Cost-benefit Analysis: An Application in Two Elementary Schools
Burns, Mildred L;Patterson, Diana;Lafrance, Leo
International Journal of Educational Management; 1993; 7, 6; SciTech Premium Collection

The question of setting appropriate standards of success is an issue that educators and education ministries must face up to.

Cost-benefit Analysis: An Application in Two Elementary Schools

Mildred L. Burns, Diana Patterson and Leo LaFrance

International Journal of Educational Management, Vol. 7 No. 6, 1993, pp. 18-31
© MCB University Press Limited, 0951-354X

Introduction

Cost-benefit analysis and accountability are touchy issues in education. Educators see them as too business oriented, as putting too much emphasis on quantity rather than on quality, as too simplistic for the complex reality of schools, as the ultimate corruption of the delicate essence of the whole child. Educators assert, on the one hand, that learning as a benefit cannot be measured, although they routinely rank the learning of students on some scale A, B, C, D; satisfactory, needs improvement, unsatisfactory. On the other hand, they assert that more resources (particularly higher salaries) will result in "better" education for their students. Finally (since we are accepting complexity), they assert equally aggressively that the school, and particularly the individual teacher, cannot be held accountable for the learning of any one child because of the impact of public and personal factors.

The tax-paying public and parents, however, continually press for lower costs in education and for more satisfactory results. Parents, of course, may define "satisfactory results" as "getting As" or "getting a good job"; and governments, as "supporting national productivity" or "providing an education labour pool". Such views are symptomatic of the value placed on education in North America and of the tremendous pressures placed on school systems to fulfil the impossible dream, to prove that in a democracy everyone can rise to the top.

Despite the complex or even impossible demands, school systems face the reality of declining public willingness to provide more money for education. The four great traditional support groups, government, business, labour and parents have changed their perspectives over the past several decades. Governments must weigh increasing demands for multiple services, so education competes with such other services as health care, protection services, environment protection. (Statistics Canada reports that "Health costs now account for 13.4 per cent of spending, up from 9.7 per cent and Social Services for 21.7 per cent, up from 18 per cent. In contrast education now swallows only 11.9 per cent of government expenditures, down from 17.4 per cen…"[1].

The corporate world is finding that traditional schooling does not satisfy the demands of the rapidly changing technological environment within which they must operate. Workers, disillusioned from their belief that higher education ensures higher wages of a "good job", recognize that they need continual upgrading of skills to remain competitive. At the same time, labour unions foresee a declining pool of new young members and therefore do not anticipate the same labour market issues they faced in the early 1900s. Finally, parents are declining in numbers in an ageing population, and are learning that many older people do not see great benefit to themselves in a costly education system. It is increasingly important for us as educators to provide evidence of the benefits of education and to provide evidence that the benefits are worth the costs.

For two reasons, then it is important for us to address the issue of costs and benefits. First, we must address the issue of benefit. The image of the school system must change from a "teaching system" to a "learning system". We must develop better ways to assess the effectiveness (desirable learning, the benefit to students) of programme and methods of learning. We must emphasize the importance of continuous assessment of benefit, of learning. Systematic judgments may be the best "measure" we presently have for many desired outcomes, but *systematic judgments consistently recorded and reviewed* will provide us with better information upon

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www.manaraa.com

which to modify learning experiences than do judgements made once a term. Technologies to accomplish assessment of individual learning exist and are rapidly becoming increasingly sophisticated.

Second, we must aim to use our costly human resources more frugally. Traditionally, the needs of teachers have been the basis of the system of education. That is, it was necessary to group students and design learning experiences for groups if the system were to be able to deal with the large numbers of students in urban areas. That is no longer necessary and we must look to the future in which learning pace and learning style, rather than teaching needs, drive education programmes. It is wasteful of student time and wasteful of teacher time (to say nothing of the interest and motivation wasted) to require the same "assignments" of students of varying abilities. We must analyse the costs of learning experiences and relate costs to the benefits of those experiences. To accomplish this, we must analyse the costs as well as the benefits of various programmes and use the data to develop and refine our education systems.

Budgeting Systems and Cost-benefit Analysis

Budgets can be viewed from two perspectives, as tools for allocating resources to programmes, projects or products according to established priorities (planning), or as tools for keeping account of expenditures (control). Regardless of the budgeting system used, budgets serve both purposes. However, different budgeting systems place different emphases on planning and control and what the different systems emphasize with regard to planning and control varies greatly.

The Traditional Line Budget

The budgeting system which pervades most North American education systems is the traditional, or line budget. It reflects the image of the school system as the unit, whether the "system" is a small community, or the province at large. Budget decisions are based on costs of resources needed to maintain sub-units such as schools and are determined by increments in resource costs. Budget categories are established on the basis of primary resources, administration, instruction, building maintenance, transportation etc. Approximately 90 per cent of the total budget falls within the two categories, administration and instruction. Thus line budgets view the education system from a functional perspective, the perspective of scientific management. The critical questions for such a system are, How many teachers does it take to teach/control "*x*" number of students; How many minutes per day or week does it take for the average student to learn specific "pieces" of content; How many administrators does it take to support/control "*y*" number of teachers. Whether the funding and legislating agencies have mandated and enforced very specific ratios as in Quebec, or operate on the basis of general guidelines, the perspective is the same: cost of resources – numbers of students – minutes of learning time (subject field priority).

Given a line budgeting perspective and a mass education philosophy, system planning has had more to do with numbers of students served than with the quality of learning that takes place. School board planning has concentrated on determining resource needs for projected numbers of students. California, for example, based state funding on Average Daily Attendance (ADA); Quebec, on the actual number of students in school on a particular day. Cost per pupil per year was the bottom line for budget projections.

Benefits, too, have been aggregated to the global unit, in terms of standardized tests results, dropout rates, attendance rates, and percentages of students advancing to higher education. Macro-studies such as the Coleman study and studies of the large city systems of Philadelphia and Chicago in the 1960s and 1970s examined the effectiveness of education systems in these global terms. Measures of benefit under the traditional budgeting system appear to be directed primarily towards benefit to society at large, level of achievement in the system and level of education to which the population ascends. Dropout and illiteracy are the critical indicators of system failure. There is little or no effort directed towards judging the system in terms of quality of individual achievement related to expected individual achievement. (Judging teachers is only a variation on the theme – quality of resources purchased. Moreover, it is such a costly quality control technology that it has seldom been implemented systematically over any extended period of time.)

