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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

A Dissertation Submitted to the

Graduate Faculty in Partial Fulfillment of

The Requirements for the Degree of

DOCTOR OF PHILOSOPHY

Department: Professional Studies
Major: Education (Educational Administration)

Approved:

In Charge of Major Work

For the Major Department

For the Graduate College

Iowa State University
Ames, Iowa

1978

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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 communi-

ties, 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 spec-

trum 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 provid-

ing 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 alloca-

tion of funds to meet the specific needs of students. Specific needs are

defined as those identified with such categories as kindergarten, handi-

capped, vocational and culturally disadvantaged. Many states have consid-

ered 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 pro-

gram 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, handi-
capped, 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 oppor-
tunities 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 indi-
vidual 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 equali-
zation of funding to local schools, passed the Iowa Foundation School Sup-
port 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 Founda-
tion 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 inequities. 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).

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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.

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

Objective 4. What are the ratios of cost differentials of vocational and nonvocational programs in Iowa schools? Average expenditure ratios are computed to ascertain which budget categories have excess costs in comparison to enrollments in vocational and nonvocational courses.

Hypotheses tested

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

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

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

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

Ho: There is no significant difference in the mean vocational to nonvocational 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 fig-
ures.

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 sam-
ple 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.

Deliminations

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 Department 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 Public 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 collection 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 pro-
gram 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 pro-
grams (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 compari-
> sons 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:

Educational Program	Weight Assigned
Basic elementary grades 1-6	1.00
Grades 7-9	1.20
Grades 10-12	1.40
Kindergarten	1.30
Mentally handicapped	1.90
Physically handicapped	3.25
Special learning disorders	2.40
Compensatory education	2.00
Vocational-technical	1.80

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:

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

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. Weight-

ing ranges were formulated as follows:

Educational Program	Weight Range
Kindergarten	1.05-1.30
Grades 1-2	1.00-1.30
Grades 3-8	1.00
Grades 9-12	1.10-1.50
Educable mentally retarded	1.50-2.50
Trainable mentally retarded	1.60-3.00
Business education	1.40-1.80
Trades and industries	1.50-2.90
Agriculture	1.60-2.60
Home economics	1.40-1.70

(38, p. 118)

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 proce-

dures in order to provide continued planning information. Program account-

ing 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).

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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 opportunity. 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 Commissioner of the Texas Education Agency. The areas identified were: Kindergarten; 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, Distributive 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:

South Carolina		Tennessee	
Grade K-3	1.3	Grades K-3	1.2
Grades 4-8	1.0	Grades 4-6	1.0
Grades 9-12	1.25	Grades 7-8	1.1
Special Education	1.74-2.57	Grade 9	1.2
Provocational	1.2	Grades 10-12	1.3
Vocational	1.29	Vocational	1.84-2.62
		Special Education (all)	2.07

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 edu-
> cational 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 instruc-
> tional organization and method, and to encourage district initia-
> tive 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 gen-

erally based on a percentage of the full-time equivalents (students, teach-

ers) 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 sepa-

rate from actual program costs. Concern existed regarding depreciation

being included over several years or at the time of purchase of the equip-

ment. 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 determin-

ing 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 agricul-
ture). Such factors as salaries, fixed charges, supplies, operation and
maintenance and capital outlay were used to determine unit costs. The com-
posite unit cost ratio for the two groups was about 1.00:2.50 (academic:
vocational). Deputy found that the higher vocational costs stemmed primar-
ily 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 rea-
sonable range cost differential scale to establish per pupil weights for
educational programs.

