower qualifications. In this sense, the magnitude of negative correlation between local school taxes and government grants, which is presently in the order of −.50 or so for both urban and rural boards, seems to be still low.

SOME COMMENTS ON TEACHER WAGE PAYMENT SYSTEMS AND EDUCATIONAL POLICY

It has been mentioned in this paper that teachers' associations generally adopt as an equity objective a single salary scale within their respective jurisdictions. In practice this typically amounts to a gradual modification of existing scales toward a single, desired mode to the extent that particular bargaining situations make practicable. The value assumption underlying this position is that it is equitable and just that a similar amount of wages be paid for similar teacher training and experience, regardless of the locality in which a teacher works.

In Saskatchewan, as any other province, it is stated government policy to provide equal educational opportunity for its young citizens irrespective of the particular locality in which they reside. Consistent with this policy, the government has revised its educational grants formula in its continuing attempt to approach a reasonable approximation of equal quality of educational services provided and has also brought about province-wide teacher-trustee bargaining on the central economic items as well as the single, province-wide wage scale.

However, it should be pointed out that when the Saskatchewan Government and the Saskatchewan Teachers' Federation refer to the single salary scale as being equitable, they are referring to, and endorsing, two distinctly different values. The government apparently assumes that a single scale will facilitate the distribution throughout the province of approximately equally paid and therefore approximately equally qualified teachers. Such a distribution of skills is, of course, necessary if equality in the provision of educational services is to be achieved. For

the Government, therefore, the term 'equity' has reference to a value concerning the quality of services provided. For the Teachers' Federation, on the other hand, the term 'equity' refers to the equality of financial compensation to individual teachers, or more properly to certain classes of teachers, on similar amounts of investments in formal training and experience.

This notion of 'equity' held by the teachers is achieved within the logics of salary scale itself. At least up to the eleventh year the two major pay-out dimensions of the scale are level of formal training and years of teaching experience. Admittedly the magnitudes of the relational values within the categories of qualification levels, and within the categories of experience, and between these sets of categories, can be changed through negotiation; but the nature of the process and the basis of accommodation reflects judgements concerning what is proper and what is practicable within the teacher labor market.

However, there is no necessary logical connection between centralized bargaining or the use of a province-wide salary scale and the government's stated objective of the provision of generally comparable levels of educational services throughout the province. What emerged quite clearly from the present study, is that in spite of a salary scale that tends toward a common mode, or even within a province-wide scale, individual school boards are able to manage the skill-mix in such a way as to perpetuate a disequitable level of teaching skills in ways and for reasons that are beyond the scope of this present paper but will be treated as the central focus of study which will be completed at a later time.

From the standpoint of public policy, therefore, it must be emphasized that the employment bargain encompasses a myriad of particular items that have significance in the market, of which perhaps the most important is the wage component, but the wage factor in itself is not so dominant as to distribute resources in such a way as to reflect precisely the values built into the pay structure. In fact, of course, if the objectives of approximate equality of provision of educational services was a serious one, and if teaching excellence were accepted as an important factor in this equality, then presumably the wage structure would have to allow for differences in pay for similar amount of training and experence so as to balance nonwage factors in the total employment bargain.

Within the field of public education various fairly autonomous administrative and human sub-systems can be identified. These sub-systems, which, to use contemporary conceptualization and terminology can be referred to as games ; each has a particular set of actors or players ; each has rules that reflect attitudes, values, customs that are developed in each game ; and each has a particular and unique set of objectives of goals, including often the notion of some one player winning or losing more than some other player. Within the area of interest touched on by this paper two such sub-systems or games are dominant. One is the budgetary game in which the central players are provincial government officials, municipal government officials and trustees. The other game is that of collective bargaining, which in Saskatchewan has as the central players provincial government officials, representatives of the Saskatchewan School Trustees Association and representatives of the Saskatchewan Teachers' Federation, and includes also in a lesser role trustees, teachers, and very occasionally in particular situations and for particular purposes students and their parents.

These games, though related in an overall way at a fairly high governmental level are pursued as quite separate activities even though each game can inflict certain constraints on the other. But by and large the objectives are different, and because the actors are different so are the final decisions which take the form of accommodations because they are essentially processes of competing interest resolved by power. This sort of analysis is used to underscore the fact that value notions such as equality of educational services, quality of teacher skill, efficient use of educational resources are going to become semantically loaded according to value of the polemic or, ultimately their power utility to each set of actors in each game. Even agreements between actors within a particular game or among actors across game lines do not necessarily mean a commonality of understanding and labelling ; rather it could mean merely an alliance, a willingness to endorse similar statements of value for some particular end that might be shared or even might, for reasons of public image, merely provide the appearance of agreement.

The point of all this is that if certain social goals are set up as objectives, the evaluation of success, or absence of it, in accomplishing those goals, must be made on the basis of direct, unbiased, procedurally proper measures. It is hazardous, naive, or even deceitful to claim as a

valid measurement of the success of a particular public policy, testimonials from one or more of the players having a direct personal or institutional interest in the way a game is played or in its outcome.

