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A study of program cost differentials in Iowa schools

William Henry Riess

Iowa State University

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A STUDY OF PROGRAM COST DIFFERENTIALS IN IOWA SCHOOLS.

IOWA STATE UNIVERSITY, PH.D., 1978
A study of program cost differentials in Iowa schools

by

William Henry Riess

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Iowa State University
Ames, Iowa

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CHAPTER I. INTRODUCTION

The problem

Education in the United States has been for everyone. Recent studies and reviews by authorities have emphasized the increasing importance of appropriate education for all citizens with resulting benefits for communities, states, the nation and the individual involved (30). Essential to this emphasis is careful planning by educators for present as well as future needs. Planning, however, is dependent upon the availability of sufficient information which must provide the planners with a broad spectrum of evidence to convince the public that fiscal responsibility exists.

There appears to be greater public support for allocation of state funds if pupils are grouped according to specific needs rather than providing state funds for classroom units and teacher salaries. In other words, legislators and public policy makers would rather provide funds for "the child to be educated rather than the teacher to be paid" (36, p. 3).

Pupil weighting, or cost differentials, is one answer to the allocation of funds to meet the specific needs of students. Specific needs are defined as those identified with such categories as kindergarten, handicapped, vocational and culturally disadvantaged. Many states have considered pupil weighting but have been confronted with such problems as lack of data provided by local schools, questionable accuracy and validity of records and ineffective methods of collecting data. Better methods must be developed to secure adequate and accurate information in pupil program cost accounting. The creation of components of a method to ascertain program costs in schools in Iowa is the problem of this study. Program costs
are those expenditures incurred for programs identified with the previously mentioned specific needs of students (kindergarten, vocational, handicapped, elementary, junior high, senior high and others). Program cost accounting is the accurate record-keeping of these expenditures.

The courts have affected legislative efforts to fund local schools. State and federal court decisions have mandated that the educational opportunities afforded children should not be a function of the wealth of the school district attended. The essence of equal educational opportunity is not in providing equal amounts of funds for the education of each student but in providing varying amounts of funds needed to insure each student an equal opportunity to obtain an education which meets his needs (7). Each state should determine the variance of program costs appropriate for individual students and consider these cost differences in the allocation of state funds.

Need for the study

In 1971, the Iowa Legislature, in an effort to provide greater equalization of funding to local schools, passed the Iowa Foundation School Support Law which sought to provide a balanced contribution considering the wealth of the local district and other revenue sources to support quality educational programs. Among the principles guiding Iowa lawmakers were the premises that the state should insure that all students have an equal access to quality education and that the state should provide for financing quality education. Provision of a guaranteed level of support for local schools has insured a more balanced contribution. The Iowa State Foundation Plan included a basic property tax of 20 mills to be kept locally.
State aid was to insure local districts of up to 70 percent of the state cost per pupil for the first year (1971-1972) and increase 1 percent each year until a maximum foundation percentage of 80 percent was reached. Each school district was to receive at least $200 per pupil. Millage rates were limited to a 10 percent reduction of the previous year's rate for three years in order to avoid sudden millage reduction in districts most affected (11).

A state allowable growth factor was computed and tied to the growth of the state's economy. Average per pupil expenditures for the 1971-72 ($920 per student) were used as the base for computations. For the first three years the growth factor was approximately 5 percent and thereafter computed entirely according to the state's economic growth. Additional property tax was levied to cover the balance of the budget if millage rates did not exceed those levied in the 1970-1971 year for general fund expenditures. The School Budget Review Committee (SBRC) was formed to review the budgets and tax askings of those schools with exceptional enrollment growth or decline problems and allocate additional funds where necessary (11).

Local school boards continued to operate the local educational program. Supplemental aid was available to school districts by request (SBRC) or by district referenda where local voters approved an additional income surtax. A guaranteed level of state aid was assured to meet the school districts' actual or maximum costs (11).

Amendments have been made to the Iowa Foundation Plan to correct inequalities. These amendments provided an alternative date for districts to figure their enrollment, allowed low-cost districts (up to the state average) to use a growth rate of 125 percent of the state growth rate, expanded
the responsibilities of the SBRC and dealt with technical details to improve the law (12).

More recent changes in the law have provided flexibility in figuring the base pupil enrollment for the school year. These amendments have cushioned the funding effects of declining enrollments in Iowa school districts.

Supplemental to the Iowa School Foundation Plan was a weighted funding plan for special education students. Students with mild handicaps whose educational program included a resource room or special classroom with integration into a "regular" classroom were funded at 1.8 times the amount of the base state aid provided for students. Students with moderate handicaps whose programs included special classes with little integration were funded at 2.2 times the base funding level. Severely handicapped students in special classes with no integration were funded at 4.4 times the base funding level. In 1977 the School Budget Review Committee reduced the weightings to 1.7, 2.0 and 4.0 for mildly, moderately and severely handicapped students, respectively.

The Iowa State Equalization Project at the Iowa Department of Public Instruction has been funded by the United States Office of Education to review the effects of the Iowa Foundation School Support Law. Among the purposes of the Project has been to ascertain, in light of the current funding plan, if students have been provided access to equal educational opportunity. In other words, has the Foundation Plan done what was intended by reducing expenditure disparities of school districts due to their wealth? The Project also considered the influence of size and growth or decline of enrollment on school district expenditures.
The National Educational Finance Project (NEFP) developed a suggested set of program weighting ratios in 1972 to illustrate the relative costs of educational programs. These weights included general funding ratios which were formulated as a guide: Elementary grades 1-6, 1.00; Grades 7-9, 1.20; Grades 10-12, 1.40; Kindergarten, 1.30; Vocational-technical, 1.80; and Compensatory education, 2.00 (34). It was deemed essential that states compute their own cost differentials to identify accurate ratios. Several states including New Mexico, Florida, Kentucky, South Dakota and Texas have developed program cost differentials and are currently funding elementary, junior high, senior high and vocational programs on a weighted basis.

**Advantages and disadvantages**

There are several advantages in allocating funds on a weighted basis. Funding is more cost effective and is related to educational programs needed by students rather than other factors. The number of students enrolled in school programs may not be consistent from program to program and the needs and goals will vary among school districts. Local districts can exercise greater flexibility in program expenditures since funding is based on pupil needs rather than standardized units. Program exploration may be encouraged with more time spent developing appropriate programs. There is a clearer relationship among student programs when the funding is based upon the difference from the unit cost of the basic program. Moreover, constant evaluations of programs and their costs are encouraged by weighted funding (38, pp. 114-115).

Disadvantages also exist in the weighted pupil concept of funding local schools. Cost differentials must be figured on the basis of state
averages and may not provide sufficient funds for individual programs within states. The incentives for particularly efficient school district practices could be hindered when average state cost differentials are used. If schools are funded on the basis of averages, monitoring and evaluation of individual programs would have to be viewed from a broad perspective by state educational agencies (38, p. 115).

Mike Kirst, president of the California State Board of Education, has claimed that funding plans adjusting for compensation of high cost programs or special local needs will lead to "grave technical problems" in the development of formulas to adjust for disparities (Mike Kirst in Education U.S.A., 45, p. 353). Iowa policy makers should carefully consider the advantages and disadvantages of weighted funding as they review the current state funding plan.

Objectives of the study

The overall objective of the study is to determine a method to ascertain program costs in school districts in Iowa. Other objectives of this investigation of program cost differentials in Iowa schools can best be determined by the following questions.

Objective 1. What are the cost differentials of educational programs (vocational, nonvocational, elementary, junior high and senior high) in Iowa schools in relation to school size? Educational program cost differentials are formulated and compared in the study among three school size categories (small, 0-999 enrollment; medium, 1000-2999 enrollment; and large, 3000 or more enrollment).
Hypotheses tested

Ho: There is no significant difference in per pupil expenditures for principals' and supervisors' salaries among the three school enrollment size categories.

Ho: There is no significant difference in per pupil expenditures for instructional salaries among the three school enrollment size categories.

Ho: There is no significant difference in per pupil expenditures for other instructional costs among the three school enrollment size categories.

Ho: There is no significant difference in per pupil costs for fixed charges among the three school enrollment size categories.

Ho: There is no significant difference in per pupil expenditures for capital outlay among the three school enrollment size categories.

Ho: There is no significant difference in per pupil expenditures for operation and maintenance among the three school enrollment size categories.

Ho: There is no significant difference in per pupil expenditures for the total sum of the variables among the three school enrollment size categories.

Ho: There is no significant difference in the mean vocational to non-vocational pupil-unit ratios among the school size categories.

Objective 2. What is the interaction of educational program costs between school size and grade level? Expenditure differentials and interactions within selected budget categories (principals' and supervisors' costs, instructional salaries, other instructional costs, fixed charges, operation and maintenance and capital outlay) are compared among the school size categories and level categories (K-6, 7-9, and 10-12).

Hypotheses tested

Ho: There is no significant interaction between grade level and school size in per pupil expenditures for principals' and supervisors' salaries.

Ho: There is no significant interaction between grade level and school size for per pupil expenditures for instructional salaries.
Ho: There is no significant interaction between grade level and school size in the per pupil expenditures for other instructional costs.

Ho: There is no significant interaction between grade level and school size in the per pupil expenditures for fixed charges.

Ho: There is no significant interaction between grade level and school size in the per pupil expenditures for operation and maintenance.

Ho: There is no significant interaction between grade level and school size in the per pupil expenditures for capital outlay.

Ho: There is no significant interaction between grade level and school size in the per pupil expenditures for the total sum of the variables.

Objective 3. What are the total cost differentials for elementary, junior high and senior high school programs without consideration for factors such as school size, wealth or enrollment changes? District average costs are computed for the previously mentioned budget categories in an effort to ascertain which grade level programs have higher expenditures.

Hypotheses tested

Ho: There is no significant difference in per pupil expenditures for principals' and supervisors' salaries among the three grade level categories.

Ho: There is no significant difference in per pupil expenditures for instructional salaries among the three grade level categories.

Ho: There is no significant difference in per pupil expenditures for other instructional costs among the three grade level categories.

Ho: There is no significant difference in per pupil expenditures for fixed charges among the three grade level categories.

Ho: There is no significant difference in per pupil expenditures for operation and maintenance among the three grade level categories.

Ho: There is no significant difference in per pupil expenditures for capital outlay among the three grade level categories.
Hypotheses tested

Ho: There is no significant difference in the mean vocational to non-vocational instructional salary ratios for the three school size categories.

Ho: There is no significant difference in the mean vocational to non-vocational other instructional costs ratios for the three school size categories.

Ho: There is no significant difference in the mean vocational to non-vocational operation and maintenance cost ratios for the three school size categories.

Ho: There is no significant difference in the mean vocational to non-vocational replacement equipment cost ratios for the three school size categories.

Ho: There is no significant difference in the mean vocational to non-vocational capital outlay cost ratios for the three school size categories.

Methodology

This study examined designated 1976-1977 general fund expenditures of school districts for vocational, nonvocational, elementary, junior high and senior high school programs. Local general fund expenditures were reviewed using the Secretary's Annual Reports (SAR) submitted to the Department of Public Instruction by local schools. Data from the reports were collected in three district enrollment categories: 0-999 students, 1000-2999 students and over 3000 students. These size categories were utilized because
State funding procedures were currently aligned with student enrollments. A systematic sampling of school districts was selected based upon their enrollments using the 1976-1977 average daily membership enrollment figures.

A sampling of 30 schools from the previously mentioned size categories was selected for closer study (interview-survey) regarding vocational and nonvocational expenditure comparisons. The 30 schools were considered the optimum number that would have adequate program cost data available. Within the size categories, 10 small schools, 8 medium size and 12 large schools were selected. Selections were based on enrollments within each category. Most of the school districts (27) declined in enrollment during the two years prior to 1976-1977. Average decline of the selected schools was 2 to 3 percent per year. The per pupil assessed valuation for the sample schools was comparable with the state average. Smaller schools tended to have higher per-pupil assessed valuations than medium or large schools.

On-site interviews with the superintendents or business managers for the 30 schools were conducted to ascertain vocational and nonvocational program cost ratios in junior high schools (7-9) and senior high schools (10-12). Vocational and nonvocational programs were determined by using definitions from the Basic Educational Data Systems (BEDS). BEDS is the established data processing information gathering procedure used by the Iowa Department of Public Instruction. Local schools submit staff, enrollment, and program information each year for data processing purposes. In order to determine if per pupil costs were consistent with numbers of students enrolled in a program, units offered and the enrollment in each offering were collected.
from BEDS information. This information was reviewed and compared to the
SAR and collected data.

Delimitations

The SAR analysis was confined to kindergarten through twelfth grade
programs in Iowa public schools in existence during the 1976-1977 school
year (449 school districts). The review of SAR's submitted to the Depart­
ment of Public Instruction was further delimited to specified categories
of general fund expenditures which included administration (principals and
supervisors), instruction (instructional salaries and other instructional
costs), fixed charges, operation and maintenance and capital outlay for
elementary, junior high and senior high programs. The interview-survey
process was limited to the sampling of 30 school districts with information
collected for designated expenditure categories for the 1976-1977 school
year. Kindergarten was included in the elementary category due to the
method of reporting.

