

DETERMINATION OF COSTS TO HOUSE
AN EDUCATIONAL PROGRAM
IN NEBRASKA

by

DWAYNE EVERETT GARDNER

A DISSERTATION

Presented to

The Faculty of the University of Nebraska
Teachers College

In Partial Fulfillment of Requirements
For the Degree of Doctor of Education
Department of School Administration

Under the Supervision of Dr. Merle A. Stoneman

Lincoln, Nebraska

1961

THE UNIVERSITY OF NEBRASKA
TEACHERS COLLEGE
ADVANCED PROFESSIONAL DIVISION

TITLE

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IN PARTIAL FULFILLMENT OF REQUIREMENTS
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APPROVED BY

DATE

Merle A. Stoneman

27 July 1961

Leslie L. Chisholm

July 27, 1961

Russell W. McCreight

July 27, 1961

W. K. Beggs

July 27, 1961

Dale K. Hayes

July 27, 1961

SUPERVISORY COMMITTEE

ACKNOWLEDGEMENTS

This research is the result of many years of statistical accounting of the operation, maintenance, and initial construction costs of all local school districts in Nebraska as submitted by County Superintendents to the Research Section of the State Department of Education.

Special recognition of Dr. Merle A. Stoneman for his guidance and leadership during my progress towards this degree are especially appreciated.

To Dr. Donald O. Bush, I am indebted for his time, patience, and assistance throughout this study; and I express to him my sincere appreciation.

To members of the Nebraska Inspection Bureau, I express my appreciation for their wholehearted cooperation. This expression of thankfulness also goes to those administrative officials of the school buildings studied.

A special note of appreciation is expressed to Dr. Freeman B. Decker, Commissioner of Education and members of his staff for their encouragement and assistance.

Finally, I am eternally grateful to my wife, Mayre, and our family for their patience and hopeful encouragement throughout the period of this study.

TABLE OF CONTENTS

LIST OF TABLES	
<u>Chapter</u>	<u>Page</u>
I. INTRODUCTION	1
A. Statement of the Problem	4
B. Definition of Terms	6
C. Plan of Study	11
D. Proposed Contribution	14
II. REVIEW OF LITERATURE	16
A. Planning As a Factor	17
B. Materials as a Factor	21
C. Relationships of Maintenance Costs	22
D. Adequate Maintenance and Its Importance	26
E. Some Design Considerations	29
F. Maintenance Staffing	32
G. Equipment as a Maintenance Factor	38
H. Purpose of Adequate Maintenance	39
I. Operational Costs	40
J. Fixed Charges	43
K. Summary	44
III. INVENTORY OF SCHOOL HOUSING COSTS	45
A. Operation of Plant	48
1. Salaries of Custodians	49
2. Fuel	50
3. Water	50
4. Electricity	50
5. Custodial Supplies	51
6. Other Expense of Operation of Plant	51
B. Maintenance of Plant	101
1. Salaries of Repairmen	102
2. Upkeep of Grounds and Buildings	102
3. Replacement of Plant Equipment	103
4. Other Expense of Maintenance of Plant	103
C. Capital Outlay	150
1. New Sites and Site Improvements	151
2. New Building and Additions to Buildings	151
3. Building Improvements	151
4. Furniture and Equipment	152
5. Other Expense	152
D. Type of Construction	200
E. A Uniform Denominator	201
F. Uncontrolled Variances	203
G. Depreciated Value	208

Table of Contents (Continued)

<u>Chapter</u>	<u>Page</u>
IV. EVALUATION OF COST DATA	211
A. Expenditure for Operation	215
B. Expenditure for Maintenance	217
C. Expenditure for Capital Outlay	222
D. Expenditure for Instructional Costs	225
E. The Expenditure Ratio	227
V. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS . .	231
A. Summary of the Study	232
B. Conclusions	239
C. Recommendations	243
BIBLIOGRAPHY	246

