Education Statistics

Bulletin

Educational Expenditure Relative to the GDP: A Comparison of Québec and OECD Countries

Introduction

The indicator that is most often used to measure financial investment to education is the percentage of the gross domestic product (GDP) spent on education. This indicator measures the relative share of a nation's wealth that is invested in education. In this context, we can ask what percentage of the GDP is allocated to education in Québec; how does this financial investment compare to that of other provinces, the United States and member countries of the Organisation for Economic Co-operation and Development (OECD); and what explains the differences observed between Québec and these other areas?

This information bulletin answers these questions and complements the *Education Indicators,*[1] in which the Ministère de l'Éducation du Québec makes comparisons primarily with the other provinces and the United States. Here, Québec's situation is compared primarily with that of the OECD countries.[2]

In December 1997, the OECD published its fifth edition of *Education at a Glance: OECD Indicators*, which offers a more in-depth analysis of the factors accounting for differences in the educational expenditure of various countries. In this bulletin, we will use this type of analysis to better situate Québec's financial investment in education in comparison with that of OECD countries.

Educational Expenditure Relative to the GDP

In 1994, Québec spent a larger portion of its GDP on education (8.0%) than the rest of Canada (7.0%), the United States (6.6%) and almost all the OECD countries for which data were available (5.9%). Only Denmark earmarked a larger percentage of its GDP to education than Québec in 1994. Following budget cutbacks in recent years, Québec reduced educational spending by approximately 1.0 percentage point, to an estimated 7.0% of its GDP in 1997.

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1. *Education Indicators*, Direction générale des services à la gestion, Direction des statistiques et des études quantitatives, Ministère de l'Éducation du Québec, yearly publication.

2. The OECD's concept of total educational expenditure is not the same as that used in the *Education Indicators* (which refers to Statistics Canada's definition for the provinces). However, in this bulletin, when Québec is compared to the OECD countries, the Québec data have been adjusted to take into account the OECD definition. Moreover, according to the OECD's instructions, the data provided by level of instruction have not been adjusted to take into account the organizational differences in the various education systems.

Table 1
Educational expenditure relative to the GDP: Québec, other regions of Canada, the United States and the OECD country mean (%)

	1994	1997
Québec	8.0	7.0
Canada, excluding Québec	7.0	6.2
United States	6.6	7.2
OECD country mean	5.9	N/A

e: estimates
N/A: not available

Appendix 1 provides detailed data by country and by level of instruction for 1994.

In 1997, the percentage of the GDP allocated to education was higher in Québec than in the rest of Canada, but lower than in the United States. The higher spending on education in Québec than the average across the Canadian provinces is primarily due to the fact that Québec's collective wealth is relatively lower. If Québec had the same level of collective wealth as the average for the other provinces, its educational expenditure would represent a smaller percentage of the GDP than elsewhere in Canada.

The most recent data available for the OECD countries date to 1994 and indicate that the portion of the GDP spent on education in Québec was 2.1 percentage points higher than the OECD country mean–a considerable difference. In effect, 2.1% of Québec's GDP (which was $167.3 billion in 1994) represents a total of $3.5 billion.

In order to explain why Québec invests a greater share of its GDP in education than the OECD country mean, the following four factors must be considered: per-student spending; collective wealth (defined as the per capita GDP); enrolment rates; and the demographic factor. When all levels of instruction are taken into account, the enrolment rate is defined as the ratio of the school population to the population of 5-to-29-year-olds, while the demographic factor is the ratio of the population of 5-to-29-year-olds to the total population.

To clearly understand the role of each factor in determining the financial investment of each area, the following simulation can be used. Let us assume that all the factors except one are identical for each area. If per-student spending is different, then the area with the higher spending invests more because a larger quantity of resources is allocated to education. Moreover, the less wealthy area (with a lower per capita GDP) spends a greater portion of its GDP on education than another area for the same quantity of resources allocated to its students. If enrolment rate or the percentage of the school-age population is different, then a higher ratio indicates a larger financial investment because more financial resources are required.[1]

Per-Student Spending

Table 2 provides data on per-student spending for elementary, secondary and postsecondary education, as well as for all levels of instruction combined.[2]

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1. See Appendix 2.

