A COST ANALYSIS OF SELECTED VOCATIONAL AND TECHNICAL EDUCATION PROGRAMS IN OKLAHOMA

By

John Dale Chumbley

Bachelor of Science
East Texas State University
Commerce, Texas
1965

Master of Education
East Texas State University
Commerce, Texas
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Thesis Approved:

Charles O. Hopkins
Thesis Adviser

Robert Terry

Robert R. Price

James P. Key

William Lewis Grant

D. Wesley Hurst
Dean of the Graduate College

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TABLE OF CONTENTS

Chapter		Page
I.	INTRODUCTION	1
	Statement of the Problem	2
	Purpose of the Study	2
	Need for the Study	2
	Objectives of the Study	3
	Assumptions and Limitations	3
II.	REVIEW OF RELATED LITERATURE AND RESEARCH	6
	Available Annual Cost Estimates	6
	Cost Items (Expenditures) to Consider	7
	Determination of Cost Items	9
	Summary	11
III.	PROCEDURE AND METHODOLOGY	12
	Introduction	12
	Development of the Annual Operating Cost Procedure	12
	Data Collecting Instruments	25
	Analysis of Data	26
IV.	PRESENTATION AND ANALYSIS OF THE DATA	27
	Introduction	27
	State Average Annual Operating Cost of High School Programs	27
	State Average Annual Operating Cost of Area School Programs	49
	State Average Annual Operating Cost of Junior College Programs	72
V.	SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS	88
	Summary of the Study	88
	Conclusions	92
	Recommendations	93
A SELECTED BIBLIOGRAPHY		94
APPENDIX A		96
APPENDIX B		98

Chapter Page

APPENDIX C 104

APPENDIX D 107

APPENDIX E 113

APPENDIX F 119

LIST OF TABLES

Table		Page
I.	State Average Annual Operating Cost for the High School Vocational Agriculture Program	28
II.	State Average Annual Operating Cost for the High School Auto Mechanics Program	38
III.	State Average Annual Operating Cost for the High School Business and Office Education Program	39
IV.	State Average Annual Operating Cost for the High School Carpentry Program	40
V.	State Average Annual Operating Cost for the High School Cosmetology Program	41
VI.	State Average Annual Operating Cost for the High School Distributive Education Program	42
VII.	State Average Annual Operating Cost for the High School Drafting Program	43
VIII.	State Average Annual Operating Cost for the High School Electronics Program	44
IX.	State Average Annual Operating Cost for the High School Home Economics Program	45
X.	State Average Annual Operating Cost for the High School Industrial Cooperative Training Program	46
XI.	State Average Annual Operating Cost for the High School Small Appliance Repair Program	47
XII.	State Average Annual Operating Cost for the High School Welding Program	48
XIII.	State Average Annual Operating Cost for the Area School Air Conditioning and Refrigeration Program	50
XIV.	State Average Annual Operating Cost for the Area School Aircraft Mechanics Program	59
XV.	State Average Annual Operating Cost for the Area School Auto Body Repair Program	60

Table		Page
XVI.	State Average Annual Operating Cost for the Area School Auto Mechanics Program	61
XVII.	State Average Annual Operating Cost for the Area School Business and Office Education Program	62
XVIII.	State Average Annual Operating Cost for the Area School Carpentry Program	63
XIX.	State Average Annual Operating Cost for the Area School Cosmetology Program	64
XX.	State Average Annual Operating Cost for the Area School Diesel Mechanics Program	65
XXI.	State Average Annual Operating Cost for the Area School Distributive Education Program	66
XXII.	State Average Annual Operating Cost for the Area School Drafting Program	67
XXIII.	State Average Annual Operating Cost for the Area School Electronics Program	68
XXIV.	State Average Annual Operating Cost for the Area School Licensed Practical Nursing Program	69
XXV.	State Average Annual Operating Cost for the Area School Machine Shop Program	70
XXVI.	State Average Annual Operating Cost for the Area School Welding Program	71
XXVII.	State Average Annual Operating Cost for the Junior College Business and Office Education Program	73
XXVIII.	State Average Annual Operating Cost for the Junior College Distributive Education (Mid-Management) Program	82
XXIX.	State Average Annual Operating Cost for the Junior College Drafting Program	83
XXX.	State Average Annual Operating Cost for the Junior College Electronics Program	84
XXXI.	State Average Annual Operating Cost for the Junior College Electro-Mechanical Program	85
XXXII.	State Average Annual Operating Cost for the Junior College Licensed Practical Nursing Program	86