Thus the line budget, established on the basis of resource costs, both arises out of and reinforces the belief that learning, the result of the education system, cannot be related to costs because it cannot be quantified. *Resource* costing makes no demands for testing common *practices to determine their effects:* age level grading, standard class periods, class sizes, group projects, standardized testing, age level presentation of particular concepts or subject content. Process-product studies have examined relationships between educational practices and results. In general, however, those studies are specific to a particular process (as reinforcement, time on task, questioning, etc.) and are one-time studies. They assess general viability of particular processes, and results are seldom related to resource costs. The basic assumption remains the theoretical economic proposition, that quantity of, or expenditures for, resources correlates with quality of learning, despite the fact that economists use that

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www.manaraa.com

proposition only as a framework for testing real relationships between inputs and outputs.

Alternative Budgeting Systems

Three alternative budgeting systems have been employed to varying degrees by education systems: zero-base budgeting (ZBB)[2,3]; Cost Unit or Cost Centre Budgeting (which as yet has received little attention in the literature); and Program Planning Budgeting Systems, PPBS [4-6]. Of the four budgeting systems, Program Budgeting (PPBS) is the most specifically results oriented. It proposes that budget allocations should be based on programme priorities and should be monitored in terms of programme achieved success.

Programme Budgeting has been implemented in many large urban school districts, Chicago, Philadelphia, Memphis, Baltimore and Seattle, for example. However, when such a system was attempted, it was usually on a system-wide basis. As with many innovations in education, the burden of detailed work fell on principals and teachers who had had little training for the process. Several problems arose immediately. Programme budgeting requires four kinds of analysis:

(1) The school or system must specify programme standards in terms of expected results, rather than in terms of processes, teaching techniques, or learning activities.

(2) The school must routinely collect data regarding levels of actual achieved success and must review those data to compare results with expected programme results.

(3) Data must track achievement over time. That is, data relating actual achievement to expected achievement must be compared across a series of terms of years, so that trends of achievement within each programme can be determined. It is trend data that signals critical decision points and suggests the need to consider possible alternatives. Trend data make it possible for the administrator to act proactively instead of reactively. A fundamental proposition of PPBS is that quality cannot be assured unless trend data are compiled and reviewed.

(4) Finally, educators must analyse programme success trends in terms of resource costs. Analysis of benefits related to costs (resource allocations) opens the door to potential system alternatives.

The author has proposed[7] that the fundamental ideas of programme budgeting can be applied most productively *at the school level and on the basis of resource allocation.* Education systems establish programme priorities and outcome priorities in terms of resources allocated. Hours of teaching time are the primary resource allocation and they are routinely varied across programmes, grade level groups and special target groups. Priorities are established and implemented by means of minutes per day or week of pupil contact. For example we might assume one hour per day per week (five hours) as a baseline allocation. Then language arts at seven and a half hours has a priority rank of 1.5, while physical education with thirty minutes per day (2.5 hours) has a priority rank of 0.5 (or a ratio of 1:3 when compared with LA).

Such priority ranks have been established on the basis of experience to serve large numbers of students at least cost. They have not been tested for outcomes, even in terms of groups, let alone in terms of individuals. Programme budgeting, if established on its educational premisses, requires continual tracking and evaluation of resource allocation practices. We have proposed that to establish an orientation and a commitment to quality education, patterns of resource allocation, (priority ranks) and success standards must be set *based on the known characteristics of each group, not on the macro-systems level only.*

We have proposed a basis upon which programme success can be tracked across years or terms to provide success information; moreover, or the same basis programme success can be related to expected success and to programme costs. That basis is *per pupil programme hour.* By using these data programmes can be compared on an equivalent basis. It is proposed that the ratio of success per pupil hour, standardized to a basis of 60 hours per term, versus dollar cost per pupil hour offers a viable basis for assessing the impact of resource allocations. Thus if the success rate per pupil hour in language arts is 0.71 (computed from marks earned in this instance) and the dollar cost per pupil hour is $2.50, the success rate per dollar cost (based on hours in the programme) is 0.284, or 28.4 per cent success per dollar cost. Similar computation for physical education might yield a success ratio of 0.50 [7, p. 17]. Such results make it appear that one of two things is operating: the physical education programme is twice as effective (productive) as the language arts programme or marking or grading standards in the two subject fields differ.

These data might signal the need for review of programmes or of evaluation criteria. As data from the present study illustrate, cost/success ratios standardized to a base-60 programme reveal more comparable results, and therefore provide more useful information. It should be emphasized that data do not signal decisions; they signal questions for analysis and review. If numbers (data) are considered de-humanizing, it is because they have been used to prove a point, not to raise questions. This article proposes that if we are to deal properly with the futures of our students, we must collect data

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www.manaraa.com

Table I. *Characteristics of the Two Schools whichParticipated in the Study*

Characteristic	School A	School B
Number of students	270	550
Number of administrators	1	2
Number of teachers	13	28
Number of report items	3	3
First language of instruction	English	French
Second language of instruction	French	English
Percentage students/first language English	100	65
Percentage students/first language French	0	35
Socio-economic level of community	Upper middle	Lower to Upper
Language arts methodology	Whole language	Whole language

systematically and review it in relation to values held, using our best judgement. It proposes, furthermore, that per pupil per hour data offer the most useful basis for programme analysis.

Methodology

The proposed method of analysing programme cost and success has been tested during the school year 1991-1992 in two elementary schools in the Montreal area. Both schools are in the same school board. The characteristics of the two schools are presented in Table I.

Results

The study examined three elements of cost-benefit analysis: actual success and its relationship to standards set (expected success), programme costs and success related to programme costs. Four kinds of data are reported here:

(1) Standards set for each programme (expected success).

(2) Actual success and success per pupil hour in the programme.

(3) Programme costs and programme costs per pupil hour.

(4) Ratios of relationship between programme success and programme cost based on per pupil programme hour.

Success data. The principals of the two schools agreed to carry out the cost-benefit analysis for all academic subjects at the second and sixth grade levels. In autumn 1991 each principal established standards of success for English language arts (first or second language), French language arts (first or second language), mathematics, social sciences and natural sciences. Standards were set on the basis of percentages of students expected to achieve at specified levels as reported on term reports to parents. Standards, expected levels of success for the programme groups, were set by the principals themselves without consulting teachers so mark reports would not be affected by the standards set. Table II reports standards set at each grade level for each academic subject for schools A and B.

Marking categories for Grade 2 language of instruction differ from the categories for other subjects. Language arts categories (whether English or French) range in five steps from (high) consolidating to (low) pre-conventional for reading and writing skills. For listening/speaking skills there is a three-step range from (high) consolidating to (low) beginning. The range for other subjects at Grade 2 is from 1 (high): demonstrates a strong aptitude in this area, to 4 (low): experiencing difficulty. For Grade 6, the range for all subject areas is from 1 (high): *démontre de fortes aptitudes*, to 5 (low): *éprouve des difficultés*. Although the reporting language differs, the ranges are the same for the English language school and the French language school. (See Appendix 1 for a copy of the report to parents, first cycle and *deuxième cycle*).

