Value-for-Money in Saskatchewan K–12 Educational Expenditures

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Introduction

> In the past few years, in Canada as well as in many other countries, increasing attention has been given to education systems and their performance. Parents, members of the business and industrial communities, concerned taxpayers, and others have asked the question: "How well are our schools preparing students for a global economy and for lifelong learning?" (Council of Ministers of Education, Canada. *1996 Report on Science Assessment.*)

The recent release by the Organisation for Economic Co-operation and Development ("OECD") of the results of the Programme for International Student Assessment ("PISA") has served once more to focus the attention of Canadians on the thorny issue of standardised educational testing. We rightly felt a sense of pride in the accomplishments of the fifteen-year-old Canadians who, in the tests for literacy in reading, mathematics and science, ranked second in reading among the thirty-two countries tested and fifth in mathematics and science. Indeed, the fifteen-year-olds from Alberta actually topped the highest ranked country, Finland, in reading literacy, while those from British Columbia and Quebec were not far behind. In literacy in mathematics, the students from Quebec were second only to those of Japan, while those from Alberta and British Columbia followed closely. With the exception only of New Brunswick, which fell below the OECD average for scientific literacy, all of the Canadian provinces exceeded the 32-nation average in each of the literacy tests. The results for the Saskatchewan students tested were above the OECD averages, but trailed the Canadian average in each area tested. It is of interest to enquire what should be made of such results.

While the press coverage of the PISA results testified to our pride in the accomplishment of our fifteen-year-old students, Canadians are divided in their views respecting the primary purpose of education. Almost one-third of them believe training youth for the world of work is most important, while twenty-three per cent consider creating good citizens of primary importance. Interestingly, only seventeen per cent indicated that the primary purpose should be encouraging intellectual development and inquiring minds.[1] There appears to be similar diversity of views respecting the quality of our primary and secondary education: for Canada as a whole, a plurality of those surveyed indicated a belief that our schooling was deteriorating, while a majority of respondents in Atlantic Canada and in Saskatchewan/Manitoba believed schooling was improving.[2]

While it is possible that schooling is improving in some parts of the country and deteriorating in others—indeed, this is almost certainly the case—it has also been suggested

[1] COMPAS Inc., *National Post/*Global Poll, *National Post*, "State of Education", September 2001, E10.
[2] *Ibid.*

that some of the range of views respecting quality may be attributable, in precisely those provinces where a perception of improvement is strongest, to the limited information parents receive regarding school performance. For example, most of the Atlantic provinces do not have mandatory student testing, provincial testing is voluntary in Manitoba, while in Saskatchewan provincial testing is voluntary and only a relatively small sample of students is tested. In consequence, parents may indeed have difficulty obtaining the data necessary to formulate informed views on the quality of education provided their children.[3] If this hypothesis is correct, an unsatisfied demand for objective information may help explain the overwhelming support for educational testing evident in the COMPAS survey: seventy-nine per cent of all respondents favoured province-wide testing in either all or a few grades, while the corresponding value for nation-wide testing was seventy per cent. Clearly, testing is perceived to be a necessary component of our educational system.

That a substantial majority of Canadians wish our school children to experience regular standardised testing is hardly surprising. The very nature of education inevitably contributes to a sense of unease among concerned parents: it is a vitally important service, but one that is experienced only vicariously, through one's children. Moreover, some of the most important decisions respecting it—for example, to which school to send one's children—are made so infrequently that it is difficult to become an informed consumer. Given these characteristics, a strongly felt desire for objective, external information respecting educational quality is an eminently reasonable parental response. Additionally, these same parents, as taxpayers, are required to make substantial investments in an educational system the cost of which is exceeded only by the public outlays on health. It is imperative that public expenditures of this order of magnitude be demonstrably economic, efficient and effective; that is, that they be seen to provide value-for-money. For this, governments must be held accountable.

It is, of course, easy to demand accountability: the problem is to find some persuasive means of demonstrating that reasonable expectations of accountability have in fact been satisfied. This is particularly troublesome in an area of public expenditure where, as in primary and secondary education, outputs are both diverse and, in some cases, intangible, and where the demonstration of value may require the passage of time.[4] Such admitted difficulties, however, cannot be permitted to serve as a rationale for inadequate systems of accountability,

[3] Helen Raham, Executive Director, Centre for Excellence in Education, cited in "Consensus on freedom of choice", *op.cit.*, 9.

and the issue raised once more by the release of the PISA results is that of the proper role of standardised testing in educational accountability systems.

What those responsible for PISA sought to determine was whether the students of today are well prepared to meet the challenges of tomorrow. They are, of course, cognisant of the difficulty in answering a query of this generality, but believe that literacy in reading, mathematics and science is an indispensable prerequisite to that preparedness; that this literacy lends itself to meaningful measurement and quantification; and that, by providing a context within which to interpret jurisdictional results, comparative international analyses can contribute to improvements at the national or sub-national levels.[5] Such analyses, they note, can assist participating governments in determining their areas of relative strength and weakness, and in monitoring their progress. Most importantly, they believe that, coupled with appropriate incentives, such programs can "motivate students to learn better, teachers to teach better and schools to be more effective."[6] They argue also that such programs support a shift in the focus of policy from educational inputs to learning outcomes, a shift that can only assist jurisdictions seeking to effect improvements in schooling.

It is important to observe that acceptance of these views does not imply any presumption that standardised testing of educational outcomes can alone constitute an adequate system of accountability: clearly, such testing must be complemented by performance indicators relating to context (or conditions) and process, where the latter term embraces inputs, broadly conceived.[7] Nor is there a presumption that standardised testing can adequately capture such difficult-to-quantify skills as critical thinking, cultural and aesthetic sensitivity, and the ability to work co-operatively.[8] There is, moreover, an evident danger that, unless consciously resisted, an excessive emphasis on testing may lead to an undue concentration in our schools on that which can be tested, and this possibly at the expense of activities that fall outside the realm of ready mensuration. Such caveats may readily be acknowledged without abandoning the view that a properly constructed output indicator can serve as a useful index of educational performance, albeit one that requires careful and informed interpretation. It is,

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[4] The passage of time is certainly necessary, for example, to demonstrate the soundness of preparation for labour-force participation or for post-secondary education.
[5] OECD 2001, 3.
[6] *Ibid.*
[7] See Lorna M. Earl, "Developing Indicators: the Call for Accountability", 21.
[8] There is anecdotal evidence, however, that schools the students of which score well in standardised tests also tend to achieve superior accomplishment in those areas that do not lend themselves readily to quantification. A

therefore, a premise of this paper that results from standardised testing, whether conducted at a provincial, national or international level, have an important role in informing educational policy and in effecting improvements in our educational systems and schooling. That their potential for improving policy and outcomes is not always realised—indeed, that it may actually be forfeited—will be one of the concerns of what follows.

The Saskatchewan Situation

Education has consistently been an area of high expenditure priority for Saskatchewan governments. Even when retrenchment had to be pursued aggressively, education was repeatedly identified as a field that had to be safeguarded from the vagaries of fiscal exigency.[9] In consequence, although it was necessary to permit the erosion of the percentage of total K–12 expenditures financed by the province, and also per student expenditure as a percentage of per capita GDP,[10] provincial educational outlays did not suffer the absolute and relative declines experienced by most other categories of expenditure.[11] The resulting outlays are thus considerable: while current data are not yet available, present annual expenditure by school boards (including that financed by the province) on K–12 education is of the order $1.2 billion. Some consideration of the adequacy of these expenditures is provided below, but first it is necessary to examine some evidence respecting the educational outcomes attributable to these very significant outlays.

As noted above, PISA is predicated on the belief that literacy in reading, mathematics and science is essential for success in the knowledge-based economy and society, and that these forms of literacy lend themselves to meaningful quantification and assessment. This does not imply an uncritical belief that such literacy constitutes a sufficient condition for workplace and civic success: clearly, and as noted above, many other skills are required. But literacy in reading, mathematics, science and technology is unquestionably a *necessary* condition for success. It is thus important to examine the recent experience of Saskatchewan with standardised testing and consider what the results achieved by our students imply about the value-for-money from our K–12 educational expenditures.

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detailed analysis of the correlation between scores on standardised tests and student achievement in these difficult to measure areas would appear to be a potentially fruitful field for further research.

[9] Cf. Various Budget Speeches, beginning with that for 1992–93.

[10] See Appendix Table A5.

[11] See Saskatchewan Department of Education, 2000, 43 ff.

It is probably not unfair to say that Saskatchewan has been a reluctant participant in standardised testing. In 1989 the Council of Ministers of Education ("CMEC") began research on the development of an assessment tool that could be used to test the knowledge and competency of Canadian students. This initiative culminated in the Council launching the School Achievement Indicators Program ("SAIP"), which was designed to test the knowledge and competency of 13- and 16-year-old Canadian students in reading, writing, mathematics and science. Despite its membership in the CMEC, Saskatchewan was the only province that did not participate in the first round of testing, which occurred in 1993 and 1994. Why, precisely, the province refused to participate was not made clear. The Chairman of the Saskatchewan Chamber of Commerce Education Committee accused the government of ignoring everyone except those who opposed the [SAIP] program, among whom spokespersons for the educational establishment were prominent.[12] When challenged by the President of the Chamber to reconsider or at least supply reasons for her stand, the then Minister of Education, Carol Teichrob, blamed the program's cost—estimated to be $2.8 million nationally and less than $200,000 (or some 0.02 per cent of the province's K–12 expenditures) for Saskatchewan—and argued that the tests would not be particularly effective.[13] The evident incongruence of this latter conclusion with the participation of all of the other provinces did not elicit any explanation.