Kindergarten	1.05-1.30
Grades 1-2	1.00-1.30
Grades 3-8	1.00
Grades 9-12	1.10-1.50
Vocational-Technical Programs:	
Business education	1.40-1.80
Distributive education	1.40-1.50
Trades and industries	1.50-2.90
Health occupations	1.40-2.70
Agriculture	1.60-2.60
Home economics	1.40-1.70

These ranges were based on comprehensive best practices and current educa-
tional 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 develop-
mental 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 opti-
mal 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 pro-
grams 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 popu-
lation to population but the U-shaped concept persisted. Small schools and
large schools tended to be more expensive to operate (22, pp. 1-2). Opti-
mum high school size relative to standard achievement tests was 1200-1600
enrollment, dependent upon the nature of the population (59). Other stud-
ies 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:

Educational Program	Weight Assigned
Basic elementary grades 1-6	1.00
Grades 7-9	1.20
Grades 10-12	1.40
Kindergarten	1.30
Mentally handicapped	1.90
Physically handicapped	3.25
Special learning disorders	2.40
Compensatory education	2.00
Vocational-technical	1.80

(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 Depart-
ment of Public Instruction. The State Equalization Project was funded to
determine if the Iowa School Foundation Plan has achieved equality of edu-
cational 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 educa-
tor 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 proce-
dures for Iowa, several factors were considered. The inadequacy of the
data at the local and state levels was a primary consideration. Secre-
tary'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 dispari-
ties, expenditures in schools having other than K-6-3-3 organizational pat-
terns were computed for the per pupil costs from registered SAR expendi-
tures by grade level.

On-site visits were made to collect information for additional program
cost review. The data collection procedure for vocational and nonvoca-
tional 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 pro-
vided 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 avail-
able to the administrator, so an option question was answered. Ratios were
developed by comparing vocational and nonvocational square footage, teach-
ing stations or class sections. Although many vocational areas were larger
than nonvocational areas, consideration was given to such areas of build-
ings 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 stu-
dents 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

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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 (ANOV) 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

Source	df	Sum of squares	Mean squares	F value
Size	2	14374	7187	16.13**
Grade	2	27878	8939	31.29**
Size-grade interaction	4	2552	638	1.43
Residual	714	318109	446	

**$p < .01$.

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

	Grades K-6	Grades 7-9	Grades 10-12	Mean
0-999 students	55	62	79	65*
1000-2999 students	51	59	70	60*
3000 or more students	71	71	81	75*
Mean	56*	62*	76*	64

*$p < .05$, 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 (ANOV) 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 (ANOV). Table 6

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Table 3. Differences of instructional salaries by size of school and grade
level: analysis of variance

Source	df	Sum of squares	Mean squares	F value
Size	2	552144	26072	10.78**
Grade	2	3928663	1964331	76.73**
Size-grade interaction	4	177373	44343	1.73
Residual	713	18253094	25600	

**p < .01.

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

	Grades K-6	Grades 7-9	Grades 10-12	Mean
0-999 students	738	733	946	806
1000-2999 students	721	748	886	785
3000 or more students	785	835	1006	875*
Mean	737	751	928*	804

*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

Source	df	Sum of squares	Mean squares	F value
Size	2	49784	24892	5.92**
Grade	2	78261	39190	9.30**
Size-grade interaction	4	204	102	.977
Residual	714	3004376	4208	

**$p < .01$.

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

	Grades K-6	Grades 7-9	Grades 10-12	Mean
0-999 students	108	103	131	114*
1000-2999 students	95	91	118	101
3000 or more students	83	80	109	91
Mean	100	95	123*	106

*$p < .05$, 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

Source	df	Sum of squares	Mean squares	F value
Size	2	15763	7881	9.41**
Grade	2	50777	25388	30.31**
Size-grade interaction	4	4701	1175	1.40
Residual	714	598110	838	

**$p < .01$.

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

	Grades K-6	Grades 7-9	Grades 10-12	Mean
0-999 students	152	146	172	157
1000-2999 students	144	144	158	149*
3000 or more students	155	151	180	162
Mean	149	146	167*	154

*$p < .05$, Duncan multiple range test.

Table 9. Differences of operation and maintenance by size of school and grade level: analysis of variance

Source	df	Sum of squares	Mean squares	F value
Size	2	17659	8829	4.26*
Grade	2	97265	48632	23.47**
Size-grade interaction	4	7197	1799	.87
Residual	714	1479755	2072	

*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)

	Grades K-6	Grades 7-9	Grades 10-12	Mean
0-999 students	186	179	205	190
1000-2999 students	172	174	199	182*
3000 or more students	184	180	222	195
Mean	180	177	204*	187

*p < .05, Duncan multiple range test.

