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Costing basic academic programs

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TABLE OF CONTENTS

INTRODUCTION

The American economy is squeezing public education right out of business. In the 1960s, when local taxpayers were asked for money to build a new school or expand a program, the answer was, "How much do you want?" Public schooling was the major interest of local communities. The results of the post-World War II baby boom were entering the schools. The priorities everywhere were to find space, personnel and teaching materials to educate these future citizens. Sputnik had been launched and American technology was threatened. School science programs became the target of generous financial support. Education enjoyed a situation of automatic public trust. The attitude of "bigger is better" pervaded most areas of the United States.

However, as student enrollments declined and inflation invaded in the 1970s and 1980s, various publics began to scrutinize school budgets. Questions such as, "Why does it cost more to educate fewer students?" have caused administrators to be more accountable for their expenditures. As public monies have become more scarce, certain expenditures have had to be cut. Public educators suddenly began to be interested in how much certain programs cost. Researchers, such as Johnson and Stafford, began to question the "bigger is better" theory.

> During the past decade, the major emphasis of research into the economic benefits accruing to investment in education has been in the area of costs of and returns to what we shall term quantity of schooling, namely, to additional years of schooling. In comparison, minor emphasis has been placed on the quality of schooling, namely, to expenditure per pupil per unit of time which we shall use to approximate quality of schooling (26).

Financing education, like the financing of any public service, is becoming increasingly difficult to achieve as post-industrial nations mature. According to Taylor, "The burgeoning costs of providing educational services, coupled with the pressures of declining resources, have placed school administrators in the increasingly awkward position of having to make difficult choices in allocating limited resources" (41). Public school education is having to share its financial resources with an increasing number of other social programs. Due to shifting age groups, some programs, such as old-age assistance, are gaining support for the public dollar. As this expansion of public supported social programs affects the tax dollar, education is being required to cut back on expenditures and be more accountable for the money being expended. School boards and administrations are more conscious of what programs are offered in relation to what can be afforded.

The idea of relating programs to costs has not been a routine practice of many schools. Cost analysis and cost-benefit analysis are exercises with which private businesses have long been involved. Even many public agencies, such as those dealing with transportation, health and urban planning, have attempted to measure costs and benefits (44). Speaking about public economics, Haveman and Margolis say, "...it now seems clear that the future work of scholars, politicians and administrators will be influenced by the recent blossoming of the field" (22).

Very little research has been done on the subject of costing out individual academic programs. Several early attempts occurred at the

junior college level in the area of vocational education. At the secondary level, Deputy (12) analyzed the costs of high school vocational courses as they compared to academic offerings and obtained a formula for costing out such programs. Most of the recent literature is centered around program budgeting, which is the general term for planning, programming and budgeting system (PPBS) and zero base budgeting (ZBB). In many of these plans, attempts are made to identify the programs that make up the total school operation (51). Some operational manuals, both on a local organization and a state department level, such as the Greenwich, Connecticut model (18) and the Florida State model (15), do have some sections devoted to formulae for costing out specific programs. A few books, mainly on PPBS, also suggest some methods of determining program costs. James Dei Rossi (11) and Stephen Knezevich (27) both present some ideas of costing programs in their discussion of PPBS. However, the vast majority of the contributors to program budgeting cleverly skirt the issue of how to cost out specific programs.

Programs in education do not lend themselves well to the identification of specific costs. Traditionally, the total educational process was funded as a whole. The public made the necessary money available and did not question its distribution. As more and more programs were added to education, resulting in higher costs, it has become fiscally wise to attempt to identify specific program costs. However, many support costs (i.e., administration, transportation, health services, maintenance, etc.) apply to the total educational process, and yet

contribute to some degree or another to individual programs. Even the identification of programs is difficult to standardize, partly due to the difference in the importance of the many programs. Only recently have state departments of public instruction begun to request financial reports of a more detailed nature. Therefore, little guidance has been provided to local organization accounting. Uniformity of accounting practices among different states is even less common.

Since public and private school organizations are increasingly being held accountable for both expenditures and educational results, cost-benefit analysis must be an integral part of planning. Taylor warns that, "In too many situations, the decisionmaker bases his or her decision on impressions, lobbying pressures or expediency rather than on an empirical base of a carefully researched set of facts" (41). Costing procedures will provide specific costs for identified programs and will form the basis for future planning, for both the continuation of existing programs as well as the consideration of new programs. Costing will also separate support service and special project costs from basic program costs to assure that expenditures are for the desired purposes.

It is critical for administrators to know, precisely, the costs of all parts of the educational operation. As they are confronted with revenue cuts, which demand budget cuts, recommendations cannot be made without knowledge of costs. If additional money is requested for expanded programs or building improvements, the public will want to know specifics about the amount of money requested and its use.

Boards of education are being questioned about the accountability of their school organizations. They are needing facts and figures to justify their decisions. Boards are also required to set more priorities since several program options cannot be funded. The costs of programs, along with their relative importance, must now be figured to realistically make decisions concerning priorities.

Employee unions are also making financial demands, presenting an internal source of frustration. Staff salaries and benefits control from 65 to 95 percent of school expenditures. Sophistication of bargaining strategies is greatly improved with precise costing data. Without this information, employee unions and third parties will not be convinced of ability/inability to pay. With good information concerning relative costs of all aspects of the educational budget, union demands can be kept in proper perspective.

As mentioned earlier, costing school programs is complex, as is the costing of any social service, but can yield valuable data. Hu Teh-wei et al. point out that, "Educational services produced by schools are both a consumption good and an investment good" (43). Indirect costs of capital investments, support services and the lost opportunity of students to earn money are difficult factors with which to deal. However, once a system is created and adopted, modern technology can easily generate the required data. As soon as costing data are available, a similar process of identifying benefits can be organized. This also is a complex process, mainly due to the many external benefits that must be considered. It is also difficult to convert these benefits

into monetary units. However, several methods are available to either estimate monetary values or consider non-monetary benefits. By comparing costs to benefits, an additional, and possibly more valuable, program determinate is available for decision making.

Statement of the Problem

In order for public and private schools to survive in this age of limited financial resources, administrations must carefully plan and account for all expenditures. Any program that is offered by a school organization needs to be worth the investment. This requires some type of cost-benefit analysis. The prerequisite of such an analysis is a systematic and meaningful method of allocating costs. This, at one time, was thought to be unimportant and even impossible. However, with the advancement of data processing capabilities, it has become more manageable.

The problem that this study addresses is the lack of a practical, systematic method of determining specific academic program costs.

A method of costing is not without its problems. Many decisions have to be made about the organization of the total educational operation. Budgets must be itemized in great detail and supported by judicious coding procedures for receipts and expenditures. These records must be maintained and organized in a systematic fashion.

Purpose of the Study

This study proposes to analyze financial records of selected schools and their corresponding organizational patterns, to generate

a standard model for costing basic academic programs. This model, having been tested by its application to the schools in the study, will then be available to determine program costs for any school that wants to analyze costs and benefits. Before a legitimate analysis can be performed, good costing methods must be applied.

More specifically, this study proposes to do the following:

1. To delineate the various sources of costs in the teaching of academic programs.

2. To develop a method of costing out basic academic programs.

3. To provide a comprehensive procedure to identify the total costs of teaching academic programs.

4. To provide a model for other educators to use to cost other program areas.

Definitions

The understanding of several terms which identify or describe various concepts that are related to this topic is helpful to the reader. Some of these terms have many implications depending upon how they are used and to what subject they are related. Following are definitions of terms as they relate to this study.

1. Academic - Traditional, core subject matter in schools that require strong, mental activities.

2. Account - A specific financial record containing information about a resource or a financial transaction.

3. Accounting - The process of classifying data for record keeping and summarizing transactions.

4. Allocating - The process of apportioning resources among programs or functions for a particular purpose.

5. Analysis - A systematic separation of a structure or problem to identify relationships of its components.

6. Benefit-cost Analysis - Synonymous with cost-benefit analysis.

7. Budget - A plan for receipting and expending money.

8. Cost - An outlay or expenditure to achieve an objective.

9. Cost Accounting - A part of accounting concerned with identifying all resources used in performing a specified activity.

10. Cost-benefit Analysis - A systematic study of relationships between economic value and economic costs of an activity.

11. Externality - A side effect from an activity that has no specific market.

12. Fiscal - Of or pertaining to financial activities.

13. Line-item - A specific object of expenditure placed on a separate line in a budget.

14. Model - An interrelated, systematic pattern that generalizes a real situation.

15. Opportunity (cost) - Economic value of opportunities foregone.

16. Planning - A process of preparing decisions for future actions.

17. PPBS - Acronym for program budgeting.

18. Program - Interdependent, closely related activities pertaining to common objectives.

19. Program Budget - Grouping expenditures around identified objects.

20. Prorating - Arbitrary techniques to assign a cost to several categories.

21. School Organization - A local school unit, a school district or an independent school.

22. Support Services - Essential, non-instructional school agents that facilitate the total school operation.

23. System - A group of components designed to accomplish an objective.

24. Unit Cost - A per measurable unit cost.

25. Zero-base Budgeting - Starting every program at zero cost and questioning all planned expenditures for justification.

Major Questions

It is a fact that financial resources are limited for educational purposes. It is also true that the educational process is complex and consists of a wide variety of services that require funding. Boards of directors and school administrators want to allocate money in proportion to the value of the service or program, as it relates to the education of children. In addition, the general public demands financial accountability. It is obvious that cost-benefit analysis of school programs is a necessity. Several sources are available to suggest methods of analyzing possible benefits of education. However, methods of providing reliable cost figures are lacking and cost-benefit analysis is based both on costs and benefits. Therefore, an exacting method of costing academic programs is needed.

As stated earlier, the purpose of this study is to create a model for determining the costs of individual academic programs. In order to create a workable model, the methods are being applied to five school organizations of varying descriptions. The two specific academic programs of reading and math are designated as the programs whose costs are to be determined. This study is not interested in any comparisons of data that are collected. Therefore, the one central question is:

1. Can specific costs of individual academic programs be determined?

Related to this central question, the following secondary questions will be answered:

2. Can a uniform set of academic programs be established for the five different school organizations?

3. Can all expenditures be attributed to academic programs?

4. Can property values be prorated to academic programs?

Sources of Data

Sources of data for this investigation were the five school organizations that joined together with Iowa State University to form a consortium for purposes of developing and testing a total system approach to school improvement. Directed by Dick Manatt and Shirley Stow, the consortium effort centered on administrator performance, teacher performance, student achievement and unit costs. The present investigation was a part of the unit cost analysis. School organizations included Minneapolis Public Schools, Edina Public Schools, Northfield Public Schools and Breck (Independent), all in Minnesota,

and Spirit Lake Community Schools in Iowa. The consortium was called the School Improvement Model (SIM) project and was funded, in large part, by the Northwest Area Foundation of Saint Paul, Minnesota. Under the auspices of SIM, the financial officers of each school organization made available all necessary financial data for this dissertation. Program and personnel information was obtained with the assistance of the SIM project staff.

REVIEW OF LITERATURE

Efficient practices in the financial operations of public agencies did not become an issue for study and comment until the 1960s. Most of the interest in cost-effectiveness before this time was related to the private sector. Even cost-effectiveness studies in the private sector before 1960 were rare. This pattern is logical, in that it parallels the historical development of both private and public businesses. As competition among private businesses grew, coupled with a limited supply of resources, incentive was present to improve efficiency. The delay in being concerned about efficient practices in the public sector can be attributed to the more recent development and growth of these agencies. It is also logical to assume that the absence of a profit motive in public agencies may have contributed to a lack of interest in efficiency.

Contrary to the fact that little interest was evident in cost-effectiveness before 1960, Harris and Bobbitt, as a part of the "scientific management" movement, were involved in educational cost studies as early as 1914 (21, 3). Harris sent out statistical blanks to principals and teachers in 19 northeastern Illinois high schools to gather data on teacher salaries, grades and subjects taught, minutes taught and numbers of pupils taught. He used this information in formulae to determine "costs of pupil per teacher" and "costs per year-minute" for various subjects (21). Bobbitt used 25 schools from the Midwest to obtain data similar to that assembled by Harris. He compared academic subjects by their cost per 1,000 student hours.

He determined that manual training and music required high costs, while English, modern languages and household occupations were low-cost programs. Bobbitt believed that, "Accurate cost-accounting lies at the foundation of all successful business management" (3).

After Harris and Bobbitt, one of the early modern pioneers of costing out educational programs in the United States was an economist by the name of Theodore Schultz (37, 38). Working in the early 1960s, he prepared charts that estimated the costs of education, on a national basis, from 1900 through 1956. Schultz stressed the impact of opportunity costs, or income that is foregone because students are not able to work while they are in school. He maintained that income foregone is the biggest, single cost by stating that, "...most of the real costs of secondary education are a consequence of the earnings that students forego while attending school" (37). The smaller part of the cost of education is all of the costs in the actual operation of the schools. Schultz did not compute these costs; instead, he used existing statistics from agencies such as the U.S. Department of Health, Education and Welfare. As a result of Schultz's studies, he concluded something that is obvious to present-day educators, "...the stream of resources entering into elementary education has increased less than that entering into either high school or higher education" (37).

After Schultz initiated the idea of applying economic costing techniques to education, some interest surfaced in studying the relationships between investments in and benefits of education (2, 16, 20, 23, 31, 52, 53). Hansen (20) used many of Schultz's cost figures (37)

and demonstrated that the return on the investment of schooling is positive. Hansen divided Schultz's costs into total resource costs (T.R.C. = teacher salaries, supplies, capital, opportunity costs and books) and private resource costs (P.R.C. = tuition).

Merrett (31) also showed a positive relationship between education and income. He devoted most of his efforts to figuring out opportunity costs. Gisser (16) went into more detail in costing out education in his study, which sought to determine that more schooling produces higher farm wages. He used farm wages, farm labor input and farm capital as components for wages and per pupil costs for schooling costs. He obtained total national costs for schools and divided that by the total number of pupils. He then adjusted this cost for foregone wages.

Even though most of the early research stressed the importance of foregone wages in computing the cost of education, some began to question the concept (51, 54). Vaizey (49), an economist doing work in Great Britain, first suggested that opportunity costs not be counted. Wiseman (53) generally questions the whole idea of the costing of human investments. He questions the importance of the costs of income foregone and wonders why the costs of leisure are not ever considered.

Another approach, using the costs of education, was typified by Correa (8, 9). He attempted to convert the costs of a course, the cost of its prerequisites and the value of its benefits to mathematical equations. He then used these equations to insert different variables in order to maximize a certain factor. He went a step further than the

use of this quadratic programming by applying his idea to linear programming. As a result, he had a method to determine which courses were more economically taught than others. Unfortunately, this approach of analyzing educational offerings did not gain popularity in educational circles.