2. Includes preschool education and undistributed expenditures.

Table 2
Per-student spending by level of instruction, in the public sector (in CAN$ converted using PPPs), 1994-95: Québec and the OECD country mean

	Elementary and Secondary Education	Postsecondary Education	All levels of instruction[1]
Québec	6 062	14 087	8 235
OECD country mean	4 726	9 649	5 560
Difference (%)	28	46	48

In 1994, per-student spending for all levels of instruction was $8 235 in Québec, compared with an average of $5 560 for the OECD countries, for a difference of 48%.

Per-student spending for elementary and secondary education was 28% higher in Québec than the OECD country mean, whereas spending per student for postsecondary education was 46% higher. Because salaries account for more than 80% of all operating expenses in Québec and in most of the OECD countries, they must be considered when looking at the factors that contribute to the differences observed.

Salaries include the remuneration of personnel as well as all aspects related to workload. Teachers obviously make up the largest category of personnel in teaching institutions and have the most impact on educational expenditure. In the 1997 edition of *Education at a Glance,* the impact of various factors on the cost of teachers' salaries was calculated for the first time. Equivalent calculations for Québec have been included below.

When comparing teaching costs per student, two main components can be used: the statutory salary and the student-teacher ratio.[1] The student-teacher ratio is obtained by dividing the number of students by the number of teachers (data on enrolments and teaching personnel is expressed in full-time equivalents).[2]

In another statistics bulletin,[3] we presented a comparison of the salaries and teaching time of teachers in public elementary and lower secondary schools in Québec and in the OECD countries for 1993-94. We considered starting salaries (at the beginning of a career), salaries after 15 years of experience, and maximum salaries (at the top of payscales). Salaries were also compared with other variables such as per capita GDP.

This comparison reveals that, according to all the indicators considered, the salaries of teachers in Québec school boards are relatively higher than for the OECD country mean. Data for 1994-95 indicate the same.

The following table provides a comparison of annual statutory salaries for teachers in public lower secondary schools (1994-95) for Québec and the OECD country mean.

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1. See Appendix 3.

2. It is important to understand that the student-teacher ratio calculated in this manner **does not indicate the average number of students per class** (average class size). To clearly understand the difference between the student-teacher ratio and the average class size, the student-teacher ratio must be considered as a composite indicator that is the result of three variables: the average number of students per class, the average teaching time of teachers and the average instruction time for students. See Appendix 3.

3. See Ministère de l'Éducation, Direction des statistiques et des études quantitatives. *Statutory Salaries and Teaching Time of Teachers in Public Elementary and Lower Secondary Schools: A Comparison of Québec and OECD Countries*, No. 2, November 1997. This document is available on the Internet: http://www.meq.gouv.qc.ca.

Table 3
Annual statutory salaries of teachers in public lower secondary schools (in CAN$ converted using PPPs), 1994-95: Québec and the OECD country mean

	Starting Salary	Salary after 15 Years of Experience	Maximum Salary
Québec	29 331	44 053	44 053
OECD country mean	25 286	33 855	40 465
Difference (%)	16	30	9

The difference between salaries is particularly high for teachers with 15 years of experience, primarily because Québec teachers reach the top of their payscale after 15 years of experience, whereas in the OECD countries, the maximum salary is attained on average after 26 years of experience.

It should be remembered, however, that teachers employed by Québec school boards are on average paid less than their colleagues in the rest of Canada and in the United States.[1]

Table 4 provides a comparison of the student-teacher ratio for elementary and secondary education (1994-95) for Québec and the OECD country mean.

Table 4
Student-teacher ratio for public elementary and secondary education, 1994-95: Québec and the OECD country mean

	Elementary Education	Secondary Education
Québec	17.5	14.5
OECD country mean	18.2	14.4
Difference (%)	-4	1

Thus, the student-teacher ratios for Québec public elementary and secondary education are very close to the OECD country mean.