LIST OF TABLES

<u>Table</u>	<u>Page</u>
I. Building Cost Increases Since 1937	18
II. Comparative Expenditures for Maintenance and Operation	23
III. Building Related Costs	24
IV. Breakdown of Components in Typical Classroom With Cleaning Time Computations	34
V. Breakdown of Additional Tasks With Cleaning Time Computations	35
VI. Standard Job Time List	36
VII. Maintenance Cost and Frequency	42
VIII. Rating by Type of Construction	202
IX. Total Square Feet Per Building	204
X. Total Number of Years Studied	206
XI. Building Cost Index	207
XII. Depreciated Value for Type "A" Buildings . . .	209
XIII. Depreciated Value for Type "B" Buildings . . .	210
XIV. Compiled Information on Type "A" Construction.	213
XV. Compiled Information on Type "B" Construction.	214
XVI. Operation Expenditures for Type "A" Construction	216
XVII. Operation Expenditures for Type "B" Construction	218
XVIII. Maintenance Expenditure for Type "A" Construction	220
XIX. Maintenance Expenditure for Type "B" Construction	221

List of Tables (Continued)

<u>Table</u>	<u>Page</u>
XX. Capital Outlay Expenditure for Type "A" Construction	223
XXI. Capital Outlay Expenditure for Type "B" Construction	224
XXII. Expenditures for Instructional Services . . .	226
XXIII. The Ratio for Type "A" Construction	228
XXIV. The Ratio for Type "B" Construction	229
XXV. Percentage of Total Expenditures	230

CHAPTER I

INTRODUCTION

With each passing year, an increasing number of children must be housed in school buildings to provide the educational privilege to which each and every child in the United States is legally and morally entitled. This privilege, in a democracy, includes the right of each child to participate in an educational program which will meet his needs in preparation as a contributing citizen regardless of race, creed, social status, economic condition, or place of residence. In the past decade the need for additional facilities plus replacement of both structurally and educationally obsolete buildings has been experienced by most communities. The emphasis on need for adequate and sufficient additional facilities to continue to house school population has been repeated many times in recent years. Speaking on the subject in 1952, Dr. Walter D. Cocking, Editor of The School Executive and The American School and University, stated:

As far as can be foreseen, school construction will continue at its present pace for the next twelve to fifteen years. In terms of new buildings, 6000-7000 new structures will be built each year.¹

¹Cocking, Walter D., "School Building Costs from the Educator's Viewpoint," The Building Research Advisory Board, 2101 Constitution Avenue, N.W., Washington 25, D.C., 1952, p. 5.

School building construction is big business and it appears that it will continue to be big business. In Nebraska more than \$127,000,000 was spent on new school construction during the 10 year period 1950-1960.²

In terms of long term financial responsibility the initial cost is only a part of the cost of providing adequate facilities. The maintenance and operation each year is a major budget item. It behooves all responsible school officials to give considerable time, to make constructive analysis of present situations, and to encourage practical experimentation in an effort to obtain the best school buildings for the money spent. Such analysis includes not only initial but long-range costs. Long-range cost analysis in terms of operation and maintenance expenses are especially imperative during periods of rising costs. Decisions made today in terms of long-range cost responsibilities will progressively become more financially burdensome in years to come. What these financial responsibilities involve seem to be more speculative than fact. Dr. Cocking recognized the lack of research back in 1952 when he made the following statement:

There has been too much guessing, too much rule of thumb, the exercise to too much prejudice or preconceived opinion.³

²Bush, Donald O., "Nebraska Public School Construction Since 1949," News Release, 1960.

³Cocking, op. cit., p. 5.

Assuming that this statement was accurate there would appear to be a need to correct the situation. There certainly should be a cause for extensive study to determine the costs of housing school children. Such a study should, among other things, indicate some possible long-range economics in schoolhouse construction.

The major opportunity to give consideration to factors affecting future maintenance and operational costs is during the time that buildings are being designed and constructed. In an article on maintaining and replacing school buildings, Dr. N. E. Viles, specialist, School Housing Section, United States Department of Health, Education and Welfare, indicated need for adequate initial planning. He stated:

Valid formulas or determining maintenance and replacement budgets in schools are not easily developed. Neglected maintenance may hasten replacement needs and adequate maintenance may defer them. And maintenance and replacement, while related, are not easily combined into one factor.