Table		Page
XXXIII.	State Average Annual Operating Costs of Selected Vocational and Technical Education Programs in Oklahoma's High Schools	90
XXXIV.	State Average Annual Operating Costs of Selected Vocational and Technical Education Programs in Oklahoma's Area Schools	91
XXXV.	State Average Annual Operating Costs of Selected Vocational and Technical Education Programs in Oklahoma's Junior Colleges	91
XXXVI.	Comparison of Drafting Program Costs and Results	97
XXXVII.	Depreciation of Facilities (High School Programs)	108
XXXVIII.	Depreciation of Equipment (High School Programs)	109
XXXIX.	Operation of Plant (High School Programs)	110
XL.	Annual Insurance of Facilities (High School Programs)	111
XLI.	Annual Insurance of Equipment (High School Programs)	112
XLII.	Depreciation of Facilities (Area School Programs)	114
XLIII.	Depreciation of Equipment (Area School Programs)	115
XLIV.	Operation of Plant (Area School Programs)	116
XLV.	Annual Insurance of Facilities (Area School Programs)	117
XLVI.	Annual Insurance of Equipment (Area School Programs)	118
XLVII.	Depreciation of Facilities (Junior College Programs)	120
XLVIII.	Depreciation of Equipment (Junior College Programs)	121
XLIX.	Operation of Plant (Junior College Programs)	122
L.	Annual Insurance of Facilities (Junior College Programs)	123
LI.	Annual Insurance of Equipment (Junior College Programs)	124

CHAPTER I

INTRODUCTION

The contributions of vocational education, its attempts to meet manpower needs, increase career options of the individual, and lend intelligibility to general education, are certainly of value to our society. Unfortunately, higher costs accompanied by the demand for additional vocational offerings come at a time when grudgingly yielded tax dollars must be shared with increased demands for other public-supported services.

Vocational administrators must start justifying expenditures for programs. Accountability for program expenditures is becoming an ever-increasing concern for all local and state educational administrators.

One method of evaluating a particular vocational program is to compare its cost with its accomplishments. Many persons are trying to evaluate programs of vocational and technical education without the slightest idea as to what the current programs are accomplishing or what the actual costs are of the programs being offered. If the current conditions relating to an occupational offering can be considered as the current objectives, a cost can then be associated with the accomplishments of the vocational training program.(7) There is an urgent need in Oklahoma for cost data that can be used in comparing the cost of vocational and technical education programs with program results or in other types of cost-benefit analysis.

Statement of the Problem

Generally no formal attempt is made to relate the costs of items in the educational budget to the results expected from the educational system. Hence, the educational community, the public, and the administrator have little data with which to assess the results of educational activities, to decide among alternative courses of action, or to plan for future needs and expenditures.(12) There is a void of information and a lack of reliable estimates of the annual operating cost of vocational and technical education programs in Oklahoma. A growing awareness of this need for usable cost data prompted this study.

Purpose of the Study

The primary purpose of this study was to determine the average annual operating cost of selected vocational and technical education programs in Oklahoma's secondary schools, area schools, and junior colleges. A separate cost was computed for the high school, area school, and junior college programs. Average annual operating cost is defined as the state average of the amount of capital required to operate and maintain a vocational or technical education program in an average school for a one year period.

Need for the Study

With the passage of the 1963 Vocational Education Act, the emphasis on vocational education took an upswing due primarily to more funds being available and a concerted effort throughout the United States to offer vocational and technical education to everyone needing training.

The 1963 Act was amended in 1968 increasing federal expenditures for vocational and technical education to 3.1 billion dollars through 1972.

Information pertaining to vocational and technical education program costs is needed in order to justify present programs and to plan for future programs. By knowing the cost of programs, vocational administrators can evaluate present programs in terms of cost-accomplishments, establish priorities for future expenditures, and do a more effective job in the over-all planning of vocational and technical education programs at both the local and state levels.