In the 1997 edition of *Education at a Glance,* for the first time the OECD presented data allowing a comparison of the factors that determine the student-teacher ratio for public lower secondary education for certain countries. The average number of students per teacher in these countries was 13.5, that is, less than Québec's student-teacher ratio for the secondary level.[2] Table 5 presents a comparison of three factors that determine the student-teacher ratio for public lower secondary education.

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1. See the *Education Indicators* of the Ministère de l'Éducation du Québec as well as the document, *Inter-Provincial Education Statistics Project*, published by British Columbia's Ministry of Education.

2. The data available for Québec do not allow the calculation of the average number of students per teacher for the first cycle of secondary education. The average number of students per teacher may be different in Québec at the beginning and at the end of secondary education primarily because of the difference in the composition of enrolments. For example: there are more students with handicaps or learning or adjustment difficulties at the beginning of secondary school than at the end, whereas there are more students in vocational education in the second cycle of secondary education. However, because more supervision is required for these two categories of students, they counterbalance each other in part.

Table 5
Instruction time for students, teaching time for teachers and average number of students per class, in public lower secondary education, 1994-95: Québec and the OECD country mean

	Instruction time for students (hours per year)	Teaching time for teachers (hours per year)	Average class size (average number of students per class)
Québec	900	615	21
OECD country mean	941	746	17
Difference (%)	-4	-18	24

The instruction time for students is defined here as the number of hours of instruction that students must receive per year. The teaching time is calculated on the basis of the annual number of hours that a teacher spends teaching in the classroom; this indicator does not take into account the hours that a teacher spends on other activities such as preparing for courses, helping students, and attending training sessions and meetings. The average class size indicates the average number of students per class; this is a theoretical measure calculated on the basis of the student-teacher ratio multiplied by the students' instruction time and divided by the teachers' teaching time (according to the OECD's method).[1]

It appears that in Québec, instruction time is slightly lower and teaching time considerably lower, but that the average class size is larger than the OECD mean for countries for which data were available.

To clearly understand the degree to which each of these factors contributes to educational expenditure, the following simulation can be used. Let us assume that two countries have identical education systems except for one of the following factors: teachers' teaching time, students' instruction time and average class size. If teachers' teaching time is different, then the country with the lower teaching time must hire more teachers and educational spending will therefore be higher. If students' instruction time is different, then the country with the lower instruction time will require fewer teachers to provide educational services and educational spending will therefore be lower. The same reasoning can be applied to the average class size to demonstrate that the country with more students per class will have a smaller financial investment in education.

If we return to the comparison of Québec and the OECD country mean, it appears that, of the three factors that determine the student-teacher ratio, one factor increases the gap between educational expenditure in Québec and the OECD country mean (lower teaching time in Québec), and two reduce it (lower instruction time and larger average class size in Québec).

Table 6 presents a summary of the degree to which factors contribute to the difference between the teaching costs per student for public lower secondary education. In this instance, salary costs are based on salary after 15 years of experience (according to the OECD indicator).

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1. More complete definitions are provided in the OECD publication, *Education at a Glance*. It should be noted that, for Québec, the enrolments considered for the calculation of the student-teacher ratio, and therefore indirectly for the calculation of the average number of students per class, include all educational activities in the school boards (regular education, welcoming and francization classes, vocational education, students with handicaps or adjustment or learning difficulties, adult education, etc.).

Table 6
Impact of various factors on teachers' salary costs per student, for public lower secondary education (in CAN$ converted using PPPs), 1994-95: Québec and the OECD country mean

Salary costs per student for Québec teachers	3 055
Salary costs per student for teachers in OECD countries	2 543
Difference between Québec and OECD countries	512
Factors accounting for this difference:	
Teachers' salaries	707
Students' instruction time	-126
Teachers' teaching time	544
Average class size	-613
Total	512

It is estimated that teaching costs per student at the lower secondary level for 1994-95 was $3 055 in Québec and $2 543 for the OECD country mean, that is, a difference of $512.

