



Measurement of Economic Costs in School Programs for Children and Youth

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Introduction

Budgetary pressures now facing many United States (U.S.) elementary and secondary schools combined with politicians' calls for schools and school systems to accept greater "accountability" for student achievement have effectively put schools in a position of having to demonstrate the economic value of their programs and services. At the same time, many school system administrators and professionals who work with schools are unfamiliar with the basic tenets and methods of economic evaluation. Consequently, they are at a significant disadvantage in forums where the economic value of school expenditures is discussed and debated.

In the U.S., economic evaluations of programs and services offered by public and private organizations have become commonplace. Used initially in the 1950's and 1960's to evaluate the costs and benefits U.S. military programs, economic evaluation methods are now used in many service sectors and for a variety of purposes. Recent applications of these methods include evaluation of the cost-effectiveness of new medical services and devices, the economic benefits of public welfare programs for children, the economic return to investments in job training programs, and the economic costs and benefits of new regulations to restrict industrial pollution.

At least some elementary and secondary schools have participated in economic evaluations of their programs and services, and many more are making plans to do so. This article is designed to orient those unfamiliar with economic evaluations to some of their key concepts, methods, and terminology. These include the various types of evaluations; the concept of "opportunity cost;" which is used to rationalize measures of costs and benefits; and some key methodological issues that are addressed in nearly all economic evaluations.

Opportunity Cost and Resource Use

The economic costs of programs and services are generally calculated according to the principle of *opportunity cost*. A program's (or a service's) opportunity cost is the full value of all the resources it utilizes, regardless of whether a resource is directly purchased. Categories of resources used to deliver services include personnel, contracted services, buildings and facilities, equipment, supplies and materials, and miscellaneous items. The monetary value of resource

purchases are sometimes referred to as a program's *direct costs*. The monetary value of any resources donated to a program in-kind, any subsidies provided, and the depreciation value of a program's durable resources are sometimes referred to as *indirect costs*. Economic costs are the sum of a program's direct and indirect costs. In general, economic costs correspond to accounting costs plus the incremental value of any in-kind donations of resources and of any subsidies offered toward the acquisition of resources.

Of course the impacts of programs do not only include the direct and indirect costs of implementing and operating a program. They also include any impacts a service or program may have on future use of resources or savings from reduced resource use.

Finally, many economic evaluations take into account qualitative impacts of services on the utility (or level of happiness) of consumers of services, whether they be patients in hospitals or students in schools. Although these qualitative effects can be enormously difficult to measure accurately and precisely, they are often essential components of a program's overall impact. Such measures are sometimes used as measures of program effectiveness in economic "cost-effectiveness" evaluations. In other evaluations, these effects are assigned a cost based on external notions of the value (e.g., jury payments for pain and suffering).

Next we describe the major types of economic evaluation, summarize key components of cost and how they are measured, and discuss practical measurement strategies for valuing opportunity costs for resources used but not directly paid for by programs.

Types of Economic Evaluation

Economic evaluations of health services and interventions include analyses of cost consequences, cost-benefit, cost-effectiveness, and cost-utility. We describe these analyses as follows:

Cost Consequences. A cost consequences analysis evaluates the monetary value of resources needed to implement and produce a service over a defined period of time. It includes both direct and indirect costs, and any offsetting gains resulting from lower use of other related services. An example of an offset effect is lower use of out-of-state special educational services resulting from an expansion of the availability of specialized mental health promotion and intervention services at school.

Cost-Benefit. A cost-benefit analysis translates all effects of a service into cost and benefit components measured in monetary units (\$), which are then used to calculate Net Benefit, which equals Benefits (\$) - Costs (\$). All relevant direct and indirect costs are measured.

Cost-Effectiveness. A cost-effectiveness analysis calculates the ratio of the average incremental cost required for implementation of a service to its average incremental gain achieved. By incremental, we mean the added value or cost compared to some alternative, such as usual services or no services. The denominator of a cost-effectiveness ratio is expressed as the difference in outcomes between a particular service and specified alternative. The numerator is the added expense required to achieve these gains in outcome. Thus, the cost-effectiveness ratio represents the mean cost per unit of gain. Some interventions have negative ratios, which could

either mean that they improve outcomes and save money or that they worsen outcomes at a higher expense. Interpretation of the data in these cases is needed to separate alternatives that do not warrant further consideration from those that are highly desirable.