Not surprisingly, the Minster's views were paralleled by those of her department: Saskatchewan Education was reported in the Saskatoon *StarPhoenix* as describing SAIP as an "expensive hobby horse which has little educational value."[14] Similar conclusions had been expressed earlier by the Saskatchewan Teachers' Federation ("STF") and by the Saskatchewan School Trustees Association ("SSTA"), both of which opposed strongly the idea of national achievement examinations. At a September 1991 symposium to discuss the Corporate-Higher Education Forum report *To Be Our Best: Learning for the Future*, the General Secretary of the STF contended that standardised testing actually measured the ability of students to perform on tests, and not, as purported, the knowledge that the students had acquired. He also stated that poor results were more likely to reflect the socio-economic status of those tested than the

[12] "Chamber wants education tested," *Leader-Post,* 29 May, 1992.
[13] *Ibid.*
[14] "Chamber enters fray over standardized tests," *Saskatoon StarPhoenix,* 29 May 92.

quality of the teaching-learning process.[15] Saskatchewan teachers were, in consequence, "actively opposing" the proposed national student testing program.[16]

Similar sentiments were expressed by the Executive Director of the SSTA, who stated "The new 'information age skills' being taught in schools are extremely difficult to assess and will be displaced, I'm afraid, by those goals that are more easily measured, if national testing is carried out." He added "We must assess progress toward *all* of our goals, not those most easily measured or conveniently reported."[17] In a similar vein—and exhibiting what might be deemed an excessively democratic approach towards the Federation's goals—the President of the STF declared "Only three of our 44 goals of education speak to reading, writing and mathematical skills."[18] Both the General Secretary and the Executive Director told the Symposium "educational goals and assessments are most relevant at the local and provincial levels, and should be left there."[19]

In the face of such opposition from the educational establishment, the decision by the province not to participate in SAIP, while disappointing, was hardly surprising. The Chamber of Commerce returned to the fray in 1993, observing that "If you want excellence, you've got to have measurements to tell you whether you're going in the right direction. We want some sort of measurement to ensure we're getting value for our money."[20] They were joined in their demand by a new community organisation, Citizens for Accountability and Excellence in Education, which included among its goals "regular province-wide, national and periodic

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[15] In this context, it is interesting to note that in the first PISA assessments, in all participating countries, "students from high socio-economic backgrounds performed better than students from low socio-economic backgrounds." (Measuring Up: Highlights, 5.) It was the case, however, that the dispersion of results was less significant in those countries for which the average results were highest. Thus, for Finland, Japan and Canada, the dispersion attributable to differences in socio-economic status, around their impressive averages, was appreciably less than that for most of the other participating countries, suggesting that it is indeed possible to achieve quality results across the range of socio-economic conditions. It is particularly interesting that, within Canada, and in respect of all three areas of literacy, students from Saskatchewan exhibited the least variation attributable to family socio-economic background. (*Ibid.*, 20-1). In consequence, as the authors of the PISA report conclude, "Low levels of performance by students from lower social backgrounds is not inevitable. There are things that schools—and policy makers—can do about poor performance." (OECD, *Knowledge and Skills for Life*, p. 27.)

[16] Lawrence McMahen, "Call for national testing rejected," *Saskatchewan Bulletin*, 24 September, 1991.

[17] *Ibid.*, emphasis in original. It is interesting to speculate why objective information regarding some sub-set of goals would be deemed inferior to an absence of such information regarding *all* goals, but no light is shed on this in the report.

[18] "National testing not the way to go", *Saskatchewan Bulletin*, 4 December, 1991.

[19] McMahen, *op.cit.* It has been speculated that, given the unanimous opposition of the "formal 'partners' in Saskatchewan education", the real, although unstated reason for Saskatchewan's non-participation in the national testing scheme was "Saskatchewan Education's fear of severe backlash from its historically trusted and reliable friends in the educational enterprise. . . . Basking in a climate of success, and having judged national testing to be a politically risky venture at best, Saskatchewan Education saw no reason to have the province participate in SAIP assessments." Cf., Stewart, 611.

[20] "Testing students urged", *Leader-Post*, 12 February, 1993.

international objective evaluations of student achievement in different grades."[21] One of their members, Dr. D. Stewart of the University of Regina Faculty of Education, observing that the emphasis within the schools had been misplaced, stated:

> Schools can't be all things to all people . . . they weren't meant to be social agencies. Schools should focus more on content and less on process, more on knowledge and less on feelings and self-esteem, and more on education and less on socialization.[22]

Another member raised the issue of standardised testing, stating that publicly funded education should be held accountable for what is taught in the schools, adding that there must be some form of evaluation in order that parents and the community can assess what is being taught and how well it is being taught.[23]

Caught betwixt these conflicting pressures, the province instituted in 1993 its own education indicators program, the Provincial Learning Assessment Program ("PLAP"), intended, among other things, to measure the success of Saskatchewan's K–12 educational system both in terms of student outcomes and their opportunities to learn. Since this was provincial in scope, it did not lend itself to the comparisons with other jurisdictions about which the STF was so exercised; indeed, the sample size utilised was so small that it could not be used to compare the performance of students in different school districts, let alone individual schools.[24] It was thus unlikely to be a source of tension between Saskatchewan Education and the STF. The possibility of such tension was also minimised by the decision that participation in PLAP would be voluntary, rather than mandated.[25] Despite the evident distaste of both the STF and the SSTA for standardised testing, it is interesting that the

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[21] "New watchdog group", *Leader-Post,* 18 February, 1993.
[22] *Ibid.*
[23] *Ibid.*
[24] Provision is made for "oversampling" (the use of a larger statistical sample) for school divisions that wish to be able to compare division results with those of the province, but not, it should be noted, with those of other divisions. It would appear, however, that even this limited comparative analysis is to be discouraged, for any division wishing to be "oversampled" is required to cover from its own resources the additional costs incurred. (Saskatchewan Department of Education, 1993, 25). It is of some interest to note that, for its participation in the PISA assessment, the province did elect to be "oversampled" in order that the provincial results could be compared with those of Canada.
[25] It should be noted that, if a selected school declines to be included in the sample, efforts will be made by the Assessment and Evaluation Unit of Saskatchewan Education to obtain participation. Sanctions have not, however, been invoked where co-operation is not forthcoming. Source: David Anderson, Director, Assessments and Evaluation Unit, Saskatchewan Education.

Department expressed the view that "the main reason for non-participation relates to inconvenience due to scheduling of the assessments".[26]

This "made-in-Saskatchewan" approach to evaluation uses as its base of reference not the results achieved by students in other jurisdictions, but rather the educational expectations of a diverse panel of knowledgeable people from around the province.[27] The panel identifies a set of criteria that students may be expected to satisfy as they move through the educational system, and the percentage of students who may be expected to achieve each of five specified levels of performance respecting those criteria. The distribution of actual results is then compared with the anticipated distribution, and any disparities between them used as an indicator of educational success.

The PLAP assessments commenced in 1994, with an assessment of skills in language arts, with mathematics being assessed in the following year. It was intended that students from grades 5, 8, and 11 take part in the study annually. Stratified random samples of schools would be chosen in such a manner as to ensure appropriate representation of urban, rural and northern school districts. Once a school is selected, all its students enrolled in language arts and mathematics take part in the assessments for their respective grades. The broad objective of the program was to determine "the extent to which students are acquiring basic reading, writing, listening, speaking and mathematics knowledge and skills." More specifically, the program was designed to assess student achievement levels and to assess student growth or progress over time; to assess for the purpose of effecting program improvement; to assist educators at all levels in enhancing skills and strategies for program improvement; and to assist Saskatchewan Education in reporting to the people of the province on the quality of its K–12 education system.[28]

We turn now to a consideration of the results that Saskatchewan students have achieved in standardised tests.

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[26] *Ibid.*, 26.

[27] The panel consists of educators—teachers, in-school administrators, school division administrators, and university educators—and representatives from the SSTA, business (the Chamber of Commerce), parents and teachers. I am indebted to David Anderson for this information.

[28] *Ibid.*, 3–4. Since the evaluations are not longitudinal—*i.e.*, since they do not follow the progress of individual students through time—it is not evident how "student growth or progress over time" would in fact be measured. Year-to-year sampling variation would certainly complicate drawing conclusions about growth or progress from aggregate data.

Test Results for Saskatchewan Students

Since 1994, Saskatchewan Education has regularly administered the PLAP assessments to students from grades 5, 8 and 11. Each assessment has resulted in the preparation of a comprehensive and detailed report which, together with other useful information, sets forth the results obtained.[29] For purposes of this analysis, discussion is limited to the results of two of the most recent assessments for which results are available, namely, the 1997 Provincial Learning Assessment in Mathematics and the recently released 1999 Provincial Learning Assessment in Technological Literacy. A focus on these particular assessments is warranted because they provide some measure of achievement in those areas of education that are vital to the realisation of the provincial development strategy recently set forth by the Premier in *Partnership for Prosperity: Success in the New Economy*.[30]

The 1997 Provincial Mathematics Learning Assessment used two methods to measure mathematics achievement at Grades 5, 8 and 11: (1) a paper-and-pencil component was utilised to derive achievement data on mathematics knowledge and problem-solving skills; and (2) a performance-based component provided data on the ability of students to solve problems in a practical or hands-on setting.[31] For Grade 5 students, the paper-and-pencil test was developed provincially, while the Grade 8 and 11 students completed the SAIP examination.[32] For the practical examination, adequate achievement was defined as level-3 or higher for all ages.

Unfortunately, the 1997 results reaffirmed the conclusion yielded by the 1995 Assessment, namely, "students' achievement in mathematics fall [*sic*] short of provincial expectations. With few exceptions, Grade 5, 8, and 11 students [did] not meet the standards for good and top level mathematics proficiencies."[33] Perhaps least unsatisfactory were the Grade 5 results on the paper-and-pencil test, which elicited the conclusion that student achievement in solving problems was close to expectations.[34] While 63 per cent had been expected to achieve at least level 3, only 58 per cent did so; the difference between outcome and expectation, however, was statistically significant only for performance level 5, for which the outcome was less than half of the expectation.

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[29] These reports may be accessed at the Department's website: http://www.sasked.government.sk.ca .
[30] See below, p. 22.
[31] Saskatchewan Education, *1997 Provincial Learning Assessment in Mathematics*, 2 and 20.
[32] Saskatchewan's participation in SAIP commenced with the 1996 Science Assessment. See below, n. 40.
[33] Saskatchewan Education, *1997 Provincial Learning Assessment in Mathematics*, 48.
[34] *Ibid.*, 40.

Less satisfactory were the results for the performance-based tests, which are summarised in Table 1. While Grade 5 students satisfied the overall expectation for performance level 3 or higher, the percentage demonstrating higher-level thinking and skill—

Table 1: Performance-based Mathematics Test Results, 1997
Percentage of Students Performing at Level 3 or Above

	Expected Outcome	Actual Outcome
Grade 5	56%	53.9%
Grade 8	69%	53.8%
Grade 11	79%	66.1%

Source: Saskatchewan Education, 1997 Provincial Learning Assessment in Mathematics

evidenced by achieving level 4 or 5—was disappointing. This was particularly true for level 5, for which the outcome (2.4 per cent) was one-third of that expected, paralleling the level 5 outcome on the paper-and-pencil test.

Still less satisfactory were the results for Grades 8 and 11, for both of which appreciably fewer than expected students achieved at least level 3 performance: while 69 per cent of the 13-year olds had been expected to perform at this level, fewer than 54 per cent in fact did so, a shortfall of some 22 per cent. For performance levels 4 and 5, the disparity, at 36 per cent, was even greater. Perhaps most disturbing was the fact that 14 per cent of the Grade 8 students—nearly double the expected number—obtained only level 1, the lowest classification.