In considering such formulas or measures for use by school officials, it seems desirable to establish a few basic concepts:

1. Adequate maintenance to extend the use of school plants is one of the most important means that is now available to effect school building economy.
2. The time to begin planning maintenance is when the building is being planned, designed, and constructed.⁴

⁴Viles, N. E., "Maintaining and Replacing Schools," The American School Board Journal, July 1959, p. 22.

It is known that annually Nebraska school districts spend a considerable amount of the total school budget for construction, operation, and maintenance of their school plants. For example, during the school year of 1958-1959, Nebraska school districts spent \$10,971,316 or 17.6 per cent of the total budget for operation and maintenance of school plants. During the life of a school plant this cumulative expenditure would certainly represent a considerable amount of public tax funds. If there are economy factors in construction or maintenance practice, then they should be known.

Statement of the Problem

Recognizing the complexity of the broad problem of schoolhouse construction, this study will be delimited to a determination of that portion of cost of providing education attributable to housing the school program. In making this study, an effort will be made to (1) present a historical overview of the problem of school building economies, (2) recognize some of the principles of school plant maintenance, (3) identify some of the significant operational costs, (4) list and make an analysis of school housing costs of selected school buildings over an extended period of use, and (5) suggest some possible economies in school plant construction applicable to sound future planning.

During the past few years much confusion has arisen in the planning of school plants in terms of initial and long-range

economies. There have been charges within recent months that "palaces" are being built. This has led to confusion on the part of the tax-payer and also has had an effect on the passing of bond issue proposals. These charges have been countered by school officials with statements which, in some cases, have not been founded on sound research. Also, such criticism has affected the quality of construction to the point where sound schoolhouse construction economies have not been realized. In fact, these false economies which have been forced upon some school systems have placed high operation and maintenance costs upon schools for future years. In many cases this crash building program has resulted in new but already obsolete buildings. This false economy may have been the use of building materials with high maintenance and hidden costs. There is a tendency for lay persons to confuse beauty with extravagance or plushness. A school building does not necessarily have to look bad to be cheap.

It would seem to be reasonable to assume that costs can be reduced over the life of a building if it has "built-in" low maintenance; if it is planned for educational program change; if it provides quality materials and workmanship; and if it is designed to be flexible. Buildings costing more initially may be more economical over their functional lifetime as a result of low maintenance. If this is supported by

experience, we need to know the initial cost factors which contribute to these economies. It is anticipated that this study will help to identify and give evidence from past experiences of some economies which may be applied to school-house construction in the future.

Definition of Terms

There are terms used universally throughout the literature which have a specific connotation relating to this study. In recent years, the need for more preciseness in the use of terms has resulted in a rather extensive study by United States Office of Education. Their definitions will be used in this study.⁵⁻⁶

School Site - The site for a given school plant consists of all the land serving the school, together with all improvements to the site (other than structures), such as grading, drainage, drives, parking areas, walks, plantings, playcourts, and playfields.

School Plant - A school plant is composed of the site, buildings, and equipment used by a single school, or by two or more schools sharing the use of common facilities.

Cost of Improvements to Site - Cost of a site improvement includes the contract amount for contract

⁵Reason, Paul, and Tankard, George. "Property Accounting for Local and State School Systems." Washington: U.S. Government Printing Office, 1959. (U. S. Department of Health, Education, and Welfare, Office of Education.)

⁶Reason, Paul, and White, Aopheus L. "Financial Accounting for Local and State School Systems." Washington: U.S. Government Printing Office, 1957. (U. S. Department of Health, Education, and Welfare, Office of Education.)

work and salaries and other expenses for work done by district employees, plus any other expenses connected with any initial installation of extension of a site improvement. It also includes the cost of any special assessments against the school district for capital improvements on or off the site, such as streets, curbs, and drains on or adjacent to the site, and any easements involved.

Fire-Resistive Building - A building constructed entirely of fire-resistive materials; or a building with fire-resistive walls and partitions, floors, stairways, and ceilings. A building of this type may have wood finish, wood or composition floor surfaces, and wood roof construction over a fire-resistive ceiling.

Semi-Fire-Resistive Building - A building with fire-resistive exterior and bearing walls and fire-resistive corridor and stairway walls, floors, and ceilings; but with ordinary construction otherwise, such as combustible floors, partitions, roofs, and finish.