($177.). 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

Source	df	Sum of squares	Mean squares	F value
Size	2	6556	3278	4.48*
Grade	2	3520	1760	2.40
Size-grade interaction	4	397	99	.14
Residual	714	522976	732	

*$p < .05$.

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

	Grades K-6	Grades 7-9	Grades 10-12	Mean
0-999 students	31	30	38	33
1000-2999 students	28	29	33	30
3000 or more students	22	22	27	23*
Mean	28	29	34*	31

*$p < .05$, Duncan multiple range test.

(Table 13). 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

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Table 13. Differences of sum of the variables (totals) by size of school and grade level: analysis of variance

Source	df	Sum of squares	Mean squares	F value
Size	2	1070963	535481	10.57**
Grade	2	9050502	4525251	89.34**
Size-grade interaction	4	283620	70905	1.40
Residual	713	36113806	50650	

**$p < .01$.

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

	Grades K-6	Grades 7-9	Grades 10-12	Mean
0-999 students	1271	1253	1570	1365*
1000-2999 students	1216	1246	1465	1309*
3000 or more students	1300	1340	1625	1422*
Mean	1252	1260	1533*	1348

*$p < .05$, Duncan multiple range test.

Table 14A. Mean per pupil costs for selected budget categories by school size (rounded to nearest (dollar)

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

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

	Principals and supervisors	Instructional salaries	Other instructional costs	Fixed charges	Operation and maintenance	Capital outlay	Total
Grades K-6	56	737	100	149	180	28	1252
Grades 7-9	62	751	95	146	177	29	1260
Grades 10-12	76	928	123	167	204	34	1533

Table 14C. Ratios of mean per pupil costs for selected budget categories by school size

	Principals and supervisors	Instructional salaries	Other instructional costs	Fixed charges	Operation and maintenance	Capital outlay	Total
0-999 students	1.08	1.03	1.26	1.05	1.05	1.41	1.04
1000-2999 students	1.00	1.00	1.12	1.00	1.00	1.28	1.00
3000 or more students	1.24	1.11	1.00	1.09	1.08	1.00	1.09

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

	Principals and supervisors	Instructional salaries	Other instructional costs	Fixed charges	Operation and maintenance	Capital outlay	Total
Grades K-6	1.00	1.00	1.05	1.02	1.02	1.00	1.00
Grades 7-9	1.11	1.02	1.00	1.00	1.00	1.01	1.01
Grades 10-12	1.36	1.26	1.29	1.14	1.15	1.21	1.23

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 nonvocational 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

	Instructional salaries (includes principal and supervisor)	Other instructional costs	Operation and maintenance	Replacement equipment	Capital outlay
0-999 students	1.00:3.72	1.00:3.46	1.00:3.85	1.00:0.99	1.00:1.75
1000-2999 students	1.00:3.92	1.00:2.51	1.00:3.29	1.00:3.24	1.00:2.99
3000 or more students	1.00:3.98	1.00:2.66	1.00:3.69	1.00:2.07	1.00:1.60
Mean	1.00:3.88	1.00:2.88	1.00:3.61	1.00:2.09	1.00:2.08

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

	Mean pupil-unit ratio
0-999 students	1.00:3.86
1000-2999 students	1.00:3.44
3000 or more students	1.00:3.93
Mean	1.00:3.76

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 nonvoca-

tional 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 catego-

ries 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

	Instructional salaries (includes principal and supervisor)	Other instructional costs	Operation and maintenance	Replacement equipment	Capital outlay
0-999 students	1.00:0.96	1.00:0.90	1.00:1.00	1.00:0.26	1.00:0.45
1000-2999 students	1.00:1.14	1.00:0.73	1.00:0.96	1.00:0.94	1.00:0.87
3000 or more students	1.00:1.01	1.00:0.68	1.00:0.94	1.00:0.53	1.00:0.41
Mean	1.00:1.03	1.00:0.77	1.00:0.96	1.00:0.56	1.00:0.55

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., junior high, $62. and senior high, $76. 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., $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., $95. 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.