Grade 11 students faired little better against expectations: while nearly 80 per cent were expected to be able to display at least an adequate level of proficiency, barely two-thirds of the students assessed managed to achieve this. Interestingly, performance at the high levels did meet provincial expectations: it was the number of people getting to level 3, the level considered satisfactory, that was disappointing.

Referring to both the PLAP and the SAIP results, the then Minister of Education, Pat Atkinson, expressed her disappointment with the outcomes and her “puzzlement” over the reasons for them. Despite her perplexity, she immediately absolved the teachers of mathematics and the mathematics curriculum as being responsible for the evident deficiencies, and then, somewhat contradictorily, announced an action plan that provided, among other

things, for more training for teachers in the new mathematics curriculum and the hiring of a curriculum specialist "to ensure complete use of the new mathematics curricula."[35]

Equally disturbing were the results from the technological literacy assessment. This evaluation, which was conducted in 1999, consisted of four components: understanding, describing, and adapting to technology; accessing, processing, and communicating information; responsible citizens and technology; and using technology, including computers.[36] The areas where problems were identified—accessing, processing, and communicating information and using the Internet—will be discussed in this section. It should be noted, however, that students seemed to have little difficulty in understanding, describing, or adapting to technology; rather, it was with the utilisation of information and technology that they struggled. In all three grades, the number of students displaying at least adequate ability to access, process, and communicate information was far below provincial standards. This is evident in the results presented in Table 2, which shows for all three grades expected and actual outcomes at level 3 or above. Particularly troubling is the fact that less than half of all grade 5 students and fewer than two-thirds of grade 8 and 11 students achieved an adequate level of proficiency.

Table 2: Accessing, Processing, and Communicating Information, 1999

Percentage of Students Performing at Level 3 and Above

	Expected Outcome	Actual Outcome
Grade 5	60%	44.8%
Grade 8	83%	62.5%
Grade 11	80%	63.5%

Source: Saskatchewan Education**,** *1999 Provincial Learning Assessment in Technological Literacy.*

Test results in the 'using technology' component were not much better. Students went through several stations that tested their abilities and skills. When it came to using word processors, for example, grades 5 and 11 met expectations for good performance, but the grade 8 students fell short. When using the Internet, all three grades achieved level 3 or higher proficiency at far lower than expected rates (Table 3).

[35] Saskatchewan, *New Release* (February 27, 1998), Education–103, "Atkinson Announces Plan to Improve Math Performance".

Table 3: Using the Internet, 1999

Percentage of Students Performing at Level 3 and Above

	Expected Outcome	Actual Outcome
Grade 5	27.5%	8.1%
Grade 8	89.5%	34.5%
Grade 11	83.6%	52.1%

Source: Saskatchewan Education**,** *1999 Provincial Learning Assessment in Technological Literacy*.

These results are clearly disappointing and disturbing. Given the importance of the knowledge-based economy today, they serve notice that perhaps students are not being adequately prepared to participate fully in the emerging "high-tech" society: students with insufficient information-technology skills will face difficulties entering both increasingly demanding labour markets and post-secondary institutions. The technological-literacy assessment did, however, provide some very useful information. For example, Saskatchewan elementary and secondary students do not have nearly enough opportunity to learn in this subject area. Table 4 summarises the data on time spent using computers in the classroom. Students actually working on computers for the recommended time per week fell woefully short of the expectations set by educators in the province, most particularly the Grade 8 students, only 4 per cent of whom actually achieved 5.1 hours of computer use per

Table 4: Expected and Actual Hours Spent on Computers, 1999

	Hours per Week	Expected % of Students	Actual % of Students
Grade 5	2.0	59%	11%
Grade 8	5.1	61%	4%
Grade 11	5.2	59%	26%

Source: Saskatchewan Education, *1999 Provincial Learning Assessment in Technological Literacy*.

Note: Expected % of students is the percentage of students that educators feel should be spending the recommended number of hours per week on a school computer. For example, it was expected that 59 per cent of Grade 5 students would spend at least 2 hours on the computer. Only 11 per cent worked on computers for the recommended hours per week.

[36]The methods of testing the four dimensions will not be discussed here. They can be found in Saskatchewan Education's *1999 Provincial Learning Assessment in Technological Literacy*.

week. In part, the explanation may be found in the fact that Saskatchewan had the highest ratio of students to computers of all the western provinces, a ratio that is higher than the Canadian average at both the elementary and high secondary levels.[37] Table 5 shows the student-computer ratio for the four western provinces and Canada.

Table 5: Students per Computer Ratios, 1999

	Elementary	Lower Secondary	High Secondary
Canada	9	8	7
Manitoba	8	6	5
Saskatchewan	10	8	8
Alberta	7	6	7
British Columbia	8	8	8

Source: Saskatchewan Education, *1999 Provincial Learning Assessment in Technological Literacy*.

Saskatchewan Students in a National Context

It is evident from the PLAP data cited that, in significant respects, Saskatchewan students are failing to perform at the levels expected of them. It is also important, however, to compare their performance with that of their counterparts in other provinces; by so doing, it may be possible to draw some conclusions regarding comparative value-for-money from K–12 educational expenditures.[38] This section therefore examines how the results achieved by Saskatchewan students in the School Achievement Indicators Program (SAIP) examinations conducted by the Council of Ministers of Education, Canada compare with those of students in other provinces.

Begun in 1993 and conducted annually, the SAIP assessments are designed to determine student performance in relation to standards agreed upon by the provinces and territories. To constrain the costs of participation to a reasonable level, the evaluations utilise a three-year cycle, rotating through three disciplines: reading and writing, mathematics, and science. A sample of students aged 13 and 16 participate and can achieve one of five performance levels, with level-5 being the highest. A sample list of schools is randomly chosen by the CMEC for each province. These schools then submit a list of all 13- and 16-year old students to the respective provincial education departments. Students are then randomly

[37] It should be noted that the province has initiated steps to improve this situation. Over the next three years, $6 million will be invested to improve classroom connectivity in schools throughout the province. See *News Release*, June 5, 2001, Education–416, "Wiring Saskatchewan Classrooms".

[38] A comparative analysis of educational expenditures is provided in the following section.

chosen to write the SAIP examinations. In Saskatchewan, for the 1999 practical science assessment, 856 thirteen-year-old and 820 sixteen-year-old students participated. While these samples are large enough to sustain inter-provincial comparisons, they are not sufficiently large to permit comparisons between school districts, let alone between particular schools.[39] As indicated above, Saskatchewan began participating in the SAIP assessments in 1996, in the third assessment of the first cycle.[40] The results achieved by Saskatchewan students are shown in Tables 6 and 7, for thirteen- and sixteen-year-old students respectively,

Table 6: Performance of 13-year old students on SAIP examinations, Canada and Saskatchewan

	Mathematics Content 1997		Mathematics Problem-Solving - 1997		Reading - 1998		Writing - 1998		Science - 1996		Science - 1999	
	Adequate	Higher	Adequate	Higher	Adequate	Higher	Adequate	Higher	Adequate	Higher	Adequate	Higher
Canada	59.4 (0.8)	28.4 (0.8)	52.2 (0.9)	15.3 (0.6)	78.0 (0.7)	41.5 (0.9)	95.2 (0.4)	70.5 (0.8)	71.9 (0.8)	43.0 (0.8)	73.3 (0.8)	53.3 (0.9)
Saskatchewan	47.9 (3.2)	18.5 (2.5)	51.2 (3.2)	11.3 (2.0)	76.1 (2.8)	34.8 (3.2)	95.9 (1.4)	73.6 (3.0)	76.1 (2.7)	44.9 (3.1)	75.5 (2.9)	52.1 (3.3)
Performance	below	below	met	below	met	below	met	met	above	met	met	met

Source: Council of Ministers of Education, Canada. *School Achievement Indicators Program (SAIP),* various reports.

Notes: 1. Numbers given are the percentage of students attaining each level.

2. Numbers in brackets are confidence interval sizes at the 95% certainty level.

3. Results are statistically different if confidence intervals do not overlap.

4. Performance is defined as how Saskatchewan students compare to the pan-Canadian level using the 95% confidence intervals.

5. Adequate level is defined as achieving a level 2 or higher; Higher level is defined as achieving any level above level 2.

Table 7: Performance of 16-year old students on SAIP examinations, Canada and Saskatchewan

	Mathematics Content 1997		Mathematics Problem-Solving - 1997		Reading - 1998		Writing - 1998		Science - 1996		Science - 1999	
	Adequate	Higher	Adequate	Higher	Adequate	Higher	Adequate	Higher	Adequate	Higher	Adequate	Higher
Canada	59.8 (0.9)	14.5 (0.7)	39.8 (0.9)	12.8 (0.6)	71.5 (0.8)	33.9 (0.9)	85.4 (0.7)	39.5 (0.9)	69.0 (0.8)	26.1 (0.8)	76.1 (0.8)	31.6 (0.8)
Saskatchewan	50.0 (3.3)	7.9 (1.8)	38.6 (3.3)	10.9 (2.1)	64.9 (3.2)	24.9 (2.9)	84.2 (2.5)	34.7 (3.3)	71.0 (3.1)	26.7 (3.0)	77.4 (2.9)	28.8 (3.1)
Performance	below	below	met	met	below	below	met	below	met	met	met	met

Source: Council of Ministers of Education, Canada. *School Achievement Indicators Program (SAIP),* various reports.

Notes: 1. Numbers given are the percentage of students attaining each level.

2. Numbers in brackets are confidence interval sizes at the 95% certainty level.

3. Results are statistically different if confidence intervals do not overlap.

4. Performance is defined as how Saskatchewan students compare to the pan-Canadian level using the 95% confidence intervals.

5. Adequate level is defined as achieving a level 3 or higher; Higher level is defined as achieving any level above level 3.

together with the national average results for all students tested. The results are presented for the three subject disciplines, starting and ending with the science assessments for 1996 and 1999. It should be noted that, for thirteen-year-old students, CMEC defines an achievement score of 2 as "adequate", while for the older students level 3 is considered "adequate". Since

[39] Some of the provinces, e.g., Alberta, remedy this deficiency when conducting their *intra*-provincial assessments, by examining all students in the relevant age-group or grade.

[40] Why Saskatchewan began to participate in the SAIP assessments at this time is not clear. It may simply have been a growing discomfort in being isolated as the only non-participating jurisdiction that prompted the change in policy.

statistical samples of students are utilised in the assessments, only differences greater than the standard errors are considered to be significant.