It is evident that standards, expected results, are high for students in these two schools. The whole language approach suggests that the category "developing" is a high rank for early primary or a low rank for later primary. Thus, the expectation that 75 per cent of the students in Grade 2 will be at the rank "developing", or that in Grade 6, 90 per cent of the students should be expected to be at Rank 3 – "*Reussit bien*" in English language arts, might seem unrealistic. However, as Table III reports, standards set were, in almost every instance, met and exceeded. Table III reports a summary of success results for both schools at Levels 2 and 6 and success per pupil hour standardized to a 60-hour programme base.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www.manaraa.com

Table II. *Programme Standards of Success, Schools A and B*

School A level 2 Programme	School A Success standards	School B level 2 Programme	School B Success standards
English Language Arts			
Reading	85% emergent		
Writing	85% emergent		
Listening	75% developing		
Speaking	75% developing		
Français	*Langue seconde*	*Français*	*Langue d'instruction*
Langue seconde	85% at 3	*Comprend ce qu'on dit*	85% *en voie de développement*
		Communique ses idées clairement	85% *en voie de développement*
		Lecture	85% *commence à lire*
		Ecriture	85% *commence à écrire*
Mathematics		*Mathématiques (défi)*	
Understanding concepts	70% at 2	*Méli-Mélo*	75% at 3
Problem solving	70% at 2	*Numération*	85% at 3
Application		*Jeux de nombres*	85% at 3
Number	70% at 2	*Logique*	80% at 3
Geometry	70% at 2	*Géometrie*	80% at 3
Measurement	70% at 2		
Fractions	70% at 2		
Social sciences	85% at 2	*Sciences humaines*	80% at 2
Natural sciences	85% at 2	*Sciences naturelles*	80% at 2
School A level 6 Programme	School A Success standards	School Blevel 6 Programme	School B Success standards
Langue Français		*Français*	
Savoir écouter	85% at 3	*Communication orale*	80% at 2
Savoir parler	85% at 3	*Lecture*	80% at 2
Savoir lire	85% at 3	*Ecriture*	75% at 2
Savoir écrire	85% at 3		
Mathématiques		*Mathématiques*	
Comprehension de concepts	80% at 2	*Comprehension de concepts*	85% at 3
Nombre	80% at 2	*Nombre*	85% at 3
Géometrie	80% at 2	*Géometrie*	85% at 3
Mesure	80% at 2	*Measure*	85% at 3
Fractions	80% at 2	*Fractions*	85% at 3
Resolution de problèmes	80% at 2	*Resolution de problèmes*	80% at 3
English Language Arts		English Language Arts	
Speaking	75% at 2	Speaking	90% at 3
Listening	75% at 2	Listening	90% at 3
Reading	75% at 2	Reading	90% at 3
Writing	75% at 2	Writing	90% at 3
Sciences humaines	80% at 2	*Sciences humaines*	80% at 2
Sciences naturelles	80% at 2	*Sciences naturelles*	80% at 2

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www.manaraa.com

Table III. *Success Achieved and Standardized to Base 60*

School A Grade 2 Programme Programme hours	English Lang. Arts 90	Français Lang. 2ième 60	Maths 60	Social Science 18	Grade 6 Natural Science 18	English Lang. Arts 60	Langue Français 90	Maths 60	Sciences Humaines 18	Sciences Naturelles 18
Avg standard set	80,00%	85.00%	70.00%	85.00%	85.00%	75.00%	85.00%	80.00%	80.00%	80.00%
Avg% success-term 1	85.25%	95.00%	71.40%	100.00%	100.00%	72.00%	91.75%	93.30%	83.00%	50.00%
Avg% success-term 2	98.50%	97.00%	62.40%	100.00%	100.00%	76.25%	95.50%	73.75%	61.00%	68.00%
Unit of success/hr	(÷90)	(÷60)	(÷60)	(÷18)	(÷18)	(÷60)	(÷90)	(÷60)	(÷18)	(÷18)
Standard set/prog hr	0.89%	1.42%	1.17%	4.72%	4.72%	1.25%	0.94%	1.33%	4.44%	4.44%
Success/prog hr-term 1	0.95%	1.58%	1.19%	5.55%	5.55%	1.20%	1.02%	1.55%	4.61%	2.78%
Success/prog hr-term 2	1.09%	1.62%	1.04%	5.55%	5.55%	1.27%	1.06%	1.23%	3.39%	3.78%
(Factor @ base 60)	(÷0.67%)	(÷1.0)	(÷1.0)	(÷3.3)	(÷3.3)	(÷1.0)	(÷0.67)	(÷1.0)	(÷3.3)	(÷3.3)
Success/hr-base 60-T1	1.42%	1.58%	1.19%	1.68%	1.68%	1.20%	1.52%	1.55%	1.40%	0.84%
Success/hr-base 60-T2	1.63%	1.62%	1.04%	1.68%	1.68%	1.27%	1.58%	1.23%	1.03%	1.14%

School B Grade 2 Programme Programme hours	Français Lang Arts 84	Maths 60	Sciences Humaines 18	Grade 6 Sciences Naturel 18	Anglais Lang 2ième 24	Français Lang Arts 90	Maths 60	Sciences Humaines 18	Sciences Naturelles 18
Avg standard set	85.00%	81.00%	80.00%	80.00%	90.00%	78.30%	84.20%	80.00%	80.00%
Avg% success-term 1	94.25%	83.20%	95.00%	93.00%	93.00%	83.30%	95.70%	83.00%	95.00%
Avg% success-term 2	95.50%	83.20%	93.00%	100.00%	93.50%	86.30%	84.40%	76.00%	82.00%
Unit of success/hr	(÷84)	(÷60)	(÷18)	(÷18)	(÷24)	(÷90)	(÷60)	(÷18)	(÷18)
Standard set/prog hr	1.01%	1.35%	4.44%	4.44%	3.75%	0.93%	1.40%	4.44%	4.44%
Success/prog hr-term 1	1.12%	1.39%	5.28%	5.17%	3.87%	0.96%	1.59%	4.61%	5.28%
Success/prog hr-term 2	1.14%	1.39%	5.17%	5.55%	3.89%	1.03%	1.41%	4.22%	4.55%
(Factor @ base 60)	(÷0.71)	(÷1.0)	(÷3.3)	(÷3.3)	(÷2.5)	(÷0.67)	(÷1.0)	(÷3.3)	(÷3.3)
Success/hr-base 60-T1	1.58%	1.39%	1.60%	1.57%	1.55%	1.35%	1.59%	1.40%	1.60%
Success/hr-base 60-T2	1.60%	1.39%	1.57%	1.68%	1.56%	1.45%	1.41%	1.28%	1.38%

Table III reports actual percentages of students who achieved the standard set for terms 1 and 2. First, the overall percentage is reported, the percentage of the group that actually achieved the standard set. For example, in school A, level 2 (grade 2), the average standard set for English language arts was 80 per cent at particular skill levels; the actual result shows that an average of 85.5 per cent of the students achieved at the desired level in term 1, but that 98.5 per cent achieved the desired level in term 2. For natural sciences, the actual success rate was 100 per cent at "2", as opposed to the expected standard of 85 per cent. School B results show a similar pattern of high achievement.