In the late 1960s, Burkhead (4) simplified the economists' approach into a more meaningful method in his study of large-city high schools. Burkhead ignored many of the external costs and benefits and dealt only with input and output within the educational setting. He studied the school systems of Chicago and Atlanta to determine optimum input and output combinations. Outputs, such as I.Q. scores, reading scores, number of dropouts and post-high school education intentions, were used as dependent variables. Inputs, used as independent variables, were median family income, average daily membership, age of school building, per pupil textbook expenditures, per pupil material and supply expenditures, median teacher experience, median proportion of teachers with M.A. or higher degrees, teacher man-years per pupil, administration man-years per pupil and auxiliary man-years per pupil. Coefficients of multiple regression were obtained for each combination of input/output variables. His results were then used as a stimulus for program budgeting. Even though Burkhead began to recognize meaningful input for analysis, he did not isolate a uniform core of input and determine their actual costs.

At about the same time as Burkhead's study, others began to analyze education costs apart from some of the complicating factors of the

economists. Coombs and others (6, 47) were involved in the planning of educational programs for developing nations through U.N.E.S.C.O. Coombs also linked educational costs with outcomes. In his discussions of educational costs, he separates resource costs, such as the number of teachers, textbooks and the amount of floor space, from money costs. He also cautions against the use of the effect of budget comparisons because of inflation. He recommends the use of constant dollars rather than current dollars. Capital costs (land, buildings and equipment) are to be added to current costs to determine total costs, according to Coombs. He provided a general overview of educational costs in educational terms. Webster (52) simplified his example even further by using direct costs only. He separated budget components and determined average costs per classroom. These figures were used for the adoption of new programs.

The most popular practical application of educational costing in the late sixties and early seventies compared costs of general education to vocational education. Corazzini (7) was concerned about the wisdom in investing in vocational education. He stressed the benefits of one program versus another. Correa and Hu Teh-wei et al. (8, 43) investigated the benefits of vocational education to developing countries. Deputy (12) determined that costs of vocational programs in high school exceeded those of general programs. He dealt only with direct program costs and not with indirect or foregone costs.

Probably the main body of literature related to educational costs was produced in the 1970s under the concept of program budgeting.

According to Haggart (19), this is one of the four components of program budgeting. The first component is the structure aspect, involving the setting of objectives and the development of a program structure. Cost-effectiveness analysis is a part of the second component -- the analytical aspect. The third component is the control aspect, or keeping tabs on the program. The fourth component is the data and information aspect which is the result that supports the analytical part of the program.

Dei Rossi (11) provided a step-by-step discussion of cost models for cost analysis. One of the first tasks is to define all the major categories of resources required by the district as cost elements. Once cost elements are defined, to avoid duplication, relationships among the elements are estimated by using numbers of units or unit costs. These are then used to plan costs for a multi-year period, as well as to determine total costs. The total cost can be used to compare various program alternatives.

Even though costing is an important component of PPBS, the actual figuring of the costs is not dealt with, in much detail, in the literature. Hirsch et al. (24) dealt more with the cost of change than with basic education costing. He discussed economic costs such as social costs, income foregone costs to society and maintenance costs, with respect to making changes in the Los Angeles County School transportation and maintenance programs. Others (1, 18, 30, 42, and 51) devote the majority of their work to the budget objectives and budget coding. Knezevich devoted a little more time identifying costing components, but he tended to shadow

their importance by stating that the schools "...were not and should not be concerned with the cost of service performed. They were not pursuing a profit, many of their social contributions were intangible but 'significant,' and cost accounting might lead to 'a cult of efficiency'" (27).

As a result of the interest in PPBS, the cost-benefit component began to be studied in more economic detail. These studies (14, 22, 29, 34, 44) involved the broader area of the public sector, in general, and usually devoted some references to education as examples. Urban development, transportation and health services were of more interest to these economists. In 1975, Maciariello pointed out the main problem in dealing with public benefits: "In all applications of benefit-cost analysis, economists have used the second-best procedure of estimating benefits in monetary terms as quantitative surrogates for true changes in social utilities, since quantitative estimates of true social utilities are beyond the scope of current estimation procedures" (29).

After about 20 years of studies and comments about educational costs and benefits, several workable examples have emerged (13, 15, 39, 41, 54). These are mainly in the form of budgeting manuals developed by educators. The state of Florida developed a manual with some definite ideas of ways to determine unit costs (15). The most practical manual published was authored by Snyder and Hogan and presents their "Cost Accountability System." They are both school superintendents who developed their system while practicing school

administration. This reference goes into great detail in the use of unit costs and program costs (39).

Summary

Interest and attempts in costing out academic programs have occurred in three phases. The first was characterized by Bobbitt (3) and Harris (21), who compiled statistics from high schools on costs per teacher and costs relating to different time units. This interest was stimulated by the popular concept of "scientific management" that was in vogue in the early 1900s. The second phase, in the late 1950s and 1960s, was dominated by economists. Theodore Schultz (37, 38) initiated this approach and was followed by Hansen (20), Merrett (31) and Gisser (16). These researchers analyzed opportunity costs and attempted to relate their costs to benefits derived from education. This phase began to move into the third phase when the British economist, Vaizey (49, 50), began to discount the concept of foregone wages as a costing factor. Wiseman (53), Burkhead (4) and Webster (52) further solidified this approach from an educator's perspective rather than an economist's. The early academic programs that were costed, related to studies of vocational programs by Deputy (12), Correa (8) and Hu Teh-wei et al. (43). Then, as a result of needs brought about by program budgeting, popularized by such educators as Haggart (19) and Knezevich (27), costs for the entire school operation became important. In the late 1970s, several approaches have been attempted to refine cost-benefit analyses. However, they have been lacking

detail on the costing side and the issue of including indirect costs is in serious need of consideration.

In the final analysis, the need for efficiency in our public schools is well-established. The recent economic recession in the early 1980s has helped to emphasize this fact. Authors such as Johnson and Stafford (26) and Leggett (28) have recognized this need and have attempted to help educators economize with many cost-saving ideas. Many educational journals have devoted quite an amount of space in printing articles on cost efficiency. This has also been a popular topic for professional conferences and workshops. Efficiency has become a necessity. However, it is obvious that there is a void in the process of determining cost-benefits in education. School organizations need to know how much it costs to teach basic academic subjects. There is no one, good, comprehensive method of determining these costs. The best reference that approaches the detail necessary for actual program costs is Snyder and Hagan's Cost Accountability and School Administrators (39). Beyond that, the references assume too much in the cost part of cost-benefit analysis. Of these other citations, the Florida State model (15), Haggart (19), Schultz (37, 38) and Thompson (44) are the best discussions of cost-benefit analysis in the schools. Due to the void of a costing method, a model that accounts for actual costs in much more detail is needed. All expenditures must be analyzed and allocated to the teaching of academic subjects. This is what school is for, and only when true costs are obtained can wise decisions of cost effectiveness be made.

METHODOLOGY

Overview

The procedures followed in this study are parts of four phases. The first phase involves many decisions pertaining to the scope and rationale for this project. The second phase consists of initial approaches to program costing, utilizing a familiar situation. The actual testing and adjusting of procedures with the study's schools is the third and most involved phase. The methodology culminates with a concise, step-by-step method of costing academic programs.

Scope and Rationale

Delimitations

The main purpose of this study is to generate a standard model for costing basic academic programs and validate it by its successful application to sample schools. To properly define the study's scope, the following delimitations apply:

1. This investigation is limited to the five school organizations in the SIM project.

2. Data collected are from central office sources only.

3. Only the fourth and eighth grade levels of math and the fourth grade level of reading programs will be analyzed.

4. All data are for the 1982-83 school year only.

Basic assumptions

The large number of variables related to this task requires that certain assumptions be accepted. The underlying assumptions that need

to be accepted for this study are:

1. All budget amounts obtained represent actual expenditures.

2. Budget and financial data submitted by the schools are accurate and complete.

3. Student and teacher time relating to costs occurs during the school day.

4. Data obtained from the schools are accurate.

5. Reading and math are representative academic programs.

6. Opportunity costs for students are zero.

7. The SIM schools are representative of schools in the United States.

8. The number of student days for the 1982-83 school year of the project schools are equal.

9. The life of each building is 80 years and of all contents is 15 years.

Guiding principles

As decisions were made for the many procedures in the costing process, they were governed by certain beliefs and understandings of this researcher. Those beliefs and understandings pertinent to this model are summarized in the following principles.

1. All expenditures support the academic programs.

2. All class time is spent on academic programs.

3. All building space exists for academic programs.

4. Actual costs are used if possible.

5. Prorated costs are stated per square foot of academic program space.

Initial Approach

Indirect costs

The cost of education involves a large variety of expenditures. Many of these expenditures are not directly related to the actual teaching of a particular academic subject. Costs for bus transportation, health services and custodial services are examples of costs that are not directly related to subject matter but are necessary for the operation of a school. As methods of ascertaining costs of academic programs were being considered, how to deal with these indirect costs became a real issue. Virtually all of the efforts to cost out educational services that were reviewed in the literature ignored these costs as operational costs that were not related to teaching. However, it was decided that these costs are a necessary component in the cost of teaching and must be included in this study. It is the view of this writer that any and all expenditures of public taxes or private tuition are for the purpose of teaching academic subjects. Therefore, they need to be a part of the cost to teach any subject.

Basically, two approaches were considered to apply these indirect costs to programs. Schools that have federal programs have a restricted, indirect cost-rate factor that is to be used on applications for federal funding. This is a percentage figure to be applied to the total budget of a federal program to account for these indirect costs. The figure is obtained, under the Restricted Indirect Cost Allocation

Plan, by analyzing a school's total budget with respect to amounts of indirect expenditures. Because of the restricted nature of determining this factor, mainly the exclusion of fixed assets, a more exacting alternative was selected. This involves identifying all expenditures from a budget, as well as values of fixed assets, and either applying them directly or prorating them to the academic program. The specifics of applying these indirect costs will be explained in more detail in a discussion of budget allocations.

Budget categories

To begin to formulate an idea of how to categorize budget expenditures, a familiar local school budget, that of the Monticello Community Schools of Monticello, Iowa, was analyzed with respect to academic program costs. Several key factors of costing emerged from this analysis. All budgeted expenditures could be categorized as either an organization-wide, building support or direct program expenditure. Organization-wide expenditures are indirect costs relating to organization or district level services, such as central office administration and staff, central maintenance personnel, transportation services and community services. This category refers to expenditures that cannot be applied to any one attendance center but are for the benefit of the organization as a whole. Building support expenditures are for indirect costs at the attendance center level. These expenditures refer to building administration, custodial services, health services, guidance services, media services, etc. Building support services cannot be applied directly to an academic program but are for

the benefit of all programs in the building. The third category, direct program costs, refers to those expenditures for specific program operation. Examples of these are math teachers, reading materials, science equipment, etc.

Fixed assets

A fourth factor, not part of the budget but which merits consideration, is the cost of fixed assets. Schools could not operate without buildings, desks and other fixed equipment. This is a cost for which some accounting must be made. Two sources of this information were considered. The original costs of buildings and equipment would provide actual expenditures that were once made for these assets. However, this information would be very difficult to obtain for many schools. The option used in this study is the buildings and contents value that is maintained for insurance purposes. Most schools have insurance and can obtain these values. These values are expressed as yearly depreciation figures based on the life-expectancy of the assets.

Academic programs

Once the sample budget was analyzed by categorizing all expenditures as either organization-wide, building support or direct program costs, methods of prorating indirect costs to academic programs needed to be considered. At the same time, a uniform list of academic programs was identified. The first list of academic programs was as follows:

Art
Reading/language arts
Foreign language
Physical education
Math
Music
Science
Driver education
Social science
Agri-business
Business education
Home economics
Industrial arts
Special education

Methods of proration

Logical methods of proration are on a per pupil, per classroom or per square foot basis or per some unit of time. Since one of the uniquenesses of this study is the inclusion of indirect costs, using a time unit as a common denominator did not seem appropriate. Many of the indirect costs pertain to buildings which relate to square feet. Even though time is not the common unit used, as is evident later in this discussion, it is one of the critical factors used in the proration of costs. Total expenditures of indirect costs can be divided by the number of pupils in a school organization to obtain a per pupil cost, which can be multiplied by the number of pupils enrolled in a program in question, to obtain a prorated indirect cost for that program. The same procedure can identify a per classroom cost, which can be multiplied by the number, or fraction of the number, of classrooms used in a program, for the prorated indirect cost. For a square foot proration, indirect costs are divided by the total square feet of

building space in a school organization and then multiplied by the number of square feet used for the program.

The method of proration chosen for this model is a combination of per pupil, per classroom and per square foot cost. The exclusive per pupil cost was rejected because of the variance of pupils from year to year. Its use also made it suspect in comparing final costs from program to program and from school to school. This is because a class with 30 students may cost the same as a class with 15 students, but would not appear that way if indirect costs were allocated on a purely per pupil basis. On the other hand, the use of a per classroom method of proration does not discriminate for efficiency of class size. The per square foot method is used in this model, with the number of square feet needed for a program determined by the number of classrooms or sections of the program multiplied by the portion of time students spend in the program. Looking at this symbolically:

$$P' = \#Se \times Cl' \times St\%$$

where

P' = number of square feet required for the program

#Se = number of rooms or sections of the program

Cl' = number of square feet of the average classroom

St% = percent of the day spent in the program.

The above formula for allocating indirect costs to academic programs requires a procedure to determine the portion of the students' time spent in a program. This procedure involves the allocation of the total number of minutes that students are required to be in school each

day to each program or activity that they attend. The number of minutes allocated to a specific program is then divided by the total minutes of the school day to obtain the percentage of time required for the program.

$$St\% = StCl/StDa$$

where

St% = percent of student time spent in the program

StCl = student time spent in all classes

StDa = student time in school.

This percentage helps to determine the number of square feet required for the program.

Prorating costs of categories

The resultant number of square feet for a program from the previous two paragraphs is used in allocating building level support and fixed asset costs, as well as organization-wide costs, to specific programs. Total building support costs are divided by the total square feet in the building to determine building support costs per square foot. This cost per square foot is simply multiplied by the number of square feet for the program to obtain the building support cost allocated to the program.

$$\$BSp = \$BS/B' \times P'$$

where

$BSp = building support cost per program

$BS = total building support cost

B' = total square feet of the building

P' = number of square feet required for the program.

Likewise, depreciation costs for buildings and contents are figured per square foot and the result multiplied by the number of square feet used for the program. Depreciation costs are figured from a life-expectancy of 80 years for buildings and 15 years for contents. These figures were chosen as representative of those used by the school organizations in the study.

$$\$B' = \$B/(80 \times B') \times P' \qquad \$C' = \$C/(15 \times B') \times P'$$

where

$B' = building depreciation cost per square foot

$C' = contents depreciation cost per square foot

$B = total building cost

$C = total contents cost

80 = 80 year life-expectancy

15 = 15 year life-expectancy

P' = number of square feet required for the program.