The results presented in Table 6 suggest that, with respect to both mathematical content and reading, Saskatchewan 13-year-old students were performing at levels that were lower by statistically significant amounts than their counterparts in the rest of Canada. The percentages of students achieving both "adequate" and "higher" levels of performance on the mathematical-content assessment were significantly lower than the national results, as was the percentage of Saskatchewan 13-year-olds demonstrating "higher" problem-solving skills. While the percentage of these students demonstrating "adequate" reading skills was not statistically significantly lower than the national percentage, the percentage for those demonstrating "higher" order skills was. The pattern of results shown in Table 7 for 16-year-olds was essentially the same: the proportions of students achieving "adequate" or "higher" ratings for knowledge of mathematical content were both significantly below the national values—indeed, the proportion of Saskatchewan 16-year-old students who were able to demonstrate "higher" accomplishments in this area was barely half the national level. These results were paralleled for the 1998 reading assessments, in which the proportions of Saskatchewan students performing at the "adequate" and "higher" levels were again both below the national results. Writing, too, was an area of deficiency at the "higher" level. In only one respect, namely, the percentage of 13-year-olds achieving an "adequate" level of performance in the 1996 science assessment, did the Saskatchewan students exceed the national level by a statistically significant margin.

While virtually all of these results are perturbing, those for mathematics content are particularly so. Indeed, they have been described as "dramatically poor" and "some of the worst results in the nation."[41] Given the evidence of the 1997 PLAP mathematics results—which demonstrated a significant deficit vis-à-vis provincial expectations—the Minister perhaps ought not to have been surprised. Her inability, noted above, to provide any plausible explanation for the disturbing results suggests that she, too, was caught off-guard. The educational partners, however, responded predictably. The SSTA president, while appearing to agree with the Minister that there was indeed a problem, dismissed as "premature" the limited initiatives she had proposed, a judgement with which the newly elected president of the

[41] Stewart, 607, 611.

STA seemed to concur.[42] As for the membership of the STF, seventy per cent of the delegates at the annual STF Spring Council voted in favour of ending the province's participation in SAIP, a remedy that made sense only if the presumption were that it was the testing that was flawed, rather than the education of the testees.[43]

No detailed tabular information is provided here on Saskatchewan's and Canada's performance on the OECD Program for International Student Assessment, but it may be recalled that, while the averages scores for literacy in reading, mathematics and science obtained by the Saskatchewan 15-year-olds who were tested exceeded the OECD averages in each area, they did trail the Canadian averages.[44]

Saskatchewan K-12 Expenditures

The assessment results discussed above are of interest in their own right. They are of particular interest in the present context, however, because of their significance as an indicator of value-for-money from Saskatchewan's K–12 educational expenditures. So stating does not in any way imply a belief that conclusions respecting value-for-money may be readily deduced merely by observing test scores. As critics of standardised testing have observed, many factors influence educational outcomes, and it would be folly to assert that *all* of these are adequately captured by the results of standardised tests, regardless of how carefully these may be constructed, administered and their results interpreted. The relationship, however, between educational outcomes and the costs of achieving these is clearly relevant to formulating conclusions regarding value-for-money. It is thus necessary to compare Saskatchewan's K–12 educational expenditures with those of other jurisdictions, to determine if relatively unsatisfactory test scores may be attributable to unfavourable absolute or relative levels of expenditure. Certainly one would expect a positive correlation between educational outlays and the associated outcomes, and although the PISA results suggest that differences in per student expenditures are not the prime determinant of inter-country variation in test outcomes, they are a statistically significant explanatory factor.[45] It is thus useful to consider what role, if

[42] O'Connor, 1998a and b.
[43] Richards, 1998.
[44] For details, see Minister of Industry, *Measuring up: The Performance of Canada's Youth in Reading, Mathematics and Science,* 2001, passim. It should be noted that, while the absolute scores for Saskatchewan trailed those for Canada, the confidence intervals about the respective means did overlap. (*Ibid.*, 50-1).
[45] The PISA results suggest that 17 per cent of inter-country variation is attributable to differences in per student expenditures. See OECD, 2001, 90 ff.

any, the level of Saskatchewan K–12 expenditures may have played in contributing to the unsatisfactory outcomes that have been identified.

Table 8: Total Public School Expenditures (1992 Dollars), 1990/91-1998/99, Canada and Provinces
millions of dollars

	BC	AB	SK	MN	ON	PQ	NB	NS	PEI	NFLD	Canada
1990/91	$3,320	$3,009	$1,013	$1,221	$12,737	$7,394	$758	$870	$121	$644	$34,010
1991/92	$3,492	$3,086	$996	$1,186	$13,397	$7,218	$758	$844	$119	$632	$32,062
1992/93	$3,445	$3,076	$1,096	$1,178	$14,101	$7,306	$779	$844	$125	$634	$32,807
1993/94	$3,554	$3,134	$1,066	$1,176	$13,376	$7,209	$786	$875	$121	$581	$32,122
1994/95	$3,654	$2,935	$1,073	$1,176	$13,764	$7,350	$770	$862	$117	$577	$32,546
1995/96	$3,758	$2,945	$1,055	$1,149	$13,579	$7,235	$774	$813	$107	$566	$32,258
1996/97	$3,806	$2,978	$1,040	$1,137	$13,244	$7,059	$541	$795	$112	$553	n/a
1997/98	$3,854	$3,101	$1,067	$1,147	$13,287	$6,978	$772	$793	$112	$514	$31,927
1998/99	$3,920	$3,134	$1,053	$1,172	$13,510	$6,723	$771	$809	$116	$515	$32,035
% change	18.1%	4.2%	3.9%	-4.1%	6.1%	-9.1%	1.8%	-7.0%	-4.5%	-20.0%	-5.8%

Source : Statistics Canada, CANSIM database; BC Ministry of Education, *Inter-Provincial Education Statistics Project: Summary of School Statistics from the Provinces* .

Expenditures on K–12 education are determined by a variety of factors that include enrolment levels, the costs of providing educational services (teacher and other salaries, costs of structures, the costs of utilities, materials, etc.), the wealth of a community (which influences the quality of educational services demanded), and other, difficult to quantify variables, such as the level and intensity of public support for education. Given the evident complexity of the manner in which these several variables interact to determine actual expenditures, no attempt will be made here to "explain" the present or past levels of K–12 expenditures in Saskatchewan. Rather, attention will be limited to a descriptive analysis of recent trends in aggregate data, and to the few, limited conclusions that this will sustain.

Perhaps the most useful place to start is with a consideration of real—i.e., inflation-adjusted—expenditures by province for the period 1990–91 to 1998–99, as shown in Table 8.[46] This period was largely one of fiscal retrenchment and reduced federal transfers to the provinces, with governments wrestling with budgetary deficits and unsustainable levels of debt. Not surprisingly, therefore, total K–12 expenditures during the period declined nationally by 5.8 per cent. Saskatchewan, however, actually experienced a 3.9 per cent increase in constant-dollar expenditure over the entire period.[47] The high priority accorded K–12 education during this period is evident in the fact that this increase occurred despite a 2.1 per cent decrease in total enrolment (see Table 9) accompanied by a 2.9 per cent decrease in full-time educators.[48] In consequence, the student-educator ratio barely changed over the period (Table 10), while constant-dollar per student expenditure (Table 11) increased by a

[46] Corresponding data in nominal or current dollars are provided in Appendix Table A3.
[47] It should be noted, however, that peak expenditures actually occurred in 1992–93; thereafter, the trend was downward.
[48] Appendix Table A4 provides data on full-time educators.

nation-leading 6.1 per cent (26.1 per cent in nominal terms). These latter two factors—the student-educator ratio and per student expenditure—warrant further discussion.

Table 9: Full-time Enrollment, 1990/91-1998/99, Canada and Provinces

	BC	AB	SK	MN	ON	PQ	NB	NS	PEI	NFLD	Canada
1990/91	502,191	466,758	188,245	186,777	1,819,657	1,065,358	132,893	165,739	24,121	122,812	4,692,784
1991/92	525,290	479,754	188,367	186,125	1,857,544	1,094,267	140,841	165,424	24,225	121,136	4,802,201
1992/93	534,077	490,140	188,888	186,030	1,891,052	1,088,842	139,950	166,112	24,383	117,957	4,847,253
1993/94	547,016	495,335	188,691	185,482	1,906,834	1,086,258	138,716	165,890	24,242	114,558	4,873,639
1994/95	560,659	488,716	187,857	184,400	1,929,473	1,082,240	136,618	164,433	24,219	110,227	4,889,930
1995/96	572,056	500,546	187,256	184,715	1,965,589	1,087,468	135,058	164,020	24,292	106,728	4,949,876
1996/97	584,905	508,868	186,964	184,900	1,946,390	1,087,696	133,276	163,941	24,415	102,794	4,946,733
1997/98	593,362	516,118	185,689	184,906	1,972,060	1,118,323	131,586	162,359	24,279	98,379	5,009,689
1998/99	592,695	523,765	184,369	185,251	1,989,159	1,114,966	129,131	160,011	24,051	94,493	5,020,588
% change	18.0%	12.2%	-2.1%	-0.8%	9.3%	4.7%	-2.8%	-3.5%	-0.3%	-23.1%	7.0%

Source: BC Ministry of Education, *Inter-Provincial Education Statistics Project: Summary of School Statistics from the Provinces*.

Notes: 1. Enrollment is defined as the number of students in provincially funded schools as of September of each school year.

2. Students who do not attend full-time, such as kindergarten, are counted according to the percentage of full-time for which they are funded.

At the beginning of the period covered by Table 9, the Saskatchewan student-educator ratio was 16.2, that is, 0.9 points or 5.9 per cent higher than the national average. By the end of the period, the difference between the Saskatchewan ratio and the national average had shrunk to 0.2 points, or 1.2 per cent. Whether differences of this order of magnitude would be significant in explaining lower test scores for Saskatchewan students is extremely difficult to determine.[49]

[49] While the differences between the Saskatchewan ratios and the national averages do not appear large, two considerations complicate their interpretation: first, while the *average* student-educator ratios may not differ significantly, it is possible that the provincial *distribution* around this average ratio is significantly different from those in other jurisdictions, with Saskatchewan having a larger proportion of students in classes with high student-educator ratios. To the extent that a higher ratio of students to educators has an adverse effect on test scores (that is not offset by other differences in the distribution), this could affect negatively the results for Saskatchewan. Unfortunately, data on the distribution of the ratio are not available. Second, the relationship between class size and student performance is highly uncertain and subject to academic controversy. On this, see Ehrenberg *et al*, 2001, and the sources cited therein.