Cost-Utility. A cost-utility analysis is one type of cost-effectiveness analysis. The only difference between them is that the former uses "utility" as its primary effectiveness measure. Utility is the qualitative notion of one's degree of happiness or quality of life. In cost-utility studies of health outcomes, utility is directly measure on a scale running from 0 ("death") to 1 ("perfect health"). These utility measures are then aggregated over time to form so-called Quality Adjusted Life Years (QALY's). The incremental effectiveness of a service is then measured by the number of QALY's it produces relative to some specified alternative.

Methods Used to Assess Costs

Although the measure of benefit or incremental gain differs across economic evaluations, measurement of resource costs is common to all types of economic evaluation. Here, we describe key components of analyses of cost and strategies for cost measurement, then provide a few examples of subtleties and ambiguities that often arise when estimating the costs of school programs.

The Perspective of the Analysis

Measurement of costs begins by defining *the perspective* of the cost analysis. By the perspective, we mean the universe of costs to be included in the evaluation. Some studies adopt the *budgetary perspective* of an institution or network of organizations. Under a budgetary perspective, any effects that do not directly or indirectly impact the budget of the institution that provides a service are ignored. A broader alternative is the *societal perspective*, which encompasses all effects to members of a relevant group, such as all school employees, students, students' families, and other taxpayers within a school district. Other perspectives that are narrower than societal but broader than budgetary are sometimes used. For example, an evaluation of a job training program might include the budgetary cost of the program as well as the taxes paid by program participants following completion of the program.

Relevant Cost Metrics

Total annual cost estimates for programs, both overall and within categories for type of cost (e.g., labor, equipment, any other physical resources, and overhead administrative and capital costs), are useful summary measures of the opportunity costs of programs and services.

Another metric that is critical to the evaluation of the cost-effectiveness of one program compared with another is the average cost per unit of service. Average cost estimates are often expressed as a value per client per unit of time (e.g., the cost per client per hour), where the client of a service could, for example, be a student or a family. Using client workload data for specific programs (e.g., total client visits over a particular time period multiplied by the average duration of each visit), total program costs can be divided by workload estimates to compute an estimate of the program's average cost of providing uninterrupted services to a single client for an hour (or other unit of time). Based on length-of-episode or length-of-program-enrollment estimates, measures of the program cost per client per episode of program involvement can be computed.

It is worth pointing out that in order to construct useful cost metrics, the "program" must be defined based primarily on criteria other than financial convenience, administrative divisions, or cost center. A recognizable program or service delivery unit and domain, such as mental health counseling, define the context for estimation of costs. It is expected that organizations will vary in how they define programs and assign resources to those programs. For example, some programs will deliver services at a single facility with a facility-specific accounting system. Other programs will have multiple facilities with multiple financial structures.

Sources of Revenue

Programs are often supported by multiple sources of financing and sometimes receive in-kind donations of resources, such as shared administrative resources. When they are, reconciliation of these multiple sources is necessary to arrive at a measure of cost that does not double-count or omit significant resource costs. For example, a primary source of revenue for a program could be donations from a foundation. These resources may be received by programs only indirectly. For example, they may be received via awards to a local non-profit service organization or school. Medicaid reimbursements and other types of revenue sometimes are received by schools as lump annual sums, which are then allocated to specific programs out of a school's health or special education budget. In such circumstances, care and effort must be taken to sort out how much revenue is attributable to a particular program or service.

Cost Data Quality

Even when budgetary information is available, program staff members (e.g., administrators familiar with programs) are often used to substantiate the reliability of cost amounts shown in budgets, and adjustments are applied to budgeted amounts when necessary in order to provide an accurate estimate of cost. In addition, budgeted amounts for personnel costs are sometimes compared to individual payroll records when available to help validate these costs and to develop measures of the cost per unit of staff time.

Components of Cost

Salaries. Salary costs include the expenditures for all full-time and part-time program personnel as well as nominal stipends paid to program participants or interns. Accounting records of actual salary expenditures often are unavailable for at least some personnel paid by school programs; in these cases, annual budgeted amounts can be used to derive labor cost estimates using labor workload and salary estimates (see *Methods for Valuing Donated Resources and Subsidies* below). Payroll journals and general ledger summary payroll reports by type of position can often be used to impute salary information by type of personnel.

Fringe benefits. In addition to salary or wages, cost estimates should include fringe benefit costs for personnel who participate in the delivery of programs. Fringe benefits include the costs of providing payroll-related taxes, hospitalization, worker's compensation, disability, retirement and health, dental and life insurance. Fringe benefits are typically computed as a percentage rate of salary, which is then added onto salary costs to obtain total direct labor cost (net of overhead).