Assumptions

The assumption was made that data submitted to the Department of Pub­
lic Instruction on the SAR were consistent and accurate. It was further
assumed that sampled schools in the SAR analysis and the interview-survey
process were representative of schools in the size enrollment categories.

Due to the lack of clearly defined program expenditures within the
local school budgets, several assumptions were essential to the data col­
clection procedures. It was assumed that vocational instructors had no more
seniority (therefore no more salary) than nonvocational instructors. It
was assumed that the survey options would assist in the formulation of
ratios similar to the ratios of actual expenditures. The budget categories surveyed were assumed to represent the total general fund budget ratios for vocational and nonvocational programs.

**Sampling**

A sampling of 30 school districts in at least two of the following three groups that adhered to the enrollment size groupings was selected for closer study (interview-survey): (1) Districts with vocational program reimbursement claims to the Department of Public Instruction; (2) School districts with modified or actual program cost accounting procedures according to Area Data Computer Processing personnel; and (3) Districts with past participation in a program budget review pilot project in 1975.

The results of the study were compared among the three school size groupings. Overall cost differentials were compared with those of other states with consideration for the differences in procedures of analyzing actual program costs. Data from the SAR's and the collected information were used to provide recommendations regarding the differences of costs of educational programs. Analysis of the data was given to the Department of Public Instruction officials for study with possible recommendations for policy makers.
CHAPTER II. REVIEW OF LITERATURE

The National Educational Finance Project (NEFP) has been the source for much of the related literature. The NEFP emphasized the importance of educational programs funded to meet the educational needs of students in order to obtain equal educational opportunity. Huxel, Hale, Nelson and others refer to the significance of equal educational opportunity and methods to achieve that end.

Summaries of research in Dissertation Abstracts International were reviewed extensively. In addition, numerous articles, papers, monographs and presentations were examined in order to obtain a comprehensive view of school finance reform related to the educational needs of students.

Overview

In an analysis of educational finance trends, Beach has stated that there is increased movement toward use of weighted funding based upon program cost differentials. This trend includes emphasis on weighting by grade level, size of school, teacher training and program. Sparcity of population has also been a consideration in various weighted funding programs (4).

Paul Mort and Walter Reusser (1951), in their landmark work, assessed weighted funding as follows:

The weighted pupil (or its mathematical equivalent, the weighted classroom) is the most systematically refined of all measures of educational need and has been in practical use for a quarter of a century in state aid laws, in expenditure comparisons of various types of districts and in comparisons of ability to support schools. During this period it has been subjected to continuous refinements. It still falls considerably short of the demands of a perfectly satisfactory measure of educational need.
but approaches these demands more closely than any other available measure (42, p. 491).

Basic needs of individuals are personal, vocational and social in nature and should be considered for effective school satisfaction and performance. School system needs are educational objectives to meet the needs of individuals (31, pp. 2-3). Educational need, when combined with fiscal equalization, provides a more permanent bond between equality of educational opportunity and state funding programs. Systems based on need will tend to eliminate or minimize wealth as a factor in determining the extent of educational offerings (39, 44, 34, 38).

**National Educational Finance Project**

The National Educational Finance Project (NEFP) has been responsible for much of the literature about weighted funding and program cost differentials as they relate to educational needs. Funded in 1968 by the United States Office of Education and sponsoring states, NEFP has served as a catalyst for subsequent research and review of alternatives in efforts to attain more equitable funding for public schools.

The study of more equitable funding practices has included the review of cost differentials for various types of programs. Educational programs designed to meet the needs of pupils vary widely in per pupil cost. NEFP developed cost ratios or weights based on differentials in expenditures. The weights computed to serve as a guide were as follows:
<table>
<thead>
<tr>
<th>Educational Program</th>
<th>Weight Assigned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic elementary grades 1-6</td>
<td>1.00</td>
</tr>
<tr>
<td>Grades 7-9</td>
<td>1.20</td>
</tr>
<tr>
<td>Grades 10-12</td>
<td>1.40</td>
</tr>
<tr>
<td>Kindergarten</td>
<td>1.30</td>
</tr>
<tr>
<td>Mentally handicapped</td>
<td>1.90</td>
</tr>
<tr>
<td>Physically handicapped</td>
<td>3.25</td>
</tr>
<tr>
<td>Special learning disorders</td>
<td>2.40</td>
</tr>
<tr>
<td>Compensatory education</td>
<td>2.00</td>
</tr>
<tr>
<td>Vocational-technical</td>
<td>1.80</td>
</tr>
</tbody>
</table>

The above weights illustrate the weighted pupil technique of funding schools, i.e., if the state foundation plan provided $500 per student, 1.8 times or $900 would be provided for the pupil enrolled in a vocational program (44, pp. 28-29).

Another method of weighting is the procedure where sample numbers of pupils per instructional unit for various types of programs are determined:

<table>
<thead>
<tr>
<th>Educational Program</th>
<th>Pupils/instructional unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic elementary grades 1-6</td>
<td>25.00</td>
</tr>
<tr>
<td>Grades 7-9</td>
<td>20.83</td>
</tr>
<tr>
<td>Grades 10-12</td>
<td>17.86</td>
</tr>
<tr>
<td>Kindergarten</td>
<td>19.23</td>
</tr>
<tr>
<td>Mentally handicapped</td>
<td>13.16</td>
</tr>
<tr>
<td>Physically handicapped</td>
<td>7.69</td>
</tr>
<tr>
<td>Compensatory education</td>
<td>12.50</td>
</tr>
<tr>
<td>Vocational-technical</td>
<td>13.89</td>
</tr>
</tbody>
</table>

In this method of weighting 25 pupils in the elementary grades become an instructional unit for funding purposes (44, p. 29).

**Range of weightings**

In 1974 Phi Delta Kappa and the Institute for Educational Finance conducted the 17th National Conference on School Finance. Proceedings from that conference edited by K. Forbis Jordan and Kern Alexander stated that educational programs vary widely and the number of students with different needs varies among school districts. State school support programs should provide pupil weightings or cost differentials to adjust for these
disparities. Conference participants recommended that each state conduct its own research because weights may not be uniform among states. Weighting ranges were formulated as follows:

<table>
<thead>
<tr>
<th><strong>Educational Program</strong></th>
<th><strong>Weight Range</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Kindergarten</td>
<td>1.05-1.30</td>
</tr>
<tr>
<td>Grades 1-2</td>
<td>1.00</td>
</tr>
<tr>
<td>Grades 3-8</td>
<td>1.05-1.30</td>
</tr>
<tr>
<td>Grades 9-12</td>
<td>1.10-1.50</td>
</tr>
<tr>
<td>Educable mentally retarded</td>
<td>1.50-2.50</td>
</tr>
<tr>
<td>Trainable mentally retarded</td>
<td>1.60-3.00</td>
</tr>
<tr>
<td>Business education</td>
<td>1.40-1.80</td>
</tr>
<tr>
<td>Trades and industries</td>
<td>1.50-2.90</td>
</tr>
<tr>
<td>Agriculture</td>
<td>1.60-2.60</td>
</tr>
<tr>
<td>Home economics</td>
<td>1.40-1.70</td>
</tr>
</tbody>
</table>

Methodology and purposes

There is little agreement on how cost differentials for program weights should be determined. One method of ascertaining cost ratios includes the following steps:

1. Identify existing programs.
2. Determine the number of full-time equivalent students in average daily membership for each program.
3. Determine the full-time equivalent teaching staff for each program.
4. Collect the direct expenditures for each program category.
5. Prorate the indirect costs to specific programs in proportion to the services received (excluding transportation, capital outlay, debt service and food service).
6. Calculate the cost differentials for each program (1, p. 167).

There is general agreement that the cost analysis of programs should be developed leading to budgeting and evaluation on a programmatic basis. The analysis should maintain sight of the objectives of budgetary procedures in order to provide continued planning information. Program accounting systems should result from the analysis which can extend to other areas of the budget. Thus the analysis leading to cost accounting can
serve as an approach to measurement of fiscal needs of local schools (31, pp. 21-23). Unit costs have been the most important basis for analysis of program expenditures with full-time equivalent (FTE) pupil enrollment as the most commonly cited.

Sabulao has indicated some of the variables to be included in a cost analysis review. Administrative, instructional, operating, student and community service, library-audio-visual and supervisory costs were categories reviewed for program cost analysis. Course offerings, average daily attendance, pupil-teacher ratio and various program quality evaluations were also important factors (60). Other considerations have included the amount of student time devoted to a program, the number of students a teacher can work with effectively and nonteaching staff time (31, p. 23).

In the development of indices, there has been a tendency to focus on the special programs and neglect the regular programs. Pupil-teacher ratio has been the most important determinant of program cost differentials. At times the "regular" student in a large class has been overlooked because advocacy groups have been well-organized in support of various special programs. Advocates for regular programs should emerge in order to maintain adequate funds for regular programs. Yet if cost differentials are set too high for special or regular programs, claims can be made that weighting has not fulfilled its intended purpose. Annual review of weightings should overcome imbalances and assurances should be made that funds are used for those programs that generate the funds (38, p. 117).
Advantages and disadvantages of weighting

Callahan and Wilken in the Legislator's Education Action Project (LEAP) cite specific advantages of weighted funding programs. Weighting can provide: (1) an educational emphasis on the child, (2) a preciseness of support level, (3) easy understanding for the public, (4) more local independence from a state agency because requests for teacher units may be minimized, (5) equalization based on student need because these needs vary from district to district, (6) support for high-cost programs in state funding plans, (7) an opportunity to direct major policy for programs from the level responsible for funding (8, p. 13).

Jordan and Alexander cite other advantages to weighting; a balanced program is created whereby all students within a state can be included within a single funding plan, thus a clear relationship exists among each category of an educational program. Funding allocations would be determined at the same time providing a balanced program. Constant evaluation of the cost differentials would permit yearly adjustments to maintain a balance (38, p. 114).

Yet pitfalls are evident in the review of cost differentials and weighted funding practices. Some of these disadvantages are merely different views of the previously mentioned advantages. If districts have more flexibility and are free to develop their own programs, there is the implication that there is less state supervision. Some concerns exist that the categorical aid might not be used for the intended student programs (8, p. 13). Due to a lack of adequate local data, cost differentials are generally figured as averages within a state and these averages may not provide adequate funds for each individual program. Also weights usually
reflect current practices and are not necessarily representative of the most efficient operation of educational programs (38, p. 114).

Another problem concerns the misclassification of students for financial gain. Some districts may classify students in high weighted programs in order to generate additional dollars for other less expensive programs (8, p. 13).

Jordan states that a need for overall caution is essential. Emerging developments in public school finance provide different amounts of money for different educational needs. Careful analysis of cost differentials and the setting of weights is difficult and careful planning is essential (37, p. 9).

State efforts

The state of Texas has reviewed a variety of constraints, concerns and issues about the weighted pupil concept for funding schools. Objectives of the Texas study were to determine costs of providing various kinds of opportunities for students and how much money would be needed to finance Texas public schools at a quality level. This research was also intended to determine which Texas districts would require more or less money based on 1970-1971 expenditures and if these allocations met the educational needs of students (39, p. 11). Several state responsibilities were revealed in the review of the Texas funding system. It was found that the State should look at what ought to be in support funding and assume that there was a direct relationship between dollars allocated and program quality. The State should also determine what constitutes a quality program and allow local schools to administer the funds (7, pp. 69-71). The
philosophy behind weighting dealt with that of equal educational opportu-
nity. Funds were allocated in varying amounts to insure a financial basis 
for giving each student an equal opportunity to obtain an education which
meets his needs (7, p. 5).

The Texas Study cited the Governor's Citizens' Committee on Education 
in Florida:

We stress that while districts should be free to spend the money 
they earn from their weighted full time equivalent (FTE) pretty
much in the ways they determine, districts can only earn weighted
FTE for a special program by having the students actually
enrolled in such a program meeting state standards (19, p. 118).

Educational program weights were formulated in Texas by figuring per
pupil costs through the identification of program area operating expenses
and dividing by the number of pupils enrolled. Then using a base of 1.0
for a particular program (elementary) state officials decided how many
students were on each weighting to determine the amount of funds a district
should receive (7, p. 5).

Program areas were selected by the Associate Commissioner and Commis-
sioner of the Texas Education Agency. The areas identified were: Kinder-
garten; Elementary, 1-6; Middle School, 7-9; High School, 10-12; Vocational
Education, Cooperatives, Homemaking, Agriculture, Trades and Industries,
Handicapped, Coordinated Vocational-Academic Educational Programs, Distrib-
utive Education, Vocational Office Education and Health Education; Special
Education; Adult Basic Education; and programs for special populations
(low-income, non-English speaking, Migrant and Gifted and Talented) (7,
p. 11). From these areas the decision was made to group vocational areas
according to cost levels, i.e., assign programs with similar costs the
same weight (7, p. 18).
The study of educational program cost differential samplings in local schools was typical. Texas weights were based on actual program costs per participating student in a sample of 28 "good practice" school districts. Excluded were capital outlay, debt service, transportation and food service (1, p. 168).