Direct program costs consist of a combination of these line-item budget costs, specifically for the program, and the teacher salary costs for the program. Since teachers generally teach more than one level of one subject, their salaries must be prorated to the program being costed. The same method of using a percent of student time to allocate space to a program is used to allocate teacher salaries. However, the percent used is of teacher time and requires knowledge of the length of the teacher day. The number of minutes the teacher is required to teach in a particular program is divided by the total

number of minutes that the teacher spends teaching to obtain a percent of time devoted to a program. This percent is multiplied by the number of classrooms or sections of the program, which is multiplied by the average teacher salary to obtain the teacher cost. This, added to the other direct costs, results in the total direct program costs.

$$\$DP = \$dp + (\$ATe \times \#Cl \times Te\%)$$

where

$DP = total direct program costs

$dp = sub-total of direct program costs

$ATe = average teacher salary

#Cl = number of classrooms/sections of the program

Te% = percent of teacher time required for the program.

The total cost to provide a particular program now becomes a simple addition exercise. Buildings and contents costs are added to organization-wide costs, which are added to building support costs, which are added to direct program costs. This total is then divided by the number of students in the program for a cost per pupil. The total program cost is also divided by the number of classrooms or sections for a cost per classroom. And, finally, the total is divided by the number of square feet required for the program for a cost per square foot.

Model Application and Adjustments

Five schools were identified as a manageable sample with which to test this costing model. The school organizations are Edina Public

Schools, Minneapolis Public Schools, Northfield Public Schools, Breck School, all in Minnesota, and Spirit Lake Community Schools in Iowa. The five schools represent several different sizes from small to large, both public and private, student populations of varied backgrounds and two different states. They also are all participants in an Iowa State University project, directed by Richard Manatt and funded by the Northwest Area Foundation, which is developing a total systems, school improvement model. Background about the nature of these school organizations was learned through interviews, attendance at an orientation for School Improvement Model participants and data review. Contact people were identified through which visits could be arranged and data could be obtained. The contact person for the Minneapolis Public Schools was Richard F. Julander, Associate Superintendent for management support services; for the Edina Public Schools was James A. Hamann, Director of Business Services; for Northfield Public Schools was Doug Crane, Director of Business Affairs; for Spirit Lake Community Schools was Harold A. Overman, Superintendent; and for Breck School was L. L. McMurtry, Business Manager. Three personal visits were made with the schools to meet key contact personnel, explain the nature of this study and collect data. In preparation for these visits and to facilitate data collection, three instruments were developed. (See Appendix A.) The first was an outline summarizing the methodology to be used in costing academic programs. The second was a checklist of categories of data needed from each school. The third was a data collection sheet,

specifying data needed from each school. These instruments were shared with the contact people from the schools in order to familiarize them with this project.

In order to understand the types of financial data available, the two state financial accounting handbooks, Uniform Financial Accounting for Iowa School Districts and Area Education Agencies (45) and Uniform Financial Accounting Standards Manual (46), were reviewed.

As the data were collected, they were entered in an Apple IIe microcomputer for organization and manipulation. A program entitled The Spreadsheet by William Graves, distributed through the Apple Puget-sound Library Exchange (A.P.P.L.E.) (17), which is an expansion of VisiCalc from VisiCorp, was used. Data were recorded on one floppy disk, with an additional back-up disk. This allowed for many changes in the collection format as well as updated values and formulae.

Adjustments to model

After several trial runs with data from the project schools, some revisions to program allocations were made. The initial list of programs was expanded by adding kindergarten and vocational categories. This resulted from further experience in allocating all parts of budgets to academic programs. However, once the list of programs was finalized and with more prorating experience, it was discovered that the only actual allocation that was necessary was to that program being analyzed. Since all allocations, with the exception of direct program allocations, were based on the square feet and percentage of time for the particular program in question, the balance of the budget automatically is in the

other programs. The same is true of the direct program costs. It is not necessary to actually assign these costs to each of the programs.

It also became evident that the general areas of the buildings, such as hallways and restrooms, needed to be taken into account. Since the basic philosophy of the whole model is that all school costs are for the academic programs, these general costs must also be prorated to academic programs. This is done by adding these general areas back into the respective programs in the same proportion to the total as the program was figured. The percent of total building space that was allocated to the program is applied to the total general area to allocate a portion to the program. The actual space needed for the program is now revised to include a percentage of the general space as well. The opposite is true of the general time students and teachers spent out of class. The percentage of out-of-class time allocated to a particular program is the same as the percentage of in-class time figured. Since only the percent is used, the actual out-of-class time can be ignored.

The correct allocation of certain building and contents space also emerged as a problem. Space used for central offices or for community services needed to be prorated equitably to all programs. Therefore, a square foot depreciation cost for organization-wide buildings and contents was obtained to be prorated to programs by their square feet required.

$$\$OB' = \$OB/(80 \times OB') \times P' \qquad \$OC' = \$OC/(15 \times OB') \times P'$$

where

$OB' = organization-wide depreciation building cost per square feet

$OC' = organization-wide depreciation contents cost per square feet

$OB = total organization-wide building cost

$OC = total organization-wide contents cost

OB' = total organization-wide building square feet

80 & 15 = life expectancy in years

P' = number of square feet required for the program.

One other deviation to the proration process relates to the handling of situations peculiar to certain schools. For example, some organization-wide costs pertain to only the elementary grades. These allocations have to be based on total elementary data, rather than total organization data. The organization of grades in attendance centers also causes the need for alternative proration. Some schools house grades four through six, while others are kindergarten through six or other combinations. These situations require only minor adjustments to compensate for the variance.

Inconsistencies

The availability of data caused some inconsistency in the processing of the data. The biggest problem was the inability to obtain a copy of the total Breck school budget. Several data were impossible to get from Breck because of their private school status. Much of Breck's indirect cost allocation was calculated with a cost per square foot rate that

was determined by the Breck business manager. Also, teacher costs were provided, rather than calculated from the model's formula.

The process of determining general area square feet and program area square feet in buildings is also done in two different ways. The square feet for Spirit Lake, Edina and Northfield were all determined by taking actual floor plans of each building and measuring general area space and program area space. The actual floor plans for the Breck school and the Minneapolis schools were not available and central office figures were used. The calculation of general area, program area and classroom size space was determined by a percentage figure obtained from the averages of the other three schools.

One other deviation involves teacher salaries. In Northfield and Spirit Lake, the actual salary of those teaching the programs was used to determine the salary allocation. In Minneapolis, Breck and Edina, the average teacher salary for the total school organization was used. The actual teacher salaries for all buildings of the other schools were not available. Calculations were figured using both actual and average salaries for Spirit Lake to show that the difference is negligible.

Summary

As a result of countless adjustments in format, refinements of formulae and updates of values, the following "cookbook" approach is offered for costing out fourth grade reading. Costs were obtained for fourth and eighth grade math as well, but fourth grade reading was chosen as an example. In order to aid the reader in understanding

these instructions, each step, one through twelve, is followed by the number of the "Guiding Principle" from page 22 that provided rationale for the step.

Ingredients:

1 - budget, complete line-item, by building

3 - enrollments: 1 - total organization
1 - total elementary
1 - 4th grade reading

1 - insurance appraisal for buildings and contents

5 - time periods: 1 - students in school
1 - students not in class
1 - students and teachers in 4th reading
1 - teachers in school
1 - teachers not in class

1 - number of classrooms or sections of 4th reading

1 - average teacher cost

Step 1: Take the budget and label all expenditures as either organization-wide, building support or direct program. (Principle 1.)

Step 2: Subtract student time not in class from student time in school to equal student time in class. Then divide student time in 4th reading class by student time in school to equal the percent of student time in 4th grade reading class. (Principle 2.)

Step 3: Repeat the process with teacher time to equal the percent of teacher time in 4th grade reading class. (Principle 2.)

Step 4: Take the number of square feet in the elementary building and separate into classroom or program area. (These may be measured exactly or determined by a percentage factor.) (Principle 3.)

Step 5: Multiply total program area square feet times the number of sections of 4th grade reading, times the percent of student time in 4th grade reading class to equal the program area for 4th grade reading. Divide this result by the total program area to equal the percent of the total program area needed for 4th grade reading. Multiply this percent times the total general area to equal the general area allocated to 4th grade reading. Add this to the program area for 4th grade reading to equal total area required for 4th grade reading. (Principles 2 and 3.)

Step 6: Take the elementary building cost from the insurance appraisal and divide it by 80 years of life-expectancy. Divide the result by the square feet of the elementary building to equal the building depreciation cost per square foot. Multiply this times the total area required for 4th grade reading to equal the building cost allocated to 4th grade reading. (Principle 3.)

Step 7: Repeat the process using contents, but substitute 15 years for the life-expectancy. This will equal the contents cost allocated to 4th grade reading. (Principle 3.)

Step 8: In a similar manner, take the costs of non-building level facilities and divide it by 80 years. Divide the result by the total square feet of all buildings to equal the building depreciation cost per square foot of organization-wide facilities. Multiply this times the total area required for 4th grade reading to equal the organization-wide building cost allocated to 4th grade reading. (Principle 3.)

Step 9: Repeat the process, using organization-wide contents and substituting a 15-year life-expectancy. This will equal the organization-wide contents cost allocated to 4th grade reading. (Principle 3.)

Step 10: Divide the organization-wide expenditures from Step 1 by the total square feet of all buildings and multiply the result times the total area required for 4th grade reading to equal the allocation of organization-wide costs to 4th grade reading. (Principle 1.)

Step 11: Divide building support costs for the elementary building from Step 1 by the total square feet of the elementary buildings and multiply the result times the total area required for 4th grade reading to equal the allocation of building support costs to 4th grade reading. (Principle 5.)

Step 12: Take the average teacher cost and multiply it times the number of sections of 4th grade reading. Multiply that result times the percent of teacher time in 4th grade reading class. Add in the direct program costs for 4th grade reading from Step 1 to equal the total direct program costs for 4th grade reading. (Principle 4.)

Step 13: Combine final results from Steps 6, 7, 8, 9, 10, 11 and 12 to equal the total cost to teach 4th grade reading.

Step 14: Divide the result in Step 13 by the enrollment in 4th grade reading to equal the cost per pupil.

Step 15: Divide the result in Step 13 by the number of sections of 4th grade reading to equal the cost per classroom.

Step 16: Divide the result in Step 13 by the result in Step 5 to equal the cost per square foot.

FINDINGS

The primary purpose of this research is to demonstrate that it is possible to obtain the actual cost to teach a particular K-12 academic program. The academic programs used for this demonstration were the two, vital subjects of reading and math. To further define the specificity of the results, the exercise focuses on the critical learning stages of fourth and eighth grade in math and fourth grade in reading. This isolates meaningful cost figures which are essential in planning for course changes, school improvement and efficiency. In order to verify that the costing process is reliable, math and reading costs are figured for five different school organizations, representing a variety of situations. These organizations are described in Table 1.

Table 1. Description of schools analyzed

Name	Location	Enrollment	Total budget
Minneapolis Public	Minneapolis, Minn.	37,948	$140,888,444
Edina Public	Edina, Minn.	6,081	21,248,255
Northfield Public	Northfield, Minn.	2,827	7,767,863
Spirit Lake Comm.	Spirit Lake, Iowa	1;249	3,380,718
Breck	Minneapolis, Minn.	1,020	5,768,342

Program Costs for Total Organizations

The results of this research indicate that it is, indeed, possible to cost out specific academic programs. This is shown in Table 2 by the presentation of the actual costs for fourth grade reading and fourth and eighth grade math in the test school organizations. It should be

Table 2. Total costs to teach 4th and 8th grade math and 4th grade reading by school organization

Cost	Minneapolis	Edina	Northfield	Spirit Lake	Breck
4th reading					
Per pupil	$ 674	$ 354	$ 554	$ 604	$ 330
Per class	18,040	10,048	14,781	12,390	6,927
Per sq. ft.	34	26	29	35	22
4th math					
Per pupil	384	304	232	349	502
Per class	10,268	8,637	6,176	7,161	10,540
Per sq. ft.	26	24	25	23	46
8th math					
Per pupil	499	351	216	253	154
Per class	13,121	10,010	6,034	6,186	3,127
Per sq. ft.	44	43	19	38	13

noted that the costs are presented in the three different forms, viz., cost per pupil, cost per classroom and cost per square foot of building space.

Even though the figures in Table 2 show that costs can be estimated and identified and that the figures are useful in comparing other programs, more valuable insight for planning and improvement is found in the many sub-parts that determine the total cost of each program. These are the sources of expenditures that can be modified for a desired result.

It is helpful to see how the schools rank with respect to the three categories of costs. Tables 3, 4 and 5 provide a perspective to which further cost analyses can be related.

Tables 3, 4 and 5 rank the school organizations separately with respect to cost per pupil, cost per classroom and cost per square foot.

Table 3. Academic program costs per pupil ranked by school (high to low)

Rank	4th reading	4th math	8th math
1	Mpls. - $674	Breck - $502	Mpls. - $499
2	Sp.L. - 604	Mpls. - 384	Edina - 351
3	Nfld. - 554	Sp.L. - 349	Sp.L. - 253
4	Edina - 354	Edina - 304	Nfld. - 216
5	Breck - 330	Nfld. - 232	Breck - 154

Table 4. Academic program costs per classroom ranked by school (high to low)

Rank	4th reading	4th math	8th math
1	Mpls. - $18,040	Breck - $10,540	Mpls. - $13,121
2	Nfld. - 14,781	Mpls. - 10,268	Edina - 10,010
3	Sp.L. - 12,390	Edina - 8,637	Sp.L. - 6,186
4	Edina - 10,048	Sp.L. - 7,161	Nfld. - 6,034
5	Breck - 6,927	Nfld. - 6,176	Breck - 3,127

Table 5. Academic program costs per square foot by school (high to low)

Rank	4th reading	4th math	8th math
1	Sp.L. - $35	Breck - $46	Mpls. - $44
2	Mpls. - 34	Mpls. - 26	Edina - 43
3	Nfld. - 29	Edina - 24	Sp.L. - 38
4	Edina - 26	Nfld. - 25	Nfld. - 19
5	Breck - 22	Sp.L. - 23	Breck - 13

Each academic program is also ranked separately within the cost categories. Minneapolis clearly ranks as the school organization spending the most money on these programs. Minneapolis is number one in five of the nine categories and number two in the other four. Breck is the number one spending school organization in fourth grade math for all categories. However, Breck spends the least of the school organizations in reading and eighth grade math. Spirit Lake, Northfield and Edina generally interchange in the two, three and four ranking positions. It is not clear which school organization is the most efficient, although Northfield has the lowest total ranking when averaged.