The salaries of Québec teachers, which were relatively higher than the OECD country mean, as well as the fact that Québec teachers spend less time teaching in the classroom, contributed considerably to the higher teaching costs ($707 + $544 = $1 251). The lower instruction time for students in Québec and the higher average class size than the OECD country mean reduced the gap in salary costs ((-$126) + (-$613)) = -$739). The net effect of these factors is a difference of $512 in the teaching costs per student.

Québec and the OECD countries for which data were available were compared here. There are obviously major differences among the countries examined. Readers interested in comparisons by country may consult the 1997 edition of *Education at a Glance*, as well as another 1997 OECD publication, *Education Policy Analysis*, which provides complementary data on comparisons by country of teaching costs per student.

These comparisons by country demonstrate the various decisions made with respect to the combination of factors selected by each country. The combination of factors chosen by a given country has a direct impact on per-student costs, and also determines the working conditions of teachers and the quality of the teaching that students receive.

For the time being, the OECD data do not allow an equivalent comparison for teachers at other levels of instruction.

Collective Wealth

The second factor considered in the analysis of the difference between Québec and the OECD country mean, in terms of the percentage of the GDP spent on education, is collective wealth.

The per capita GDP was used as the indicator of collective wealth.

In 1994, Québec's per capita GDP was $22 949, compared with $20 725 for the OECD country mean, that is, a difference of 11%. Because Québec is relatively wealthier than

the OECD country mean, it spends a smaller portion of its GDP on education for the same amount of resources allocated to students. This factor therefore plays a role in narrowing the gap between Québec's financial investment in education and the OECD country mean.

Enrolment Rates

The enrolment rate is defined here as the ratio of the total enrolments (for all levels of instruction) to the population of 5-to-29-year-olds. A higher enrolment rate for an area indicates (all other variables being equal) that more individuals will attend school in this area and, therefore, that a larger financial investment in education will be required.

In 1994, the enrolment rate was 68% in Québec, and the OECD country mean, 61%. The higher enrolment rate in Québec contributed significantly to its higher educational spending.

It is also important to know that the enrolment rate increased considerably in Québec from 1981 to 1994, going from 54% in 1981 to 68% in 1994.

This increase is in part attributable to a higher student retention rate for secondary education. Also, in Québec, the probability of obtaining a secondary school diploma was much higher in 1994-95 (85%) than in 1981-82 (71%).

The enrolment rate for postsecondary education is much higher in Québec than in the OECD countries and this is a major reason why Québec's educational spending is greater. Table 7 presents a comparison of net enrolment rates for postsecondary education, by age group.

Table 7
Net enrolment rates for public and private higher education, by age group, 1994: Québec and the OECD country mean

	18-to-21-year-olds	22-to-25-year-olds	26-to-29-year-olds
Québec	46.3	24.1	11.1
OECD country mean	21.5	15.3	6.6

Demographic Factor

The age structure of the population for the areas considered is also a factor accounting for the differences observed in the portion of the GDP spent on education.

The demographic factor is defined here as the percentage that a group of 5-to-29-year-olds represents in terms of the total population, or the segment of the population that is most likely to attend school. For a given area (all other variables being equal), a larger proportion of young people in the total population indicates that there will be more persons attending school in this area and that, therefore, a greater financial investment in education will be required.

In 1994, this proportion was 34% in Québec, whereas the OECD country mean was 36%. This factor therefore contributed to reducing the difference between Québec and the OECD country mean.

It should also be noted that this proportion dropped considerably in Québec between 1981 and 1994, going from 43% to 34%. This could have considerably brought down educational spending, but did not, because of a significant rise in the enrolment rate. Thus, these two factors counterbalance each other to a great extent.

Summary of Factors at Play

In 1994, Québec allocated 8.0% of its GDP to education, compared with 5.9% for the OECD country mean, for a difference of 2.1 percentage points.

Table 8 indicates the degree to which the main factors contribute to this difference. The "positive" factors are those that account for an increase in educational spending in Québec and the "negative" factors are those that bring it down.