Table 10: Student-Educator Ratios, 1990/91-1998/99

	BC	AB	SK	MN	ON	PQ	NB	NS	PEI	NFLD	Canada
1990/91	16.1	16.8	16.2	14.7	14.8	14.6	16.3	15.9	16.9	15.3	15.3
1991/92	16.2	16.8	16.4	15.0	14.7	14.4	16.6	15.9	17.1	15.2	15.2
1992/93	16.4	17.3	16.5	15.0	14.9	14.2	16.7	16.4	16.8	15.0	15.3
1993/94	16.8	17.6	17.0	14.9	15.0	14.4	16.9	16.4	16.7	14.7	15.4
1994/95	16.8	17.8	17.0	15.0	15.4	14.4	17.0	17.1	17.1	14.7	15.6
1995/96	16.8	18.3	17.0	15.3	15.6	14.4	16.9	17.5	16.9	14.7	15.8
1996/97	16.9	18.5	16.8	15.4	15.8	14.7	17.0	17.5	16.9	14.5	15.9
1997/98	17.0	18.5	16.7	15.4	15.8	14.9	17.1	17.3	16.9	14.7	16.0
1998/99	16.5	18.3	16.3	15.4	16.0	14.9	17.1	16.6	n/a	14.6	n/a
% change	2.3%	9.4%	0.8%	4.5%	7.6%	2.1%	4.9%	4.5%	0.0%	-4.4%	5.1%

Source: BC Ministry of Education, *Inter-Provincial Education Statistics Project: Summary of School Statistics from the Provinces*.
Note: Ratio is calculated by using full-time students and full-time educators.

Table 11: School Expenditure per Full-time Student (1992 dollars), 1990/91-1998/99

	BC	AB	SK	MN	ON	PQ	NB	NS	PEI	NFLD	Canada
1990/91	$6,612	$6,446	$5,382	$6,538	$6,999	$6,940	$5,703	$5,249	$5,031	$5,241	$7,247
1991/92	$6,648	$6,434	$5,289	$6,370	$7,212	$6,596	$5,380	$5,100	$4,927	$5,220	$6,677
1992/93	$6,450	$6,276	$5,801	$6,333	$7,457	$6,710	$5,568	$5,080	$5,122	$5,372	$6,768
1993/94	$6,497	$6,328	$5,652	$6,342	$7,015	$6,637	$5,666	$5,276	$4,971	$5,069	$6,591
1994/95	$6,517	$6,005	$5,712	$6,379	$7,134	$6,792	$5,638	$5,241	$4,819	$5,232	$6,656
1995/96	$6,569	$5,883	$5,633	$6,220	$6,908	$6,653	$5,729	$4,957	$4,396	$5,305	$6,517
1996/97	$6,507	$5,852	$5,564	$6,149	$6,804	$6,490	$4,060	$4,849	$4,571	$5,377	n/a
1997/98	$6,495	$6,008	$5,746	$6,205	$6,738	$6,240	$5,870	$4,882	$4,606	$5,229	$6,373
1998/99	$6,614	$5,984	$5,712	$6,324	$6,792	$6,030	$5,973	$5,057	$4,817	$5,452	$6,381
% change	0.0%	-7.2%	6.1%	-3.3%	-3.0%	-13.1%	4.7%	-3.7%	-4.3%	4.0%	-12.0%

Source: Statistics Canada: CANSIM database; BC Ministry of Education, *Inter-Provincial Education Statistics Project: Summary of School Statistics from the Provinces*.

Certainly Quebec, which throughout the period has maintained either the lowest or second-lowest student-educator ratio, has consistently been one of the best-performing provinces in national and international assessments; other things being equal, this would tend to suggest an inverse correlation between class size and student performance. On the other hand, Alberta—and to a lesser extent, British Columbia—provides a counter example of a province for which the student-educator ratio has been consistently and significantly above the national average, but which has also been one of the best-performing provinces in inter-jurisdictional assessments.[50] There is also the evidence provided—albeit across a cultural divide—by Japan, in which classes of forty students are not unusual, but where excellent results in international assessments are the norm.[51] Confronted by such contradictory evidence, it is extremely difficult to draw any conclusion respecting the impact of class size in Saskatchewan on the relative performance of our students in standardised tests.

The data respecting per-student expenditure are also somewhat ambiguous. Despite having the largest percentage increase in constant-dollar spending on K–12 education—and, at

[50] See Kim Honey, "Alberta teens top worldwide literacy test."
[51] Ehrenberg *et al*, 84. See also Zorpette, 84.

4.1 per cent in 1998, devoting to elementary and secondary education one of the largest percentages of GDP of any province west of the Maritimes—constant-dollar per student expenditure in this province has been consistently lower than the national average; indeed, only Nova Scotia, Prince Edward Island and Newfoundland spent less per student than did Saskatchewan.[52] Although the gap between national per student expenditure and that of Saskatchewan narrowed over the period under review, it was still a very significant 10.5 per cent in 1998–99. To the extent that differences in per-student expenditure contribute to differences in test scores, the relatively low expenditure levels for this province may have contributed to the relatively unfavourable assessment results achieved by Saskatchewan students. It is important, however, not to attach too much weight to this single statistic: as noted above, the PISA analysts found that only 17 per cent of the observed variation in inter-country scores was attributable to differences in cumulative (to age fifteen) per-student expenditures. Moreover, some countries—Korea is one—achieved results comparable to those of countries, such as Japan, spending more than twice as much per student.[53] And, again, there is the contrary experience of Alberta, which—while spending some six per cent less (1998–99) per student than the national average—consistently achieves excellent results.
Once more, the difficulty of generalisation is evident.

What we find, then, is that Saskatchewan allocates one of the highest percentages of GDP to K–12 education, has maintained a student-educator ratio not appreciably greater than the national average, and—despite increasing constant-dollar K–12 expenditures more rapidly than any of the other provinces—has consistently had one of the lowest levels of per student expenditure. The first and last of these findings may appear somewhat contradictory: how can Saskatchewan simultaneously spend one of the largest shares of GDP on K–12 education and still have one of the lowest levels of per student expenditure? The answer is found in the relationship between the student and total populations.

The very high rate of growth of Aboriginal youth population and the relatively high rates of outward migration of the non-Aboriginal, non-elderly population result in Saskatchewan having the highest ratio in the country of K–12 students to the total population.

[52] A similar result is found if the indicator used is per student expenditure expressed as a percentage of per capita GPP: for 1998–99, only fiscally conservative Alberta had a percentage lower than the 22.7 per cent value for Saskatchewan, but this lower percentage still involved a higher absolute level of per student expenditure. See Appendix Table A5.
[53] OECD, 2001, 91.

Table 12: Student to Population Ratios, 1996, All Provinces

	BC	AB	SK	MN	ON	PQ	NB	NS	PEI	NFLD
Total Population	17.2%	19.9%	20.9%	19.7%	19.5%	18.9%	18.0%	18.0%	18.2%	19.0%
Employed Population	36.6%	39.3%	46.5%	43.2%	41.7%	43.7%	44.2%	44.2%	42.1%	56.9%

Source: Council of Ministers of Education, Canada, *Education Indicators in Canada 1999*; Statistics Canada, CANSIM database.

Note: Ratios are calculated by dividing the number of total students in the 1996/97 school year by the jurisdiction's total population as of July 1, 1996 and by the number of employed persons in 1996, respectively.

This is evident in the data presented in Table 12. Since the province also has the highest ratios of over-65 and over-80 population, and a relatively low labour-force participation rate for the Aboriginal population, it is second only to Newfoundland in the ratio of students to the employed population. Even a relatively high proportion of GDP devoted to educational expenditures will thus yield relatively low per student expenditures. Moreover, the demographic data also suggest that maintaining competitive levels of per student expenditure will result in disproportionately heavy fiscal burdens on the residents and taxpayers of the province. This, of course, serves to highlight the importance of achieving value-for-money from our K–12 expenditures.

In summary, the province devotes a relatively high proportion of GDP to K–12 education, has a slightly higher than average student-educator ratio, and, among the provinces west of the Maritimes, one of the lowest levels of per student expenditure. To the extent that the latter two of these are correlated with educational performance, they might be expected to have a negative effect on the test scores of Saskatchewan students. The evidence, however, would suggest that neither effect has a great deal of explanatory power (at least within the observed range of variation), and both can clearly be dominated by other considerations. We are thus forced to look elsewhere for an explanation of the relatively unsatisfactory assessment results examined earlier.

Conclusions

This paper set out to examine the value Saskatchewan students and taxpayers are receiving from their investment in the province's elementary and secondary school system. The fundamental premise of the paper was that literacy in reading, mathematics, science and technology was a necessary condition for both civic and economic success, and that such literacy lends itself to meaningful quantification and measurement. It is also premised on the acceptance of the view that, where there is substantial commonality in the content of curricula and where statistical samples of adequate size are utilised, literacy assessments yield results

that provide objective, comparable indicators of the quality of educational outcomes being achieved.[54] Finally, it is premised on the belief that such objective results are an essential component of accountability systems relating to K–12 educational systems. These premises provided the framework within which we considered the results achieved by Saskatchewan students in recent provincial, national and international assessments.

Our review did not encompass all the assessments in which Saskatchewan students have participated in recent years. Rather, the emphasis was on those deemed most relevant to the fulfilment of the strategy recently spelled out by the Premier in *Partnership for Prosperity: Success In the New Economy,* a new economic development strategy intended to increase the province's prosperity by the year 2005. Ambitious in its objectives, this document identifies several policy initiatives and specifies measurable targets to be met. The primary thrust is to retool the Saskatchewan economy to compete in new, knowledge-based and export-driven sectors. For example, specific targets include increasing the number of jobs in the province by 30,000, increasing non-traditional exports by 60 per cent, and increasing value-added agri-food production by 50 per cent. Achieving such ambitious targets will require exploiting new technologies, and this will be possible only with a highly educated and versatile labour force. It is in this critical context that the unsatisfactory reading, mathematics and technological-literacy results must be viewed: success in the advanced education required by *Partnership for Prosperity* will be more difficult to attain unless a sound foundation has been laid in these critical areas of K–12 education. It is not evident in the results discussed above that that foundation is indeed present.

Determining what in fact the reported results convey is fraught with difficulty. As educators would rightly note, not all children have the same opportunities to learn, and there is considerable evidence that measured performance is significantly correlated with socio-economic circumstances: students coming from disadvantaged families and backgrounds are less likely to have a strong motivation to learn and typically have fewer and poorer opportunities to learn outside the classroom. While the provincial-poverty rate for children under 18 is, at 18.6 per cent in 1997, somewhat lower than the national rate of 19.6 per cent, it is appreciably higher for school-aged Aboriginal children, a group that comprises one-third of

[54] It is probably unnecessary to emphasise the distinction between *measuring* differences in the quality of outcomes and *explaining* such differences.

the province's school-aged (5–17) population.[55] For this group, the 1996 provincial-poverty rate was 53.1 per cent , the highest rate for any province, while that for the non-Aboriginal school-aged population was 15.5per cent.[56] It certainly is possible that the assessment results for Saskatchewan are depressed by this incidence and distribution of poverty, most particularly by poverty among Aboriginal students.