Uniform Academic Programs

Initially, it was believed that a uniform set of academic programs was necessary in the development of a costing model. It was not difficult to determine this uniform group. Some of the vocational areas had to be grouped together for Minneapolis, which had more offerings than the smaller schools. However, as procedures were developed, such a uniform set of academic programs was not a requirement in the process. Nevertheless, the uniform list was developed and is presented in Table 6. If a school wished to cost all of its programs, such a list would be necessary.

Sources of Costs

Costs to operate schools, and thus provide academic programs, are derived from a few basic sources. A total school organization budget

Table 6. Academic programs

Kindergarten	Driver Education
Art	Social Science
Reading/Language	Vocational Education
Foreign Language	Business Education
Physical Education	Home Economics
Math	Industrial Arts
Music	Special Education
Science	

is one of the major and most visible sources. This source lists all of the current operating expenses. All of the fixed assets of a school organization represent a second source. Costs of these assets, as well as the square foot space that the building portion of these assets provide for academic programs, must be accounted for in a costing procedure. The third, and most critical source, is time.

Categories of expenditures

The first task of the costing process is the assignment of all school expenditures to one of the four major categories of fixed assets, organization-wide costs, building support costs or direct program costs. This was accomplished by labeling data from budget documents accordingly. These data were totaled and are listed in Table 7. Referring to Table 7, the costs of fixed assets are greater for the smaller schools, especially when newer buildings are involved. Of the other three categories, two percentages are noteworthy. Minneapolis, having many of the higher costs, spends more on organization-wide costs than the other four schools. However, Minneapolis spends less than the other schools on

Table 7. Costs by expenditure category

Category	Minneapolis	Edina	Northfield	Spirit Lake	Breck
Building sq. ft.	8,242,389	1,416,700	537,601	206,801	233,152
Fixed assets	$315,307,820	$80,257,046	$32,264,967	$10,852,466	$18,822,629
Depreciation/sq. ft.	.72	.94	1.20	1.07	1.45
Organization-wide	52,729,902	6,606,643	2,430,687	1,065,332	1,683,357
Percent of total	37%	31%	31%	32%	29%
Building support	35,007,509	5,377,769	1,533,671	744,905	NA[a]
Percent of total	25%	25%	20%	22%	NA[a]
Direct program	53,151,033	9,263,843	3,803,505	1,570,481	NA[a]
Percent of total	38%	44%	49%	46%	NA[a]

[a]Not available.

direct program costs. It is necessary to break these costs down further if more insight is desired.

Time requirements

One of the key factors in determining the allocation of resources needed for an academic program is the amount of time devoted to the program. The times used in the calculations for this study are in Table 8. Averages are used because information from surveys of both teachers and administrators varied for a particular class or grade level. Time data were from two sources. Direct input from contact personnel at each of the school organizations was one source. This was recorded on data sheets from interviews (see Appendix A). Data from surveys administered by SIM co-director, Shirley Stow, were extracted as the other source. Survey question numbers 10 and 11 on the administration survey and 6 and 7 on the teacher survey were specifically included for this study (see Appendix C).

Time is presented as a number of minutes per day. The number of days per year are fairly similar for the school organizations in this study. The lengths of the school year for these school organizations vary no more than six days from a 180-day school year. The greater percentages of class time compared to total school time result in more of the school's resources being applied to that program. Minneapolis' average of about 26 percent, followed closely with Northfield's 24 percent, begin to explain their higher cost of teaching fourth grade reading. Percentages of time spent in eighth grade math seem to follow the same pattern but are not quite as definitive. However, Breck spends

Table 8. Allocation of time by school averages in minutes per day

Activity	Minneapolis		Edina		Northfield		Spirit Lake		Breck	
	No.	%	No.	%	No.	%	No.	%	No.	%
4th grade teacher										
In school	461		480		480		465		480	
In class	396	86	368	77	305	64	318	68	400	83
8th grade teacher										
In school	468		480		480		463		480	
In class	358	76	358	75	328	68	293	63	390	81
4th grade student										
In school	357		360		387		405		405	
In class	297	83	280	78	321	83	330	81	320	79
In reading	77	26	58	21	64	20	79	24	50	16
In math	58	20	57	20	48	15	47	14	37	12
8th grade student										
In school	366		400		403		412		405	
In class	323	88	334	84	302	75	358	87	320	79
In math	50	15	46	14	48	16	43	12	40	13

the lowest percentage of time in fourth grade math but has the highest cost per pupil. This indicates that there are other factors that contribute to the costs of the programs.

Building Level Costs

In order to analyze the costs further, a breakdown of these costs by building is helpful. It is not the intent of this study to compare and contrast factors building by building. However, a school organization that is interested in the reasons why the costs are as they are, would want to do just that. Tables 9 and 10 do contain figures that can aid in understanding why certain programs cost more than others.

Tables 9 and 10 provide the same types of data for each attendance center that were presented for the school organizations, as a whole, in Tables 2 and 7. One variation is that Table 9 presents costs as per square foot instead of as raw totals. Since different sized attendance centers were listed, the per square foot reporting allows for more meaningful comparisons. It was noted earlier that some factor, other than time, influenced the high cost of teaching fourth grade math in the Breck school. Table 9 registers a direct program cost of $37.25 per square foot for math, which is one of the higher rates in that category. This, in conjunction with a $1.45 per square foot fixed asset cost, is evidence of the higher math cost. The high costs associated with Minneapolis relate to the $10.64 organization-wide cost in Table 9. This includes central office staffs and unused buildings. Table 9 also lists the lower costs of the schools in the Northfield and Edina organizations.

Table 9. Costs per square foot by building by expenditure category

School	Fixed assets[a]	Organization-wide[a]	Building support[a]	Direct costs[a] Reading	Direct costs[a] Math
Minneapolis Elem.					
Andersen	$ .92	$10.64	$ 2.70	$10.07	$10.10
Bancroft	.45	10.64	5.03	22.57	10.48
Barton	.41	10.64	5.41	23.97	10.18
Burroughs	.52	10.64	6.19	26.85	10.23
Field	.62	10.64	4.84	26.89	10.23
Fulton	.55	10.64	5.91	31.86	16.22
Hall	.57	10.64	6.04	19.67	10.12
Holland	.51	10.64	6.06	28.81	10.25
Jefferson	.49	10.64	3.66	27.21	13.71
Kenwood	.73	10.64	5.31	16.34	7.18
Lincoln	.49	10.64	4.06	30.71	11.47
Lyndale	.80	10.64	5.37	38.78	10.26
Olson	.65	10.64	4.84	17.96	10.06
Putnam	.54	10.64	5.33	26.72	10.77
Seward	.59	10.64	12.53	26.61	10.14
Tuttle	.80	10.64	4.54	26.99	10.14
Waite Park	.56	10.64	5.61	37.90	11.33
Webster	.80	10.64	4.84	23.47	10.11
Wilder	.77	10.64	2.90	47.77	10.35
Minneapolis Jr. Hi.					
Andersen	.92	10.64	1.57		12.17
Anthony	.63	10.64	6.50		33.18
Anwatin	.79	10.64	6.83		25.75
Barton	.41	10.64	5.41		15.38
Folwell	.62	10.64	5.65		27.17
Franklin	.84	10.64	6.89		25.29
Hall	.57	10.64	6.04		12.11
Northeast	.65	10.64	5.46		29.29
Sanford	.49	10.64	5.52		24.53
Webster	.80	10.64	4.84		12.23
Edina Elem.	.90	6.30	6.05	13.00	10.77
Concord	.91	6.30	4.96	15.22	12.10
Cornelia	.76	6.30	8.06	12.91	10.63
Countryside	.89	6.30	5.88	11.25	10.62
Creek Valley	1.01	6.30	5.53	13.21	10.35
Edina Jr. Hi.	2.50	6.30	13.12		21.18
South View	2.71	6.30	14.26		20.26
Valley View	2.35	6.30	11.02		22.10

[a]The calculations for these figures are explained in the previous discussions on categories of costs.

Table 9. Continued

School	Fixed assets	Organization-wide	Building support	Direct program Reading	Direct program Math
Northfield Elem. Sibley	$1.34	$ 7.37	$ 2.61	$17.54	$13.32
Northfield Jr. Hi. Middle School	1.24	7.37	2.48		7.67
Spirit Lake Elem.	1.11	6.81	5.33	21.84	9.54
Spirit Lake Jr. Hi.	1.56	6.81	10.82		18.52
Breck Lower	1.45	N.A.	7.22	13.49	37.25
Breck Middle	1.45	N.A.	7.22		3.84

Table 10. Total program costs by attendance center

School	Cost per pupil		Cost per class		Cost per square foot	
	Reading	Math	Reading	Math	Reading	Math
Minneapolis Elem.	674	384	18,040	10,268	34.39	26.33
Andersen	666	387	19,647	11,411	31.58	24.35
Bancroft	909	439	24,245	11,707	31.75	26.48
Barton	738	441	17,351	10,371	33.46	26.55
Burroughs	728	433	24,009	14,295	34.73	27.45
Field	699	417	20,271	12,099	33.51	26.55
Fulton	570	429	16,152	12,149	36.98	27.10
Hall	843	520	34,579	21,338	33.34	27.32
Holland	730	435	17,891	10,662	34.50	27.30
Jefferson	752	319	19,559	8,302	32.27	25.68
Kenwood	881	440	24,378	12,187	28.80	23.82
Lincoln	529	321	19,220	11,677	35.75	26.53
Lyndale	618	350	18,532	10,507	35.74	26.90
Olson	694	376	18,924	10,240	36.50	26.22
Putnam	727	526	19,327	13,982	34.51	27.24
Seward	751	451	22,037	13,223	42.50	33.86
Tuttle	630	359	17,849	10,184	34.42	26.07
Waite Park	474	297	13,937	8,739	41.35	28.06
Webster	672	391	17,693	10,297	34.12	26.36
Wilder	610	311	18,694	9,531	36.05	24.40
Minneapolis Jr. Hi.		499		13,121		44.31
Andersen		297		8,175		26.41
Anthony		548		16,910		48.55
Anwatin		445		10,632		46.25
Barton		478		8,845		28.57
Folwell		429		11,696		44.07
Franklin		550		12,675		46.06
Hall		698		9,077		29.32
Northeast		547		14,247		46.02
Sanford		493		12,744		41.16
Webster		440		8,790		28.39
Edina Elem.	354	304	10,048	8,637	26.33	24.16
Concord	218	134	11,433	6,998	27.67	24.26
Cornelia	456	421	11,708	10,795	28.03	25.75
Countryside	438	428	9,521	9,299	24.31	23.63
Creek Valley	385	335	8,462	7,379	26.04	23.19
Edina Jr. Hi.		351		10,010		42.65
South View		396		11,172		43.53
Valley View		313		8,383		41.77

Table 10. Continued

School	Cost per pupil		Cost per class		Cost per square foot	
	Reading	Math	Reading	Math	Reading	Math
Northfield Elem. Sibley	554	232	14,781	6,176	28.87	24.65
Northfield Jr. Hi. Middle School		216		6,034		18.76
Spirit Lake Elem.	604	349	12,390	7,161	35.31	23.02
Spirit Lake Jr. Hi.		253		6,186		37.94
Breck Elem.	330	502	6,927	10,540	22.17	45.89
Breck Jr. Hi.		154		3,127		12.51

Table 10 lists the same information found in Table 2 but does so for each attendance center within each school organization. These data were generated by the model and taken directly from the computer operations in Appendix B. Costs in different attendance centers from the same school organizations can vary greatly. An example is the reading cost per square foot of $28.80 at the Kenwood school as compared to the $42.50 cost at Seward in Minneapolis. Using Table 9 to analyze this difference, the categories of building support and direct program costs are much less for Kenwood than they are for Seward. As these examples indicate, this costing model generates a wealth of information with which to analyze program costs.

Computer Costing Model

As described in the discussion on methodology, it was discovered that a simple spreadsheet program applied to a microcomputer could be used to handle the data. The printout for Spirit Lake's elementary school is presented here to illustrate the computer model. The printouts for each school and each attendance center can be found in Appendix B.

The spreadsheet is divided into columns labeled A, B, C...BK, and rows labeled 1, 2, 3...254. Each cell that is created with combinations of these columns and rows can be identified as A1, B6, D20, etc., depending on its location. Data are entered in these cells as either labels, numbers or formulae whose results are numbers. These data are then manipulated and calculated to achieve desired results. The fourth grade reading calculations, column D, has been expanded to

Table 11. Spirit Lake computer printout

A	B	C	D
1			
2	Total Enrollment	1249	
3	Total Building Sq'	206801	
4	Organization-wide Build.Sq'	48150	
5	Total Building Cost	9269120	
6	Organization-wide Build.Cost	1067437	
7	Total Equipment Cost	1583346	
8	Organization-wide Equip.Cost	38639	
9	Total Budget	3380718	
10	Organization-wide Budget	1065332	
11			
12	Elementary		
13			4th
14		Building	Reading
15			
16	Enrollment	643	82(Value)
17	% Total Dist.Enrollment	.51	.07(D16/C2)
18	Building Cost	2917014	
19	Equipment Cost	317242	
20	General Area Sq.Feet	16687	450(C20xD21/C21)
21	Program Area Sq.Feet	35313	953((4x950xD23+(169/5))
22	Sq.Feet (Total)	52000	1403(D20+D21)
23	% Student Time	330	.24(80/C23)
24	% Teacher Time	318	.25(80/C24)
25	Building Depr. Cst/Yr/Sq'	.70	984(C25xD22)
26	Org.-wide Build.Depr.Cst/Sq'	.28	389(C26xD22)
27	Equipment Depr.Cst/Yr/Sq'	.41	571(C27xD22)
28	Org.-wide Equip.Depr.Cst/Sq'	.05	75(C28xD22)
29	Organization-wide Cst/Sq'	6.71	9424(C29xD22)
30	Support Cst/Sq'	5.33	7477(C30xD22)
31	Direct Program Cost		11235(56174x.2)
32	Reg.Teacher Ave.Cost	19292	19403(C32x4xD24)

Table 12. Continued

33		
34	Total	49558(Sum D25...D32)
35		
36	Cost/Pupil	604(D34/D16)
37	Cost/Classroom	12390(D34/4)
38	Cost/Sq.'	35.31(D34/D22)

show how the figures refer to other data entered. Each cell is identified by row and column and, if the entered value is the result of a formula, the formula is in parentheses.

Table 12 shows that the use of average teacher salaries, rather than actual salaries, has little effect on the final cost of the program. Average salaries were used, with the exception of Breck school, which supplied the actual salaries. Spirit Lake's average salaries were based on each building, rather than the total organization.