Kentucky also selected a representative sample of 28 districts for their study. A cost for each full-time equivalent pupil in the basic and special education programs was obtained. Exclusions were similar to those in the Texas Study (1, p. 171).

South Dakota legislation (based upon two years of study) allows for weighted pupil funding. Ratios developed were: kindergarten (half day), 1.0; grades 1-2, 1.1; grades 3-12, 1.0 and Special Education (all categories), 2.0. Sparcity weights were also formulated at 1.01 to 1.04 for districts with less than 1.25 pupils per square mile and 1.02 to 1.16 for small districts with less than 500 students (16, p. 1).

Missouri has formulated legislation providing for a weighted foundation expenditure plan. Included was a weighting of an additional 25 percent for enrolled public school children from families receiving ADC assistance or orphans (16, p. 1).

Tennessee and South Carolina have recently passed legislation enacting weighting systems. Assigned pupil weights were as follows:

<table>
<thead>
<tr>
<th>South Carolina</th>
<th>Tennessee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade K-3</td>
<td>1.3</td>
</tr>
<tr>
<td>Grades 4-8</td>
<td>1.0</td>
</tr>
<tr>
<td>Grades 9-12</td>
<td>1.25</td>
</tr>
<tr>
<td>Special Education</td>
<td>1.74-2.57</td>
</tr>
<tr>
<td>Provocational</td>
<td>1.2</td>
</tr>
<tr>
<td>Vocational</td>
<td>1.29</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
In both South Carolina and Tennessee districts must spend at least 85 percent of the state aid in the category generating the funds (16, p. 2).

In 1973 Utah developed weightings where cost differentials were greatest: small schools, Special Education, Vocational Education and staff costs. Weightings were formulated to be in addition to the 1.0 generated for pupils in grades 1-12. Vocational weightings were applied to the full-time equivalency of students in each program. Weights formulated were: Agriculture, 1.2; Business 0.7; Distributive Education, 1.5; Home Economics, 0.3; and Technical and Industrial, 1.4. Study of vocational program costs has not been evident since the law passed the 1975 Utah Legislature (8, p. 17).

New Mexico developed a weighting plan which incorporated pupil weights and instructional staff weights as well as adjustments for school and district size. Basic program weights formulated were Kindergarten, 1.1; Grades 1-3, 1.1; Grades 4-6, 1.0; Grades 7-9, 1.2; and Grades 10-12, 1.4. The vocational education weighting of 0.8 was based upon the fact that it would be funded in addition to one of the basic program weights (8, p. 19).

Florida has been among the most active states involved in educational finance reform. In 1973 the Florida Legislature passed legislation which intended:

To guarantee to each student in the Florida public school system the availability of programs and services appropriate to his educational needs, which are substantially equal to those available to any similar student not withstanding geographic differences and varying local economic factors; and to increase the authority and responsibility of districts for deciding matters of instructional organization and method, and to encourage district initiative in seeking more effective and efficient means of achieving the goals of various programs . . . (19, pp. 21-22).
Within the Florida Law basic programs were weighted as follows: Kindergarten-3, 1.234; Grades 4-9, 1.00; and Grades 10-12, 1.10. In order to encourage a wide range of vocational offerings, six weighted groupings were formulated. The range for vocational-technical programs was 1.17 to 4.26. It was anticipated that 15 percent of all expenditures would support vocational-technical funds in the 1975-1976 fiscal year (8, p. 22). The funds were to be expended at the 90 percent level in the program and schools which generated the funds. Transportation aid was provided on top of the weightings. As a result of the legislation, the State of Florida will assume, with minor exceptions, full state funding of capital outlay (29, p. 89).

The method of allocation of costs for programs in Florida was studied by the Institute for Educational Finance. Allocation of costs were generally based on a percentage of the full-time equivalents (students, teachers) in a program. Space costs were figured on a prorated basis (operation and maintenance) where the square footage used by programs was prorated to the total square footage of a building. Transportation was charged to all programs on a full-time equivalent basis unless unusual circumstances required additional transportation expenditures (21, pp. 7-9).

Depreciation of buildings was generally not figured in the Florida plan as a program cost, however, if depreciation were included, a plan for prorating such costs on a space basis was considered the best alternative. Depreciation of equipment, another indirect cost, was accounted for separate from actual program costs. Concern existed regarding depreciation being included over several years or at the time of purchase of the equipment. Memorandum accounting of equipment depreciation was recommended.
NEFP has recommended that states share capital outlay expenses with local districts, particularly the unusually high "start-up" costs for equipment associated with vocational programs (21, pp. 9-10).

**Vocational weightings**

Nystrom and Hennessey have conducted research relating to vocational weightings. Their objectives were to define total general and occupational course costs in Illinois identifying administrative, facility, equipment, instructor salary, instructional supply and overhead costs. Their data collection was limited to the degree that existing fiscal information was subclassified. Preciseness was therefore limited to estimates in determining cost differentials (47, pp. 54-55).

Elements of their study included administration, instruction, pupil transportation, physical plant, fixed charges, capital outlay and transfer accounts. Enrollment data were used to provide course cost differentials. Average differential cost ratios were formulated as follows:

- Applied Biological and Agricultural Occupations: 4.98
- Health Occupations: 2.53
- Personal and Public Service Occupations: 1.42
- Business, Marketing and Management Occupations: 1.35
- Industrial Oriented Occupations: 2.54

The statewide differential average for all vocational courses was 2.09 which substantiated that vocational programs were approximately twice as expensive as nonvocational programs (47, pp. 60-61).

An Iowa comparative study of vocational and nonvocational program costs was conducted by Rex Deputy. Deputy compared the unit costs of selected academic courses (communicative skills, mathematics, social studies and science) and vocational courses (distributive education, home
economics, office education, trades and industries and vocational agriculture). Such factors as salaries, fixed charges, supplies, operation and maintenance and capital outlay were used to determine unit costs. The composite unit cost ratio for the two groups was about 1.00:2.50 (academic: vocational). Deputy found that the higher vocational costs stemmed primarily from lower pupil-teacher ratios (15, p. 37).

Some consistency has been evident in the cost differentials developed by states. NEFP synthesized the various state ratios and developed a reasonable range cost differential scale to establish per pupil weights for educational programs.

<table>
<thead>
<tr>
<th>Kindergarten</th>
<th>1.05-1.30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grades 1-2</td>
<td>1.00-1.30</td>
</tr>
<tr>
<td>Grades 3-8</td>
<td>1.00</td>
</tr>
<tr>
<td>Grades 9-12</td>
<td>1.10-1.50</td>
</tr>
<tr>
<td><strong>Vocational-Technical Programs:</strong></td>
<td></td>
</tr>
<tr>
<td>Business education</td>
<td>1.40-1.80</td>
</tr>
<tr>
<td>Distributive education</td>
<td>1.40-1.50</td>
</tr>
<tr>
<td>Trades and industries</td>
<td>1.50-2.90</td>
</tr>
<tr>
<td>Health occupations</td>
<td>1.40-2.70</td>
</tr>
<tr>
<td>Agriculture</td>
<td>1.60-2.60</td>
</tr>
<tr>
<td>Home economics</td>
<td>1.40-1.70</td>
</tr>
</tbody>
</table>

These ranges were based on comprehensive best practices and current educational expenditures in several sample states. These ranges were developed for state and federal agency planning purposes. NEFP findings of cost differentials and other cost analyses indicated that even though developmental programs and inconsistent fiscal accounting practices complicated data gathering, it was generally accepted that cost differential analysis was an effective and practical planning tool (1, p. 176).

Jordan and Stultz projected cost differentials through 1980 based upon collected data from several states. From their efforts it became apparent that state and federal agency planners should increase expenditures at an
annual rate of 10 percent in order to meet the highest needs of students (Jordan and Stultz in Alexander and Jordan, 1, p. 206).

Size-cost relationship

Size of school has been a factor to be considered in the review of program cost expenditures. Cohn and Hu studied program costs in relation to school size in Michigan and found that average costs for all vocational programs exceeded average costs of all nonvocational programs by $99.18 per student. There was considerable variance of costs within the vocational and nonvocational areas. Some vocational programs were found to be less expensive than nonvocational programs (Home economics, $168 per student and language, $398 per student). Consideration was given program enrollments, salaries and enrollment-faculty ratios. In all cases they found that optimal enrollment sizes were higher than the current enrollments within the programs. Cohn and Hu also concluded that larger schools may not reduce program costs unless enrollments increase in those particular areas in question. They concluded that reallocation of students in existing programs would achieve greater cost efficiency than the formulation of larger schools (13, pp. 306-312).

Hickrod et al. found that there was a curvilinear relationship between unit costs and school size. The optimum size of a school varied from population to population but the U-shaped concept persisted. Small schools and large schools tended to be more expensive to operate (22, pp. 1-2). Optimum high school size relative to standard achievement tests was 1200-1600 enrollment, dependent upon the nature of the population (59). Other studies tended to view the 1500-2000 student range school as the most efficient.
Johns has pointed out, however, that very few studies of cost-size relationships have controlled for the quality of services provided. Therefore, data collected in this light must be treated with caution (29, p. 3).

Summary

Weighted funding plans based upon program expenditures have been in existence for several years. Due to recent court decisions more emphasis has been placed on the provision of equal educational opportunity for all students. Equal educational opportunity has not meant the provision of the same dollars for all students but consideration of program cost differentials or weighted funding to meet student needs.

Much of the current information available about weighted funding and cost differentials has been a result of the National Educational Finance Project. Weights have been developed for educational programs including kindergarten, elementary, junior high, senior high, handicapped, compensatory and vocational education programs. The weights computed by NEFP to serve as a guide were as follows:

<table>
<thead>
<tr>
<th>Educational Program</th>
<th>Weight Assigned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic elementary grades 1-6</td>
<td>1.00</td>
</tr>
<tr>
<td>Grades 7-9</td>
<td>1.20</td>
</tr>
<tr>
<td>Grades 10-12</td>
<td>1.40</td>
</tr>
<tr>
<td>Kindergarten</td>
<td>1.30</td>
</tr>
<tr>
<td>Mentally handicapped</td>
<td>1.90</td>
</tr>
<tr>
<td>Physically handicapped</td>
<td>3.25</td>
</tr>
<tr>
<td>Special learning disorders</td>
<td>2.40</td>
</tr>
<tr>
<td>Compensatory education</td>
<td>2.00</td>
</tr>
<tr>
<td>Vocational-technical</td>
<td>1.80</td>
</tr>
</tbody>
</table>

(44, pp. 28-29)

Other studies have taken the size of school into consideration as a factor in program expenditures. Generally large and small school programs have been found to be more expensive than medium size schools.
Several methods have been developed by states in the formulation of cost differentials, although the most prominent factor in developing funding weights has been pupil-teacher ratio. Typically states have had difficulty in the formulation of weighted funding plans due to a lack of adequate program cost data available. Experts have recommended that each state conduct its own study of program cost differentials since educational program costs have varied. The number of students with different needs has not been the same among school districts within a state. Existing literature has supported the contention that improved funding practices can accommodate these students to insure them a quality educational program.
CHAPTER III. PROCEDURES AND METHODOLOGY

This investigation of program costs in Iowa schools was developed to provide information for the Iowa State Equalization Project of the Department of Public Instruction. The State Equalization Project was funded to determine if the Iowa School Foundation Plan has achieved equality of educational opportunity for all Iowa public school students. Project areas of study have included the investigation of educational program adequacy, determination of financial need of local districts, study of educational program cost variances, study of measures of financial ability of school districts, review of the equity of the tax support system, study of educator and citizen attitudes related to educational finance and study of the efficiency of school district size and organization (25).

This study was planned to provide more specific resource information about variances in educational program costs. Data gathering procedures were elicited from selected local superintendents, merged area school data processing staff, area education agency personnel and Department of Public Instruction personnel, as well as by reviewing procedures in other states.

In previous studies several methods have been used to gather data to ascertain local program expenditures. In developing data gathering procedures for Iowa, several factors were considered. The inadequacy of the data at the local and state levels was a primary consideration. Secretary's Annual Reports for years prior to the 1976-1977 school year were inadequate for study purposes. Clear delineation of grade level program costs was difficult due to the many grade level patterns of schools other than the K-6-3-3 structure requested on the SAR. Other patterns such as
K-8-4 and K-6-6 were not uncommon. In order to adjust for such disparities, expenditures in schools having other than K-6-3-3 organizational patterns were computed for the per pupil costs from registered SAR expenditures by grade level.

On-site visits were made to collect information for additional program cost review. The data collection procedure for vocational and nonvocational program cost-ratio information was hindered by the lack of clearly defined program expenditures. Actual information was not available in relation to budget categories in some of the schools so options were provided on the survey instrument (Appendix C) in order to develop ratios.