Unfortunately, we have not found in the public domain any data that shed light on this issue, and this, surely, is a problem crying out for remediation. Where relative under-performance occurs, it is vital to be able to ascertain with some precision its causes. If, for example, it is attributable to specific factors such as disproportionate poverty among Aboriginal students or excessive rates of student turnover, this must be identified. Without knowing the causes of unsatisfactory assessment results, it is virtually impossible to formulate an appropriate policy response: certainly a general increase in K–12 expenditures is unlikely to be efficacious if the primary problem is excessive rates of student turnover in inner-city schools or of teacher turnover in Northern schools. To be cost-effective, policies must be targeted, and targeting is possible only if one has the requisite information. What is required of our standardised testing, therefore, is both a measure of the quality of the educational outcomes being achieved, and, where these are unsatisfactory, the identification of the sources of failure. In this regard, the procedures utilised by the OECD, as an integral part of the PISA assessment, appear to provide an excellent model.

Central to the PISA process is the compilation and analysis of relevant socio-economic data from all students who participate in the assessments.[57] With students self-identifying their status in respect of those socio-economic parameters that have demonstrable statistical value in explaining assessment-score variation, it would be possible to estimate the impact of various factors on actual outcomes. Supplementary information could also be supplied by the principals of the schools participating in the assessment. Thus, if poverty among Aboriginal students or excessive rates of student turnover were statistically significant factors in explaining relatively poor performance, this could in fact be ascertained, and appropriate

[55] M. Tymchak, *School Plus: A Vision for Children and Youth*, p.8. Dr. Tymchak cites data from a Saskatchewan Education Briefing Note, May 15, 1998. It should be noted, however, that on-reserve Aboriginal students were not included in the assessments discussed here.
[56] National Council of Welfare. *Poverty Profile 1998.*
[57] As those responsible for the design of the PISA process realised, students may be unable to provide information on, for example, family income. But they can provide information on such proxies as the occupational status of parents, whether it is a one- or two-parent family, profession of parents, parental time devoted to helping with

policy developed for their remediation. It is this last point that is crucial: unless the causes of relatively poor performance are identified, it is virtually impossible to prescribe an efficacious policy response. A prerequisite, however, of the design of targeted policies is the availability of data directly related to the problems the policies are intended to remedy. At a minimum, the province's participation in standardised testing must yield such data.

It is, of course, possible that the unsatisfactory test results are not attributable to the socio-economic characteristics of the testees or other such readily quantifiable factors. For example, one cannot dismiss the possibility that the underlying problems are attributable to flaws in the province's revised curricula—especially that for mathematics—or to deficiencies in the professional preparation of elementary teachers, most particularly, in their training in mathematics: if our elementary teachers are themselves ill-prepared in mathematics, how likely are they to be able to provide the sound foundation required by students for subsequent work in that discipline? These possibilities are explored most informatively by Stewart, and certainly warrant careful consideration.[58]

Given the province's record as a reluctant participant in standardised testing, and its manifest commitment to a testing philosophy that precludes any possibility of intra-provincial comparisons, whether of school districts or schools, it is difficult to feel optimistic that the data required for effective educational policy will be forthcoming. The contrast with Alberta—a province whose students, as noted above, consistently score well on standardised tests—is striking. In that province, participation in provincial testing is mandatory, and all students enrolled in the tested grades are in fact tested. With such an approach, the resulting data sustain *informed* comparisons of outcomes between school districts and, if necessary, the performance of students from individual schools may be compared with those of students from comparable schools or with the averages for the relevant district. These, of course, are precisely the sort of comparisons that have been anathema to the STF and the SSTA.

It should be noted that, by "informed comparisons", we do not mean comparisons that disregard everything other than the test results themselves. Differences in socio-economic circumstances do indeed matter; it is important, therefore, to combine the compilation and

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school work, number of books in household, and other factors that have a statistically significant impact on test scores.

[58] Stewart, 2000, 613–16. Among other factors, Stewart questions the relative allocation of time in the mathematics curriculum to "mathematical knowledge" and "problem solving"; the fact that the reformed curriculum allocates less than half as many minutes per week to mathematics as to English language arts; and, perhaps most importantly, to the paucity of mandatory courses in mathematics in the required curricula for Elementary Education in our faculties of education.

analysis of data for these various factors with the assessment outcomes, to determine the statistical significance of each factor and its contribution to observed differences in outcomes. Only by so doing does it becomes possible to draw meaningful conclusions concerning differences in measured outcomes between jurisdictions and units, conclusions that can be used as useful and informative constituents of accountability systems.

If the scope of provincial testing were to be expanded by the use of samples large enough to sustain comparisons between units, an issue that would inevitably arise concerns the results for individual schools. While parents may have apprehensions regarding the quality of the K–12 system as a whole, or about the quality of education in a particular school district, their primary concern will almost certainly be the quality of education being provided their children at the schools they attend. An accountability system that did not provide such information would probably be considered incomplete and defective by many parents. What must be appreciated, however, is that assessment results do not provide *inerrant* measures of educational quality: if the same group of students from a particular school were subjected repeatedly to tests of identical difficulty—assuming that such tests could be devised—the results would almost certainly vary from test to test, and the relative variability would be greater the smaller the number of students in the school.[59] When the issue is further complicated, as it would be in a comparison of the results achieved by different schools, interpreting the results is a matter requiring some degree of statistical sophistication. Moreover, most parents do not have an adequate appreciation of the manner in which inter-school differences could be attributable not to differences in the quality of teaching provided their children, but to differences in the socio-economic parameters for the different school populations. The provision of raw test scores for individual schools—precisely the information that parents would most like to receive—thus has a considerable potential for misinterpretation and possibly misplaced concern. It thus poses something of a dilemma for the educational authorities.

One possible way to resolve this dilemma would be to provide for individual schools not the average absolute scores obtained by their students on standardised tests, but relative scores, *e.g.*, a rank or percentile score. Also, despite the PISA evidence that high inequality indexes (*i.e.*, the variation attributable to differing socio-economic circumstances) are not inevitable, these relative scores could be organised by class of school, so that the scores for

inner-city schools were not compared directly with those for schools in the affluent suburbs.[60] A rank or percentile score within such a class—and even more so, changes in such a score over time—would provide parents, staff and administrators an indicator of how well a particular school was performing relative to reasonably comparable schools, and some measure of the success or failure of initiatives that were being taken in respect of that school. Deriving the maximum benefit from such scores would require that they be placed in the public domain.[61]

Generating comparative data would require testing on a wider scale than that utilised currently by Saskatchewan. In turn, this would necessitate higher expenditures for testing and evaluation, and this at a time when provincial resources are strained to the limit.[62] The pressure upon the provincial budget is indisputable, but the present evaluation processes, with their use of too small samples, may be a false economy. What is necessary is a testing methodology and scale that permit the identification not only of problems but also their probable causes. It does not suffice, when clearly unsatisfactory results are identified, for the Minister of Education to express her "puzzlement" while immediately leaping to the defence both of the province's teachers and its mathematics curriculum: if neither the teachers nor the curriculum is at fault, it is incumbent on the Minister and her department to identify what is.[63] In short, not only should our K–12 educational expenditures be cost effective; so, too, should be the programs used to establish that the province is, in fact, obtaining value-for-money from those expenditures.

It is important to emphasise that standardised testing, even when accompanied by the compilation and analysis of the socio-economic data for the students involved, is no educational panacea. While it can measure effectively such things as literacy in reading,

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[59] This variability in the results obtained by means of repeated tests does not constitute a reason *not* to test. Rather, it simply means that appropriate caution should be used in interpreting the results.

[60] For policy purposes, it is clearly important to establish the magnitude of the educational deficit of inner-city schools, and this does require the direct comparison of the results for such schools with those of the higher performing schools. It could, however, be both discouraging and disturbing for all involved with the inner-city schools if the test results for such schools were regularly and publicly compared with those for students who have many more opportunities to learn outside the school and who have more supportive educational environments. It would probably be more efficacious to group into a single class the inner-city schools from all of the province's cities, and use the test scores to rank them within this class. All the other schools in each school district could be ranked in a second class. It would be the percentile or rank scores that would be made available publicly.

[61] Some aspects of this paper were, in the course of preparation, discussed with three classes of students in the Faculty of Education of the University of Regina. Several of the students involved volunteered the information that they had participated in the provincial assessments, and had been told by the teachers that "the tests didn't matter." Public release of the results for the individual schools would go some way to encouraging a more positive and supportive attitude on the part of the teachers respecting the significance of the evaluation process.

[62] See Saskatchewan, The Hon. Eric Cline, Minister of Finance, *Third Quarter Financial Report,* February 2002, *passim.*

mathematics, science, and technology, there is much that present tests cannot measure at all well. As the Canadian Teachers' Federation has noted, such testing "[does] not capture the broader mission of education to imbue the next generation with a sense of citizenship, ethics, health, fitness, confidence, character, aesthetic appreciation, and respect for others."[64] One may readily concede the validity of such observations while rejecting as totally impractical the counsel of perfection that "We must assess progress toward *all* our goals, not those most easily measured or conveniently reported."[65] What is not evident in such advocacy is why some objective data on academic outcomes is deemed to be less desirable than a virtually total absence of such data, most particularly when the objective data relate to educational concerns as central as literacy in reading, mathematics, science and technology.

There is, of course, the danger that "one gets what one measures", that "teachers will teach to the test", and that those things that are not easily measured will be sacrificed on the altar of enhanced test scores. Certainly such possibilities exists, but their inherent danger ought not to be exaggerated, particularly when educational administrators are alert to the possibilities. Moreover, the necessity of adhering to and covering the mandated curriculum constrains the latitude that teachers have to err on the side of an excessive emphasis on "the tests". More fundamentally, if those responsible for our K–12 educational system cannot ensure that resources, time and effort—including those of the teachers—are directed to where they are meant to be, the problems confronting the system are far more serious than merely an insufficiency of objective testing.

In summary, this paper set out to examine the value Saskatchewan students and taxpayers are receiving from their investment in the province's elementary and secondary school system. While generalisation is difficult, the relatively poor results achieved by Saskatchewan students on components of national examinations and their failure to match provincial expectations in critical areas inevitably raises the issue of value-for-money from the province's K–12 educational investment. In part, the problematic results may be attributable to our inability to spend as much money per student as provinces with larger economies or different demographics, both sources of comparative disadvantage that are difficult to eradicate. It is important, however, to establish the extent to which the deficient performance is attributable to such factors and how much is caused by factors endogenous to our K–12

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[63] See above, note 33.
[64] Canadian Teachers' Federation, *National Issues in Education: Issue Sheet No. 1*, undated, p. 1.

educational system. This will not be an easy task. The comparative analyses necessary to establish the sources of under-performance would require both sampling ratios appreciably higher than those actually used and the compilation and analysis of the socio-economic data of those tested. Without these, it would be difficult to explain the relatively poor results achieved on the national mathematics assessment and the low levels of technological literacy documented in the provincial assessments, and virtually impossible to formulate an appropriate policy response.