Combustible Building - An all-frame building; a building with fire-resistive veneer on wood frame; or one with fire-resistive bearing walls, but otherwise of combustible construction.

Mixed Construction - A building with one or more sections of one type of construction and one or more sections (as additions) of another type of construction.

Gross Floor Area of Building Facility - The gross area of a building is the sum of the areas at each floor level included within the principal outside faces of exterior walls, neglecting architectural setbacks or projections. Include all stories or areas which have floor surfaces with clear standing head room (6 feet 6 inches minimum) regardless of their use. Where a ground level or intermediate story, or part thereof, is left unenclosed, consider the gross area of the unenclosed story as the projected area of the story above. Exclude all unroofed areas and unenclosed roofed-over spaces. Include mezzanines, balconies, and library stack floors only to the extent of their actual floor area; do not include unenclosed areas under the first floor. Unenclosed roofed areas which

have been included in original cost contracts can be excluded on a computed or estimated basis for the development of comparative data of gross building areas and costs.

Pupil Capacity of Building - (Applicable only to buildings designed for use as school buildings).--The membership that can be accommodated in the classrooms and other instruction areas of a building for the school day according to existing State approved standards, exclusive of multiple sessions. Pupil capacity of a given building is dependent upon existing standards or policies governing the operation of the school in question with respect to three major elements: Class size, organization of the school, and educational program of the school. Once established, this figure should be changed only when the standards or policies regulating the three elements are definitely changed or when there is a change affecting capacity in the classroom or other instruction areas as a result of additions to, or remodeling of, a building.

Number of Pupils Served - (Applicable only to buildings not designed for use as school buildings).--The number of different pupils assigned to a building facility for instruction or other school activities. This account is increased or decreased when changes are made in the number of pupils assigned.

Cost of Building - The cost of a building as maintained in the records of the owning unit is the actual cost to that unit in acquiring the building, regardless of how the building may have been acquired. The cost of a building that has been erected by the owning school district is the construction cost of the original building and any subsequent additions or remodeling, plus any miscellaneous expenses of the district which are connected with the construction and acquisition of the building and additions, such as advertisements for contracts and expenses connected with the sale of bonds, less the estimated cost of any part of the building that has been removed. The cost of a building does not include debt service costs (payments of principal, interest on debt, and paying agents' fees).

Operation of Plant - Consists of the housekeeping activities concerned with keeping the physical plant open and ready for use. It includes cleaning, disinfecting, heating, lighting, communications, and other such

housekeeping activities as are repeated somewhat regularly on a daily, weekly, monthly, or seasonal basis. Operation of plant does not encompass the repairs and replacements of facilities and equipment.

Salaries for Custodial Services - The full-time, part-time, and prorated portions of salaries of custodians, firemen, custodians' helpers, matrons, general utility men, dairymen, night watchmen, and other such personnel who sweep, clean, polish, mop, care for buildings and livestock, operate the heating and ventilating systems, and perform any other housekeeping duties, for all purposes except direct expenses for PUPIL TRANSPORTATION, FOOD SERVICES, STUDENT-BODY ACTIVITIES, and COMMUNITY SERVICES.

Heat for Buildings - Expenditures for all coal, steam, electricity, gas, gasoline, fuel oil, and wood used for heating, including transportation costs involved in securing them, except direct heating expenses for PUPIL TRANSPORTATION, FOOD SERVICES, STUDENT-BODY ACTIVITIES, and COMMUNITY SERVICES.

Water and Sewerage - Expenditures for water and for sewage disposal, for all purposes except direct expenses for PUPIL TRANSPORTATION, FOOD SERVICES, STUDENT-BODY ACTIVITIES, and COMMUNITY SERVICES.

Electricity - Expenditures for electricity for artificial lighting and power, except for heating buildings, for all purposes except direct expenses for PUPIL TRANSPORTATION, FOOD SERVICES, STUDENT-BODY ACTIVITIES, and COMMUNITY SERVICES.

Custodial Supplies - Expenditures for brooms, mops, soap, dusters, electrical fuses, electric light bulbs, paper towels, hand towels, bath towels, paper cups, toilet paper, and other such custodial supplies used by students and district employees, for all purposes except direct expenses for PUPIL TRANSPORTATION, FOOD SERVICES, STUDENT-BODY ACTIVITIES, and COMMUNITY SERVICES.