Table 12. Comparison of costs using Spirit Lake's actual salaries versus average salaries

4th reading	Costs using actual salaries	Costs using average salaries
Cost per pupil	$ 635	$ 644
Cost per class	13,007	13,209
Cost per sq. ft.	37.07	37.65

CONCLUSIONS

Summary

The difficulties that schools experience in the financing of their organizations have realistically been shown to be a major problem. Increasing numbers of social institutions are competing for limited amounts of financial resources. Contrary to the 1950s and 1960s, when enrollments were increasing and schools were growing, the public and private patrons are demanding strict accountability for their financial investment. Since schools, in general, have not been accustomed to financial scrutiny, cost-benefit analysis has not been a popular practice. Further, what activity that has occurred in this area has been seriously lacking in the costing process. This raised serious questions concerning the possibilities of determining the costs of academic programs. Could they be determined? Could a specific set of uniform academic programs be established? Could all expenditures be attributed to academic programs? Could fixed assets be prorated to academic programs? These are questions that this study has addressed.

As the literature was reviewed, these questions became more and more critical. A small amount of interest in the cost of education was discovered during the "scientific management" era of school administration in the early 1900s. Research by Bobbitt (3) and Harris (21) characterized this interest. However, they were limited by the difficulty of handling large amounts of data. With the computerized model developed in this study, the limits are greatly expanded and the data become more precise. Then, little was done until the late 1950s,

when Schultz (37, 38), among other economists, related costs to benefits, from an economist's point of view. More recently, educators have adopted a real interest in analyzing costs and benefits of education. Haggart (19), Deputy (12), Thompson (44) and Snyder and Hagan (39) are examples of such researchers. However, the void of a good, comprehensive costing model became more evident. The costing model presented in this study fills that void.

With the immediate need to provide this type of data for the important School Improvement Model being developed by co-directors, Dick Manatt and Shirley Stow, this study became an integral part of the Northwest Area Foundation Project involving the Minneapolis, Edina, Northfield, Spirit Lake and Breck schools. Committed to applying all expenditures and assets to the purposes of education, the academic programs, all entries of the budgets were assigned to programs. Methods of prorating indirect costs were determined and applied. With the aid of an Apple IIe microcomputer and The Spreadsheet (17), methods were applied and adjustments were made. The result was a step-by-step set of instructions for determining the cost of teaching fourth grade reading and fourth and eighth grade math for the five schools in the study.

It has clearly been shown that specific costs of academic programs can be determined. The costs for the schools in this study have been presented in the three units of cost per pupil, cost per classroom and cost per square foot. A uniform set of academic programs has also been established. Following one of the major premises of this costing

model, all expenditures have been attributed to the academic programs identified. In addition, the property values have likewise been prorated to academic programs. The costs of the programs have also been broken down by building as a basis for a more detailed analysis, if that is desired. Finally, an explanation of the role the microcomputer played in this model was presented for further insight into the workings of the model.

Specific Conclusions

The costing model developed in this study answers those questions referred to in the previous discussion in the affirmative and opens the door to a more precise cost and benefit analysis. Through the successful application of this model to the fourth grade reading and fourth and eighth grade math programs of the five schools in this study, it has been shown that specific costs of individual academic programs can be determined. In the process, a set of academic programs uniform to the five schools was established. As a critical element of this model, budgeted expenditures and values of fixed assets were prorated to the academic programs.

The necessity of establishing a uniform set of academic programs was found to be unnecessary. The original plan was to assign all expenditures to this set of academic programs. Since most of the proration of indirect costs were applied to a factor of square feet necessary for a specific program, this would involve assigning all parts of the buildings to academic programs. However, it was soon discovered that this only needed to be done for the academic programs

in question. The balance of the building space, and thus indirect costs, would automatically belong to the balance of the academic programs. The set of those programs that are in that balance is unimportant, unless all programs are to be costed. This condition makes this model so much more practical. It can be used to determine the cost of just one program, of all programs or of each program from a variety of total sets of programs. Thus, the model is universal in its application.

Contributing to this model's universality is its flexibility. Several sub-costs in the model may be calculated on a slightly different basis, if so desired by a particular school. As in the example referred to earlier, if a school wants to use the salaries of those actually teaching in the program being costed, rather than a function of the average teacher salary, it can be accomplished with little extra effort. A different figure or formula is simply inserted in the direct cost cell of the microcomputer spreadsheet for salaries. In the case of Spirit Lake, both actual and average salaries were inserted, with only a small variance resulting. The cost per pupil varied by $9, the cost per class varied by $202 and the cost per square foot varied by $.58 (see Table 12). For most purposes, the average teacher salary approach would be preferred, since it would generate a cost that would generally be applicable for several years and in many situations. However, if a school desires to carefully consider the current situation, with the possibility of immediate changes in staff, the actual teacher salary approach should be used. The other obvious

places to alter input are when time in class is determined and when square feet of space required for the program is determined. Again, the choice is in using averages or actual amounts. Each may be the preferred approach, depending upon the nature of the results desired.

Once the time and space allocations are determined, the remainder of the indirect cost prorations are much less flexible. Organization-wide and building level costs, as well as values of fixed assets, are expressed as costs per square foot. Therefore, their contribution to the total cost of a program is governed by the number of square feet required for the program.

Other discoveries made possible by this model relate to the many manipulations of the costing data supplied. With or without the aid of the microcomputer, the data are available. In addition to a simple listing of costs of the academic programs for the schools, the data were presented in other forms. Each unit cost of the programs studied was listed, by school, in rank order, from high to low. Each expenditure category that helped to determine the program costs was also listed by school. Another important cost determiner, the amount of time spent in school and in class, was listed by school. Finally, most of the data referred to previously were listed by individual attendance center as well.

Limitations

In the attempt to accurately include all costs in this model, the investments in the fixed assets of the school organizations were included. However, the method of determining the actual costs of these investments

is debatable. The method chosen for this model uses the yearly depreciation amount of the replacement value of the fixed assets, with life expectancies of 80 years for buildings and 15 years for contents. Another approach considered was using the actual costs of buildings and contents, divided by the number of years that they were in existence. There does not appear to be any exacting method of accounting for fixed asset costs.

The inability to obtain the actual budget document for Breck School limits the accuracy of their final program costs, when compared to the other schools in the study. The organization-wide and building support costs were calculated from an indirect cost factor supplied by the school and may or may not coincide with those figures that would have been generated by the model. This indirect cost factor is a cost per square foot figure that includes organization-wide and building support costs.

Two other limitations relate to the accuracy and availability of data on time spent in programs and space allocated to programs. Time was obtained from the three sources: central office staff, building principals and teachers. These data varied in some instances and averages were used. This situation raises some question as to the exact amount of time required for the program. Similarly, some data on classroom sizes were quite exact while other were less exact. These two factors of time and space are critical to the costing model. The accuracy of the output is directly related to the accuracy of the input. However, these inconsistencies of time and space do not limit

the integrity of this model, since the input is assumed to be accurate. They only limit the analysis of the results when compared with other schools, which is not a part of this study.

Discussion

The applications for the model developed in this study are both basic and far-reaching. They are basic because the model uses data that are readily available and generates cost figures of those programs for which schools are organized. They are extremely versatile when computerized because of the seemingly unlimited number of ways the data can be analyzed. These analyses can be the basis for decisions on building programs, teacher salaries, collective bargaining, budgeting, student scheduling, the length of the school day and year, teacher assignments and size of supervisory staffs, just to name a few.

As findings were presented in the previous chapter, costs among school organizations and costs among attendance centers within school organizations varied. In some cases, the costs varied greatly. This raises questions relating to reasons for these variances. In analyzing the sources of costs and the procedures used for this costing model, many reasons become apparent. It appears that the high costs associated with the Minneapolis schools are a result of a large central office staff and many unused school facilities. These are sources of costs in the organization-wide cost category, which are higher than those of the other schools. The high cost of teaching fourth grade math at Breck relates to a high teacher cost due to small classes. Breck also supports large, new facilities in comparison to the other schools.

Edina, even though supporting large, new facilities, seems to counteract this with an efficient central office and a record of disposing of unused facilities. Northfield and Spirit Lake also are efficient in their use of facilities and central office personnel to aid in their lower costs.

A most critical factor in explaining cost variances is time. The schools that devote more time in an academic area will generally reflect higher costs. This is because time in class determines the amount of teacher salaries required for a program. Teacher salaries consume the largest single budget item in most school organizations.

Continuous use of this model, with changes made in certain input data, can provide valuable projections. For example, if a school knows the amount of time devoted to reading and learns its cost from the application of this model, it can be rerun with a lesser amount of time entered. This may project a savings of a certain sum of money. If, by increasing teaching efficiency it is determined that student achievement will not decline with the lesser amount of time, the school has realized a savings. On the other hand, if it is determined that student achievement will gain with the addition of a number of minutes, the school can determine the amount of investment necessary for that gain.

Many schools face the problem of buildings vacated by declining enrollment. This model can provide data to help decide whether to sell, demolish or maintain these buildings. If the costs of all programs are calculated through this model, they can be recalculated

with the amount of these unused fixed assets deleted. That will determine how much money will be saved to continue with the same programs, minus unused buildings. Decisions to close a building can be aided in a similar manner.

The size of central office and support staff can also be analyzed with cost data from this model. If a school is concerned with the high cost of a certain program, specific amounts for support staff related to the program can be deleted from the input and costs can be recalculated.

An application for the very small school organization relates to decisions to consolidate with other schools. Present programs can be costed separately and then recalculated with the elimination of all of the duplication in a simulated consolidation. A much more accurate budget projection results, which could convince the communities to reorganize. Likewise, a much broader program of studies could be simulated, with the assurance that it could be financed with consolidation.

The above examples are some of the practical applications with which many schools have had concerns. However, applications of this model extend further into future experimentation and research. As research studies substantiate the importance of such positive concepts as academically assigned time, time on task, staff evaluation, staff development and school climate, their implementation can be accomplished through manipulations of this costing model. Many combinations of implementation costs, efficiencies derived from implementations and

increased student learner outcomes can be entered in the model. The result can be a workable plan for school improvement.

Recommendations

The completion of this study creates many new opportunities to apply these procedures and to analyze the results. Several follow-up activities can enhance the effectiveness of this model and further research can solidify its strength.

Practical applications

This model for determining the costs of academic programs has successfully been applied to the five project schools. The results have been presented and discussed. In order to impact decision making in the schools, the model needs to be disseminated to many more schools and applied by different personnel for different purposes. As others become familiar with the model, variations and improvements may be developed.

The more important practices that need to occur are related to the data that are input and generated with the model. The effects of the categories of the budget such as organization-wide, building support and direct costs need to be determined. The effects of the critical factors of time and space, relative to specific programs, must be learned. The nature of the fixed asset costs of buildings and contents also needs to be understood to a greater extent. These analyzing opportunities are much more inviting and much more meaningful than the final program costs.

In order to really analyze the components of the model, schools will want to study the data at the attendance center level. At that level, the input can be more exact and any recommendations for change resulting from the analysis can be more appropriately implemented. Central office staff of larger school organizations can also achieve more benefits by analyzing attendance center data. They can better understand the total picture by seeing its individual parts.

The dissemination of this model would be accelerated if the procedures were programmed into a computer program and made available through a software outlet. However, the process is easily applied to any number of spreadsheet programs for the individual who has a limited amount of experience with a microcomputer. The process can be done manually to obtain the program costs, but a computer is recommended because of the ease with which the process can be replicated, using alternative input. Schools that choose to use this model will gain valuable information about their operations that will provide a solid foundation on which to base decisions.

Further research

The development and application of this model provide the opportunity for some interesting and meaningful research. This is related to the analyses of the components of the model. Questions arise as to the effect the various data have on the costs to teach academic programs. For example, in comparing the costs of various programs within a school, the relative importance of the key data can be determined. How important a factor is the amount of time spent in

class in the calculation of its cost? Is the amount of space that is required more critical?

A more valuable area for research is in the relationship between the factors that determine program costs and those program outcomes. Would the addition of one reading consultant result in a measurable gain in student achievement? Would a certain amount of staff development provide significant gains in student achievement? Would higher teacher salaries improve the teacher quality and, thus, student achievement? Would more or better facilities produce student gains? How much more time on task does it take to raise reading scores a specified amount?

With the knowledge of the costs necessary to implement interventions such as those above, the research opportunities expand to further questions. If staff development activity A costs X dollars and activity B costs Y dollars, which activity results in the greater student gains? What type of consultant will result in more achievement test score gains? What staff evaluation criteria increase student scores more on a school climate survey?

As has been shown, the development of this model to determine costs of academic programs was an achievement that was sorely needed. It now becomes the basis for more valuable and more applicable research in effective teaching and increased learner outcomes. Convincing answers to the previous questions will provide what is needed for true school improvement.

REFERENCES

1. Alioto, Robert F., and Jungherr, J. A. Operational PPBS for Education. New York: Harper and Row, 1971.

2. Blaug, M., gen. ed. Economics of Education 1, Selected Readings. Baltimore: Penguin Books, 1968.

3. Bobbitt, J. T. "High School Costs." School Review 23 (October 1915): 505-34.

4. Burkhead, Jesse. Input and Output in Large-City High Schools. Syracuse: Syracuse University Press, 1967.

5. Capps, W. J. A Report on the Use of Costing and Other Financial Techniques in Technical Colleges. London: H. M. S. O., 1969.

6. Coombs, Philip H., and Hallak, Jacques. Managing Educational Costs. New York: Oxford University Press, 1972.

7. Corazzini, Arthur J. "The Decision to Invest in Vocational Education: An Analysis of Costs and Benefits." Journal of Human Resources, Supplement: Vocational Education 3 (1968): 88-120.

8. Correa, Hector. "Optimum Choice Between General and Vocational Education." Kyklos 18, Fasc. 1 (1965): 107-15.

9. Correa, Hector. "Planning the Educational Curriculum." Kyklos 18, Fasc. 4 (1965): 685-90.

10. Cumming, Christopher. Studies in Educational Costs. Edinburgh: Scottish Academic Press, 1971.

11. Dei Rossi, James A. "Cost Models and Analysis of Cost." In Program Budgeting for School District Planning, pp. 102-23. Edited by Sue E. Haggart. Englewood Cliffs: Educational Technology Publications, 1972.

12. Deputy, Rex. "Cost Analysis of Selected High School Vocational Courses in Relation to Academic Offerings." Ph.D. dissertation. Iowa State University, 1970.

13. Dougharty, Laurence A. A Program Budgeting Cost Model for School District Planning. Hartford: Hartford Press, 1973.

14. Fisher, G. H. "Cost Functions and Budgets." In The Analysis of Public Output. Edited by Julius Margolis. New York: National Bureau of Economic Research, 1970.

15. Florida State Department of Education. "A Manual ... Financial and Program Cost Accounting and Reporting for Florida Schools." Tallahassee: Department of Education, 1974.

16. Gisser, Micha. "On Benefit-Cost Analysis of Investment in Schooling in Rural Farm Areas." American Journal of Agricultural Economics 50, No. 3 (August 1968): 621-29.

17. Graves, William G. The Spreadsheet. Kent, Washington: Apple Pugetsound Program Library Exchange, 1983.

18. Greenwich Board of Education. "Program Budgeting, A Case Study from the Greenwich Public Schools." Greenwich: Board of Education, 1973.