Such an approach to educational testing would undoubtedly cost more than the present, unsatisfactory approach, particularly if the province were to emulate Alberta's practice of testing all students in the province in the tested grades. At the very least, the province should utilise statistical samples sufficiently large to sustain comparisons between school districts. There is much to be said, however, for obtaining and making public educational-outcome data for individual schools; indeed, parents, with good reason, would be unlikely to think positively about any accountability system that failed to provide such information.[66] As long as the data relating to individual schools are reasonably interpreted—a process that must involve considering the educational outcomes conjointly with the analysis of the socio-economic parameters relating to the students tested—the benefits of providing data for individual schools should considerably outweigh any negative consequences. There is clearly an important role here for Saskatchewan Education in providing both the data and the necessary analyses.

Whether the solution is a larger investment of public dollars in K–12 education is a matter that all stakeholders should address. As noted above, the evidence regarding the relation between per student expenditure and test performance is mixed. A province such as Ontario has a relatively high level of per-student expenditure, yet it too performs poorly on national mathematics examinations. Quebec, on the other hand, with a relatively low per student expenditure, performs consistently well. The Society for the Advancement of Excellence in Education points to Alberta—which consistently ranks at or near the top both in per student expenditure and in student achievement in national assessments—as a model for improving

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[65] Craig Melvin, Executive Director, Saskatchewan School Trustees Association, as quoted in Lawrence McMahen, "Call for national testing rejected", *Saskatchewan Bulletin* 58 (Oct. 11, 1991): 3.

[66] While the Alberta approach of testing all the students in a given grade—and, therefore, all the schools—is clearly ideal, it would be readily possible to develop a more economical system of rotation, one in which each school would, over the course of a complete cycle, be tested in each area, but where, say, only one-third of the schools would be included in each assessment.

educational outcomes.[67] Such disparate provincial results would seem to suggest that *how* the K–12 dollars are spent is at least as important as *how much* is spent. We are brought back again, however, to the point that fine tuning the "how" requires both more data and more comparative data than are being generated by the present Saskatchewan testing regime.

Clearly, getting better results is not entirely in the control of Saskatchewan Education (although a more directive, less comfortable relationship between the Department and its partners in the K–12 educational enterprise would undoubtedly help): many socio-economic factors beyond the direct influence of our educators are extremely important in determining educational outcomes. But the testing that has been done suggests strongly that there is a problem in the critical areas of mathematical competence and technological literacy, and this must be addressed. A useful first step in the process would be the adoption of a fundamentally changed philosophy of educational testing. This would permit the generation of the data required for the detailed comparative analyses that are prerequisite to the formulation of the necessary changes to our K–12 educational system. It is not evident that this can occur in time to satisfy the targets of *Partnership for Prosperity: Success In the New Economy.*

[67] Helen Raham, "Linking Assessment and School Success" (paper presented to the American Educational Research Association, Montreal, April 1999). While it is true that Alberta spends more per student than Saskatchewan, it also has implemented an ambitious program that sets targets for its education system and then uses assessments to evaluate and improve on student achievement.

APPENDIX

Table A1: Performance Level of 13-year-old students on SAIP Assessments

	Mathematics Content - 1997		Mathematics Problem-Solving - 1997		Reading - 1998		Writing - 1998		Science - 1996		Science - 1999	
	Adequate	Higher	Adequate	Higher	Adequate	Higher	Adequate	Higher	Adequate	Higher	Adequate	Higher
NFLD	56.9 (3.3)	24.0 (2.8)	43.6 (3.3)	10.0 (2.0)	78.2 (2.9)	41.5 (3.5)	96.1 (1.4)	70.7 (3.2)	71.4 (3.0)	38.2 (3.2)	68.0 (2.6)	46.9 (2.8)
PEI	53.6 (3.2)	15.3 (2.3)	49.3 (3.2)	13.3 (2.2)	77.3 (2.9)	39.3 (3.4)	94.9 (1.6)	68.2 (3.3)	76.4 (2.7)	45.8 (3.1)	74.3 (2.9)	52.9 (3.3)
NS (e)	53.0 (3.3)	17.3 (2.5)	46.0 (3.3)	11.4 (2.1)	71.4 (2.5)	34.1 (2.6)	94.4 (1.3)	69.5 (2.7)	73.3 (2.9)	39.3 (3.3)	69.5 (3.3)	48.2 (3.6)
NS (f)	66.0 (0.0)	36.1 (0.0)	48.1 (0.0)	15.9 (0.0)	58.4 (0.0)	24.7 (0.0)	71.2 (0.0)	20.9 (0.0)	73.7 (0.0)	38.5 (0.0)	61.8 (3.5)	40.2 (3.5)
NB (e)	54.6 (3.3)	18.5 (2.6)	47.2 (3.3)	11.8 (2.1)	76.1 (3.0)	38.8 (3.4)	95.0 (1.6)	70.1 (3.4)	70.6 (2.9)	43.7 (3.2)	69.4 (3.2)	49.7 (3.5)
NB (f)	63.2 (3.0)	33.2 (2.9)	53.2 (3.1)	16.1 (2.3)	72.8 (2.9)	36.2 (3.1)	87.7 (2.1)	40.9 (3.2)	60.4 (2.9)	34.8 (2.8)	60.5 (3.1)	38.5 (3.1)
PQ (e)	65.3 (3.3)	41.9 (3.4)	57.9 (3.4)	17.4 (2.6)	77.6 (2.9)	42.3 (3.5)	94.7 (1.6)	73.8 (3.2)	72.6 (2.8)	43.0 (3.1)	69.6 (3.0)	50.5 (3.3)
PQ (f)	78.3 (2.6)	48.7 (3.2)	66.8 (3.0)	24.5 (2.7)	83.7 (2.5)	54.6 (3.3)	95.3 (1.4)	66.2 (3.1)	73.3 (2.6)	48.4 (3.0)	72.8 (2.8)	57.3 (3.1)
ON (e)	50.0 (3.1)	17.9 (2.4)	45.4 (3.1)	10.5 (1.9)	77.8 (2.7)	38.4 (3.2)	96.6 (1.2)	73.9 (2.9)	67.4 (2.8)	36.6 (2.8)	72.1 (3.1)	48.4 (3.5)
ON (f)	51.9 (3.0)	21.4 (2.5)	43.0 (3.0)	10.6 (1.9)	72.4 (3.2)	35.5 (3.4)	80.8 (2.8)	30.8 (3.3)	57.1 (3.1)	26.9 (2.8)	57.2 (3.3)	35.4 (3.2)
MN (e)	51.9 (3.3)	23.0 (2.8)	45.2 (3.3)	11.9 (2.2)	73.4 (3.1)	34.9 (3.3)	94.3 (1.7)	70.6 (3.3)	72.9 (2.8)	42.4 (3.1)	72.8 (3.0)	53.7 (3.4)
MN (f)	61.9 (3.2)	31.9 (3.1)	52.1 (3.3)	16.8 (2.5)	70.5 (6.7)	42.4 (7.3)	80.1 (1.7)	28.0 (6.9)	59.8 (3.4)	29.4 (3.2)	61.2 (3.7)	40.3 (3.7)
SK	47.9 (3.2)	18.5 (2.5)	51.2 (3.2)	11.3 (2.0)	76.1 (2.8)	34.8 (3.2)	95.9 (1.4)	73.6 (3.0)	76.1 (2.7)	44.9 (3.1)	75.5 (2.9)	52.1 (3.3)
AB	64.7 (3.0)	32.1 (2.9)	57.8 (3.1)	19.8 (2.5)	78.2 (2.6)	39.4 (3.1)	95.3 (1.4)	74.7 (2.9)	83.0 (2.2)	55.7 (2.9)	82.5 (2.4)	64.9 (0.0)
BC	56.9 (3.0)	27.0 (2.7)	47.8 (3.1)	14.0 (2.1)	74.9 (2.9)	38.7 (3.3)	94.5 (1.6)	72.0 (3.2)	74.9 (2.6)	45.5 (3.0)	76.1 (2.9)	57.9 (3.4)
CANADA	59.4 (0.8)	28.4 (0.8)	52.2 (0.9)	15.3 (0.6)	78.0 (0.7)	41.5 (0.9)	95.2 (0.4)	70.5 (0.8)	71.9 (0.8)	43.0 (0.8)	73.3 (0.8)	53.3 (0.9)