Table 8
Impact of various factors on the difference in the percentage of the GDP spent on education in 1994: Québec and the OECD country mean

Educational expenditure relative to the GDP in Québec (%)	8.0
Educational expenditure relative to the GDP for the OECD countries (%)	5.9
Difference (Québec–OECD countries) in percentage points	2.1
Factors contributing to this difference (in percentage points):	
Higher per-student spending for elementary and secondary education in Québec	1.2
Higher per-student spending for postsecondary education in Québec	0.8
Higher enrolment rates for elementary and secondary education in Québec	0.2
Higher enrolment rates for postsecondary education in Québec	1.4
Higher per capita GDP in Québec	-0.6
Demographic factor (older population in Québec)	-0.7
Net impact of other factors	-0.2
Total	2.1

Of the factors that contribute to Québec spending a larger portion of its GDP than the OECD country mean, a higher per-student spending for elementary, secondary and postsecondary education accounted for 2.0 percentage points (1.2 + 0.8). Moreover, higher enrolment rates in Québec accounted for 1.6 percentage points (0.2 + 1.4).

Of the factors that reduced the gap between the portion of the GDP spent on education in Québec and the OECD country mean, Québec's slightly higher per capita GDP narrowed the gap by 0.6 percentage points, just as did Québec's relatively older population (-0.7 percentage points).

If the levels of instruction are considered separately, postsecondary education, which is more extensive in Québec, plays an important role in the difference observed in the portion of the GDP allocated to education in Québec and the OECD country mean. Thus, per-student spending for postsecondary education, which is higher in Québec, accounts for 0.8 percentage points, whereas a higher enrolment rate accounts for 1.4 percentage points.

Data sources:

- OECD: *Education at a Glance: OECD Indicators*, 1997
- OECD: *Education at a Glance: OECD Indicators*, 1996
- OECD: *Education Policy Analysis*, 1997
- Statistics Canada: OECD indicators as they apply to the provinces
- Ministère de l'Éducation, *Education Indicators*, Direction générale des services à la gestion, Direction des statistiques et des études quantitatives
- Ministère de l'Éducation, Direction générale des services à la gestion, Direction des statistiques et des études quantitatives
- Ministère de l'Éducation, Direction générale des relations de travail

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Other Education Statistics Bulletins available:

- Lespérance, André, *Level of Graduation Upon Leaving the Education System*, No. 1, November 1997.
- Demers, Marius, *Statutory Salaries and Teaching Time of Teachers in Public Elementary and Lower Secondary Schools: A Comparison of Québec and OECD Countries,* No. 2, November 1997.

APPENDIX 1

Table 1
Educational expenditure as a percentage of GDP, by level of instruction: an international comparison, 1994 (%)

	Elementary and secondary education (excluding preschool)	Post-secondary education	Elementary, secondary and post-secondary education	All levels (including preschool and undistributed expenditures)
Denmark	4.8	2.1	6.9	8.4
Sweden	5.1	2.2	7.3	7.8
Finland	4.6	1.9	6.5	7.3
Canada	4.4	2.6	7.0	7.2
United States	3.9	2.4	6.3	6.6
Hungary	4.3	1.3	5.6	6.5
France	4.5	1.2	5.7	6.4
Australia	4.1	2.0	6.1	6.2
Korea	3.9	1.8	5.7	6.2
Germany	3.9	1.1	5.0	6.0
Ireland	3.8	1.6	5.4	6.0
Spain	4.1	1.1	5.2	5.8
Austria	4.0	1.0	5.0	5.6
Mexico	4.0	1.1	5.1	5.6
Iceland	N/A	1.0	N/A	5.5
Portugal	4.0	0.9	4.9	5.5
Netherlands	3.4	1.7	5.1	5.4
Japan	3.1	1.1	4.2	4.9
Italy	N/A	0.9	N/A	4.8
Turkey	2.2	1.3	3.5	3.5
Greece	1.7	0.7	2.4	2.4
OECD country mean	**3.9**	**1.5**	**5.4**	**5.9**
Québec, 1994	4.5	3.3	7.8	8.0
Québec, 1997[e]	3.9	2.9	6.8	7.0

N/A: data not available
e: estimates

Sources: – For the OECD countries: *Education at a Glance: OECD Indicators,* 1997;
– For Québec (1994): Statistics Canada: OECD indicators as they apply to the provinces;
– For Québec (1997): Ministère de l'Éducation, Direction générale des services à la gestion, Direction des statistiques et des études quantitatives.