19. Haggart, Sue E. "Program Budgeting for Improved School District Planning." In Program Budgeting for School District Planning, pp. 3-20. Edited by Sue E. Haggart. Englewood Cliffs: Educational Technology Publications, 1972.

20. Hansen, W. Lee. "Total and Private Rates of Return to Investment in Schooling." Journal of Political Economy 71 (April 1963): 128-40.

21. Harris, R. C. "Comparative Costs of Instruction in High Schools." School Review 22 (June 1914): 371-84.

22. Haveman, Robert H., and Margolis, Julius, Eds. Public Expenditures and Policy Analysis. Chicago: Rand McNally College Publishing Company, 1977.

23. Hirsch, Werner Z., and Segelhorst, Elbert W. "Incremental Income Benefits of Public Education." Review of Economics and Statistics 48, No. 4 (November 1965): 392-99.

24. Hirsch, Werner Z., Marcus, Morton J., and Gay, Robert M. Program Budgeting for Primary and Secondary Public Education. New York: Praeger Publishers, 1972.

25. Iowa Association of School Boards. "$23,815 Average Cost Per Teacher in Iowa." IASB Dialogue 33, No. 2 (September-October 1982): 10-11.

26. Johnson, George E., and Stafford, Frank P. "Social Returns to Quantity and Quality of Schooling." In Benefit-Cost and Policy Analysis 1973, pp. 443-460. Edited by Robert H. Haveman, Arnold C. Harberger, Laurence E. Lynn, Jr., William A. Niskanen, Ralph Turvey and Richard Zeckhauser. Chicago: Aldine Publishing Company, 1974.

27. Knezevich, Stephen J. Program Budgeting (PPBS). Berkeley: McCutchan Publishing Company, 1973.

28. Leggett, Stanton. "Decision Packages: They Answer 'What if...' Questions." In Managing Schools in Hard Times, pp. 138-149. Edited by Stanton Leggett. Chicago: Teach 'em, Inc., 1981.

29. Maciariello, Joseph A. Dynamic Benefit-Cost Analysis. Lexington, Massachusetts: D. C. Heath and Company, 1975.

30. Macleod, Roderick K. "Program Budgeting Works in Non-profit Institutions." Harvard Business Review 49, No. 5 (September-October 1971): 46-56.

31. Merrett, Stephen. "The Rate of Return to Education: A Critique." Oxford Economic Papers 18, No. 3 (November 1966): 289-303.

32. Monk, David H. "Educational Cost Differentials and Rural Schools: A Broadened View." Administrator's Notebook 30, No. 4 (1982).

33. New York State Commission on the Quality, Cost and Financing of Elementary and Secondary Education. Report of the Commission 1. New York: Author, 1972.

34. Prest, A. R., and Turvey, R. "Cost-Benefit Analysis: A Survey." The Economic Journal 75 (December 1965): 683-705.

35. Rothenberg, Jerome. "Cost-Benefit Analysis: A Methodological Exposition." In Handbook of Evaluation Research, Vol. 2, pp. 55-88. Beverly Hills: Sage Publications, 1975.

36. Sabock, Ralph J., and Kowalski, Peter. "How to Analyze Sports Costs." The Executive Educator 4 (May 1982): 26-27.

37. Schultz, Theodore W. "Capital Formation by Education." Journal of Political Economy 68, No. 6 (December 1960): 571-83.

38. Schultz, Theodore W. The Economic Value of Education. New York: Columbia University Press, 1963.

39. Snyder, Philip C., and Hagan, Earl E. Cost Accountability and School Administrators. West Nyack, New York: Parker Publishing Company, 1979.

40. Taussig, Michael K. "An Economic Analysis of Vocational Education in the New York City High Schools." Journal of Human Resources, Supplement: Vocational Education 3 (1968): 59-87.

41. Taylor, Jack P. A Perspective of Program Costs - The Teaching Budget. Shaker Heights, Ohio: Shaker Heights City School District, 1978.

42. Taylor, Raymond G., Jr. "Toward a Cost-Effective Public School Education." Education 99, No. 4 (Summer 1979): 343-54.

43. Teh-wei, Hu, Lee, Maw Lin, and Stromsdorfer, Ernst. "Economic Returns to Vocational and Comprehensive High School Graduates." In Benefit-Cost Analysis. Edited by Arnold C. Harberger. Chicago: Aldine-Atherton, Inc., 1972.

44. Thompson, Mark S. Benefit-Cost Analysis for Program Evaluation. Beverly Hills: Sage Publications, 1980.

45. Uniform Financial Accounting System for Public School Districts and Area Education Agencies. Des Moines: Iowa Department of Public Instruction, 1975.

46. Uniform Financial Accounting Standards Manual. St. Paul: Minneapolis Department of Education, 1975.

47. United Nations Educational, Scientific and Cultural Organization. Educational Cost Analysis in Action: Case Studies for Planners. Paris: UNESCO: International Institute for Educational Planning, 1972.

48. Vaizey, John Ernest. The Costing of Educational Plans. Paris: UNESCO, 1967.

49. Vaizey, John Ernest. The Costs of Education. London: Allen and Unwin, 1958.

50. Vaizey, John Ernest. The Economics of Education. London: Faber and Faber, 1962.

51. Vernon Public Schools. "Instruction Manual ZBB Zero Base Budgeting." Vernon, Connecticut: Vernon Public Schools, 1978.

52. Webster, William J. "Cost and Effect Analysis: An Educational Example." Educational Economics (May-June 1976): 10-14.

53. Wiseman, Jack. "Cost-Benefit Analysis in Education." Southern Economic Journal 32, No. 1, Part 2 (July 1965 Supplement): 1-14.

54. Wohlford, Gerald H. "Cost Analysis in Education." Educational Forum 34 (March 1970): 339-45.

APPENDIX A.

DATA COLLECTION GUIDES

SIM
School Improvement Model (a Northwest Area Foundation Project)
College of Education | Iowa State University | E005 Quad | Ames, Iowa 50011 | Telephone 515-294-5521 or 294-5529

DATA
for
Reading and Math Costs

I. Categorize Expenditures

_____1982-83 Detailed Working Budget

II. Determine Property Values

_____Original Costs of Buildings and Grounds

_____Acquisition Date of Property

_____Equipment Inventory (By Building)

III. Prorate Indirect Costs

_____Building Maps

_____Square footage of all Buildings

_____Square footage of individual Buildings

IV. Determine Teacher Costs

_____Total Teacher Salaries and Benefits

_____Total Number of Teachers

_____Length of Teacher Day (In Minutes)

_____Teacher Time in Class

_____Teacher Time Out of Class

_____Length of Student Day (In Minutes)

_____Student Time in Class

_____Student Time Out of Class

_____Time Spent Teaching 4th & 8th Math and 4th Reading (In Minutes/Day)

_____Length of Student Year and Teacher Contract Year (In Days)

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COSTING ACADEMIC PROGRAMS

Methodology

I. Categorize all parts of the Budget

- A. Buildings, Grounds and Equipment Values
- B. District Wide Costs
- C. Building Level Support Costs
- D. Direct Program Costs

II. Identify program List

- A. Art
- B. Reading-Language Arts-English
- C. Foreign Language
- D. Physical Education
- E. Math
- F. Music
- G. Science
- H. Driver Education
- I. Social Science
- J. Agri-Business
- K. Business Education
- L. Home Economics
- M. Industrial Arts
- N. Special Education

III. Determine school day length

- A. Student Time
  1. Class
  2. Non-class
- B. Teacher Time
  1. Class
  2. Non-class

IV. Determine Costs

- A. Build.,Grounds & Equip.- Total cost ÷ Life Exp. = Depr. cost/yr.
  Depr. cost ÷ Total Sq.' = Cost/sp.'/yr.
  1. Categorize building use
     a. General areas
     b. Program areas
  2. Prorate general costs among program areas
  3. Combine prorated general with actual program area costs

DATA COLLECTION SHEET

_____
SCHOOL ORGANIZATION

_____
ATTENDANCE CENTER

BUILDINGS

Actual Cash Value (ACV) _____

ACV District-Wide (DW) _____

Square Footage (Sq.') _____

Square Footage (DW) _____

Floor Plan _____

Number of Classrooms _____

Square Footage:

Classrooms	_____	Gym	_____
Halls	_____	Multipurpose	_____
Restrooms	_____	Lunchrooms	_____
Storeage	_____	Offices	_____
Music	_____	Art	_____

EQUIPMENT (ACV) _____

TIME

Student:		Teacher:	
Year (Days)	_____	Year (Days)	_____
Day (Min.)	_____	Day (Min.)	_____
In Class	_____	In Class	_____
Out Class	_____	Out Class	_____

Reading _____ Math _____

DIRECT COSTS

Total Teacher Salaries and Benefits _____

Total Number of Teachers _____

Reading Materials and Supplies _____

Math Materials and Supplies _____

INDIRECT COSTS

Restricted Indirect Cost Factor _____

Unrestricted Indirect Cost Factor _____

APPENDIX B.

PRINTOUTS BY SCHOOL

Minneapolis

Total Enrollment	37948
Total Building Sq'	8242389
Org.-wide Build.Sq'	2997504
Total Building Cost	277732200
Org.wide Build.Cost	69603354
Total Equip.Cost	37575620
Org.-wide Equip.Cost	13469489
Total Budget	140888444
Org.-wide Budget	52729902

Elementary

	Bancroft 3-6 Total	Reading	Math
Enrollment	691	160	160
% Tot.Elem.Enrollment	.03587188	.008306	.008306
% Tot.Dist.Enrollment	.01820913	.004216	.004216
Building Cost	1941337		
Equipment Cost	172982		
General Area Sq.Feet	43429	2520	1459
Program Area Sq.Feet	35533	2062	1194
Sq. Feet (Total)	78962	4582	2653
% Student Time	285	.33	.19
% Teacher Time	370	.25	.15
Building Depr.Cst/Yr/Sq'	.31	1408	815
.290rg.-wide Build.Depr.Cst/Sq'		1330	770
Equip.Depr.Cst/Sq'/Yr.	.15	669	387
.300rg.-wide Equip.Depr.Cst/Sq'		1373	795
100rg.-wide Cost/Sq'		46064	26668
Support Cost/Sq'	5.03	23052	13346
Elem.-wide Gen.Supp.Cst/Sq'			
32940Direct Program Cost	2980733	24758	274
26609Reg. Teacher Ave.Cost	26609	46817	27184
Total		145471	70239
Cost/Pupil		909	439
Cost/Classroom		24245	11707
Cost/Sq'		31.75	26.48

Barton K-8			Burroughs K-6			Field 4-6		
Total	Reading	Math	Total	Reading	Math	Total	Reading	Math
403	47	47	580	99	99	578	174	174
.020921	.002440	.002440	.030110	.005139	.005139	.030006	.009033	.009033
.010620	.001239	.001239	.015284	.002609	.002609	.015231	.004585	.004585
1186881			1498807			2731233		
94300			132510			142787		
28042	570	430	28818	1141	859	38464	1996	1504
22944	467	352	23579	933	703	31470	1633	1230
50986	1037	781	52397	2074	1562	69934	3630	2734
297	.26	.20	297	.26	.20	297	.26	.20
396	.19	.15	396	.19	.15	396	.19	.15
.29	302	227	.36	742	559	.49	1772	1335
	301	227		602	453		1054	794
.12	128	96	.17	350	263	.14	494	1335
	311	234		621	468		1087	819
	10426	7853		20852	15707		36491	27487
5.41	5614	4229	6.19	12845	9676	4.84	17583	13245
	7273	80		15319	169		26925	298
	10348	7795		20696	15589		36218	27281
	34702	20741		72027	42884		121623	72592
	738	441		728	433		699	417
	17351	10371		24009	14295		20271	12099
	33.46	26.55		34.73	27.45		33.51	26.55

Fulton K-6			Hall K-12			Lincoln K-6		
Total	Reading	Math	Total	Reading	Math	Total	Reading	Math
659	85	85	205	41	41	753	109	109
.034211	.004413	.004413	.010642	.002128	.002128	.039090	.00566	.00566
.017366	.002240	.002240	.005402	.001080	.001080	.019843	.00287	.00287
1855901			1376634			3528615		
173012			88839			456346		
34783	721	740	22399	570	430	83961	887	726
28459	590	605	18327	467	352	68695	726	594
63242	1310	1345	40726	1037	781	152656	1613	1321
290	.22	.22	297	.26	.20	315	.20	.17
390	.16	.17	396	.19	.15	405	.15	.14
.37	481	493	.42	438	330	.29	466	382
	380	390		301	227		468	383
.18	239	245	.15	151	114	.20	321	263
	393	403		311	234		483	396
	13174	13520		10426	7853		16213	13277
5.91	7742	7946	6.04	6260	4715	4.06	6547	5361
	13153	145		6344	70		16867	186
	12895	13304		10348	7795		16294	14783
	48456	36448		34579	21338		57660	35031
	570	429		843	520		529	321
	16152	12149		34579	21338		19220	11677
	36.98	27.10		33.34	27.32		35.75	26.53

Holland 4-6			Andersen 4-6 & K-8			Jefferson K-6		
Total	Reading	Math	Total	Reading	Math	Total	Reading	Math
515	147	147	1572	295	295	942	130	130
.026735	.007631	.00763	.0816072	.015314	.015314	.04890204	.00675	.00675
.013571	.003874	.00387	.0414251	.007774	.007774	.02482344	.00343	.00343
1501157			11171594			3570440		
117462			770167			520338		
28525	1711	1289	114309	3422	2578	88523	1667	889
23339	1400	1055	93526	2800	2109	72428	1364	727
51864	3111	2343	207835	6222	4687	160951	3030	1616
297	.26	.20	297	.26	.20	330	.30	.16
396	.19	.15	396	.19	.15	405	.25	.13
.36	1126	848	.67	4181	3149	.28	840	448
	903	680		1806	1360		880	469
.15	470	354	.25	1537	1158	.22	653	348
	932	702		1864	1404		908	484
	31278	23560		62556	47120		30465	16248
6.06	18846	14195	2.70	16795	12651	3.66	11080	5909
	22747	251		45648	504	2980733	20116	191
	31044	23384		62088	46767		32851	17411
	107344	63974		196475	114114		97793	41509
	730	435		666	387		752	319
	17891	10662		19647	11411		19559	8302
	34.50	27.30		31.58	24.35		32.27	25.68