Second, for each subject area, the actual percentages of *success per programme hour* are reported. These percentages were computed by dividing "Average percentage success" by "programme hours" (as 85.25 per cent Term 1 – 90 hours = 0.95 per cent achieved per programme hour Term 1). These two percentages (percentage achieved and percentage achieved per hour) inform teachers and principal about the particular programme. The fact that the "average percentage success" for mathematics in school A, level 2 declined from 71.4 per cent in term 1 to 62.4 per cent in term 2 (from 1.19 per cent to 1.04 per cent per hour), makes it very clear that students had more difficulty with the content of term 2. Such a change signals the need for a review of time devoted to the work of term 2, or to some other aspect of the programme or system. Similarly, declines in achieved success in *sciences humaines* and *sciences naturelles* in school B suggest a possible need for review.

At first glance, the fact of 4.61 per cent success per programme hour in sciences humaines, school B, term 1 versus 1.12 per cent success per programme hour in

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www.manaraa.com

Français language arts could lead to incorrect conclusions. It might suggest that sciences humaines is more "effective" than *Français*, or than *mathématiques*. However, these differences are an artefact of the number of programme hours. Achievement marks are relevant to content covered, not to contact hours. This relationship differs from the relationship of costs to hours, which is constant. Therefore, all success results have been standardized to a base 60-hour programme. Figures 1 and 2 show these results graphically.

Dollar cost data. Dollar costs per pupil programme hour were computed for each programme at the two grade levels. Table IV reports the results of these analyses. (See Appendix 2 for the ratios of computing costs per programme; Appendix 3 for examples of determining programme costs of two programmes: mathematics, school A, grade 2 and *sciences naturelles*, school B, grade

Figure 1. *Success per Hour, and at Base 60-School A, Grades 2 and 6; Terms 1 and 2 (from Table III)*

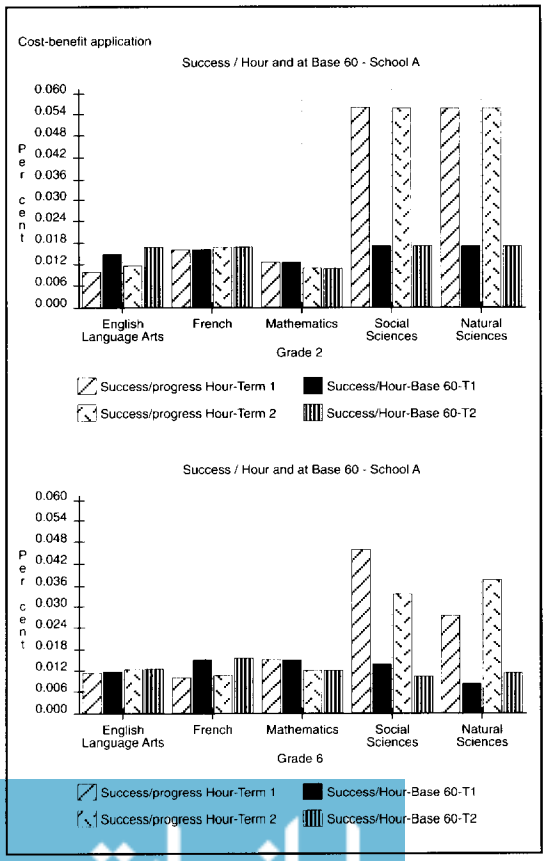
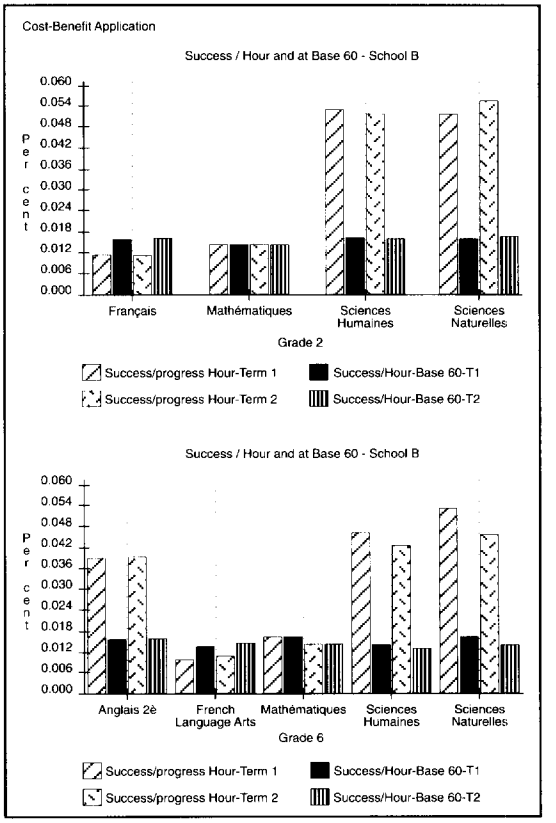


Figure 2. *Success per Hour, and at Base 60-School B, Grades 2 and 6; Terms 1 and 2 (from Table III)*



6; and Appendix 4 for computations standardizing costs at base 60.)

These data provide dramatic evidence that education may be the best bargain the public gets today. Costs per pupil per hour vary from a low of $3.62 to a high of $4.35. On a cost per pupil per hour basis, education is very inexpensive.

Cost/Benefit

The question remains then, what is the relationship between costs and success (benefit). "Benefits" or success findings in this study were based on marks reported to parents. The argument could be made that these marks may be inflated, that they do not represent true measures of learning. Indeed, that argument lies behind the spate of criticism levelled at schools today. It is the argument that North American schools are not keeping up with schools in Japan, for instance, that they are not achieving the results expected by the public.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www.manaraa.com

Table IV. *Programme Costs per Pupil per Year, and per Pupil per Programme Hour. Schools A and B*

School A Programme	Cost/yr $	$/Student hr Grade 2	School B Programme	Cost/yr $	$/Student/hr Grade 2
English Language Arts	1175.52	4.35			
French second language	749.59	4.16	*Français Langue Art*	993.05	3.94
Mathematics	650.76	3.62	*Mathématiques*	711.70	3.96
Social Sciences	217.54	4.03	*Sciences Humaines*	209.98	3.89
Natural Sciences	217.54	4.03	*Sciences Naturelles*	209.98	3.89
		Grade 6			Grade 6
English Language Arts	753.27	4.18	*Anglais 2è*	282.51	3.92
Langue Français	1005.26	3.72	*Langue Français*	1042. 72	4.14
Mathématiques	753.27	4.18	*Mathématiques*	752.46	4.18
Sciences Humaines	217.17	4.02	*Sciences Humaines*	220.65	4.09
Sciences Naturelles	217.17	4.02	*Sciences Naturelles*	220.65	4.09

This may very well be true. The author proposes, however, that if standardized tests are to be used to measure success, the results expected on such tests must be set in the context of the community, the school and the class group. For this study, "standards of success" were set on the basis of reports to parents. They could just as easily be set *on the basis* of provincial exams, or standardized tests, but *they should be set for* the particular class group.