In the operation and maintenance category, for example, expenditure information for vocational and nonvocational areas may not have been available to the administrator, so an option question was answered. Ratios were developed by comparing vocational and nonvocational square footage, teaching stations or class sections. Although many vocational areas were larger than nonvocational areas, consideration was given to such areas of buildings as the physical education, art or music facilities which tended to balance any size disparities.

Selection of sample

The selection of school districts for study was based upon placing the 449 districts into three enrollment-size categories. Categories were 0-999 students, 1000-2999 students and 3000 students or more. A systematic sampling of school districts was conducted according to the number of students in each of the size categories, using the 1976-1977 average daily membership enrollment figures. These size categories were selected because
of the relative balance in numbers of students in each group. The total average daily membership in the 0-999 student category was 174,582 students and included 319 school districts. The total average daily membership of the 1000-2999 enrollment category was 168,910 students and included 101 school districts. Average daily membership for school districts with 3000 or more was 253,421 and included 29 school districts. Student enrollment distributions were used because state funding procedures were based upon student enrollments in school districts.

All school districts in the medium (1000-2999 enrollment) and large (3000 or more enrollment) were selected for the SAR study. A systematic sampling procedure was used to select 111 schools from the small schools group. The total sample for the SAR study included 241 school districts.

A sampling of 30 schools from the previously mentioned size categories was selected for closer study regarding vocational and nonvocational cost comparisons. School districts selected were included in at least two of the following three groups: (1) Districts submitting vocational reimbursement claims to the Department of Public Instruction; (2) School districts using modified or actual program cost accounting procedures according to Area Data Processing personnel; and (3) Districts participating in a program budget review pilot project in 1975.

The field sample included 10 small school districts, 8 medium-size districts and 12 large districts. The enrollment sizes of the sampling ranged from under 300 students to over 36,000 students and were representative of the statewide declining enrollment trend. The average per-pupil assessed valuation of the sample was slightly above the state average.
Description of the instruments

The study examined designated categories of the SAR in order to compare K-6, 7-9, and 10-12 costs for the three school size groupings for the 1976-1977 school year. The Secretary's Annual Report (see Appendix A) was submitted to the Department of Public Instruction prior to August 1, 1977. Included were general expenditure fund categories according to the grade levels mentioned previously. Also included was the average daily membership for each grade in the school district.

A survey instrument (see Appendix C) was developed for those schools selected for closer study (interview). Included were the budget categories: Instructional salaries, principals' and supervisors' salaries, other instructional costs, operation and maintenance, replacement equipment and capital outlay. Questions for each category included the options due to the lack of adequate data available regarding actual expenditures for vocational and nonvocational programs. The survey requested vocational and nonvocational expenditure ratios for junior and senior high schools. Vocational and nonvocational programs were defined according to BEDS course offering information submitted to the Department of Public Instruction by local districts (see Appendix B).

Collection of data

Categories selected for the SAR portion of the study were: Administration (principals' and supervisors' salaries), instruction (instructional salaries and other instructional costs), fixed charges, operation and maintenance and capital outlay for elementary, junior high and senior high school programs.
Contacts were made with superintendents or business managers in those districts selected for closer study. Each district was visited and an interview conducted using the Survey of Program Cost Ratios. Interviews were conducted between May 4, 1978, and June 15, 1978. In the interview process, costs and expenditures were expressed synonymously. Similar reference was maintained in the findings.

Twenty-seven of the 30 sampled districts responded. Eight district administrators preferred to keep the survey and respond after researching specific data. Five of the eight respondents returned completed or nearly completed surveys. Twenty-two surveys were completed during the on-site visit.

**Treatment of data: SAR**

SAR information was coded for computer analysis of each budget category and enrollment size category. A two-way analysis of variance using the Statistical Analysis System compared K-6, 7-9 and 10-12 district average per pupil costs based upon average daily membership of the sampled schools for the 1976-1977 school year. Mean costs were computed and compared for each budget category for the three school size groups and the three grade level categories. A 3 x 3 factorial analysis was formulated to ascertain the main effects of the variables and to determine if there was any interaction between grade levels and school sizes. The testing determined if per pupil expenditures varied by grade level, school enrollment or because of an interaction of the two factors. Mean per pupil costs or expenditures referred to school district average per pupil costs within the budget, size or grade level categories unless otherwise indicated. The
Duncan multiple range test was performed to determine where analyzed significant differences existed in the variables. An alpha level of .05 was used in the analysis of variance and Duncan multiple range test.

**Collected data (survey)**

A one-way analysis of variance was calculated for the ratio data collected in the survey interviews. Vocational and nonvocational mean ratios of each budget category from the three school sizes were compared.

**Pupil-unit data**

Information from the Basic Educational Data System (BEDS) submitted to the Department of Public Instruction was gathered. The number of vocational and nonvocational offerings (by unit) were multiplied by the number of students enrolled in each offering to determine pupil-units. A vocational to nonvocational ratio was developed using these units. An analysis of variance was used to compare the mean vocational to nonvocational pupil-unit ratios for each school enrollment category.

**Comparison of survey data and pupil-units**

Pupil-unit ratios were compared to the budget category ratios and school size ratios to indicate those categories with excess costs. Ratios higher than the pupil-unit ratios indicated that per pupil costs for nonvocational programs were higher. Ratios lower than the pupil-unit ratios indicated excess costs per pupil for vocational programs. In other words, in formula form: Pupil-Unit Ratio > Budget Category Ratio = Higher Vocational Costs; Pupil-Unit Ratio < Budget Category Ratio = Higher Nonvocational Costs.
CHAPTER IV. FINDINGS

The findings of this study were organized around four objectives. The first determined and compared educational cost differentials among school sizes. Second, the determination of differentials and their interactions among the designated budget categories were compared among school size and grade level groupings. The third objective compared expenditures among elementary, junior high and senior high school programs and the fourth cost differentials of vocational and nonvocational programs. Within each objective comparisons were made for the designated budget categories.

It should be noted that in the second objective, there was no significant interaction between size of school enrollment and grade level categories for any of the designated budget categories (principals and supervisors' costs, instructional salaries, other instructional costs, fixed charges, operation and maintenance and capital outlay). This lack of interaction between grade level and school size indicated that the amount of expenditures for a particular grade level category was not affected by the size of the school's enrollment.

**Principals and supervisors**

There was a highly significant difference in the per pupil costs for principals and supervisors among the three school size categories (Table 1). Principal and supervisor mean per pupil costs were consistently lowest in the medium school size category and highest in the large school category (Table 2). Average per pupil expenditures of the three school sizes were significantly different from each other among the school sizes based upon the Duncan multiple range test.
The per pupil expenditures for principals and supervisors in the three school size categories were such that small school expenditures were 8 percent higher than medium size schools and large schools were 24 percent higher than schools in the medium size range. Mean expenditures were $65. per student for small, $60. for medium and $75. for large schools. Expressed as cost ratios, small, medium and large schools were 1.08, 1.00 and 1.24, respectively.

A highly significant difference existed (ANOVA) in the mean principal and supervisor per pupil costs among grade levels and is shown in Table 1. As illustrated in Table 2, elementary expenditures were consistently lowest and senior high costs highest. Large-school elementary and junior high principal and supervisor per pupil costs were the same. However, the overall mean costs for grade level categories were from lowest to highest, elementary, $56. per student; junior high, $62. per student; and senior high, $76. per student, respectively. Using the Duncan multiple range test, a significant difference was found between senior high and junior high costs, between senior high and elementary costs and between junior high and elementary costs for principals and supervisors. Cost ratios for principals and supervisors in the grade level categories were elementary, 1.00; junior high, 1.11; and senior high, 1.36.

A curvilinear relationship existed in the per pupil principals' and supervisors' costs. Medium size schools had the lowest per pupil expenditures for principals and supervisors with costs increasing as school district size increased or decreased.
Table 1. Differences of principals' and supervisors' salaries by size of school and grade level: analysis of variance

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of squares</th>
<th>Mean squares</th>
<th>F value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>2</td>
<td>14374</td>
<td>7187</td>
<td>16.13**</td>
</tr>
<tr>
<td>Grade</td>
<td>2</td>
<td>27878</td>
<td>8939</td>
<td>31.29**</td>
</tr>
<tr>
<td>Size-grade interaction</td>
<td>4</td>
<td>2552</td>
<td>638</td>
<td>1.43</td>
</tr>
<tr>
<td>Residual</td>
<td>714</td>
<td>318109</td>
<td>446</td>
<td></td>
</tr>
</tbody>
</table>

**p < .01.

Table 2. Mean per pupil costs for principals' and supervisors' salaries by school size and grade level category (rounded to nearest dollar)

<table>
<thead>
<tr>
<th>Grades</th>
<th>0-999 students</th>
<th>1000-2999 students</th>
<th>3000 or more students</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grades</td>
<td>Mean</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>K-6</td>
<td>55</td>
<td>51</td>
<td>71</td>
<td>56*</td>
</tr>
<tr>
<td>7-9</td>
<td>62</td>
<td>59</td>
<td>71</td>
<td>62*</td>
</tr>
<tr>
<td>10-12</td>
<td>79</td>
<td>70</td>
<td>81</td>
<td>76*</td>
</tr>
</tbody>
</table>

*Mean

*p < .05, Duncan multiple range test.
**Instructional salaries**

A highly significant difference existed in per pupil instructional salary costs among the school size categories (Table 3). Large school costs ($875) were significantly higher than small ($806) and medium size schools ($785) based upon the Duncan multiple range test, as shown in Table 4. On the average, per pupil instructional salary expenditures were lowest in the medium size school category and highest in large schools among the three school size categories. Cost ratios for instructional salaries for the size categories were: Small size, 1.03; medium size, 1.00; and large size schools, 1.11.

There was a highly significant difference (ANOVA) in the per pupil grade level category expenditures. Elementary programs had the lowest overall per pupil costs except in small schools where junior highs had slightly lower per pupil instructional salary expenditures (Table 4). High school instructional salary expenditures were significantly greater than both elementary and junior high school costs. Elementary and junior high school mean instructional salary expenditures did not differ from each other significantly. Mean per pupil expenditures for instructional salaries between the grade levels were $737, $751, and $928 for elementary, junior high and senior high school, respectively. Expressed as cost ratios the comparisons were elementary, 1.00; junior high, 1.02; and senior high school, 1.26.

**Other instructional costs**

There was a highly significant difference (Table 5) in per pupil other instructional costs among the three size categories (ANOVA).
Table 3. Differences of instructional salaries by size of school and grade level: analysis of variance

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of squares</th>
<th>Mean squares</th>
<th>F value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>2</td>
<td>552144</td>
<td>26072</td>
<td>10.78**</td>
</tr>
<tr>
<td>Grade</td>
<td>2</td>
<td>3928663</td>
<td>1964331</td>
<td>76.73**</td>
</tr>
<tr>
<td>Size-grade interaction</td>
<td>4</td>
<td>177373</td>
<td>44343</td>
<td>1.73</td>
</tr>
<tr>
<td>Residual</td>
<td>713</td>
<td>18253094</td>
<td>25600</td>
<td></td>
</tr>
</tbody>
</table>

**p < .01.

Table 4. Mean per pupil costs for instructional salaries by school size and grade level category (rounded to nearest dollar)

<table>
<thead>
<tr>
<th>Grades</th>
<th>Grades K-6</th>
<th>Grades 7-9</th>
<th>Grades 10-12</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-999 students</td>
<td>738</td>
<td>733</td>
<td>946</td>
<td>806</td>
</tr>
<tr>
<td>1000-2999 students</td>
<td>721</td>
<td>748</td>
<td>886</td>
<td>785</td>
</tr>
<tr>
<td>3000 or more students</td>
<td>785</td>
<td>835</td>
<td>1006</td>
<td>875*</td>
</tr>
<tr>
<td>Mean</td>
<td>737</td>
<td>751</td>
<td>928*</td>
<td>804</td>
</tr>
</tbody>
</table>

*p < .05, Duncan multiple range test.
illustrates that small schools had significantly higher per pupil expenditures than medium and large schools. Large schools had the lowest instructional costs categorized as "other," although there was no significant difference between medium and large school expenditures based on the Duncan multiple range test. Cost ratios and per pupil expenditures for the size of school categories were: Large schools, 1.00 ($91.); medium schools, 1.12 ($101.); and small schools, 1.26 ($114.).

A highly significant difference existed among the grade level categories in the per pupil other instructional costs (Table 5). On the average, senior high school per pupil expenditures ($123.) were significantly higher than both elementary ($100.) and junior high school ($95.) other instructional costs, as shown in Table 6. There was no significant difference in the elementary and junior high school expenditures, although the junior high costs were slightly lower. Cost ratios for other instructional costs for grade level categories were: Elementary, 1.05; junior high, 1.00; and senior high, 1.29.