Table A2: Performance Level of 16-year olds on SAIP Assessments

	Mathematics Content - 1997		Mathematics Problem-Solving - 1997		Reading - 1998		Writing - 1998		Science - 1996		Science - 1999	
	Adequate	Higher	Adequate	Higher	Adequate	Higher	Adequate	Higher	Adequate	Higher	Adequate	Higher
NFLD	43.0 (3.4)	7.2 (1.8)	30.8 (3.2)	7.2 (1.8)	71.4 (3.2)	30.8 (3.2)	88.8 (2.3)	35.4 (3.4)	64.4 (3.2)	25.0 (2.9)	72.7 (2.8)	30.4 (2.9)
PEI	48.5 (3.6)	4.1 (1.4)	27.5 (3.2)	5.7 (1.7)	63.9 (3.5)	25.5 (3.2)	85.1 (2.7)	33.6 (3.6)	68.6 (3.3)	22.5 (3.0)	81.3 (3.1)	35.9 (3.8)
NS (e)	57.3 (3.5)	8.4 (2.0)	36.8 (3.5)	9.2 (2.1)	66.4 (3.0)	27.3 (2.8)	88.5 (2.1)	37.5 (3.2)	68.5 (3.4)	19.4 (2.9)	74.6 (2.4)	29.5 (2.6)
NS (f)	76.1 (0.0)	19.0 (0.0)	44.2 (0.0)	10.7 (0.0)	62.0 (0.0)	26.0 (0.0)	44.8 (0.0)	4.8 (0.0)	80.3 (0.0)	33.8 (0.0)	73.8 (7.6)	38.1 (8.4)
NB (e)	47.3 (3.5)	8.4 (1.9)	33.6 (3.3)	8.7 (2.0)	65.9 (3.5)	27.0 (3.3)	87.5 (2.5)	36.7 (3.6)	69.8 (3.1)	19.9 (2.7)	72.6 (3.3)	28.3 (3.4)
NB (f)	63.4 (3.2)	12.8 (2.2)	37.1 (3.2)	10.4 (2.0)	68.1 (3.2)	31.3 (3.2)	61.2 (3.4)	16.8 (2.6)	58.0 (3.1)	13.9 (2.1)	69.4 (3.1)	19.4 (2.6)
PQ (e)	74.3 (3.2)	21.9 (3.0)	46.5 (3.6)	18.3 (2.8)	71.9 (3.2)	31.0 (3.3)	87.6 (2.5)	43.6 (3.8)	65.6 (3.0)	21.2 (2.6)	76.7 (2.7)	32.4 (3.0)
PQ (f)	81.0 (2.7)	28.1 (3.1)	57.0 (3.4)	20.7 (2.7)	79.4 (2.7)	41.8 (3.4)	87.0 (2.3)	39.8 (3.3)	73.4 (2.6)	28.6 (2.6)	80.5 (2.4)	32.8 (2.9)
ON (e)	52.0 (3.2)	9.3 (1.8)	33.0 (3.0)	10.0 (1.9)	71.6 (3.0)	35.5 (3.1)	87.5 (2.3)	42.2 (3.4)	64.9 (3.0)	22.6 (2.6)	72.2 (3.4)	28.0 (3.5)
ON (f)	49.2 (3.3)	5.4 (1.5)	27.8 (3.0)	6.1 (1.6)	65.0 (3.4)	28.0 (3.2)	50.8 (3.5)	13.4 (2.4)	51.4 (3.3)	14.9 (2.3)	60.1 (4.0)	18.1 (3.1)
MN (e)	53.4 (3.5)	9.7 (2.1)	40.2 (3.5)	10.0 (2.1)	65.5 (3.4)	27.1 (3.1)	86.4 (2.6)	38.9 (3.7)	67.8 (3.0)	29.6 (3.0)	79.8 (2.6)	35.5 (3.1)
MN (f)	61.2 (5.5)	9.8 (3.4)	45.3 (5.5)	7.9 (3.0)	59.9 (7.6)	27.5 (6.9)	56.8 (7.7)	7.1 (4.0)	67.8 (4.4)	30.2 (4.3)	76.2 (3.3)	21.9 (3.2)
SK	50.0 (3.3)	7.9 (1.8)	38.6 (3.3)	10.9 (2.1)	64.9 (3.2)	24.9 (2.9)	84.2 (2.5)	34.7 (3.3)	71.0 (3.1)	26.7 (3.0)	77.4 (2.9)	28.8 (3.1)
AB	61.4 (3.2)	16.0 (2.4)	44.8 (3.3)	14.6 (2.3)	67.4 (3.1)	28.6 (2.9)	83.8 (2.5)	42.7 (3.3)	78.6 (2.4)	42.1 (2.9)	85.8 (2.3)	49.8 (3.2)
BC	54.6 (3.2)	12.7 (2.2)	31.2 (3.0)	9.9 (2.0)	67.9 (3.3)	29.0 (3.2)	83.6 (2.8)	37.5 (3.6)	69.2 (2.9)	23.6 (2.7)	75.8 (3.2)	29.5 (3.4)
CANADA	59.8 (0.9)	14.5 (0.7)	39.8 (0.9)	12.8 (0.6)	71.5 (0.8)	33.9 (0.9)	85.4 (0.7)	39.5 (0.9)	69.0 (0.8)	26.1 (0.8)	76.1 (0.8)	31.6 (0.8)

Source : Council of Education Ministers, Canada. *School Achievement Indicators Program (SAIP),* various reports.

Notes : 1. Numbers given are the percentage of students attaining each level.

2. Numbers in brackets are confidence interval sizes at the 95% certainty level.

3. Results are statistically different if confidence intervals do not overlap.

4. Adequate level is defined for 13-year-old (16-year-old) students as achieving a level 2 (3) or higher; Higher level is defined as achieving any level above level 2 (3).

Table A3: Total Public School Expenditures, 1990/91-1998/99, Canada and Provinces

millions of dollars

	BC	AB	SK	MN	ON	PQ	NB	NS	PEI	NFLD	Canada
1990/91	$3,067.9	$2,801.1	$953.3	$1,145.4	$12,048.9	$6,765.5	$707.1	$814.3	$112.0	$599.9	$31,731.0
1991/92	$3,401.4	$3,040.2	$986.3	$1,169.0	$13,263.0	$7,088.3	$752.4	$837.7	$118.4	$626.0	$31,581.4
1992/93	$3,444.6	$3,076.3	$1,095.8	$1,178.1	$14,101.3	$7,305.9	$779.3	$843.8	$124.9	$633.7	$32,807.4
1993/94	$3,678.4	$3,171.9	$1,098.4	$1,208.0	$13,616.5	$7,310.2	$796.2	$885.7	$122.8	$590.6	$32,699.9
1994/95	$3,854.7	$3,011.1	$1,125.7	$1,224.5	$14,011.8	$7,350.2	$784.1	$881.6	$118.7	$593.4	$33,197.1
1995/96	$4,050.8	$3,091.9	$1,127.6	$1,228.2	$14,163.0	$7,365.3	$800.1	$843.9	$110.3	$591.1	$33,618.8
1996/97	$4,144.6	$3,195.1	$1,132.9	$1,241.6	$14,025.4	$7,298.9	$806.2	$839.4	$117.4	$585.9	n/a
1997/98	$4,227.8	$3,395.3	$1,176.8	$1,280.4	$14,337.1	$7,320.1	$825.7	$854.4	$119.1	$556.6	$34,353.5
1998/99	$4,312.4	$3,469.3	$1,177.3	$1,323.8	$14,712.8	$7,153.6	$829.2	$877.9	$122.8	$558.5	$34,789.7
% change	40.6%	23.9%	23.5%	15.6%	22.1%	5.7%	17.3%	7.8%	9.6%	-6.9%	9.6%

Source: BC Ministry of Education, *Inter-Provincial Education Statistics Project: Summary of School Statistics from the Provinces*.

Table A4: Full-time Educators, 1990/91-1998/99, Canada and Provinces

	BC	AB	SK	MN	ON	PQ	NB	NS	PEI	NFLD	Canada
1990/91	31,147	27,827	11,654	12,674	122,637	73,174	8,167	10,417	1,429	8,015	307,510
1991/92	32,373	28,484	11,496	12,437	126,635	75,779	8,500	10,372	1,417	7,951	315,592
1992/93	32,566	28,308	11,417	12,436	126,974	76,483	8,359	10,100	1,451	7,885	317,310
1993/94	32,630	28,160	11,078	12,423	126,932	75,678	8,220	10,121	1,449	7,769	315,814
1994/95	33,325	27,390	11,022	12,303	125,272	75,326	8,022	9,624	1,417	7,521	312,630
1995/96	34,127	27,302	11,038	12,065	125,882	75,557	8,010	9,356	1,435	7,259	313,426
1996/97	34,711	27,510	11,123	11,997	123,554	74,121	7,836	9,384	1,444	7,101	310,189
1997/98	34,966	27,873	11,112	12,028	124,556	75,208	7,696	9,396	1,439	6,705	312,371
1998/99	35,921	28,547	11,319	12,031	124,621	75,036	7,568	9,621	n/a	6,453	n/a
% change	15.3%	2.6%	-2.9%	-5.1%	1.6%	2.5%	-7.3%	-7.6%	0.7%	-19.5%	1.6%

Source: BC Ministry of Education, *Inter-Provincial Education Statistics Project: Summary of School Statistics from the Provinces*.

Note: Educators include all staff members who are required to have teaching certification. It excludes substitute teachers, teaching assistants and consultants.

Table A5: Expenditure per Full-time Student as a Percentage of Per-Capita GDP, 1990/91-1998/99, Canada and Provinces

	BC	AB	SK	MN	ON	PQ	NB	NS	PEI	NFLD	Canada
1990/91	25.4%	20.9%	24.1%	28.1%	24.2%	29.0%	29.3%	26.3%	27.8%	30.6%	27.6%
1991/92	26.7%	22.6%	24.8%	29.1%	26.4%	29.5%	29.2%	26.3%	28.2%	31.2%	27.0%
1992/93	25.7%	22.1%	27.6%	28.9%	27.6%	30.1%	29.7%	25.8%	28.8%	32.6%	27.5%
1993/94	25.6%	21.1%	25.5%	29.6%	26.2%	29.7%	29.3%	26.9%	27.3%	30.6%	26.6%
1994/95	25.3%	19.0%	24.8%	28.8%	25.4%	28.8%	28.2%	26.7%	26.1%	30.2%	25.7%
1995/96	25.4%	18.5%	23.2%	28.0%	24.1%	27.7%	27.2%	24.8%	23.0%	29.5%	24.7%
1996/97	25.4%	17.8%	21.4%	26.9%	23.8%	27.1%	27.5%	24.5%	23.3%	30.7%	n/a
1997/98	24.8%	17.5%	22.3%	26.8%	22.9%	25.4%	28.2%	24.4%	24.3%	30.0%	23.4%
1998/99	25.5%	18.1%	22.7%	27.1%	22.6%	24.3%	27.7%	24.3%	24.5%	28.7%	23.2%

Source: Statistics Canada, CANSIM database; BC Ministry of Education, *Inter-Provincial Education Statistics Project: Summary of School Statistics from the Provinces*.

Table A6: Public School Expenditure Per Full-Time Student, 1990/91-1998/99, Canada and Provinces

	BC	AB	SK	MN	ON	PQ	NB	NS	PEI	NFLD	Canada
1990/91	$6,109	$6,001	$5,064	$6,132	$6,622	$6,350	$5,321	$4,913	$4,643	$4,885	$6,762
1991/92	$6,475	$6,337	$5,236	$6,281	$7,140	$6,478	$5,342	$5,064	$4,888	$5,168	$6,576
1992/93	$6,450	$6,276	$5,801	$6,333	$7,457	$6,710	$5,568	$5,080	$5,122	$5,372	$6,768
1993/94	$6,724	$6,404	$5,821	$6,513	$7,141	$6,730	$5,740	$5,339	$5,066	$5,155	$6,710
1994/95	$6,875	$6,161	$5,992	$6,640	$7,262	$6,792	$5,739	$5,361	$4,901	$5,383	$6,789
1995/96	$7,081	$6,177	$6,022	$6,649	$7,205	$6,773	$5,924	$5,145	$4,541	$5,538	$6,792
1996/97	$7,086	$6,279	$6,059	$6,715	$7,206	$6,710	$6,049	$5,120	$4,809	$5,700	n/a
1997/98	$7,125	$6,579	$6,337	$6,925	$7,270	$6,546	$6,275	$5,262	$4,905	$5,658	$6,857
1998/99	$7,276	$6,624	$6,386	$7,146	$7,396	$6,416	$6,421	$5,486	$5,106	$5,910	$6,929
% change	19.1%	10.4%	26.1%	16.5%	11.7%	1.0%	20.7%	11.7%	10.0%	21.0%	2.5%

Source: BC Ministry of Education, *Inter-Provincial Education Statistics Project: Summary of School Statistics from the Provinces*.

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