Objectives of the Study

The objectives of this study were:

1. To develop a cost procedure that could be applied to cost information received from Oklahoma's public schools to compute the average annual operating cost of selected vocational and technical education programs in Oklahoma.
2. To develop and validate a method for determining each cost item used in the procedure.
3. To establish and validate cost for each vocational and technical program selected.

Assumptions and Limitations

Assumptions

For the purposes of this study the following assumptions were made:

1. The information received from Oklahoma's public schools pertaining to the cost of vocational and technical education programs was accurate information.

2. The information obtained from electric companies, gas companies, insurance companies, etc., which was used in the development of certain aspects of the cost procedure utilized in the study was typical of charges assessed for the respective services across the state.
3. The cost procedure used by the investigator when applied to the cost information received from the public schools yielded the average annual cost of selected vocational and technical education programs in Oklahoma.
4. The use of a panel of Oklahoma public school administrators was an acceptable method by which to ascertain the validity of the findings of the study.

Limitations

The following limitations of the study were recognized:

1. The study was limited to determining the annual operating costs of vocational and technical education programs in Oklahoma. It is not intended that the annual operating costs of the high school, area school, and junior college vocational and technical education programs be compared with each other. The costs of the programs in each type institution were computed differently. The cost information generated through this study cannot be used as the sole criterion in appraising particular parograms. It would be a great injustice to do so. Vocational and technical education programs cannot be appraised with cost as the sole criterion. The cost of the program must be compared with the results of the program (number of students

enrolled, number graduated, number placed on a related job) or the other benefits accruing from the program in order to determine the real worth of the program to a particular community. Cost of programs is only one input into cost-benefit analysis. A program higher in cost may actually have a more desirable cost-benefit ratio than a less expensive program. An example of how the cost of a vocational and technical education program can be compared with that program's results is given in Appendix A.

2. The average annual operating cost of only selected vocational and technical education programs in Oklahoma was computed.

CHAPTER II

REVIEW OF RELATED LITERATURE AND RESEARCH

The review of related literature and research was an important aspect of this study. It was devoted to the consideration of the following questions:

(1) Are there now available estimates of the annual operating cost of vocational and technical education programs in Oklahoma?

(2) What cost items (expenditures) should be included in a determination of the annual operating cost of vocational and technical education programs?

(3) How can each of these cost items be determined?

In order to facilitate clarity and organization, materials reviewed are presented under the major topical headings listed above which served as guides for the search of the literature.

Available Annual Cost Estimates

Dueker and Altman (4) studied sixteen comprehensive and sixteen vocational schools to identify the kinds of costs and related data that could be obtained to aid in planning and evaluating programs of vocational education. They concluded that data are not easily obtained for realistic cost-effectiveness studies of vocational education.

Kaufman (9) stated that many economists who have conducted cost studies of vocational-technical education found that the cost data available were highly inadequate.

Dupree (5) in a cost-benefit study of post-high school technical education in Oklahoma used the per-student cost for all students, technical or otherwise, in his analysis because he found that there were no means available of determining actual per-student costs of operation in specific programs such as electronics or data processing. He felt that without the design and adoption of methods to determine the costs of operation of specific programs, the actual contribution of individual programs was more difficult to assess.

Cost Items (Expenditures) to Consider

The school's expenditures for educating a student in a vocational-technical program can be compared to a manufacturing firm's costs because both the school and the manufacturing firm are producing a product. A study of cost-estimating can appropriately start with industry because without proper cost-estimating and allocating procedures factories may not be in business long.

Tucker (15) and Woolsey (16), who both wrote books on costing techniques in industry, feel that costs can be divided into two categories - variable and fixed costs. They defined variable costs as those costs directly related to production and sales activities.