Acknowledging, then, the pros and cons of appropriate bases for standards, the study examined the relationships between "success" standardized to a base-60 hour programme and costs. Table V presents the ratio of cost to success, terms 1 and 2: the dollar cost per unit of success standardized at base 60.

Results from Tables IV and V are shown graphically in Figure 3.

These data show that although the cost per pupil per hour does not vary greatly across programmes, the cost/success ratio does vary, both across programmes and from term 1 to term 2. The ratio should be read as: lower dollar cost means greater success per dollar, per hour. Thus English language arts, grade 2, School A cost less per unit of achieved success in term 2 than term 1 (or that grade 2 English language arts achieved more success per dollar in term 2 than in term 1). These results could "mean" different things: that the teachers were inclined to give higher marks in term 1 to encourage students; that content was more difficult in term 2; that students applied themselves more conscientiously in term 1. Data do not give answers; they give food for thought. Data raise questions that may assist teachers and administrators to work towards more effective programmes.

Summary and Conclusions

Reported by the Participating Principals

(1) Setting standards was difficult. One factor that created difficulty in setting standards was that mainstreamed students were included in all statistics. A second factor was that the whole language approach in language arts requires that assessments be made on a more flexible sliding continuum than the one used for mathematics, for example. A third factor was that French is the language of instruction in School B, but English is the mother tongue of 65 per cent of the students. Therefore, to assess English as *Anglais, langue deuxième*, requires some mental gymnastics on the part of teachers.

(2) Costs per pupil hour were surprisingly low and surprisingly similar across programme and schools.

(3) The results suggest review of assessment practices and standards.

(4) Results should provide the board and the province with bases for further study and review of resource allocations and programme priorities.

From the Research Director

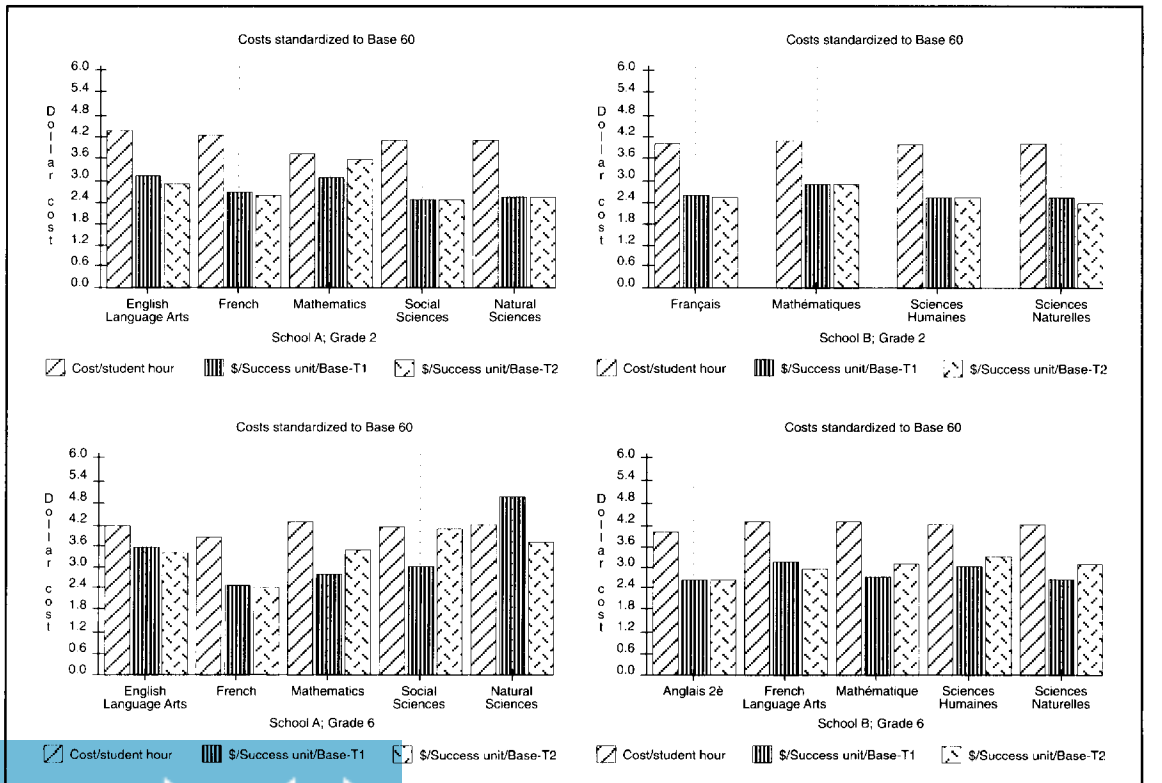
All of the conclusions reached by the participating principals are valid and are important. The researcher would remind the teacher that these results are based on

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www.manaraa.com

Table V. *Ratio of Cost to Success: Dollar Cost per Unit of Success Standardized at Base*

Programme	School A level 2 $ cost unit success, base 60 Term 1 $	Term 2 $	Programme	School B level 2 $ cost unit success base 60 Term 1 $	Term 2 $
English Language Arts	3.06	2.67			
French second language	2.63	2.57	*Français Langue Arts*	2.49	2.46
Mathematics	3.04	3.48	*Mathématiques*	2.85	2.85
Social Sciences	2.40	2.40	*Sciences Humaines*	2.43	2.48
Natural Sciences	2.39	2.39	*Sciences Naturelles*	2.48	2.31
Level 6			*Level 6*		
English Language Arts	3.48	3.29	*Anglaise 2è*	2.53	2.51
Langue Français	2.45	2.35	*Français Langue*	3.07	2.85
Mathematics	2.70	3.40	*Mathématiques*	2.63	2.96
Social Sciences	2.87	3.90	*Sciences Humaines*	2.92	3.19
Natural Sciences	4.79	3.53	*Sciences Naturelles*	2.56	2.96

Figure 3. *Cost per Student per Hour and Costs per Unit of Success. Standardized at Base 60 for Schools A and B; Grades 2 and 6; Term (T1) and Term 2 (T2). (from Tables IV and V).*



Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www.manaraa.com

only two terms. Cost/success ratios differ from term 1 to term 2. This may have resulted from a number of factors, but it is trends that are most revealing. Analyses should be made routinely, and records should be kept over a period of time to provide better information for making programme changes.