Fixed charges

Based upon the ANOV (Table 7), there was a highly significant difference in the per pupil expenditures for fixed charges among the school size categories. Medium-sized school fixed charges ($149.) were significantly lower than both large ($162.) and small school expenditures ($157.) (Table 8). Large school per pupil costs were highest, although not significantly different from small school mean expenditures based upon the Duncan multiple range test. Cost ratios for fixed charges for the school size
Table 5. Differences of other instructional costs by size of school and grade level: analysis of variance

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of squares</th>
<th>Mean squares</th>
<th>F value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>2</td>
<td>49784</td>
<td>24892</td>
<td>5.92**</td>
</tr>
<tr>
<td>Grade</td>
<td>2</td>
<td>78261</td>
<td>39190</td>
<td>9.30**</td>
</tr>
<tr>
<td>Size-grade interaction</td>
<td>4</td>
<td>204</td>
<td>102</td>
<td>.977</td>
</tr>
<tr>
<td>Residual</td>
<td>714</td>
<td>3004376</td>
<td>4208</td>
<td></td>
</tr>
</tbody>
</table>

**p < .01.

Table 6. Mean per pupil costs for other instructional costs by school size and grade level category (rounded to nearest dollar)

<table>
<thead>
<tr>
<th></th>
<th>Grades K-6</th>
<th>Grades 7-9</th>
<th>Grades 10-12</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-999 students</td>
<td>108</td>
<td>103</td>
<td>131</td>
<td>114*</td>
</tr>
<tr>
<td>1000-2999 students</td>
<td>95</td>
<td>91</td>
<td>118</td>
<td>101</td>
</tr>
<tr>
<td>3000 or more students</td>
<td>83</td>
<td>80</td>
<td>109</td>
<td>91</td>
</tr>
<tr>
<td>Mean</td>
<td>100</td>
<td>95</td>
<td>123*</td>
<td>106</td>
</tr>
</tbody>
</table>

*p < .05, Duncan multiple range test.
categories were: Small schools, 1.05; medium schools, 1.00; and large schools 1.09.

Per pupil costs for fixed charges in the three grade level categories were significantly different (.01) as shown in Table 7. Senior high school costs were significantly higher than both elementary and junior high school per pupil expenditures for fixed charges. On the average, junior high school mean costs were lowest, although not significantly different from the per pupil fixed charges for elementary schools. The cost ratios for average per pupil fixed charges between the three grade level categories were: Elementary, 1.02 ($149.); junior high, 1.00 ($146.); and senior high schools, 1.14 ($167.).

**Operation and maintenance**

Within the operation and maintenance budget category, there was a significant difference in per pupil costs for the three school size groups (ANOV). Medium size school expenditures were significantly lower than both the large and small school size categories (Table 10). Large school per pupil expenditures were highest, although not significantly different from small school costs. Per pupil expenditures for small, medium and large schools were $190., $182. and $195., respectively. Cost ratios for operation and maintenance for the size categories were: Small schools, 1.05; medium schools, 1.00; and large schools, 1.08.

According to the ANOV (Table 9), a highly significant difference existed in the operation and maintenance per pupil costs among the grade levels. Table 10 illustrates that senior high costs ($204.) were significantly higher than both elementary ($180.) and junior high expenditures
### Table 7. Differences of fixed charges by size of school and grade level: analysis of variance

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of squares</th>
<th>Mean squares</th>
<th>F value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>2</td>
<td>15763</td>
<td>7881</td>
<td>9.41**</td>
</tr>
<tr>
<td>Grade</td>
<td>2</td>
<td>50777</td>
<td>25388</td>
<td>30.31**</td>
</tr>
<tr>
<td>Size-grade interaction</td>
<td>4</td>
<td>4701</td>
<td>1175</td>
<td>1.40</td>
</tr>
<tr>
<td>Residual</td>
<td>714</td>
<td>598110</td>
<td>838</td>
<td></td>
</tr>
</tbody>
</table>

**p < .01.

### Table 8. Mean per pupil costs for fixed charges by school size and grade level category (rounded to nearest dollar)

<table>
<thead>
<tr>
<th>Grades K-6</th>
<th>Grades 7-9</th>
<th>Grades 10-12</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-999 students</td>
<td>152</td>
<td>146</td>
<td>172</td>
</tr>
<tr>
<td>1000-2999 students</td>
<td>144</td>
<td>144</td>
<td>158</td>
</tr>
<tr>
<td>3000 or more students</td>
<td>155</td>
<td>151</td>
<td>180</td>
</tr>
<tr>
<td>Mean</td>
<td>149</td>
<td>146</td>
<td>167*</td>
</tr>
</tbody>
</table>

*p < .05, Duncan multiple range test.
Table 9. Differences of operation and maintenance by size of school and grade level: analysis of variance

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of squares</th>
<th>Mean squares</th>
<th>F value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>2</td>
<td>17659</td>
<td>8829</td>
<td>4.26*</td>
</tr>
<tr>
<td>Grade</td>
<td>2</td>
<td>97265</td>
<td>48632</td>
<td>23.47**</td>
</tr>
<tr>
<td>Size-grade interaction</td>
<td>4</td>
<td>7197</td>
<td>1799</td>
<td>.87</td>
</tr>
<tr>
<td>Residual</td>
<td>714</td>
<td>1479755</td>
<td>2072</td>
<td></td>
</tr>
</tbody>
</table>

*p < .05.

**p < .01.

Table 10. Mean per pupil costs for operation and maintenance by school size and grade level category (rounded to nearest dollar)

<table>
<thead>
<tr>
<th>Graded K-6</th>
<th>Grades 7-9</th>
<th>Grades 10-12</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-999 students</td>
<td>186</td>
<td>179</td>
<td>205</td>
</tr>
<tr>
<td>1000-2999 students</td>
<td>172</td>
<td>174</td>
<td>199</td>
</tr>
<tr>
<td>3000 or more students</td>
<td>184</td>
<td>180</td>
<td>222</td>
</tr>
<tr>
<td>Mean</td>
<td>180</td>
<td>177</td>
<td>204*</td>
</tr>
</tbody>
</table>

*p < .05, Duncan multiple range test.
Junior high school mean expenditures were lowest, although there was no significant difference in the elementary and junior high school costs based upon the Duncan multiple range test. The grade level cost ratios for operation and maintenance were: Elementary school, 1.02; junior high school, 1.00; and senior high school, 1.15.

**Capital outlay**

Capital outlay per pupil costs for the three enrollment size categories were significantly different based upon ANOV findings. Large school costs were significantly lower than both small and medium size school expenditures (Table 12). Small school per pupil costs for capital outlay were highest, although there was no significant difference between small and medium size school expenditures. Mean per pupil capital outlay cost ratios for the size categories were: Large schools, 1.00; medium size schools, 1.28 and small schools, 1.41. Mean per pupil expenditures were $23., $30. and $33. for large, medium and small schools, respectively.

There was no significant difference in the capital outlay per pupil costs among the three grade level categories (Table 11). Mean senior high school per pupil costs were slightly higher than elementary and junior high schools, although the difference was insignificant, based upon DMRT findings. Cost ratios for capital outlay expenditures for grade level categories were: Elementary, 1.00 ($28.); junior high, 1.01 ($29.); and senior high, 1.21 ($34.).

**Totals: sum of the variables**

A highly significant difference existed (ANOV) in the per pupil costs for the budget category means among the three school enrollment size groups.
Table 11. Differences of capital outlay by size of school and grade level: analysis of variance

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of squares</th>
<th>Mean squares</th>
<th>F value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>2</td>
<td>6556</td>
<td>3278</td>
<td>4.48*</td>
</tr>
<tr>
<td>Grade</td>
<td>2</td>
<td>3520</td>
<td>1760</td>
<td>2.40</td>
</tr>
<tr>
<td>Size-grade interaction</td>
<td>4</td>
<td>397</td>
<td>99</td>
<td>.14</td>
</tr>
<tr>
<td>Residual</td>
<td>714</td>
<td>522976</td>
<td>732</td>
<td></td>
</tr>
</tbody>
</table>

*p < .05.

Table 12. Mean per pupil costs for capital outlay by school size and grade level category (rounded to nearest dollar)

<table>
<thead>
<tr>
<th>Grades</th>
<th>Grades</th>
<th>Grades</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>K-6</td>
<td>7-9</td>
<td>10-12</td>
<td></td>
</tr>
<tr>
<td>0-999 students</td>
<td>31</td>
<td>30</td>
<td>38</td>
</tr>
<tr>
<td>1000-2999 students</td>
<td>28</td>
<td>29</td>
<td>33</td>
</tr>
<tr>
<td>3000 or more students</td>
<td>22</td>
<td>22</td>
<td>27</td>
</tr>
<tr>
<td>Mean</td>
<td>28</td>
<td>29</td>
<td>34*</td>
</tr>
</tbody>
</table>

*p < .05, Duncan multiple range test.
As shown in Table 14, large school expenditures were highest ($1422.) and were significantly different from small and medium school per pupil costs. Costs of medium sized schools ($1309.) were lowest and were significantly different from large and small school ($1365.) expenditures. Cost ratios for mean per pupil costs for the sum of the variables were: Medium size schools, 1.00; small schools, 1.04; and large schools, 1.09.

Results of the analysis of variance showed a highly significant difference in the per pupil costs for the sum of the category means among the three grade level groups (Table 13). According to the Duncan multiple range test, senior high mean expenditures ($1533.) were significantly higher than both elementary and junior high school per pupil costs (Table 14). Elementary costs ($1252.) were lowest although not significantly different from junior high school costs ($1260.). Ratios for the mean per pupil costs for the sum of the variables were: Elementary, 1.00; junior high school, 1.01; and senior high school, 1.23.

Collected data and pupil-units

The findings indicated no significant difference in the vocational to nonvocational ratios of the selected budget categories for the three school size groups (ANOV). In other words, the difference of vocational to non-vocational cost ratios for instructional salaries (including principals and supervisors), other instructional costs, operation and maintenance, replacement equipment and capital outlay among the three school size enrollment groups was not significant (Appendix D, Tables 17-22).

The vocational to nonvocational mean ratios (Table 15) indicated a range of from 1.00:2.08 in capital outlay to 1.00:3.88 for instructional
Table 13. Differences of sum of the variables (totals) by size of school and grade level: analysis of variance

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of squares</th>
<th>Mean squares</th>
<th>F value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>2</td>
<td>1070963</td>
<td>535481</td>
<td>10.57**</td>
</tr>
<tr>
<td>Grade</td>
<td>2</td>
<td>9050502</td>
<td>4525251</td>
<td>89.34**</td>
</tr>
<tr>
<td>Size-grade interaction</td>
<td>4</td>
<td>283620</td>
<td>70905</td>
<td>1.40</td>
</tr>
<tr>
<td>Residual</td>
<td>713</td>
<td>36113806</td>
<td>50650</td>
<td></td>
</tr>
</tbody>
</table>

**p < .01.

Table 14. Mean per pupil costs for sum of the variables (totals) by school size and grade level category (rounded to nearest dollar)

<table>
<thead>
<tr>
<th>Grades</th>
<th>Grades</th>
<th>Grades</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>K-6</td>
<td>7-9</td>
<td>10-12</td>
</tr>
<tr>
<td>0-999 students</td>
<td>1271</td>
<td>1253</td>
<td>1570</td>
</tr>
<tr>
<td>1000-2999 students</td>
<td>1216</td>
<td>1246</td>
<td>1465</td>
</tr>
<tr>
<td>3000 or more students</td>
<td>1300</td>
<td>1340</td>
<td>1625</td>
</tr>
<tr>
<td>Mean</td>
<td>1252</td>
<td>1260</td>
<td>1533*</td>
</tr>
</tbody>
</table>

*p < .05, Duncan multiple range test.
Table 14A. Mean per pupil costs for selected budget categories by school size (rounded to nearest dollar)

<table>
<thead>
<tr>
<th></th>
<th>Principals and supervisors</th>
<th>Instructional salaries</th>
<th>Other instructional costs</th>
<th>Fixed charges</th>
<th>Operation and maintenance</th>
<th>Capital outlay</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-999 students</td>
<td>65</td>
<td>806</td>
<td>114</td>
<td>157</td>
<td>190</td>
<td>33</td>
<td>1365</td>
</tr>
<tr>
<td>1000-2999 students</td>
<td>60</td>
<td>785</td>
<td>101</td>
<td>149</td>
<td>182</td>
<td>30</td>
<td>1309</td>
</tr>
<tr>
<td>3000 or more students</td>
<td>75</td>
<td>875</td>
<td>91</td>
<td>162</td>
<td>195</td>
<td>23</td>
<td>1422</td>
</tr>
</tbody>
</table>

Table 14B. Mean per pupil costs for selected budget categories by grade level category (rounded to nearest dollar)

<table>
<thead>
<tr>
<th></th>
<th>Principals and supervisors</th>
<th>Instructional salaries</th>
<th>Other instructional costs</th>
<th>Fixed charges</th>
<th>Operation and maintenance</th>
<th>Capital outlay</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grades K-6</td>
<td>56</td>
<td>737</td>
<td>100</td>
<td>149</td>
<td>180</td>
<td>28</td>
<td>1252</td>
</tr>
<tr>
<td>Grades 7-9</td>
<td>62</td>
<td>751</td>
<td>95</td>
<td>146</td>
<td>177</td>
<td>29</td>
<td>1260</td>
</tr>
<tr>
<td>Grades 10-12</td>
<td>76</td>
<td>928</td>
<td>123</td>
<td>167</td>
<td>204</td>
<td>34</td>
<td>1533</td>
</tr>
</tbody>
</table>
Table 14C. Ratios of mean per pupil costs for selected budget categories by school size