Supplies and materials. This category includes a variety of office and operating supplies along with educational materials and minor equipment/furniture purchases. These costs can usually be identifiable from an organization's general ledger combined with reasonable

assumptions about use of these resources by particular programs. When valuable resources are shared between programs, an allocation method is used to distribute expenses to each.

Contracted services. This category includes the costs for any services obtained by a consultant through a contractual agreement or on an adjunct basis. For example, a school system might purchase the services of a training consultant to help it implement a new treatment intervention program. Amounts budgeted for a training consultant should be verified by program staff and the salaries paid to the interviewers were obtained from payroll records. Other minor consulting costs reported on the community agency's general ledger were allocated between the screening and treatment programs utilizing similar methods based on total salaries as described above.

Buildings/Facilities. Although programs in schools often do not incur monetary annual rental/lease expenses for school building space, there is an opportunity cost associated with the decision to use this space to house a particular program instead of using it for alternative purposes. To estimate this cost, market rental rates for office space in similar buildings and institutions are used to impute an average cost per square foot of use per month or per year. This imputed rate is then multiplied by the square footage of occupied space to allocate facility costs back to screening and treatment programs.

Miscellaneous. This category represents the costs of other direct expenses not captured elsewhere. They include certain costs for telephone services, repairs and maintenance, staff travel and training, postage, advertising and other minor miscellaneous expenses. These costs are often tracked by programs or can be imputed using values obtained from similar programs.

Methods for Valuing Donated Resources and Subsidies

Most programs and services result in at least some amount of indirect costs from use of capital equipment, administrative services that are not specifically paid for by a single school service or program, and donated labor time. Valuation of these resources is enormously important. When they are ignored, programs that require few of these resources end up looking artificially expensive when compared against programs in which they are intensively utilized.

The general strategy to valuation of these resources is to multiply the quantity of a resource used in a particular program by an estimate of its market value per unit of time of use (i.e., by its *unit cost*). The market value of interest is the cost that the program would have incurred if the subsidized or free resource had not been available without payment.

Sometimes direct measures of the quantity of a resource used by a program are unavailable. In these cases, quantity can be estimated as a share of an aggregated measure. Allocation methodologies are often developed to spread recorded budgetary amounts between services categories in order to approximate their operating costs. The key to this approach is having information on the workloads or level of physical resource use associated with relevant cost centers within a school.

For example, it might be known that a program uses 200 square feet of office space within a school building 10 hours per week on average, or 520 hours per year. This represents roughly 104,000 square feet hours of office space use per year. By dividing this number by the total number of square feet hours of office in the school per year, we can obtain a percentage allocation

of office space to the school. Say this percentage is 1.3%. This proportion can be multiplied by the total annual budget for building depreciation to obtain a depreciation cost estimate for the program.

Adjustments may be made for special characteristics of programs that influence the value of space that a program uses. For example, use of classroom space during the daytime may represent a different opportunity cost to a school than classroom space used in the evening.

The following are important categories of indirect cost. For each we briefly summarize the approach to valuation.

Capital Equipment Costs. Depreciation is the value of a piece of equipment or capital investment that is lost over time due to degradation and obsolescence. In order to assess the financial cost impact related to depreciation on capital equipment, an allocation method is usually applied. This begins by listing an organizations' fixed asset inventory. These assets would include any shared infrastructure, such as telephone and air conditioning systems, which may serve an entire school or school-based health clinic, not just the school's MH/SA services.

For each type of capital, depreciation expenses specific to particular service interventions are computed using an allocation method. For air conditioning systems, for example, depreciation expenses can be computed based on the proportion of total square footage of space occupied by the service being evaluated. This proportion is then multiplied by the overall depreciation cost to allocate the costs attributable to the service. In some cases, records of utility bills of service providers can offer useful information about the cost of this type of infrastructure.

The depreciation expense for capital equipment is only one portion of its cost, however. There is also a societal cost associated with capital purchases. The opportunity cost of the funds tied up in the capital equipment items also has to be considered, as these funds could have been utilized for other purposes. To estimate these opportunity costs, a discount rate (i.e., an investment return foregone) is applied to the undepreciated balance of the program's capital equipment items and added to this balance. By convention, a discount rate of 3% is frequently utilized and sensitivity analysis over a range of reasonable rates (including 1, 5% and 7%) is computed to demonstrate the sensitivity of program cost estimates to the particular choice of rate.