Other Expenses for Operation of Plant - Expenditures for express, drayage, and freight which cannot be charged to the specific activity for which incurred; rental of operation-of-plant equipment; in-service training expenses other than salaries and

supplies; and any other expenses incurred by district employees for operation of plant that cannot be recorded under a specific account, for all purposes except direct expenses for PUPIL TRANSPORTATION, FOOD SERVICES, STUDENT-BODY ACTIVITIES, and COMMUNITY SERVICES.

Maintenance of Plant - Consists of those activities that are concerned with keeping the grounds, buildings, and equipment at their original condition of completeness or efficiency, either through repairs or by replacements of property (anything less than replacement of a total building).

Upkeep of Grounds - Expenditures, including labor and other expenses, for the repair and upkeep of grounds by personnel who are not on the payroll of the school district, for all purposes except direct expenses for PUPIL TRANSPORTATION, FOOD SERVICES, STUDENT-BODY ACTIVITIES, and COMMUNITY SERVICES.

Repair of Buildings - Expenditures, including labor and other expenses, for the repair of buildings by personnel who are not on the payroll of the school district, for all purposes except direct expenses for PUPIL TRANSPORTATION, FOOD SERVICES, STUDENT-BODY ACTIVITIES, and COMMUNITY SERVICES.

Repair and Replacement of Equipment - Expenditures, including labor and other expenses, for the repair and upkeep, by personnel who are not on the payroll of the school district, of equipment which is not a built-in item, for all purposes except direct expenses for PUPIL TRANSPORTATION, FOOD SERVICES, STUDENT-BODY ACTIVITIES, and COMMUNITY SERVICES.

Other Expenses for Maintenance of Plant - Under this account are recorded expenditures for materials and other expenses, except salaries, for maintenance of plant performed by school district employees, including supplies used in the operation of vehicles and other equipment used in the maintenance of plant.

Property Insurance - Expenditures for all forms of insurance covering the loss of, or damage to, property of the school district from fire, theft, storm, or any other cause, except pupil transportation insurance. Also recorded here are costs for appraisals of property for insurance purposes.

Capital Outlay - Expenditures are those which result in the acquisition of fixed assets or additions to fixed assets. They are expenditures for land or existing buildings, improvements of grounds, construction of buildings, additions to buildings, remodeling of buildings, or initial or additional equipment.

Debt Service - Consists of expenditures for the retirement of debt and expenditures for interest on debt, except principal and interest of current loans (money borrowed and paid back during the same fiscal year).

Plan of Study

It is necessary to confine the scope of this study to those cost factors which are directly related to operation and maintenance, particularly design and initial construction costs. Consideration of such factors as the educational program, number of pupils housed, and location of the school plant are not considered significant to this study even though it is admitted that such factors have considerable impact upon the overall costs of education. In an effort to make this study valid and objective, it was deemed advisable to eliminate those factors where considerable variability exists and where controls are not possible. A careful selection of buildings where a complete record was available and where major additions or losses from fire, wind, etc., have not been experienced reduces greatly the variability factors and gives objectivity to the statistics. Even with these limiting factors, it is admitted that there is a broad area of costs to be explored. The aim will be to survey the

situation with respect to selected buildings and in the process identify factors of possible economy. It was not intended that a study of this kind should deal with specifics, but more in terms of generalities. A review, identification, and evaluation of a number of factors of construction and design with as specific conclusions as possible as to their relative potentials, are the primary concern in this study.

School buildings when grouped according to type of construction provide some comparability. The relationship of costs, such as original cost, operation, maintenance, and repair, when analyzed will make it possible to determine relationships of these costs per year, per square foot, per school plant, per classroom, etc., when housed in buildings of varying types of construction.

To further standardize the results of the study, the following criteria will be used in the selection of school plants to be studied:

- a. A school building housing all children (K-12) of a particular school district.
- b. Buildings classified by type of construction as rated by the Nebraska Inspection Bureau.
- c. Buildings constructed after the year of 1922 because of the uniformity of records available on plant costs and maintenance and operation costs in the Nebraska State Department of Education.