<table>
<thead>
<tr>
<th>School Size</th>
<th>Principals and supervisors</th>
<th>Instructional salaries</th>
<th>Other instructional costs</th>
<th>Fixed charges</th>
<th>Operation and maintenance</th>
<th>Capital outlay</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-999 students</td>
<td>1.08</td>
<td>1.03</td>
<td>1.26</td>
<td>1.05</td>
<td>1.05</td>
<td>1.41</td>
<td>1.04</td>
</tr>
<tr>
<td>1000-2999 students</td>
<td>1.00</td>
<td>1.00</td>
<td>1.12</td>
<td>1.00</td>
<td>1.00</td>
<td>1.28</td>
<td>1.00</td>
</tr>
<tr>
<td>3000 or more students</td>
<td>1.24</td>
<td>1.11</td>
<td>1.00</td>
<td>1.09</td>
<td>1.08</td>
<td>1.00</td>
<td>1.09</td>
</tr>
</tbody>
</table>

Table 14D. Ratios of mean per pupil costs for selected budget categories by grade level category

<table>
<thead>
<tr>
<th>Grade Level</th>
<th>Principals and supervisors</th>
<th>Instructional salaries</th>
<th>Other instructional costs</th>
<th>Fixed charges</th>
<th>Operation and maintenance</th>
<th>Capital outlay</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grades K-6</td>
<td>1.00</td>
<td>1.00</td>
<td>1.05</td>
<td>1.02</td>
<td>1.02</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Grades 7-9</td>
<td>1.11</td>
<td>1.02</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.01</td>
<td>1.01</td>
</tr>
<tr>
<td>Grades 10-12</td>
<td>1.36</td>
<td>1.25</td>
<td>1.29</td>
<td>1.14</td>
<td>1.15</td>
<td>1.21</td>
<td>1.23</td>
</tr>
</tbody>
</table>
salaries. On a total basis without consideration for the numbers of students enrolled in a program, there was an average of $3.88 spent for non-vocational instructional salaries for each dollar spent for vocational program instructional salaries. Similarly, on a total basis, there was an average of $2.08 spent for nonvocational capital outlay for each dollar spent for vocational capital outlay. The lowest ratios, that is, where the total vocational costs were highest compared to total nonvocational expenditures were in the replacement equipment and capital outlay budget categories. Within these two categories, medium size schools had higher total nonvocational costs in relation to vocational expenditures. The only category where there were greater total expenditures for vocational than nonvocational programs was in the replacement equipment category for small schools where the ratio was 1.00:0.99. Medium size schools had lower ratios (less total difference between vocational and nonvocational costs) in the other instructional costs and operation and maintenance categories than both small and large schools.

A comparison of pupil-unit ratios related to the first objective showed no significant difference (p < .05) in the vocational and nonvocational pupil units among the three school size categories (Table 22, Appendix D). Comparison of mean pupil-unit ratios with the mean budget categorical ratios showed a per pupil cost indicator of total expenditures (Tables 15-16). In other words, in formula form: Pupil-Unit Ratio > Budget Category Ratio = Higher Vocational Costs; Pupil-Unit Ratio < Budget Category Ratio = Higher Nonvocational Costs.

To more clearly illustrate the relative expenditures, Table 16A shows vocational and nonvocational cost ratios adjusted by mean pupil-unit ratios.
Table 15. Mean senior high school vocational to nonvocational cost ratios of selected budget categories by school size

<table>
<thead>
<tr>
<th>Instructional salaries (includes principal and supervisor)</th>
<th>Other instructional costs</th>
<th>Operation and maintenance</th>
<th>Replacement equipment</th>
<th>Capital outlay</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-999 students</td>
<td>1.00:3.72</td>
<td>1.00:3.85</td>
<td>1.00:0.99</td>
<td>1.00:1.75</td>
</tr>
<tr>
<td>1000-2999 students</td>
<td>1.00:3.92</td>
<td>1.00:3.29</td>
<td>1.00:3.24</td>
<td>1.00:2.99</td>
</tr>
<tr>
<td>3000 or more students</td>
<td>1.00:3.98</td>
<td>1.00:3.69</td>
<td>1.00:2.07</td>
<td>1.00:1.60</td>
</tr>
<tr>
<td>Mean</td>
<td>1.00:3.88</td>
<td>1.00:3.61</td>
<td>1.00:2.09</td>
<td>1.00:2.08</td>
</tr>
</tbody>
</table>

Table 16. Mean senior high school vocational to nonvocational pupil-unit ratios by school size

<table>
<thead>
<tr>
<th>Mean pupil-unit ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-999 students</td>
</tr>
<tr>
<td>1000-2999 students</td>
</tr>
<tr>
<td>3000 or more students</td>
</tr>
<tr>
<td>Mean</td>
</tr>
</tbody>
</table>
For example, the adjusted other instruction cost ratio was 1.00:2.88 : 1.00:3.76 = 1.00:0.77. Therefore, on a pupil-unit basis for each dollar spent for vocational other instructional costs, $0.77 was spent for nonvocational other instructional costs. The greatest relative difference in the adjusted ratios was in the equipment categories where almost twice as much was spent for vocational equipment (replacement, 1.00:0.56, capital outlay, 1.00:0.55) than for nonvocational equipment. Small schools in particular spent more (1.00:0.26, 1.00:0.45) for vocational equipment in these categories than for nonvocational. Other adjusted comparative ratios between vocational and nonvocational programs were cited in Table 16A.

Table 16A. Mean senior high school vocational to nonvocational cost ratios of selected budget categories by school size adjusted by mean pupil-unit ratios

<table>
<thead>
<tr>
<th>Instructional salaries (includes principal and supervisor)</th>
<th>Other instructional costs</th>
<th>Operation and maintenance</th>
<th>Replacement equipment</th>
<th>Capital outlay</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-999 students</td>
<td>1.00:0.96</td>
<td>1.00:0.90</td>
<td>1.00:1.00</td>
<td>1.00:0.26</td>
</tr>
<tr>
<td>1000-2999 students</td>
<td>1.00:1.14</td>
<td>1.00:0.73</td>
<td>1.00:0.96</td>
<td>1.00:0.94</td>
</tr>
<tr>
<td>3000 or more students</td>
<td>1.00:1.01</td>
<td>1.00:0.68</td>
<td>1.00:0.94</td>
<td>1.00:0.53</td>
</tr>
<tr>
<td>Mean</td>
<td>1.00:1.03</td>
<td>1.00:0.77</td>
<td>1.00:0.96</td>
<td>1.00:0.56</td>
</tr>
</tbody>
</table>
CHAPTER V. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Following is a summary of findings, conclusions based upon the results of the study and recommendations for decision makers and for further research.

Summary

In the statistical analysis requisite to the development of a method to ascertain program costs (elementary, junior high, senior high, vocational and nonvocational) for Iowa schools, the findings indicated significant differences in program expenditures among the three school size categories. Examination of the budget categories (principals and supervisors, instructional salaries, other instructional costs, operation and maintenance and capital outlay) revealed that medium size (1000-2999 enrollment) schools had the lowest overall average district per pupil costs. Costs in these school districts were significantly lower than both the small (0-999 enrollment) and large (over 3000 enrollment) school districts. Large schools had significantly higher overall district average per pupil expenditures than small and medium size school districts. A curvilinear relationship existed among the expenditures of the school sizes. Average costs for the sum of the variables studied were $1365., $1309. and $1422. for small, medium and large schools, respectively.

The findings showed no significant interaction between school size and grade level categories for any of the designated budget categories. Senior high schools (10-12) were significantly more expensive than elementary (K-6) and junior high schools (7-9) for overall district per pupil costs. Little difference was noted in the overall elementary and junior high
school category expenditures. On the average, costs for the sum of the variables studied were elementary, $1252.; junior high, $1260.; and senior high schools, $1533.

Analysis of data comparing vocational and nonvocational cost ratios revealed excess expenditures for vocational programs were particularly evident in the categories of replacement equipment and capital outlay. Small school vocational instructional salaries were higher than nonvocational expenditures on a pupil-unit basis. Overall, however, among the three school district size categories, per pupil-unit expenditures for vocational and nonvocational instructional salaries were about the same. Vocational programs also had higher overall expenditures on a per pupil unit basis in the other instructional cost category.

On the average, maintenance and operation per pupil unit expenditures were slightly higher for vocational programs. Small school nonvocational operation and maintenance per pupil-unit expenditures were the same as vocational expenditures; medium and large school ratios showed slightly higher per pupil unit costs in vocational program operation and maintenance. Equipment (replacement and capital outlay) were the most clearly evident categories where vocational costs exceeded nonvocational costs by nearly twice as much.

The following information was obtained which directly related to the objectives.

Objective 1. What are the cost differentials of educational programs in relation to school size?

1. Per pupil expenditures for principals' and supervisors' costs were $65., $60. and $75. for small, medium and large schools,
respectively. Expressed as ratios the differentials were 1.08, 1.00 and 1.24.

2. Expenditure ratios for instructional salaries for the size categories were 1.03, 1.00 and 1.11 for small, medium and large schools, respectively. Expressed in dollar amounts the costs were $806., $785. and $875. per student.

3. Other instructional costs expressed as ratios among the school sizes were, respectively, for small, medium and large schools, 1.26, 1.12 and 1.00. Average actual per pupil dollars spent were $114., $101. and $91. for the three size categories.

4. Cost ratios for fixed charges among the school sizes were small, 1.05; medium, 1.00; and large schools, 1.09. Expressed as dollars, fixed charges were $157., $149. and $162. per pupil.

5. Expenditures per pupil for operation and maintenance among the school sizes were $190., $182. and $195. for small, medium and large schools, respectively. Ratios for the expenditures were 1.05, 1.00 and 1.08.

6. Per pupil expenditures for capital outlay for the size categories were $33., $30. and $23. for small, medium and large schools, respectively. In ratio form the cost differentials were 1.41, 1.28 and 1.00.

7. The average sum of the studied variable expenditures expressed as cost ratios was small, 1.04; medium, 1.00; and large schools, 1.09. In per pupil dollar amounts costs were $1365., $1309. and $1422.
8. The pupil-unit ratios in the school size categories for vocational and nonvocational programs were small, 1.00:3.86; medium, 1.00:3.44; and large, 1.00:3.93.

Objective 2. What is the interaction of educational program costs between school size and grade level?

1. The interaction between the grade levels and school size categories for per pupil expenditures was not significant in any of the selected budget categories (none of the variance could be attributed to size by grade interaction).

Objective 3. What are the total cost differentials for elementary, junior high and senior high school programs without consideration for factors such as school size, wealth or enrollment changes?

1. Per pupil expenditures for principals and supervisors for the grade level categories were elementary, $56.1; junior high, $62.1; and senior high, $76.1. Expressed as ratios the differentials were 1.00, 1.11 and 1.36 for the categories.

2. Ratios for instructional salaries for the grade level categories were 1.00, 1.02 and 1.26 for elementary, junior and senior high schools, respectively. Actual per pupil dollar amounts were $737.1, $751 and $928.

3. Other instructional costs expressed as ratios among the grade level categories were 1.05, 1.00 and 1.29 for elementary, junior high and senior high schools, respectively. Per pupil expenditures were $100.1, $95.1 and $123.

4. Cost ratios for fixed charges among the grade level categories were elementary, 1.02; junior high, 1.00; and senior high schools,
1.14. In per pupil dollar amounts expenditures were $149., $146. and $167., respectively.

5. Operation and maintenance expenditures among the grade level categories were for elementary, junior high and senior high schools, $180., $177. and $204., respectively. Expressed as ratios the differentials were 1.02, 1.00 and 1.15.

6. Cost ratios for capital outlay among the grade level categories were 1.00, 1.01 and 1.21 for elementary, junior high and senior high schools, respectively. In per pupil dollar amounts, the differentials for capital outlay were $28., $29. and $34.

7. Average expenditures for the sum of the studied variables expressed as ratios were 1.00, 1.01 and 1.23 for elementary, junior high and senior high schools, respectively. Per pupil expenditures were $1252., $1260. and $1533. for the grade level categories.

Objective 4. What are the ratios of cost differentials of vocational and nonvocational programs in Iowa schools?

1. The average vocational and nonvocational cost ratios for instructional salaries were 1.00:3.72, 1.00:3.92 and 1.00:3.98 for small, medium and large schools, respectively.

2. Average other instructional costs expressed as ratios for vocational and nonvocational programs were small, 1.00:3.46; medium, 1.00:2.51; and large schools, 1.00:2.66.