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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 non-vocational 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 non-vocational 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 impor-
tant 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 elemen-
tary 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 voca-
tional 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 with-
out 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 expenditures 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 categories (principals' and supervisors' instructional salaries, other instructional 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 collected for grades 9-12 from local school districts. SAR information is

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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.

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APPENDIX A. GENERAL FUND EXPENDITURES

BY PROGRAM LEVEL: 1976-1977

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UNIVERSITY MICROFILMS.

GENERAL FUND EXPENDITURES BY PROGRAM LEVEL
1976 - 1977
77

County No.	District No.	AEA No.
1	3	

	Basis of * Distrib.	K-6 Elementary	7-9 Junior High	10-12 Senior High	TOTAL
ADMINISTRATION:					
Board of Education					⑳ 7
Superintendent					17
Assistant Superintendent					27
Business Manager					37
Adm. Clerical & Secretarial					47
Principals					57
Supervisors					67
A-1 Total Administration Costs . . . . (Sec. a + b, page 4)	xxxxxxx ㉛ 7	17	27	37	
INSTRUCTION:					
Instructional Salaries					㉜ 7
Other Instructional Costs					17
B-1 Total Instructional Costs . . . . (Sec. c + d, page 4)	xxxxxxxxx 27	37	47	57	
OTHER EDUCATIONAL COSTS.					
Attendance Services					㉝ 7
Health Services					17
Pupil Transportation Services					27
Fixed Charges					47
Retirement Costs					
Other Fixed Charges					57
Operation and Maintenance					67
Food Services					㉞ 7
Student Body Activities					17
Community Services					27
Capital Outlay - (Grand Total)					37
Debt Services					47
Tuition to Other Districts					57
Transportation to Other Districts					67
C-1 Total Other Costs . . . . ㉟ (Sec. f, page 4)	xxxxxxxxx 7	18	29	40	
TOTAL GENERAL FUND EXPENDITURES . . . . . ㊱ (Total A + B + C) (Agrees with item g, page 4)	xxxxxxxxx 7	18	29	40	

*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 (use abbreviation S-E for this method)

3. Building Enrollment - 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 offer-
    ing 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 edu-
    cation 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 admin-
    istrative assistants of a school. Principals and supervisors would
    include those certified building personnel not in a collective bargain-
    ing 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 nonvoca-
           tional 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 adminis-
tered)?

Junior High (7-9) $_____

Senior High (10-12) $_____

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

Junior High (7-9) $_____

Senior High (10-12) $_____

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

Junior High (7-9)   _____

Senior High (10-12) _____

How many square feet are allocated to nonvoca-
tional instruction in school buildings in your
district?

Junior High (7-9)   _____

Senior High (10-12) _____

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

Junior High (7-9)   _____

Senior High (10-12) _____

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

Junior High (7-9)   _____

Senior High (10-12) _____

Option d. 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) _____

Option e. 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) _____   _____

6. Capital Outlay (instructional related) - 1976-1977

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) _____   _____

                          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

Source	df	Sum of squares	Mean squares	F value
Treatments	2	.33	.17	.05
Error	24	77.71	3.24	
Total	26	78.05		

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

Source	df	Sum of squares	Mean squares	F value
Treatments	2	11.11	5.56	.88
Error	21	132.18	6.29	
Total	23	143.29		

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Table 19. Differences of senior high school vocational and nonvocational operation and maintenance ratios by school size: analysis of variance

Source	df	Sum of squares	Mean squares	F value
Treatments	2	15.73	7.87	1.13
Error	24	166.47	6.94	
Total	26	182.20		

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

Source	df	Sum of squares	Mean squares	F value
Treatments	2	21.04	10.52	1.26
Error	20	167.33	8.37	
Total	22	188.37		

Table 21. Differences of senior high school vocational and nonvocational
capital outlay ratios by school size: analysis of variance

Source	df	Sum of squares	Mean squares	F value
Treatments	2	14.58	7.29	2.59
Error	19	53.50	2.82	
Total	21	68.08		

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

Source	df	Sum of squares	Mean squares	F value
Treatments	2	.91	.45	.33
Error	27	36.63	1.36	
Total	29	37.54		