One fact has come out in all cost analyses done by students over the years, and is evident in this study – education is not an expensive proposition. The total bill for education may be high, but three to four dollars per student per hour is not expensive.

The question of setting appropriate standards of success is an issue that educators and education ministries must face up to. Is the issue macro-comparisons? If so, the normal interpretation of results by the public is that "our school" is good or bad because of how it compares on the national or international level. This implies that all schools and all class groups represent a normal distribution of the population, which is patently absurd. It also violates the social proposition that schools should meet community needs, since it implies that all communities "need", or value, the same things.

The author proposes that standards should be set in terms of community values and population groups, regardless of what measure is used to assess results – whether teacher marks or provincial tests.

The author proposes secondarily, that with present technology it is no longer necessary for all students to have standard blocks of learning time in every subject. But it is necessary to track costs and success over time to make more informed judgments about learning programmes.

Future Research

Third term results from the two participating schools will be collected and analysed. The author hopes to extend the study to a larger group of schools in the province. The researchers intend that the expanded study will include standards set on bases other than teacher marks, but set in reference to the groups involved. Such standards will enable administrators to track programmes internally to the school, but at the same time to make some useful comparisons to larger population bases.

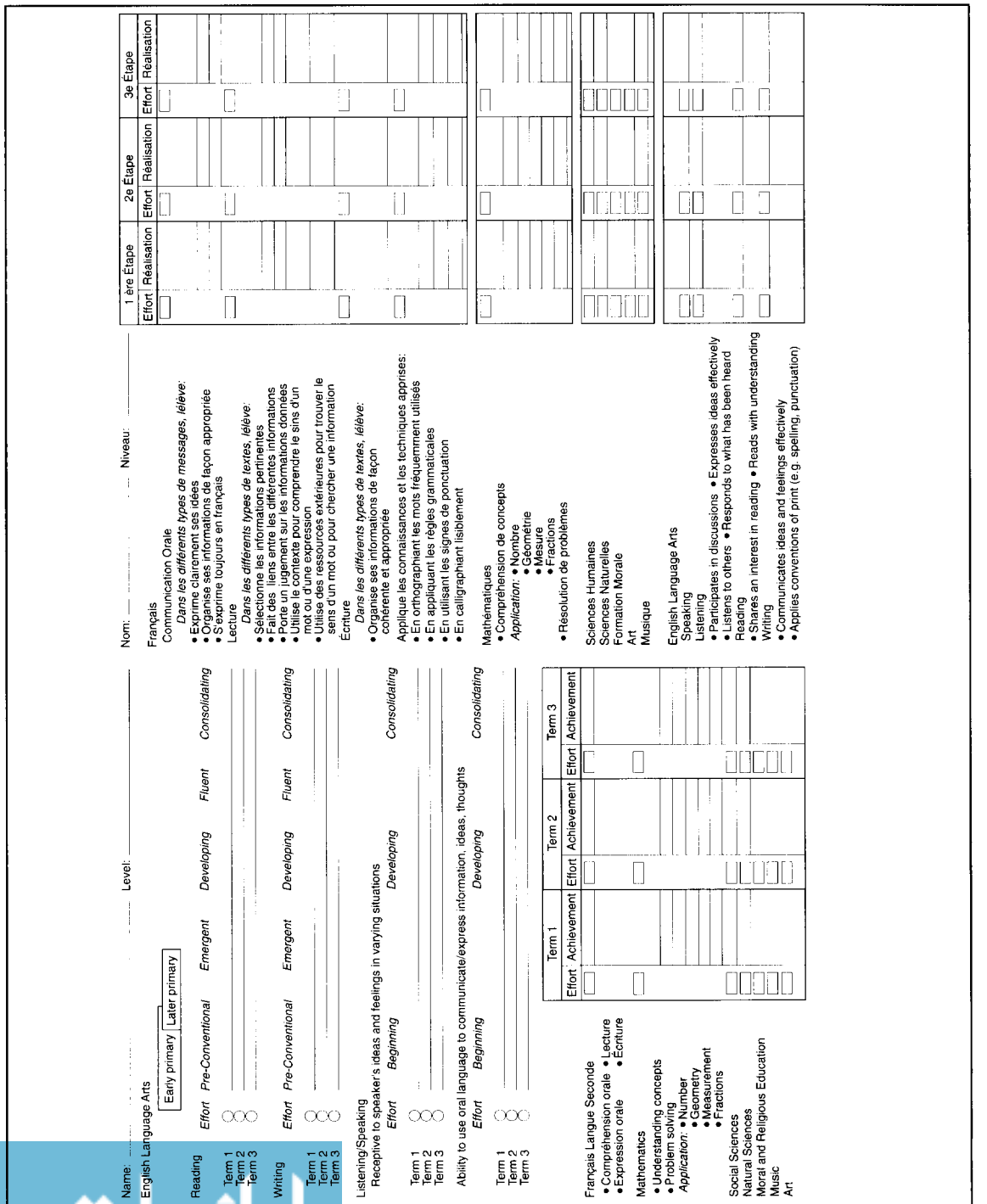
References

1. Statistics Canada, *The Montreal Gazette*, 2 April 1992.
2. Phyrr, P.A., *Zero Base Budgeting*, John Wiley & Sons, New York, NY, 1973.
3. MacFarlane, J.A., "Zero Base Budgeting in Action", *CA Magazine*, Vol. 109 No. 6, December 1976, pp. 28-32.
4. Hartley, H.J., "PPBS and Cost Effectiveness Analysis", *Educational Administration Quarterly*, Vol. 5 No. 1, Winter 1969, pp. 65-80.
5. Alioto, R.F. and Jungherr, J.A., *Operational PPBS for Education*, Harper & Row, New York, NY, 1971.
6. Popham, W.J., "California's Precedent Setting Teacher Evaluation Law", *Educational Researcher*, Vol. 1 No. 7, July 1972, pp. 13-15.
7. Burns, M.L., "Accountability for Educational Values: A School-based Application of PPBS", paper presented at the Canadian Association for Studies in Educational Administration Annual Conference. Kingston, Ontario, June 1991

(The appendices start overleaf).