3. Vocational and nonvocational operation and maintenance costs expressed as ratios were 1.00:3.85, 1.00:3.29 and 1.00:3.69 for small, medium and large schools, respectively.
4. Average vocational and nonvocational cost ratios for replacement equipment was 1.00:0.99, 1.00:3.24 and 1.00:2.07 for small, medium and large schools, respectively.

5. Capital outlay expenditure ratios for vocational and nonvocational programs were 1.00:1.75, 1.00:2.99 and 1.00:1.60 for small, medium and large schools, respectively.

6. Mean vocational and nonvocational cost ratios of selected budget categories were instructional salaries, 1.00:3.88; other instructional costs, 1.00:2.88; operation and maintenance, 1.00:3.61; replacement equipment, 1.00:2.09; and capital outlay, 1.00:2.08.

7. The average vocational to nonvocational cost ratios of selected budget categories by school size adjusted by mean pupil-unit ratios were: instructional salaries, 1.00:1.03; other instructional costs, 1.00:0.77; operation and maintenance, 1.00:0.96; replacement equipment, 1.00:0.56; and capital outlay, 1.00:0.55.

**Limitations**

Use and discussion of the findings should be constrained by the following limitations:

1. The data available proved to be inadequate for a total study of program costs.

2. Budget coding was not consistent between the schools in the case study sampling.

3. Junior high school data were not included in the study due to inadequacy of the data and the variety of grade level patterns of organization.
4. BEDS information (pupil-unit) was collected for grades 9-12. Data from lower grades with vocational programs were not included.

5. Actual vocational and nonvocational expenditures were unavailable so ratios were used to indicate relative costs.

6. The study was limited to budget categories related to instruction and may not be indicative of relative total average per pupil expenditures. Nondiscretionary expenditures such as transportation, administration (central), attendance and health services which may be relatively lower in larger districts were not accounted for in this investigation.

Conclusions

When cost differences by school size, grade level, size by grade and vocational to nonvocational were considered, the following conclusions appear warranted:

1. The lowest average per pupil costs for the areas studied in relation to school size were in medium size schools (1000-2999 students).

2. The highest average per pupil costs for the areas studied in relation to school size were in large size schools (over 3000 students).

3. The average per pupil cost variance could not be attributed to size by grade interaction for the areas studied.

4. The highest mean per pupil expenditures in the grade level categories were for senior high schools.
5. The lowest mean per pupil expenditures in the grade level categories were for elementary schools.

6. The average ratios for cost differentials of vocational and nonvocational programs illustrated that vocational programs were more expensive than nonvocational programs on a pupil-unit basis.

7. The average ratios for cost differentials of vocational and nonvocational programs illustrated that on a pupil-unit basis expenditure differences were greatest in the equipment categories (replacement equipment and capital outlay).

8. The following ratios from the designated budget categories in this study could be used to compare expenditures by school size: small, 0-999 students, 1.04; medium, 1000-2999 students, 1.00; and large, over 3000 students, 1.09.

9. The following ratios from the data of this study could be used as a pilot test to review program cost ratios in Iowa: elementary kindergarten-grade 6, 1.00; junior high grades 7-9, 1.01; and senior high grades 10-12, 1.23.

10. The following adjusted ratios could be used as a comparison of mean vocational to nonvocational pupil-unit expenditures based upon the designated budget categories studied: instructional salaries, 1.00:1.03; other instructional costs, 1.00:0.77; operation and maintenance, 1.00:0.96; replacement equipment, 1.00:0.56; and capital outlay, 1.00:0.55.

This study of program cost differentials revealed significant differences in expenditures of sizes of schools and grade level categories for the selected budget categories. The method of study to ascertain the
differentials included those budget categories (variables) most closely associated with instruction. Determination of relative educational program costs was imperative in the development of program cost differentials.

Discussion

The curvilinear relationship of expenditures in the three school size categories showed that medium size schools have operated more efficiently than large and small school districts. As the size of the school districts varied from the medium range, the expenditures increased. These findings were consistent with those of Hickrod and others that stated optimum enrollments of schools varied but were generally in the 1200-2000 student enrollment range. Smaller schools have been limited due to declining enrollments and budget ceilings in their program offerings. Medium and large schools have also felt the funding limits but greater flexibility in the use of such funds has probably existed.

It may be speculated that those budget categories considered nondiscretionary were higher for smaller schools. Excluded from the investigation were expenditures for transportation, attendance, health services and administration (central). Existing literature has indicated that small schools cost more per pupil to operate than large schools. Exclusion of the nondiscretionary budget categories may provide explanation for the results of this study.

Higher principals' and supervisors' salary totals for large schools could be explained by the lack of supervisors in most small and medium size schools. A second contributing factor was the sampling of schools. It is likely that, by chance, medium size schools were among the most efficient
within the size of enrollment range. This factor was particularly important in the review of vocational and nonvocational information. Medium size schools sampled tended to have effective, well-balanced vocational and nonvocational programs.

The relatively high senior high school expenditures were probably due to the higher educational preparatory level of teachers. The specificity of program offerings in senior high schools involving more specialized equipment and supplies was an additional factor in the high senior high costs. Principals' and supervisors' salaries and instructional salaries for senior high schools comprised about 60 percent of the total budget. These two budget categories were significantly higher than those of elementary and junior high schools which accounted for the relatively high senior high expenditures. Other variables were significantly greater for senior highs but made up a smaller portion of the budget and were not considered the primary factors in the significantly higher senior high expenditures.

Other states already using weighted funding to support educational programs have employed comparable ratios to those found in this study. Such states as South Carolina, Tennessee, Utah and Florida have had funding ratios ranging from 1.1-1.3 for kindergarten through grade 3. Weights for grades 4-8 ranged from 1.00-1.10 and for grades 9-12, 1.20-1.40. These states have used various combinations of grade levels in the formulation of weights.

This study used the K-6, 7-9 and 10-12 format because of existing data. Similarities were apparent; kindergarten-grade 6 weights in this study were 1.00 and for grades 7-9, 1.01. In comparison with other states, the higher funding differentials in the lower grades (kindergarten-grade 3)
and in grade 9 would explain the closeness (1.00-1.01) of the elementary and junior high weights in this study. It could be speculated that the lower elementary and upper junior high school weights may have offset each other in this investigation. The weight ratio for grades 10-12 in this investigation was 1.23 which also was similar to the senior high school range in the states previously mentioned.

Vocational programs had higher mean expenditures (ratios) in four of the five budget categories. Contrary to the literature, instructional salary ratios which comprise the largest part of the budget were about the same as the pupil-unit ratios. However, the inclusion of exploratory courses within the BEDS vocational categories probably accounts for the relatively even balance of vocational and nonvocational instructional salary expenditures on a pupil-unit basis. Many of the exploratory courses, it was speculated, had large class sizes and increased the vocational teacher-pupil ratio. The findings proved somewhat contradictory in that medium size schools had the lowest pupil-unit ratio (the nearest balance of vocational and nonvocational offerings based on enrollment) yet medium size school expenditures were the lowest. One speculation was that small school offerings may not have been operating at full capacity or efficiency due to low enrollments. Large schools on the other hand may have provided such a broad range of offerings in the era of declining enrollments that the teacher-pupil ratio was small in some of the elective nonvocational offerings which explained the high pupil-unit ratios. Medium size schools may have been able to offer a flexible curriculum without providing specialized courses found in some large schools.
Cost differentials for vocational and nonvocational programs in this study were lower than those in other states. Nystrom and Hennessey found vocational programs in Illinois to be nearly twice as expensive as nonvocational programs. The inclusion of vocational exploratory courses in this investigation probably explained the lower overall ratios in the budget categories. Equipment categories were the exceptions where vocational replacement equipment and capital outlay costs were nearly twice as high as nonvocational equipment expenditures.

Recommendations

For policy makers Implementation of a uniform financial accounting system for Iowa should proceed as expeditiously as possible. Legislators are demanding greater amounts of information regarding program expenditures to facilitate future planning. Caution should be taken to carefully indicate to local administrators the types of information needed when they submit the various reports and data to the Department of Public Instruction. That is, the budget categories essential to planning must be carefully defined and recorded for funding and decision-making purposes. In addition, if school districts are required to submit program data to the state agency, flexibility should be built into the instrument to allow for individual district differences in grade organizational patterns, yet contain sufficient information to assist in planning.

The National Educational Finance Project has formulated weights to serve as a guide for policy makers. Weights assigned were elementary grades 1-6, 1.00; grades 7-9, 1.20; grades 10-12, 1.40; kindergarten, 1.30;
and vocational-technical, 1.80. These weights were based upon total expendi­
titures rather than those directly related to instruction.

The formulated weights from this investigation were somewhat lower
than those developed by NEFP. Using the sum of the studied variables, the
weights were elementary K-6, 1.00 ($1252.); junior high 7-9, 1.01 ($1260.);
and senior high school, 1.23 ($1422.). Inclusion of the kindergarten in
the elementary may have skewed the weights in such a way that they appear
lower. Also, Iowa's homogenous population relative to other states may
also have been a factor.

In the formulation of weights for elementary, junior and senior high
school programs, the findings support the use of selected budget catego­
ries (principals' and supervisors' instructional salaries, other instruc­
tional costs, fixed charges, operation and maintenance and capital outlay).
In order to determine accurate weights, however, the data available must be
improved. Inconsistencies in coding within the various budget categories
could be improved. Also, the differences in coding procedures related to
grade level organizations were a factor in the study.

Studies of variances in expenditures by school size should use total
general fund expenditures rather than the selected instructional-related
categories. Based upon the literature as well as perceptions, a clearer
picture would evolve showing the relative total expenditures of small,
medium and large schools.

The procedures for vocational program data collection would also be
enhanced by consistencies in budget coding as well as data collection by
the Department of Public Instruction. BEDS information is currently col­
lected for grades 9-12 from local school districts. SAR information is
submitted to the Department of Public Instruction and is based upon K-6, 7-9 and 10-12 expenditures. Information collected by the state agency could be more consistent in the manner it is requested.

Capital outlay and replacement equipment were shown by the study as the highest areas of disparity of expenditures for vocational programs. Consideration should be given to a provision for state assistance in the purchase of equipment for vocational instructional purposes. Support for equipment purchases should be clearly defined and built into the current foundation formula. Such allocations should be for approved vocational programs and contingent upon proper application to the Department of Public Instruction.

Senior high schools have greater expenditures than both elementary and junior high schools. Yet, recommending additional or weighted funding for senior highs ignores any efficiency factor in terms of the benefits to students. Educational outcomes have not been carefully reviewed in this study, yet they must be considered in such a recommendation. With this end in mind, it is more appropriate to seek additional funds for vocational programs than for an overall senior high school program. Such support for vocational programs would encourage greater review of the vocational needs of student populations.

For further research If policy makers are serious about weighted funding for Iowa, further research would enhance a fair and equitable formula for funding educational programs. Among the more fruitful areas for further study would be the investigation of vocational program costs. Vocational programs that are preparatory in nature should be reviewed to ascertain a clearer picture of the per pupil costs. Included would be the
study of salaries, maintenance and operation, fixed charges and equipment. Comparisons could then be made with other programs to determine the actual excess dollars needed to effectively operate such programs.

Another aspect of vocational and nonvocational program expenditure comparisons would be a review of the general fund expenditures for nonvocational programs, excluding designated basic programs such as English, mathematics, social science and science. These expenditures could be compared with vocational program costs, excluding exploratory programs in such areas as industrial arts, home economics, agriculture and business education. Such an investigation would in effect compare program costs that are not required in schools (except for physical education).

Procedures for the above studies would depend upon the abilities of local schools to supply accurate data. Preliminary planning with sampled administrators would enable them to consistently code expenditures for the investigated programs and increase the accuracy of the gathered data.

Further analysis of the relationship of school site and program costs would also assist decision makers in the review of Iowa funding practices. Again, preliminary planning with (and training for) local administrators relating the objectives of the study would enhance data collection. Included in the planning would be careful program budget coding procedures. Such planning could provide a study more longitudinal in nature. Budget categories should include those investigated in this study as well as selected nondiscretionary expenditures such as transportation, central administration and health services.

Procedures of such a study should include the comparison of school size categories. These size categories could be based upon the unit of
funding, in this case, the pupil. Categories could be developed in such a way that a relative balance of numbers of pupils would be in each size grouping. Four or more size groupings would give a clearer picture of the cost comparisons. One category could include only those school districts of 500 students or less and another 5,000 students or more with at least two other categories for other school sizes. A more accurate picture of school size and program expenditure comparisons should include instructional related expenditures as well as the nondiscretionary expenditures previously mentioned.

In addition to the above investigations, further refinement of data gathering procedures at the Department of Public Instruction could provide greater use of fiscal accounting and program information. Alternatives to BEDS and other data collection and processing methods could be tested for efficiency and effectiveness to assist decision makers. Such a study would review past usage of such information and project the kind of information needed in the future. The investigation would prove beneficial to the further study of program costs.