Kenwood K-6			Lyndale 4-6			Putnam 4-6		
Total	Reading	Math	Total	Reading	Math	Total	Reading	Math
569	83	83	756	210	210	453	133	133
.029538	.00431	.00431	.039246	.01090	.01090	.023517	.00690	.00690
.014994	.00219	.00219	.019922	.00553	.00553	.011937	.00350	.00350
2535624			3901885			1436098		
148441			227753			96166		
31349	1397	844	50532	1996	1504	24732	1540	1412
25650	1143	691	41344	1633	1230	20236	1260	1155
56999	2540	1535	91876	3630	2734	44968	2800	2567
215	.42	.26	297	.26	.20	300	.28	.26
405	.22	.14	396	.19	.15	375	.22	.21
.56	1412	853	.53	1927	1451	.40	1118	1025
	737	446		1054	794		813	745
.17	441	266	.27	967	728	.14	399	366
	761	460		1087	819		839	769
	25531	15431		36491	27487		28150	25804
5.31	13472	8143	5.37	19486	14678	5.33	14933	13688
	12843	122		32495	308		20580	195
	17936	10841		36218	27281		29802	27319
	73134	36561		129725	73546		96634	69911
	881	440		618	350		727	526
	24378	12187		18532	10507		19327	13982
	28.80	23.82		35.74	26.90		34.51	27.24

Seward K-6			Tuttle K-6			Waite Park 4-6		
Total	Reading	Math	Total	Reading	Math	Total	Reading	Math
666	88	88	610	85	85	631	206	206
.034574	.00457	.00457	.031667	.00441	.00441	.032757	.01069	.01069
.017550	.00232	.00232	.016075	.00224	.00224	.016628	.00543	.00543
1716667			3008340			1908074		
233038			79427			128006		
34367	856	644	29359	856	644	32052	1298	1199
28118	700	527	24021	700	527	26224	1062	981
62485	1556	1172	53380	1556	1172	58276	2359	2180
297	.26	.20	297	.26	.20	345	.17	.16
396	.19	.15	396	.19	.15	415	.14	.13
.34	534	402	.70	1096	825	.41	966	892
	452	340		452	340		685	633
.25	387	291	.10	154	116	.15	346	319
	466	351		466	351		707	653
	15639	11780		15639	11780		23721	21914
12.53	19495	14685	4.54	7067	5323	5.61	13228	12221
	13617	129		13153	125		31876	302
	15522	11692		15522	11692		26032	24237
	66112	39670		53548	30552		97560	61170
	751	451		630	359		474	297
	22037	13223		17849	10184		13937	8739
	42.50	33.86		34.42	26.07		41.35	28.06

Webster K-8			Wilder 4-6			Olson K-6		
Total	Reading	Math	Total	Reading	Math	Total	Reading	Math
550	79	79	1643	368	368	762	109	109
.028552	.00410	.00410	.08529305	.01910	.019104	.039558	.005659	.005659
.014494	.00208	.00208	.04329609	.00970	.009697	.020080	.002872	.002872
3571506			7648732			4106745		
163940			792823			364313		
38011	856	644	106393	3422	2578	63529	1141	859
31100	700	527	87048	2800	2109	51979	933	703
69111	1556	1172	193441	6222	4687	115508	2074	1562
297	.26	.20	297	.26	.20	297	.26	.20
396	.19	.15	396	.19	.15	396	.19	.15
.65	1005	757	.49	3075	2317	.44	921.764	694
	452	340		1806	1360		602	453
.16	246	185	.27	1700	1281	.21	436	328
	466	351		1864	1404		468	468
	15639	11780		62556	47120		20852	15707
4.84	7526	5669	2.90	18029	13581	4.84	10035	7559
	12224	116	3832371	73214	539		21686	160
	15522	11692		62088	46767		20696	15589
	53080	30890		224332	114369		75696	40959
	672	391		610	311		694	376
	17693	10297		18694	9531		18924	10240
	34.12	26.36		36.05	24.40		36.50	26.22

Minneapolis

Total Enrollment	37948
Total Building Sq'	8242389
Org.-wide Build. Sq'	2997504
Total Building Cost	277732200
Org.-wide Build. Cost	69603354
Total Equip. Cost	37575620
Org.-wide Equip. Cost	13469489
Total Budget	140888444
Org.-wide Budget	52729902

Elementary

		Reading Total	Math Total
	Enrollment	2648	2648
	% Total Elementary Enrollment	.13746561	.13746561
	% Total District Enrollment	.06977970	.06977970
	Building Cost		
	Equipment Cost		
	General Area Sq. Feet		
	Program Area Sq. Feet	99	99
	Sq. Feet (Total)	51938	38603
	% Student Time		
	% Teacher Time		
	Building Depr.Cst/Yr/Sq'	23810	17803
.290	rg.-wide Build.Depr.Cst/Sq'	15075	11205
	Equip.Depr.Cst/Sq'/Yr.	10088	8446
.300	rg.-wide Equip.Depr.Cst/Sq'	15406	11564
10.050	rg.-wide Cost/Sq'	522162	388095
	Support Cost/Sq'	249638	186820
	Elem.-wide Gen.Supp.Cst/Sq'		
28235	Direct Program Cost	430837	4164
26609	Reg. Teacher Ave. Cost	518937	388402
	Totals	1785953	1016499
	Cost/Pupil	674	384
	Cost/Classroom	18040	10268
	Cost/Sq'	34.39	26.33

Minneapolis

Total Enrollment	37948
Total Building Sq'	8242389
Org.-wide Build. Sq'	2997504
Total Building Cost	277732200
Org.-wide Build. Cost	69603354
Total Equip. Cost	37575620
Org.-wide Equip. Cost	13469489
Total Budget	140888444
Org.-wide Budget	52729902

Junior High

		Anthony 7-8 Total	Math
	Enrollment	998	494
	% Tot. Jr.Hi. Enrollment	.16880920	.083559
	% Tot. Dist. Enrollment	.02629915	.013018
	Building Cost	4618083	
	Equipment Cost	502740	
	General Area Sq. Feet	79363	3065
	Program Area Sq. Feet	64933	2508
	Sq. Feet (Total)	144296	5573
	% Student Time	323	.15
	% Teacher Time	358	.14
	Building Depr. Cst/Yr/Sq'	.40	2229
.290	rg.-wide Build. Depr.Cst/Sq'		1618
	Equip. Depr. Cst/Sq'/Yr	.23	1294
.300	rg.-wide Equip.Depr. Cst/Sq'		1669
10.050	rg.-wide Cost/Sq'		56026
	Support Cost/Sq'	6.50	36206
	Jr.Hi.-wide Gen. Supp.Cst/Sq'		
9412	Direct Program Cost	207684	104628
26609	Reg. Teacher Ave. Cost		66894
	Totals		270566
	Cost/Pupil		548
	Cost/Classroom		16910
	Cost/Sq'		48.55

Anwatin 7-8		Folwell 7-8		Franklin 7-8		Northeast 7-8		Sanford 7-8	
Total	Math	Total	Math	Total	Math	Total	Math	Total	Math
792	382	1023	491	842	415	973	469	971	465
.133965	.06461	.173038	.08305	.142422	.07020	.164581	.07933	.164242	.07865
.020871	.01007	.026958	.01294	.022188	.01094	.025640	.01236	.025588	.01225
5167106		4467291		6692844		6458919		3720904	
522530		510001		376309		644059		446994	
69501	2023	79289	2627	71261	2724	104014	3065	86422	3065
56864	1655	64873	2150	58305	2229	85102	2508	70709	2508
126365	3678	144162	4777	129566	4954	189116	5573	157130	5573
385	.13	390	.13	323	.15	323	.15	323	.15
505	.10	485	.11	358	.14	358	.14	358	.14
.51	1880	.39	1850	.65	3199	.43	2379	.30	1650
	1068		1387		4954		1618		1618
.28	1014	.24	1127	.19	959	.23	1265	.19	1057
	1102		1431		1484		1669		1669
	36976		48025		49801		56026		56026
6.83	25107	5.65	26969	6.89	34117	5.46	30412	5.52	30787
130109	65663	155700	78632	147029	74175	190889	96191	137908	69694
	37305		51106		59461		66894		66894
	170114		210526		228150		256454		229395
	445		429		550		547		493
	10632		11696		12675		14247		12744
	46.25		44.07		46.06		46.02		41.16

Andersen K-8&4-6		Barton K-8		Hall K-12		Webster K-8	
Total	Math	Total	Math	Total	Math	Total	Math
148	55	87	37	21	13	57	20
.0055631	.00930	.003270	.00626	.000546	.00220	.002143	.00338
.0039001	.00145	.002293	.00098	.000553	.00034	.001502	.00053
11171594		1186881		1376634		3571506	
770167		94300		88839		163940	
114309	341	28042	341	22399	170	38011	170
93526	279	22944	279	18327	139	31100	139
207835	619	50986	619	40726	310	69111	310
323	.15	323	.15	323	.15	323	.15
358	.14	358	.14	358	.14	358	.14
.67	416	.29	180	.42	131	.65	200
	180		180		90		90
.25	153	.12	76	.15	45	.16	49
	185		185		93		93
	6225		6225		3113		3113
2.70	1671	5.41	3352	6.04	1869	4.84	1498
0	88	0	59	0	21	0	32
	7433		7433		3716		3716
	16351		17690		9077		8790
	297		478		698		440
	8175		8845		9077		8790
	26.41		28.57		29.32		28.39

Minneapolis

Total Enrollment	37948
Total Building Sq'	8242389
Org.-wide Build. Sq'	2997504
Total Building Cost	277732200
Org.-wide Build. Cost	69603354
Total Equip. Cost	37575620
Org.-wide Equip. Cost	13469489
Total Budget	140888444
Org.-wide Budget	52729902

Junior High

		Totals Math
	Enrollment	2841
	% Tot. Jr.Hi. Enrollment	.4805480
	% Tot. Dist. Enrollment	.0748656
	Building Cost	
	Equipment Cost	
	General Area Sq. Feet	
	Program Area Sq. Feet	108
	Sq. Feet (Total)	31984
	% Student Time	
	% Teacher Time	
	Building Depr. Cst/Yr/Sq'	14114
.290	Org.-wide Build. Depr.Cst/Sq'	12800
	Equip. Depr. Cst/Sq'/Yr	7039
.300	Org.-wide Equip.Depr. Cst/Sq'	9582
10.050	Org.-wide Cost/Sq'	321556
	Support Cost/Sq'	191987
	Jr.Hi.-wide Gen. Supp.Cst/Sq'	
9412	Direct Program Cost	489182
26609	Reg. Teacher Ave. Cost	370853
	Totals	1417113
	Cost/Pupil	499
	Cost/Classroom	13121
	Cost/Sq'	44.31

Edina

Total Enrollment	6081
Total Building Sq'	1416700
Org.-wide Build. Sq'	170437
Total Building Cost	74104211
Org.-wide Build.Cost	9946488
Total Equip.Cost	6152835
Org.-wide Equip.Cost	680899
Total Budget	21248255
Org.-wide Budget	6606643

Elementary

	Total	Concord 4th Reading	4th Math
Enrollment	551	131	131
% Total Elementary Enrollment	.236379	.0561991	.0561991
% Total Org. Enrollment	.090610	.0215425	.0215425
Building Cost	3851446		
Equipment Cost	307586		
General Area Sq.Feet	42970	560	391
Program Area Sq.Feet	32572	473	330
Sq.Feet (Total)	75542	1033	721
% Student Time	323	.19	.15
% Teacher Time	356	.17	.13
Building Depr.Cost/Yr/Sq'	.64	658	460
Equipment Depr.Cost/Yr/Sq'	.27	280	196
Org.-wide Build.Depr.Cst/Sq'		753	526
Org.-wide Equip.Depr.Cst/Sq'		275	192
Org.-wide Cost/sq'		5475	3823
Support Cost/Sq'	3.57	3687	2574
Elem.-wide Gen.Supp.Cst/Sq'		1432	1000
Direct Program Cost		4960	
Reg.Teacher Ave.Cost		11061	8726
Total		28583	17496
Cost/Pupil		218	134
Cost/Classroom		11433	6998
Cost/Sq'		27.67	24.26

Cornelia			Countryside			Creek Valley		
Total	4th Reading	4th Math	Total	4th Reading	4th Math	Total	4th Reading	4th Math
540	77	77	620	87	87	620	88	88
.2316602	.0330330	.0330330	.2659803	.0373230	.0373230	.2659803	.0377520	.0377520
.0888012	.0126624	.0126624	.1019569	.0143069	.0143069	.1019569	.0144713	.0144713
2856481			3687678			4248295		
226840			278822			344613		
34424	651	651	37406	804	804	42635	740	740
31862	602	607	35464	762	770	32277	560	533
66286	1253	1258	72870	1567	1574	74912	1300	1273
315	.20	.20	300	.17	.19	330	.16	.15
378	.17	.17	366	.14	.16	398	.13	.13
.54	675	677	.63	991	996	.71	921	902
.23	286	287	.26	400	402	.31	399	390
	914	917		1143	1148		948	929
	334	335		417	335		346	339
	6642	6667		8305	8345		6890	6749
6.67	8358	8389	4.49	7039	7073	4.14	5380	5270
	1738	1744		2172	2183		1802	1765
	2915			3294			3332	
	13264	13368		14325	16713		13832	13173
	35125	32385		38086	37194		33851	29518
	456	421		438	428		385	335
	11708	10795		9521	9299		8463	7379
	28.03	25.75		24.31	23.63		26.04	23.19

Edina

Total Enrollment	6081
Total Building Sq'	1416700
Org.-wide Build. Sq'	170437
Total Building Cost	74104211
Org.-wide Build.Cost	9946488
Total Equip.Cost	6152835
Org.-wide Equip.Cost	680899
Total Budget	21248255
Org.-wide Budget	6606643

Elementary

	Elementary 4th Reading	Elementary 4th Math
Enrollment	383	383
% Total Elementary Enrollment	.16430716	.16430716
% Total Org. Enrollment	.06298306	.06298306
Building Cost		
Equipment Cost		
General Area Sq.Feet		
Program Area Sq.Feet	14	14
Sq.Feet (Total)	5152	4826
% Student Time		
% Teacher Time		
Building Depr.Cost/Yr/Sq'	3245	3035
Equipment Depr.Cost/Yr/Sq'	1364	1275
Org.-wide Build.Depr.Cst/Sq'	3758	3520
Org.-wide Equip.Depr.Cst/Sq'	1372	1201
Org.-wide Cost/sq'	27312	25583
Support Cost/Sq'	24463	23306
Elem.-wide Gen.Supp.Cst/Sq'	7145	6692
Direct Program Cost	14501	0
Reg.Teacher Ave.Cost	52482	51980
Total	135644	116593
Cost/Pupil	354	304
Cost/Classroom	10048	8637
Cost/Sq'	26.33	24.16

Edina

Total Enrollment	6081
Total Building Sq'	1416700
Org.-wide Build. Sq'	170437
Total Building Cost	74104211
Org.-wide Build.Cost	9946488
Total Equip.Cost	6152835
Org.-wide Equip.Cost	680899
Total Budget	21248255
Org.-wide Budget	6606643