A lot has been written on skill, wage equity, quality of service, and administrative efficiency in the field of public education. This study begins an attempt to establish a few rather modest measurement indices based entirely on the empirical data available for Saskatchewan.

Les écarts de salaire chez les enseignants et la qualité des services d'éducation : le cas de la Saskatchewan

Cet article a pour objet d'analyser la structure des négociations et des échelles de salaire dans les commissions scolaires en Saskatchewan en regard de mesures destinées à assurer l'équivalence des services éducatifs dans l'ensemble de la province. On tient pour avéré, semble-t-il, que le paiement de traitements à peu près uniformes soit de nature à permettre d'avoir un personnel enseignant de valeur à peu près égale où que les enseignants se trouvent dans la province. Une répartition égale des compétences est naturellement essentielle pour assurer partout des services qui s'équivalent. C'est cette considération qui a été à l'origine de la centralisation de la négociation collective en Saskatchewan. Ce que nous soutenons dans cet article, c'est que la centralisation des mécanismes de négociation ne conduit pas nécessairement à une répartition uniforme des compétences. Les recherches expérimentales sur ce sujet comprennent trois parties.

En premier lieu, on a évalué les différentiels de salaire au cours d'une période de douze ans entre 1960 et 1964 et entre 1966 et 1972. On y a découvert que, au fur et à mesure que les années s'écoulaient, les écarts allaient se rétrécissant et que les différentiels de salaire, considérés sous leur angle territorial, reflétaient en partie une répartition déformée de la compétence des effectifs et en partie les différentiels de salaire comme tels. Aussi cette constatation traduit-elle le déplacement graduel de la négociation collective du niveau local au niveau régional, puis du niveau régional au niveau provincial au fil des années. La centralisation des mécanismes de négociation a inévitablement réduit les écarts de salaire.

Par après, l'analyse a consisté à évaluer dans quelle mesure le degré de qualification des enseignants mesuré en fonction de ses brevets et de ses années d'expérience a tendance à modifier le taux moyen des salaires. En se fondant sur un échantillonnage des données pour les années 1970, 1971 et 1972, on a découvert qu'une bonne portion de la variation totale des taux moyens de salaire s'explique par ces deux facteurs, principalement le degré des brevets. Même si les données pour les années antérieures n'étaient pas disponibles, on a pu en déduire que, au cours de cette période de douze ans, les écarts qui existaient dans le degré de

qualification des enseignants se sont moins atténués que les disparités de salaire. En ce qui concerne la qualité de l'enseignement, les écarts de niveaux de compétence constituent un enjeu plus important que les différences de salaire.

Aussi, la troisième partie de l'étude porte-t-elle sur la répartition inégale des qualifications d'une localité à l'autre. À ce propos, on a exprimé l'hypothèse selon laquelle le niveau moyen des compétences dans une commission scolaire dépendait en grande partie de la capacité de payer de la municipalité scolaire. En réalité, plus une commission scolaire est capable de payer des traitements élevés, plus on y retrouve des enseignants compétents et expérimentés, alors que la commission scolaire plus pauvre ne peut se payer ce luxe.

Pour vérifier cette hypothèse, on a établi certains modèles distincts de capacité de paiement pour les municipalités scolaires urbaines et pour les municipalités scolaires rurales, ceci du fait qu'elles possèdent des installations différentes. La capacité de payer des commissions scolaires urbaines fut établie en considérant le montant d'impôts scolaires perçus par élève et celle des municipalités scolaires rurales à partir de leurs revenus totaux, déduction faite du coût des transports des écoliers et de ce qu'il leur fallait verser à d'autres commissions scolaires. Dans les deux cas, la capacité de payer correspond d'une façon significative au niveau moyen de compétence du corps professoral, ce qui confirme notre hypothèse.

Ce qui ressort clairement de la présente étude, c'est que, malgré des échelles de salaire qui tendent à s'uniformiser, les commissions scolaires prises individuellement sont en mesure d'influer sur le niveau moyen de compétence de telle manière qu'elles perpétuent un niveau équitable de qualification professionnelle d'une commission par rapport à l'autre. En fait, sous le régime de la négociation provinciale, les différences de capacité de paiement entre les commissions scolaires locales n'ont guère d'influence sur les taux de salaire, mais, par contre, elles influeront sur la répartition du degré de compétence des enseignants tant que les municipalités scolaires prises individuellement percevront les impôts scolaires et détiendront le pouvoir d'embaucher et de congédier les enseignants.

D'un point de vue politique, la conclusion de cette étude est claire. Pour arriver à une répartition plus uniforme de la compétence professionnelle, il est nécessaire d'uniformiser la capacité de payer. Le gouvernement provincial est bien placé pour atténuer les écarts dans la capacité de payer au niveau local en ajustant sa politique de subventions de telle sorte que des subsides plus généreux soient versés aux commissions scolaires qui, présentement, emploient des enseignants de moindre qualification.