APPENDIX 2

Factors explaining the differences between the areas with respect to the percentage of the GDP spent on education[1]

In order to be able to explain the differences observed among the areas in terms of the portion of the GDP spent on education, it is necessary to do a comparative analysis of the main factors that determine the level of educational expenditure for each area. The factors considered are: total per-student spending; per capita GDP; an indicator of enrolment rates defined as the ratio of enrolments to the population of 5-to-29-year-olds; and a demographic factor defined as the ratio of 5-to-29-year-olds to the total population.

The equation used is as follows:

$$\frac{EXP}{GDP} = \frac{EXP}{FTE} \times \frac{1}{GDP/POP} \times \frac{FTE}{5\text{-}29} \times \frac{5\text{-}29}{POP}$$

where,

EXP	:	expenditure for all levels of instruction
GDP	:	gross domestic product
FTE	:	enrolments in full-time equivalents
POP	:	total population
5-29	:	population of 5-to-29-year-olds
EXP/GDP	:	portion of the GDP spent on all levels of instruction
EXP/FTE	:	spending per student
GDP/POP	:	per capita GDP
FTE/5-29	:	enrolment rate
5-29/POP	:	demographic factor

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1. The formulas used to calculate the degree to which factors contribute to the difference in the percentage of the GDP spent on education in Québec and for the OECD country mean are provided in Appendix 3 of the following document: Demers, Marius, *L'effort financier pour l'enseignement primaire et secondaire; Une comparaison Québec–Autres provinces–États-Unis, de 1981-1982 à 1991-1992*, Direction des études économiques et démographiques, Ministère de l'Éducation du Québec, December 1992.

APPENDIX 3

Factors explaining the differences between the areas with respect to teaching costs per student for lower secondary education[1]

In order for data on teaching costs per student in lower secondary education, by country, to be as comparable as possible, the OECD uses a theoretical calculation on the basis of three variables: the statutory salary of teachers with 15 years of experience, and enrolments and teaching personnel expressed in full-time equivalents.

The equation used is as follows:

$$\frac{TS}{FTE} = \frac{TS}{TP} \times \frac{TP}{FTE}$$

where,

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TS        :  teachers' salaries
FTE       :  enrolments
TP        :  teaching personnel
TS/FTE    :  teaching costs per student
TS/TP     :  statutory salary of teachers with 15 years of experience
TP/FTE    :  teacher-student ratio
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For convenience, the teacher-student ratio is expressed in the text as the number of students per teacher. We have stated that the student-teacher ratio **does not indicate the average number of students per class** (average class size). In effect, the student-teacher ratio can be considered a composite indicator that is the result of three variables: average number of students per class, average teaching time of teachers, and average instruction time for students.

The equation used is as follows:

$$\frac{FTE}{TP} = \frac{FTE}{CL} \times \frac{HR}{TP} \times \frac{1}{HR/CL}$$

where,

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FTE       :  enrolments
TP        :  teaching personnel
CL        :  number of classes
HR        :  number of hours of instruction
FTE/TP    :  average number of students per teacher
FTE/CL    :  average number of students per class (average class size)
HR/TP     :  average number of hours of teaching for teachers
HR/CL     :  average number of hours of instruction for students
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1. The formulas used to calculate the degree to which factors contribute to the difference in teaching costs per student are provided in Appendix 3 of the following document: Demers, Marius, *L'effort financier pour l'enseignement primaire et secondaire; Une comparaison Québec–Autres provinces–États-Unis, de 1981-1982 à 1991-1992*, Direction des études économiques et démographiques, Ministère de l'Éducation du Québec, December 1992.