Junior High

	South View		Valley View	
	Total	8th Math	Total	8th Math
Enrollment	813	310	982	375
% Total Junior High Enrollment	.452925	.1727019	.5470752	.2089136
% Total Org. Enrollment	.133695	.0509785	.1614866	.0616675
Building Cost	7169773		8854827	
Equipment Cost	707036		881430	
General Area Sq.Feet	29222	1635	34086	1329
Program Area Sq.Feet	21228	1188	37959	1481
Sq.Feet (Total)	50450	2823	72045	2810
% Student Time	400	.12	400	.12
% Teacher Time	326	.15	390	.12
Building Depr.Cost/Yr/Sq'	1.78	5016	1.54	4317
Equipment Depr.Cost/Yr/Sq'	.93	2638	.82	2292
Org.-wide Build.Depr.Cst/Sq'		2060		2050
Org.-wide Equip.Depr.Cst/Sq'		752		748
Org.-wide Cost/sq'		14967		14896
Support Cost/Sq'	14.26	40266	11.02	30954
Jr.Hi.-wide Support Cost/Sq'		11353		13734
Direct Program Cost				
Reg.Teacher Ave.Cost	28301	45836	28670	48372
Total		122887		117363
Cost/Pupil		396		313
Cost/Classroom		11172		8383
Cost/Sq'		43.53		41.77

Edina

Total Enrollment	6081
Total Building Sq'	1416700
Org.-wide Build. Sq'	170437
Total Building Cost	74104211
Org.-wide Build.Cost	9946488
Total Equip.Cost	6152835
Org.-wide Equip.Cost	680899
Total Budget	21248255
Org.-wide Budget	6606643

Junior High

	Total 8th Math
Enrollment	685
% Total Junior High Enrollment	.3816156
% Total Org. Enrollment	.1126459
Building Cost	
Equipment Cost	
General Area Sq.Feet	2965
Program Area Sq.Feet	2669
Sq.Feet (Total)	5633
% Student Time	
% Teacher Time	
Building Depr.Cost/Yr/Sq'	9333
Equipment Depr.Cost/Yr/Sq'	4930
Org.-wide Build.Depr.Cst/Sq'	4109
Org.-wide Equip.Depr.Cst/Sq'	1500
Org.-wide Cost/sq'	29863
Support Cost/Sq'	71220
Jr.Hi.-wide Support Cost/Sq'	25087
Direct Program Cost	
Reg.Teacher Ave.Cost	94208
Total	240250
Cost/Pupil	351
Cost/Classroom	10010
Cost/Sq'	42.65

Northfield

Total Enrollment	2827
Total Building Sq'	537601
Org.-wide Build.Sq'	52238
Total Building Cost	27820456
Org.-wide Build Cost	3116966
Total Equip.Cost	4444511
Org.-wide Equip.Cost	1267687
Total Budget	7767863
Org.-wide Budget	2430687

Elementary

	Totals Sibley 4-5	Totals Reading	Totals Math
Enrollment	360	160	160
% Tot.Elem.Enrollment	.32	.14	.14
% Tot.Dist.Enrollment	.13	.06	.06
Building Cost	2802293		
Equipment Cost	559639	-	
General Area Sq.Feet	24448	1391	681
Program Area Sq.Feet	29562	1681	823
Sq. Feet (Total)	54010	3072	1504
% Student Time	321	.20	.15
% Teacher Time	305	.21	.16
Building Depr.Cst/Yr/Sq'	.65	1992	975
Org.-wide Build.Depr.Cst/Sq'	.75	2291	1121
Equip.Depr.Cst/Sq'/Yr.	.69	2122	1039
Org.-wide Equip.Depr.Cst/Sq'	1.62	4970	2433
Organization-wide Cost/Sq.'	5.01	15385	7530
Support Cost/Sq'	1.88	5768	2823
92321Elem.-wide Gen.Supp.Cst/Sq'	.74	2259	1105
Direct Program Cost		27068	56
Reg. Teacher Ave.Cost	21217	26832	19975
Total		88688	37057
Cost/Pupil		554	232
Cost/Classroom		14781	6176
Cost/sq'		28.87	24.65

Northfield

Total Enrollment	2827
Total Building Sq'	537601
Org.-wide Build.Sq'	52238
Total Building Cost	27820456
Org.-wide Build Cost	3116966
Total Equip.Cost	4444511
Org.-wide Equip.Cost	1267687
Total Budget	7767863
Org.-wide Budget	2430687

Middle School

	Totals Middle	Totals Math
Enrollment	697	223
% Tot.Midl. Enrollment	1.00	.32
% Tot.Org.Enrollment	.25	.08
Building Cost	8361774	
Equipment Cost	959475	
General Area Sq.Feet	81904	1553
Program Area Sq.'	53835	1021
Sq. Feet (Total)	135739	2573
% Student Time	302	.16
% Teacher Time	328	.15
Build.Depr.Cst/Sq'/Yr.	.77	1982
Org.-wide Build.Depr.Cst/Sq'	.75	1919
Equip.Depr.Cst/Sq'/Yr.	.47	1213
Org.-wide Equip.Depr.Cst/Sq'	1.62	4163
Organization-wide Cost/Sq'	5.01	12888
Support Cost/Sq'	2.48	6383
Direct Program Cost		133
Reg. Teacher Ave.Cost	21389	19593
Total		48274
Cost/Pupil		216
Cost/Classroom		6034
Cost/sq'		18.76

Spirit Lake

Total Enrollment	1249
Total Building Sq'	206801
Organization-wide Build.Sq'	48150
Total Building Cost	9269120
Organization-wide Build.Cost	1067437
Total Equipment Cost	1583346
Organization-wide Equip.Cost	38639
Total Budget	3380718
Organization-wide Budget	1065332

Elementary

	Building	4th Reading	4th Math
Enrollment	643	82	82
% Total Dist.Enrollment	.51	.07	.07
Building Cost	2917014		
Equipment Cost	317242		
General Area Sq.Feet	16687	450	399
Program Area Sq.Feet	35313	953	845
Sq.Feet (Total)	52000	1403	1244
% Student Time	330	.24	.15
% Teacher Time	318	.25	.15
Building Depr. Cst/Yr/Sq'	.70	984	872
Org.-wide Build.Depr.Cst/Sq'	.28	389	345
Equipment Depr.Cst/Yr/Sq'	.41	571	506
Org.-wide Equip.Depr.Cst/Sq'	.05	75	67
Organization-wide Cst/Sq'	6.71	9424	8355
Support Cst/Sq'	5.33	7477	6629
Direct Program Cost		11235	0
Reg.Teacher Ave.Cost	19292	19403	11869
Total		49558	28643
Cost/Pupil		604	349
Cost/Classroom		12390	7161
Cost/Sq.'		35.31	23.02

Spirit Lake

Total Enrollment	1249
Total Building Sq'	206801
Organization-wide Build.Sq'	48150
Total Building Cost	9269120
Organization-wide Build.Cost	1067437
Total Equipment Cost	1583346
Organization-wide Equip.Cost	38639
Total Budget	3380718
Organization-wide Budget	1065332

Junior High

	Totals Jr.Hi.	Totals Math
Enrollment	199	98
% Total Dist.Enrollment	.16	.08
Building Cost	1029249	
Equipment Cost	96404	
General Area Sq.Feet	4246	224
Program Area Sq.Feet	8100	428
Sq.Feet (Total)	12346	652
% Student Time	357.5	.12
% Teacher Time	292.5	.15
Building Depr. Cst/Yr/Sq'	1.04	680
Org.-wide Build.Depr.Cst/Sq'	.28	181
Equipment Depr.Cst/Yr/Sq'	.52	340
Org.-wide Equip.Depr.Cst/Sq'	.05	35
Org.-wide Cost/Sq'	6.71	4380
Support Cst/Sq'	10.82	7059
Direct Program Cost		
Reg.Teacher Ave.Cost	20770	12072
Total		24746
Cost/Pupil		253
Cost/Classroom		6186
Cost/Sq.'		37.94

Breck

Total Enrollment	1020
Total Building Sq'	233152
Org.-wide Build. Sq'	N.A.
Total Building Cost	16940366
Org.-wide Build. Cost	Incl. in Support
Total Equip. Cost	1882263
Org.-wide Equip. Cost	Incl. in Support
Total Budget	5768342
Org.-wide Budget	Incl. in Support

Elementary

	Lower K-4 Totals	Totals Reading	Totals Math
Enrollment	279	42	42
% Total Elementary Enrollment	1.00	.15	.15
% Total Org. Enrollment	.27	.04	.04
Building Cost	4633688		
Equipment Cost	514854		
General Area Sq. Feet	35076	344	253
Program Area Sq. Feet	28698	281	207
Sq. Feet (Total)	63774	625	459
% Student Time	320	.16	.11
% Teacher Time	400	.13	.09
Building Depr. Cost/Yr/Sq'	.91	568	417
Org.-wide Build.Depr.Cst/Sq'			
Equipment Depr. Cost/Yr/Sq'	.54	336	247
Org.-wide Equip.Depr.Cst/Sq'			
Org.wide Cost/Sq'			
Support Cost/Sq'	7.22	4513	3317
Elem.wide Gen.Supp.Cst/Sq'			
Direct Program Cost		600	600
Reg. Teacher Ave.Cost		7837	16498
Totals		13854	21079
Cost/Pupil		330	502
Cost/Classroom		6927	10540
Cost/Sq'		22.17	45.89

Breck

Total Enrollment	1020
Total Building Sq'	233152
Org.-wide Build. Sq'	N.A.
Total Building Cost	16940366
Org.-wide Build. Cost	Incl. in Support
Total Equip. Cost	1882263
Org.-wide Equip. Cost	Incl. in Support
Total Budget	5768342
Org.-wide Budget	Incl. in Support

Middle School

	Middle Total	Totals Math
Enrollment	286	81
% Total Elementary Enrollment	1.00	.28
% Total Org. Enrollment	.28	.08
Building Cost	4749946	
Equipment Cost	527772	
General Area Sq. Feet	35956	550
Program Area Sq. Feet	29418	450
Sq. Feet (Total)	65374	1000
% Student Time	320	.13
% Teacher Time	390	.10
Building Depr. Cost/Yr/Sq'	.91	908
Org.-wide Build.Depr.Cst/Sq'		
Equipment Depr. Cost/Yr/Sq'	.54	538
Org.-wide Equip.Depr.Cst/Sq'		
Org.wide Cost/Sq'		
Support Cost/Sq'	7.22	7220
Elem.wide Gen.Supp.Cst/Sq'		
Direct Program Cost		175
Reg. Teacher Ave.Cost		3666
Totals		12507
Cost/Pupil		154
Cost/Classroom		3127
Cost/Sq'		12.51

APPENDIX C. SURVEYS

SIM

ADMINISTRATION INFORMATION SURVEY
Spring, 1983

School Organization and Building # _____ Administrator I.D. # _____

1. How long have you been an administrator in this school? (Please count this year as one year.) _____ years

2. How many years have you been an administrator? (Please count this year as one year.) _____ years

3. What is your age?
   _____ 20-29
   _____ 30-39
   _____ 40-49
   _____ 50-59
   _____ over 60

4. Sex: Please circle M F

5. What is your highest earned degree?
   _____ Bachelors
   _____ Masters
   _____ Specialist
   _____ Doctorate
   _____ Other (Specify)→_____

QUESTIONS 6-8 APPLY TO FORMAL EVALUATION

6. How many teachers will you formally evaluate this year? _____ teachers

7. What is the average number of classroom observations you made for these teachers per teacher this year? _____

8. On the average, how many minutes (per teacher per year) do you spend on each of the following?

   _____ Informal Observation
   _____ Preparation for pre-observation conferences
   _____ Pre-observation conferences
   _____ Formal classroom observation (Pre-assessment observation)
   _____ Preparing reports from observations
   _____ Preparation for post-observation conferences
   _____ Post-observation conferences (Instructional Observation Conference)
   _____ Observing for reinforcement
   _____ Preparing reports after conferences

(OVER)

9. Given the following categories and definitions, estimate the percent of your time spent on each of the following. (These percents should add up to 100%.)

_____% General Administration - paperwork, telephone, staff meetings, parent conferences, central office or division meetings.

_____% Supervision - assigned regular duties, discipline, time "in the building".

_____% Teacher Evaluation - classroom observations, pre- and post-observation conferences with teachers, completing forms, reviewing materials and data for Teacher Performance Evaluation (TPE).

10. In your school, how many minutes per student per week is alloted for instruction in:

_____ Math

_____ Reading (elementary administrators only)

11. How many minutes per day:

_____ are teachers required to be in school?

_____ are students required to be in school?

_____ is the typical student not in class (recess, lunch, passing time, etc.)?

_____ is the typical teacher not in direct contact with students (lunch, prep period, etc.)?

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ONLY MINNEAPOLIS PUBLIC SCHOOL'S ADMINISTRATORS ANSWER QUESTION 12.

12. If you were an administrator for Minneapolis Public Schools last year (1981-1982), what type of program did you administer?

_____ Was not an administrator for Minneapolis Public Schools last year.

_____ Comprehensive

_____ Contemporary

_____ Continuous Progress

_____ Fundamentals

_____ Montessori

_____ Open

_____ Other (Specify)→_____

SIM

TEACHER INFORMATION SURVEY
Spring, 1983

School Organization and Building # _____ Teacher I.D. # _____

1. How long have you taught in this school? (Please count this year as one year.) _____ years

2. How many years have you been teaching? (Please count this year as one year.) _____ years

3. What is your age?
   _____ 20-29
   _____ 30-39
   _____ 40-49
   _____ 50-59
   _____ over 60

4. Sex: (Please circle) M F

5. What is your highest earned degree?
   _____ Bachelors
   _____ Masters
   _____ Specialist
   _____ Doctorate
   _____ Other (Specify)→ _____

6. Do you teach math?
   _____ Yes--answer a) and b) below.
   _____ No--go on to question 7.

   a) Assuming a typical class period for math instruction, how many minutes do you spend on group math instruction? (time when you are actively presenting concepts to a group of students)

   _____ minutes

   b) Assuming a typical class period for math instruction, how many minutes do you allocate for your students to work individually on math assignments?

   _____ minutes

(OVER)

7. Do you teach reading? _____ Yes--answer a) and b) below.

_____ No--go on to question 8 if you are a teacher for Minneapolis Public Schools

a) Assuming a typical class period, how many total minutes are spent on teaching reading skills from your basic reading series in your classroom?

_____ minutes

b) Assuming a typical class period, how many minutes do your students spend working individually on reading assignments?

_____ minutes

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ONLY MINNEAPOLIS PUBLIC SCHOOL'S TEACHERS ANSWER QUESTION 8.

8. If you were a teacher for Minneapolis Public Schools last year (1981-1982), what type of program did you teach?

_____ Did not teach for the Minneapolis Public Schools last year.

_____ Comprehensive

_____ Contemporary

_____ Continuous Progress

_____ Fundamentals

_____ Montessori

_____ Open

_____ Other (Specify)→_____