Data for this study were gathered from the most convenient and authoritative sources, namely the Nebraska Inspection Bureau, Nebraska State Department of Education, cooperative

survey reports by the University of Nebraska and State Department of Education, local Nebraska school districts, contacts and conferences with authorities in fields related to school building costs, on-site inspection of the studied buildings, and a review of previous work and pertinent literature.

Since permanent annual records of all school expenditures, including school housing costs, are available in the Statistical Services Section, Nebraska State Department of Education, maximum use will be made of this information. These records itemize the annual operation, maintenance, construction, and debt service costs for each school district for each year of their operation.

A personal visit will be made to many of the selected school plants to evaluate and obtain information on such items as condition of existing building, total floor space, number of children housed, and such other information as was not available in existing records.

A standardized rating, as provided by the Nebraska Inspection Bureau, will be used to determine adequacy of initial construction in terms of materials used. This is a recognized authority and considered a very reliable source since it is used for the establishment of all insurance rates.

Proposed Contribution

Many national authorities, as well as local school officials, have expressed a need for a study of this type. There is a need for factual information on existing school-housing costs, for identification of potential economies especially significant during the planning and construction phases, and a need for an analysis of past operation and maintenance costs. It is believed that this study will make a contribution by (1) providing a sample of past operation and maintenance costs experienced by local school districts, (2) reviewing findings of other studies either directly or indirectly relating to these costs, (3) indicating a need for adequate planning during the construction of new facilities, (4) identifying possible economies in operation and maintenance of a school plant, (5) indicating the importance of adequate initial construction in relation to long-range economy, (6) stressing the importance of an adequate maintenance program and (7) making such further suggestions and recommendations as may be desirable and worthy of future consideration and study.

Although many buildings have been constructed in the last few years, there appears to be a need for considerable planning for future construction. The area of operation and maintenance costs may be only a small portion of the total costs in providing an education for children. Still, this

item of cost is important and cannot be over-looked by the prudent school official when each year it appears in his budget and particularly when planning and constructing new facilities.

PREVIEW

CHAPTER II

REVIEW OF LITERATURE

During the past decade numerous school-bond proposals have been turned down at the polls by the voters. Undoubtedly, there are many reasons in specific situations, some valid, but many unfounded, for not voting funds for new school buildings. The tactic of creating confusion seems to be the most effective method of defeating issues. The most often used methods of creating confusion in the minds of the lay participants has resulted from charges that schools being constructed are palaces, memorials, and include nonessentials at great expense. Even though these charges have been made, there are indications that schoolhouse construction generally has been among the most economical of all construction. There are statistics that show the comparison of increase for different types of construction during the past 20 years: (1) school building--150 per cent, (2) all buildings--210 per cent, (3) general construction--275 per cent, (4) medium-priced brick residences--225 per cent, (5) medium-priced frame residences--228 per cent, and (6) highway construction--200 per cent.¹ This does, it seems, demonstrate the concern

¹"Those Fairy Tales About 'Palaces'." National Education Association Journal. October 1958, p. 23.

of school officials in keeping initial costs of schools down.

Planning As a Factor

School plant planners, architects, and school officials have been concerned with keeping the cost of schoolhouses down. The comparison in Table I is undoubtedly the result of a sincere effort on the part of responsible people. There are apparently ways of doing this without hindering the functionality and usefulness of the building. In an attempt to counteract the confusion created by some of the critics, a number of authorities have defined factors of economy in schoolhouse construction. Dr. Cocking recognized the importance of construction that will permit economy in operation and maintenance.

But hundreds of thousands of dollars can be saved over the life of a school building if it has built-in low maintenance, if the quality of its materials and workmanship assures that it will wear well, if the design is flexible enough to allow the school to adopt to program changes that will come about in the years ahead.

First - rate buildings may initially cost more than second- or third-rate buildings. But over their life they will be the least expensive. Second-class buildings never perform well and they are expensive to keep in working order. Sound, well planned facilities will always be a good investment.²

Others have been equally concerned about operation and

²Cocking, Walter D. "The School Building Situation." School Executive. November 1957, p. 3.