The recommended studies would clarify the method and reasons to collect program cost information for local administrators submitting the data. The study of such information should include instructional related categories to ascertain program expenditures and additional nondiscretionary expenditures for school size expenditure comparisons.
BIBLIOGRAPHY


APPENDIX A. GENERAL FUND EXPENDITURES

BY PROGRAM LEVEL: 1976-1977
PLEASE NOTE:

Dissertation contains small and indistinct print.
Filmed as received.

UNIVERSITY MICROFILMS.
<table>
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<th>Program Level</th>
<th>K-6 Elementary</th>
<th>7-9 Junior High</th>
<th>10-12 Senior High</th>
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<td>27</td>
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<td>47</td>
<td>101</td>
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<td>57</td>
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<td>57</td>
<td>87</td>
<td>151</td>
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<td>97</td>
<td>171</td>
</tr>
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<td>Principal*</td>
<td>57</td>
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<td>127</td>
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</tr>
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<td>Supervisors</td>
<td>67</td>
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<td>137</td>
<td>291</td>
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<td><strong>A-1 Total Administration Costs</strong></td>
<td><strong>57</strong></td>
<td><strong>87</strong></td>
<td><strong>127</strong></td>
<td><strong>271</strong></td>
</tr>
</tbody>
</table>

| Instructional Salaries | 27 | 37 | 47 | 111 |
| Other Instructional Costs | 37 | 47 | 57 | 131 |
| **B-1 Total Instructional Costs** | **47** | **57** | **87** | **281** |

| Attendance Services | 17 | 27 | 47 | 91 |
| Health Services | 27 | 47 | 67 | 131 |
| Pupil Transportation Services | 37 | 57 | 87 | 171 |
| Fixed Charges | 47 | 67 | 97 | 211 |
| Retirement Costs | 57 | 87 | 117 | 251 |
| Other Fixed Charges | 67 | 97 | 127 | 291 |
| Operation and Maintenance | 77 | 97 | 117 | 291 |
| Food Services | 87 | 117 | 147 | 341 |
| Student Body Activities | 97 | 127 | 157 | 381 |
| Community Services | 107 | 137 | 167 | 407 |
| Capital Outlay - (Grand Total) | 117 | 147 | 177 | 441 |
| Debt Services | 127 | 157 | 187 | 471 |
| Tuition to Other Districts | 137 | 167 | 197 | 507 |
| Transportation to Other Districts | 147 | 177 | 207 | 537 |
| **C-1 Total Other Costs** | **157** | **187** | **217** | **607** |

| TOTAL GENERAL FUND EXPENDITURES | **177** | **207** | **237** | **607** |

*KEY - Basis of Distribution for grades K-6; 7-9; 10-12 - the expenditures must be spread in each level regardless of your organizational structure.

Indicate by method for each line item in appropriate box:
1. Direct Cost (use abbreviation D-C for this method)
2. Student Enrollment - prorate floor space (use abbreviation B-E for this method)
3. Building Enrolment - prorate floor space (use abbreviation B-E for this method)
4. Combination of above (show both numbers - example: 1.3 use abbreviation C-A for this method)
5. Other - explain briefly (use abbreviation A for this method)
APPENDIX B. DEFINITION OF TERMS FOR SURVEY
OF PROGRAM COST RATIOS

_**Vocational Education**_ - Basic Educational Data Systems (BEDS) course offering information is used to define vocational education. Included are instructional courses listed under:

01 - Agriculture  
03 - Business Education  
04 - Distributive Education  
07 - Health Occupations  
09 - Home Economics  
10 - Industrial Arts  
14 - Office Education  
16 - Multi-Occupations  
17 - Trades and Industries

_**Nonvocational Education**_ - Course offerings not included in vocational education BEDS categories.

_**Instructional Salaries**_ - The total amount paid to individuals for their services which deal directly or aid in the teaching of students or improve the quality of teaching.

_**Principals' and Supervisors' Salaries**_ - The total amount for salaries of principals, assistant principals, supervisors or other certified administrative assistants of a school. Principals and supervisors would include those certified building personnel not in a collective bargaining unit.

_**Other Instructional Costs**_ - Expenditures for supplies and other expenses for the instructional program of the school. Included are materials which are consumed in the teaching-learning process or which are used but not consumed in the teaching-learning process. This category includes professional books, periodicals and general instructional costs such as equipment rental, assembly expenses, membership dues, etc. Also included are audio-visual aids, testing program materials, textbooks, library books, periodicals and supplies, telephone (instruction related) and travel (instruction related). Essentially this category includes all instructional costs except salaries.
**Operation and Maintenance** (related to instruction not including replacement equipment) - Expenditures concerned with keeping the physical plant open and ready for use. Included are costs for custodians, utilities, fuel, supplies and expenses for maintenance and operation, laundry, etc.

**Equipment replacement** (instructional related) - Expenditure for a complete unit of equipment purchased to take the place of a complete unit of equipment serving the same purpose.

**Capital Outlay** (instructional related) - Expenditures for additional (not replacement) equipment used for a school program. Included are the salaries of those persons employed to manufacture and construct original equipment for the school district. Capital outlay includes instructional equipment and furniture such as: desks, tables, bookcases, shop machinery, typewriters, science laboratory apparatus, etc.
APPENDIX C. SURVEY OF PROGRAM COST RATIOS

School District Name _______________________________________________________

County-District Code ___________________________________________________

Please supply the following information using the attached definitions of terms.

Respond only to one option for each numbered category.

1. Instructional Salaries - 1976-1977

Option a. What are the actual expenditures for vocational instructional salaries in your district?

Junior High (7-9) $________

Senior High (10-12) $________

What are the actual expenditures for nonvocational instructional salaries in your district?

Junior High (7-9) $________

Senior High (10-12) $________

Option b. How many vocational instructors teach in your school district (include part-time)?

Junior High (7-9) ________

Senior High (10-12) ________

How many nonvocational instructors teach in your school district (include part-time)?

Junior High (7-9) ________

Senior High (10-12) ________
2. Principals and Supervisors Salaries - 1976-77

Option a. What is the expenditure for principals' salaries in your school district?

Elementary (K-6) $________
Junior High (7-9) $________
Senior High (10-12) $________

3. Other Instructional Costs - 1976-77

Option a. What are the actual other instructional expenditures for vocational programs in your school district?

Junior High (7-9) $________
Senior High (10-12) $________

What are the actual other instructional costs for nonvocational programs in your school district?

Junior High (7-9) $________
Senior High (10-12) $________

Option b. Based upon your experience from 1976-77 and other years, what is your best estimate of the vocational to nonvocational ratio for other instructional expenditures?

Vocational : Nonvocational

Junior High (7-9) ________ ________
Senior High (10-12) ________ ________

REMINDER - You only need to respond to one option per category.
4. Operation and Maintenance (excluding replacement equipment) - 1976-77

**Option a.** What are the total expenditures for operation and maintenance for vocational programs in your school district (omit jointly administered)?

<table>
<thead>
<tr>
<th></th>
<th>Junior High (7-9)</th>
<th>Senior High (10-12)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$_________</td>
<td>$_________</td>
</tr>
</tbody>
</table>

What are the total expenditures for operation and maintenance for nonvocational programs in your school district (omit jointly administered)?

<table>
<thead>
<tr>
<th></th>
<th>Junior High (7-9)</th>
<th>Senior High (10-12)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$_________</td>
<td>$_________</td>
</tr>
</tbody>
</table>

**Option b.** How many square feet are allocated to vocational instruction in the school buildings in your district?

<table>
<thead>
<tr>
<th></th>
<th>Junior High (7-9)</th>
<th>Senior High (10-12)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>_______</td>
<td>_______</td>
</tr>
</tbody>
</table>

How many square feet are allocated to nonvocational instruction in school buildings in your district?

<table>
<thead>
<tr>
<th></th>
<th>Junior High (7-9)</th>
<th>Senior High (10-12)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>_______</td>
<td>_______</td>
</tr>
</tbody>
</table>

**Option c.** How many vocational teaching stations are in the secondary school buildings in your district?

<table>
<thead>
<tr>
<th></th>
<th>Junior High (7-9)</th>
<th>Senior High (10-12)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>_______</td>
<td>_______</td>
</tr>
</tbody>
</table>

How many nonvocational teaching stations are in the secondary school buildings in your district?

<table>
<thead>
<tr>
<th></th>
<th>Junior High (7-9)</th>
<th>Senior High (10-12)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>_______</td>
<td>_______</td>
</tr>
</tbody>
</table>
How many sections of vocational courses are offered in the secondary schools (7-12) in your school district?

Junior High (7-9) __________
Senior High (10-12) __________

How many sections of nonvocational courses are offered in the secondary schools (7-12) in your school district?

Junior High (7-9) __________
Senior High (10-12) __________

Based upon your experience from 1976-77 and other years, what is your best estimate of the vocational to nonvocational ratio for operation and maintenance?

Vocational : Nonvocational

Junior High (7-9) __________ __________
Senior High (10-12) __________ __________

5. Equipment Replacement (instructional related) - 1976-77

Option a. What were the 1976-1977 vocational instructional equipment replacement expenditures for secondary (7-12) schools in your district?

Junior High (7-9) $_________
Senior High (10-12) $_________

What were the 1976-77 nonvocational instructional equipment replacement expenditures for secondary (7-12) schools in your district?

Junior High (7-9) $_________
Senior High (10-12) $_________

What were the 1976-1977 Elementary (K-6) instructional equipment costs in your district?

$_________
Option b. Based upon your experience from 1976-1977 and other years, what is your best estimate of the vocational to nonvocational cost ratio for replacement equipment?

Vocational : Nonvocational

Junior High (7-9) _________ _________
Senior High (10-12) _________ _________


Option a. What was the actual expenditure for capital outlay (instructional related) for secondary (7-12) vocational programs in your school district?

Junior High (7-9) $__________
Senior High (10-12) $__________

What was the actual expenditure for capital outlay (instructional related) for secondary (7-12) nonvocational programs in your school district?

Junior High (7-9) $__________
Senior High (10-12) $__________

Option b. Based upon your experience from 1976-1977 and other school years, what is your best estimate of the vocational to nonvocational cost ratio for capital outlay (instructional related) in your school district?

Vocational : Nonvocational

Junior High (7-9) _________ _________
Senior High (10-12) _________ _________

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Bill Riess
Iowa Department of Public Instruction
Grimes State Office Building
Des Moines, Iowa 50319
APPENDIX D. TABLES

Table 17. Differences of senior high school vocational and nonvocational instructional salaries ratios by school size: analysis of variance

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of squares</th>
<th>Mean squares</th>
<th>F value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatments</td>
<td>2</td>
<td>.33</td>
<td>.17</td>
<td>.05</td>
</tr>
<tr>
<td>Error</td>
<td>24</td>
<td>77.71</td>
<td>3.24</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>26</td>
<td>78.05</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 18. Differences of senior high school vocational and nonvocational other instructional costs ratios by school size: analysis of variance

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
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<th>Mean squares</th>
<th>F value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatments</td>
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<td>11.11</td>
<td>5.56</td>
<td>.88</td>
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<tr>
<td>Error</td>
<td>21</td>
<td>132.18</td>
<td>6.29</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>23</td>
<td>143.29</td>
<td></td>
<td></td>
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</tbody>
</table>
Table 19. Differences of senior high school vocational and nonvocational operation and maintenance ratios by school size: analysis of variance

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of squares</th>
<th>Mean squares</th>
<th>F value</th>
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</thead>
<tbody>
<tr>
<td>Treatments</td>
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<td>15.73</td>
<td>7.87</td>
<td>1.13</td>
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<tr>
<td>Error</td>
<td>24</td>
<td>166.47</td>
<td>6.94</td>
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<tr>
<td>Total</td>
<td>26</td>
<td>182.20</td>
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</tr>
</tbody>
</table>

Table 20. Differences of senior high school vocational and nonvocational replacement equipment ratios by school size: analysis of variance

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of squares</th>
<th>Mean squares</th>
<th>F value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatments</td>
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<td>21.04</td>
<td>10.52</td>
<td>1.26</td>
</tr>
<tr>
<td>Error</td>
<td>20</td>
<td>167.33</td>
<td>8.37</td>
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</tr>
<tr>
<td>Total</td>
<td>22</td>
<td>188.37</td>
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</tbody>
</table>
Table 21. Differences of senior high school vocational and nonvocational capital outlay ratios by school size: analysis of variance

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
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<th>Mean squares</th>
<th>F value</th>
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</thead>
<tbody>
<tr>
<td>Treatments</td>
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<td>14.58</td>
<td>7.29</td>
<td>2.59</td>
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<tr>
<td>Error</td>
<td>19</td>
<td>53.50</td>
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<tr>
<td>Total</td>
<td>21</td>
<td>68.08</td>
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</table>

Table 22. Differences of senior high school vocational and nonvocational pupil-unit ratios by school size: analysis of variance

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
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<th>Mean squares</th>
<th>F value</th>
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</thead>
<tbody>
<tr>
<td>Treatments</td>
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<td>.45</td>
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<td>36.63</td>
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<tr>
<td>Total</td>
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<td>37.54</td>
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</table>