Administrative Costs Not Directly Valued. Other indirect costs for services resulting from a program's need for various administrative and operational supports, such as building maintenance, accounting, payroll and data processing services provided by schools or by community agency should also be included in its cost. An allocation methodology is often required to distribute these indirect costs back to specific programs. To accomplish this, accounting staff sometimes provide information on the number of FTE staff of different types required to fulfill administrative functions. These FTE estimates are used in combination with information on the total number of FTE staff within an administrative unit and the total budget for that unit to derive the percentage of labor expense that can be attributed to a particular service. Additional adjustments are typically needed to account for factors such as fringe benefit expenses or overtime.

Donated Time. The costs associated with volunteer labor services received by programs should also be considered and included in any cost analysis. Programs often benefit from donations of time from students, parents, and other community members. For example, disease screening programs in schools sometimes are managed by nurses and other healthcare professionals who donate some of their time to schools. To estimate the costs associated with this volunteer labor, salary and fringe benefit information on paid employees who deliver similar services can be used to impute an hourly wage rate for these voluntary services. The imputed wage rate is multiplied by a measure of the amount of volunteer hours received by a program to convert volunteered time to monetary units.

An Illustration of the Complexity of Cost Measurement

Although carrying out an evaluation of a program's cost can be routine, usually it involves dealing evenhandedly with subtleties and ambiguities. To ensure accurate reflection of a program's actual opportunity cost in a cost estimate, economists and other practitioners who carry out economic evaluations require clarity of thought about the resource impacts of an intervention or service. Here, one of the more difficult issues in evaluations of programs offered by schools -- the costs of time of program participants -- is discussed briefly in the context of an example.

Suppose, for example, that a school has implemented, on a trial basis, a classroom-based behavioral intervention that is designed to prevent aggressive behavior in elementary school aged children. The school has invited an economist, Dr. Green, to complete an economic cost evaluation of this intervention, framed from the societal perspective. The intervention involves participation by all students in a classroom in a teacher-led game, wherein teams of students earn points for their good behavior, and lose points for their bad behavior.

How should Dr. Green value the students' time of participation in the intervention, if at all? Here, there is a certain ambiguity, which depends on how one views the value, or opportunity cost, of the students' time. In principle, their opportunity cost is the value of their time in the highest value alternative. Because elementary school aged students are not legally able to work for pay, the market value of their time is essentially zero.

However, by committing time to the intervention, the students are implicitly foregoing time which could have been spent in other classroom activities (e.g., learning mathematics). Classroom time is typically thought to be productive, and to have a corresponding financial return sometime in the future. In principle, the teacher's salary provides an approximate value of the students' time, because she is paid to spend her time teaching the students. The students' time could therefore be valued by the amount of classroom time spent on the intervention multiplied by an hourly rate of compensation for the teacher. This rate would include her salary plus fringe benefits costs and employer payroll taxes divided annual hours in the classroom.

How should Dr. Green value the teacher's participation in the intervention, if at all? The value of in-class time presumably should not be counted, because it is accounted for by the value assigned to students' time. However, the value of any additional time required of the teacher in intervention-related activities that occur outside of the classroom, for example, in evening training

sessions, would be counted. The value of this time would be counted either as a direct program cost, or as an opportunity cost of teacher time, depending on whether the teacher was paid for participation in training. The teacher's time attending training is the value of her foregone leisure time. If the teacher is explicitly paid for participating in a training program, the program incurs a cost that equals the value of the teacher's foregone leisure. If the teacher is not paid for participation in training, the opportunity cost of training would normally be valued using her hourly after-tax rate of pay multiplied by the number of hours spent in training.

The significance of counting these and other indirect costs of programs is that not counting them can result in unfair comparisons between competing demands on a school's resources. In the example above, if opportunity costs of time are not counted, the behavioral intervention would look artificially cheap. Comparison to another proposed program that would not require any additional classroom time but would require greater expenditure on teacher training would therefore be biased in favor of the classroom intervention. Fair representation of all program costs, whether direct or indirect, is therefore critical to an evaluation of the costs of school programs.

Summary

Evaluation of the costs of school programs and services is an increasingly necessary task. As schools enter an era of more rigorous evaluation of the costs and cost-effectiveness of their programs, they require knowledge about the methods typically used to assign costs. Schools may find advantages in implementing processes and systems to track resource use and to estimate the costs of the services they provide. Tracking costs more accurately can help reveal how a school's resources are being allocated, and can create an opportunity to meaningfully compare the cost implications of alternative uses of a school's resources.

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