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www.manaraa.com

Appendix 1. *Copies of Categories of Reporting Form: "Student Progress Report" First Cycle and* Deuxième Cycle du Primaire



Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www.manaraa.com

Appendix 2. *Bases of Computing Costs per Programme: Schools A and B, All Programmes*

	School A Grade two Eng. L.A.	Maths	Fr. 2nd Lang	Soc. Sci.	Nat. Sci.	School Grade six Français	Maths	Eng L.A.	Sci. Hum.	Sci. Nat.
Teacher equivalents										
1a Number s's in prog.	37	37	37	37	37	24	24	24	24	24
1b. Prog hrs/s'sa/week	7.5	5	5	1.5	1.5	7.5	5	5	1.5	1.5
1b.1=(1b. + 5) =/day	1.5	1	1	0.3	0.3	1.5	1	1	0.3	0.3
1c. total s's prog hrs/wk:										
(1a.) x (1b)	277.5	185	185	55.5	55.5	180	120	120	36	36
1d. T/P ratio for prog.	1 to 25	–	–	–	–	1 to 24	–	–	–	–
1e. Class sections/day:										
(1a.) + (1d.)	1.4	1.4	1.4	1.4	1.4	0.8	0.8	0.8	0.8	0.8
1f. # tchg hours/T/day	4.1	–	–	–	–	4.1	–	–	–	–
1g. # tch equiv./day:										
(1b.1) x (1e) + (1f)	0.5	0.3	0.3	0.1	0.1	0.3	0.2	0.2	0.06	0.06
In school personnel										
(costs to programme)										
2a. # students in school	260	–	–	–	–	260	–	–	–	–
2b. # students hrs/week:										
(2a) x 5da. 4.7hr/da	6110	–	–	–	–	6110	–	–	–	–
2c. Pers. at schl full time										
(Admin., secty., cust.):										
(1c) +(2b) = % of salary	0.045	0.03	0.03	0.009	0.009	0.03	0.02	0.02	0.006	0.006
2d. Pers part time:										
(% at sch) x (2a) + (2b)										
Librarian	0.02	–	–	–		0.02	–	–	–	–
Subject consultant	0.006	0.006	0.013	0.006	0.006	0.013	0.004	0.004	0.004	0.004
Student services	0.014	–	–	–	–	0.009	0.009	0.009	0.009	0.009
District personnel										
(costs to programme)										
3a. #students in district	136000	–	–	–	–	13600	–	–	–	–
3b. #s's hours per week:										
(3a) x 5da 4.7 hr/da	319600	–	–	–	–	319000	–	–	–	–
3c. # schs in district	28	–	–	–	–	28	–	–	–	–
3d. Cost to school:										
1 + (3c)	0.036	–	–	–	–	0.036	–	–	–	0.035
3e. Cost to programme										
sch cost x {(1c)+(3b)}	0.0009	0.0005	–	0.0002	0.0002	0.005	0.0003	0.0003	0.0001	0.0001

	School B Grade two Fr.. L.A.	Maths(Fr.)	Sci. Hum. (Fr)	Sci. Nat. (Fr)	School B Grade six Français	Maths (Fr)	Sci. Hum (Fr)	Sci. Nat. (Fr)	Anglais
Teacher equivalents									
1a Number s's in prog.	92	92	43	92	43	43	43	43	43
1b. Prog hrs/s'sa/week	7	5	1.5	1.5	7	5	1.5	1.5	2
1b.1=(1b. + 5) =/day	1.4	1	0.3	0.3	1.4	1	0.3	0.3	0.4
1c. total s's prog hrs/wk:									
(1a.) x (1b)	644	460	64.5	138	301	215	64.5	64.5	86
1d. T/P ratio for prog.	1 to 23	–	1 to 22	1 to 23	1 to 22	1 to 22	1 to 22	1 to 22	1 to 22
1e. Class sections/day:									
(1a.) + (1d.)	4	4	1.95	4	1.95	1.95	1.95	1.95	1.95
1f. # tchg hours/T/day	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
1g. # tch equiv./day:									
(1b.1) x (1e) + (1f)	1.36	0.98	0.14	0.29	0.67	0.48	0.14	0.14	0.19
In school personnel									
(costs to programme)									
2a. # students in school	550	–		–	–		–	–	–
2b. # students hrs/week:									
(2a) x 5da. 4.7hr/da	12925	–	–	–	–	–	–	–	–
2c. Pers. at schl full time									
(Admin., secty., cust.):									
(1c) +(2b) = % of salary	0.05	0.035	0.005	0.01	0.023	0.017	0.005	0.005	0.007
2d. Pers part time:									
(% at sch) x (2a) + (2b)									
Librarian	0.03	0.018	0.0025	0.005	0.011	0.008	0.0025	0.0025	0.0035
Subject consultant	0.005	0.003	0.0005	0.001	0.002	0.002	0.0005	0.0005	0.0007
Student services	0.005	0.003	0.0005	0.001	0.002	0.002	0.0005	0.0005	0.0007
District personnel									
(costs to programme)									
3a. #students in district	13600	–	–	–	–	–	–	–	–
3b. #s's hours per week:									
(3a) x 5da 4.7 hr/da	319600	–	–	–	–	–	–	–	–
3c. # schs in district	28	–	–	–	–	–	–	–	–
3d. Cost to school:									
1 + (3c)	3.6	–	–		–	–		–	–
0.035									
3e. Cost to programme									
sch cost x {(1c)+(3b)}	0.002	0.014	0.0002	0.0004	0.0009	0.0007	0.0002	0.0002	0.0003

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www.manaraa.com

Appendix 3. *Examples of Determining Programme Costs: Mathematics, School A, Grade 2, and Sciences Naturelles, School B, Grade 6*

School A (260 students) Mathematics, Grade 2 (37 students)

Resources	Units	Per cent unit cost	Cost per unit	Cost	Per cent programme	Cost programme	Cost student yr	Cost student hr
Personnel								
Teachers	0.3	100.00%	$48000,00	$14400,00	100.00%	$14400,00	$389.19	$2.16
Administration	1	100.00%	$65000.00	$65000.00	3.00%	$1950.00	$52.70	$0.29
Central admin: Directors	12	3.60%	$75000.00	$32400.00	0.05%	$16.20	$0.44	$0.00
Central admin: Secretaries	24	3.60%	$38000.00	$32832.00	0.30%	$16.42	$0.44	$0.00
Student services	0.1	100.00%	$45000.00	$4500.00	0.30%	$13.50	$0.36	$0.00
Consultants	0.1	100.00%	$52000.00	$5200.00	3.00%	$15.60	$0.42	$0.00
Secretarial	1	100.00%	$35000.00	$35000.00	3.00%	$1050.00	$28.38	$0.16
Custodian	1.8	100.00%	$48000.00	$86400.00	1.50%	$2592.00	$70.05	$0.39
Librarian	0.5	100.00%	$35000.00	$17500.00		$262.50	$7.09	$0.04
Materials								
Paper and copying	50	100.00%	$10.00	$500.00	100.00%	$500.00	$13.51	$0.08
Equipment and furnishings (Prorated to life expectancy)								
Teacher desk and chair	1.5	100.00%	$24.00	$36.00	21.00%	$7.56	$0.20	$0.00
Student chairs	37	100.00%	$3.72	$137.63	21.00%	$28.90	$0.78	$0.00
Student tables/desks	37	100.00%	$10.32	$382.58	21.00%	$80.34	$2.17	$0.01
Facilities								
Teaching area	1.5	100.00%	$9984.00	$14976.00	21.00%	$3144.96	$85.00	$0.47
Totals						$24077.98	$650.76	$3.62

School B (550 students) Sciences Naturelles, Grade 6 (43 students)

Resources	Units	Per cent unit cost	Cost per unit	Cost	Per cent programme	Cost programme	Cost student yr	Cost student hr
Personnel								
Teachers	0.1	100.00%	$48000,00	$6720.00	100.00%	$6720.00	$156.28	$2.89
Administration	2	100.00%	$65000.00	$130000.00	0.50%	$650.00	$15.12	$0.28
Central admin: Directors	12	3.60%	$75000.00	$32400.00	0.02%	$6.48	$0.15	$0.00
Central admin: Secretaries	24	3.60%	$38000.00	$32832.00	0.02%	$6.57	$0.15	$0.00
Student services	0.1	100.00%	$45000.00	$45.00.00	0.05%	$2.25	$0.05	$0.00
Consultants	0.5	100.00%	$52000.00	$5200.00	0.05%	$2.60	$0.06	$0.00
Librarian	0.5	100.00%	$35000.00	$17500.00	0.25%	$43.75	$1.02	$0.02
Secretarial	1	100.00%	$35000.00	$35000.00	0.50%	$175.00	$4.07	$0.08
Custodian	1.8	100.00%	$48000.00	$86400.00	0.50%	$432.00	$10.05	$0.19
Materials								
Paper and copying	15	100.00%	$10.00	$150.00	100.00%	$150.00	$3.49	$0.06
Equipment and furnishings (Prorated to life expectancy)								
Teacher desk and chair (15yr)	2	100.00%	$24.00	$48.00	6.30%	$3.02	$0.07	$0.00
Student chairs (15 yrs)	43	100.00%	$3.72	$159.96	6.30%	$10.08	$0.23	$0.01
Student tables/desks	43	100.00%	$10.34	$444.62	6.30%	$28.01	$0.65	$0.00
Facilities								
Teaching area	2	100.00%	$9984.00	$19968.00	6.30%	$1257.98	$29.26	$0.54
Totals						$9487.74	$220.65	$4.09

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www.manaraa.com

Appendix 4. *Computations Standardizing Costs at Base 60*

School A Grade 2					Grade 6					
Programme	English Lang. Arts	Français Lang 2ième	Maths	Social Science	Natural Science	English Lang. Arts	Langue Français	Maths	Sciences Humaines	Sciences Naturelles
Programme hours	90	60	60	18	18	60	90	60	18	18
Avg% success-term 1	85.25%	95.00%	71.40%	100.00%	100.00%	72.00%	91.75%	93.30%	83.00%	50.00%
Avg% success-term 2	98.50%	97.00%	62.40%	100.00%	100.00%	76.25%	95.50%	73.75%	61.00%	68.00%
Unit of success/hr	(+90)	(+60)	(+60)	(+18)	(+18)	(+60)	(+90)	(+60)	(+18)	(+18)
Success/prog hr-term 1	0.95%	1.58%	1.19%	5.55%	5.55%	1.20%	1.02%	1.55%	4.61%	2.78%
Success/prog hr-term 2	1.09%	1.62%	1.04%	5.55%	5.55%	1.27%	1.06%	1.23%	3.39%	3.78%
(Factor @ base 60)	(+0.67%)	(+1.0)	(+1.0)	(+3.3)	(+3.3)	(+1.0)	(+0.67)	(+1.0)	(+3.3)	(+3.3)
Success/hr-base 60-T1	1.42%	1.58%	1.19%	1.68%	1.68%	1.20%	1.52%	1.55%	1.40%	0.84%
Success/hr-base 60-T2	1.63%	1.62%	1.04%	1.68%	1.68%	1.27%	1.58%	1.23%	1.03%	1.14%
Cost/student hour (from Table IV)	$4.35	$4.16	$3.62	$4.03	$4.02	$4.18	$3.72	$4.18	$4.02	$4.02
$/Success unit/base-T1	$3.06	$2.63	$3.04	$2.40	$2.39	$3.48	$2.45	$2.70	$2.87	$4.79
$/Success unit/base-T2 (CST + Success Base 60)	$2.67	$2.57	$3.48	$2.40	$2.39	$3.29	$2.35	$3.40	$3.90	$3.53

School B Grade 2			Grade 6						
Programme	Français Lang Arts	Maths	Sciences Humaines	Sciences Naturel	Anglais Lang 2ième	Français Lang Arts	Maths	Sciences Humaines	Sciences Naturelles
Programme hours	84	60	18	18	24	90	60	18	18
Avg% success-term 1	94.25%	83.20%	95.00%	93.00%	93.00%	83.30%	95.70%	83.00%	95.00%
Avg% success-term 2	95.50%	83.20%	93.00%	100.00%	93.50%	86.30%	84.40%	76.00%	82.00%
Unit of success/hr	(+84)	(+60)	(+18)	(+18)	(+24)	(+90)	(+60)	(+18)	(+18)
Success/prog hr-term 1	1.12%	1.39%	5.28%	5.17%	3.87%	0.96%	1.59%	4.61%	5.28%
Success/prog hr-term 2	1.14%	1.39%	5.17%	5.55%	3.89%	1.03%	1.41%	4.22%	4.55%
(Factor @ base 60)	(+0.71)	(+1.0)	(+3.3)	(+3.3)	(+2.5)	(+0.67)	(+1.0)	(+3.3)	(+3.3)
Success/hr-base 60-T1	1.58%	1.39%	1.60%	1.57%	1.55%	1.35%	1.59%	1.40%	1.60%
Success/hr-base 60-T2	1.60%	1.39%	1.57%	1.68%	1.56%	1.45%	1.41%	1.28%	1.38%
Cost/student hour (from Table IV)	$3.94	$3.96	$3.89	$3.89	$3.92	$4.14	$4.18	$4.09	$4.09
$/Success unit/base-T1	$2.49	$2.85	$2.43	$2.48	$2.53	$3.07	$2.63	$2.92	$2.56
$/Success unit/base-T2 (CST + Success Base 60)	$2.46	$2.85	$2.48	$2.31	$2.51	$2.85	$2.96	$3.19	$2.96

Mildred L. Burns is an Associate Professor at McGill University, Montreal, Quebec. Diana Patterson and Leo LaFrance are Principals of Lakeshore School Board, Pointe Claire, Quebec, Canada.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www.manaraa.com