They defined fixed costs as those costs that are expected to remain substantially the same in total amount regardless of the volume of sales and production. The costs they considered as fixed or overhead costs were:

Depreciation of machinery and equipment
Depreciation of furniture and fixtures
Repairs to building
Power and lights
Heat
Water

Group insurance
Insurance on buildings
Insurance on machinery
Insurance on contents of buildings
Salaries and expenses of sales department
Use and occupancy insurance
Advertising
Real estate taxes
Taxes on machinery and equipment
Personal property and other taxes
Depreciation of buildings
Insurance of product inventories

Hu, Stromsdorfer and Lee (8), Dupree (5), Sell, Hamreus and McAbee (10), Davie (3), Abt (1), and Anderson (2) in cost-benefit studies of vocational-technical education considered the following as the school's annual operating expenditures in educating a student in a particular vocational or technical program:

Instructor's salary
Supportive personnel salary (includes salary of the administrator, counselor, custodian, and librarian)
Depreciation cost of equipment
Depreciation cost of facilities
Physical plant maintenance and operation
Usable supplies

Finch (6) did a study to discover how costs affect quality in schools. Sixteen different methods of computing educational costs were developed and correlated with a cluster of quality related factors (QRC). The QRC was composed of staffing adequacy variables, measures of teacher quality, and provisions for instructional materials. Data for the correlation were obtained from 1,055 city school districts in 48 states. Finch's primary objectives were:

(1) To determine which cost measure was the best predictor of quality

(2) To study the effect of using various weighting factors in cost-quality studies. The sixteen expenditures measures were subjected to weighting which compensated for secondary ADA figures.

Finch concluded that the best predictor of educational quality was total expenditures less capital outlay and transportation (.8676 correlation). However, it was not a significantly better predictor than some of the other measures. Weighting secondary school pupils did not improve the predictability of the measure. Finch questions the validity of the cost measures in cost-quality studies where weighting for secondary school pupils is used.

Determination of the Cost Items

Tucker (15), who had 23 years experience in developing, installing, testing, and cross checking his cost-estimating and pricing technique in thousands of installations in almost every type of industry, feels the key to the cost-estimating puzzle lies in the allocation of the fixed (overhead) costs to the product. Following is how he distributes these costs.

Cost	Distribution
Depreciation of machinery and equipment	Present market value
Depreciation of furniture and fixtures	Present market value
Repairs to building	Area occupied
Power and light	Actual consumption
Heat	Area occupied
Water	Actual consumption (engineering estimates)
Group insurance	Employee participation
Insurance on buildings	Floor space occupied
Insurance on machinery	Present market value of machinery in center
Insurance on contents of buildings	Inventory values

Salaries and expenses of sales department	Products served
Use and occupancy insurance	Gross profits
Advertising	Products advertised
Real estate taxes	Area occupied by center
Taxes on machinery and equipment	Valuation
Personnel property and other taxes	Gross profits
Depreciation of buildings	Area occupied
Insurance on product inventoris	Service of warehouse to each center

Hopkins (7) in a report to vocational administrators at Institute X in Little Rock, Arkansas, presented the following procedure for determining the annual operating cost for vocational and technical education programs. On the left are the costs he considered and on the right how each was determined.

$$\text{Annual depreciation cost of facilities} = \frac{\text{Value of buildings}}{\text{Life expectancy of buildings}}$$

$$\text{Annual depreciation cost of equipment} = \frac{\text{Value of equipment - Salvage value}}{\text{Life expectancy of equipment}}$$

$$\text{Annual insurance cost of equipment} = \text{Average value of equipment} \times .6\%$$

$$\text{Av. value} = \frac{\text{Value of equipment + Salvage value}}{2}$$

$$\text{Annual insurance cost of facilities} = \text{Average value of facilities} \times .6\%$$

$$\text{Annual operation of plant} = \text{Sq. feet of floor space} \times \$.62 \text{ per sq. foot}$$

Salary of supportive personnel = Actual yearly salary
(Administrator, counselor, business manager, etc.)

Summary

After an extensive review of related literature and research the investigator was unable to uncover any estimates of the annual operating cost of present vocational and technical education programs in Oklahoma. The search did yield the cost items to consider in the calculation of the annual operating cost of vocational and technical education programs in Oklahoma.

Also, some insight was gained into how each cost item could be determined; however, the investigator did feel there was a need to validate the method of determination for certain cost items.

CHAPTER III

PROCEDURE AND METHODOLOGY

Introduction

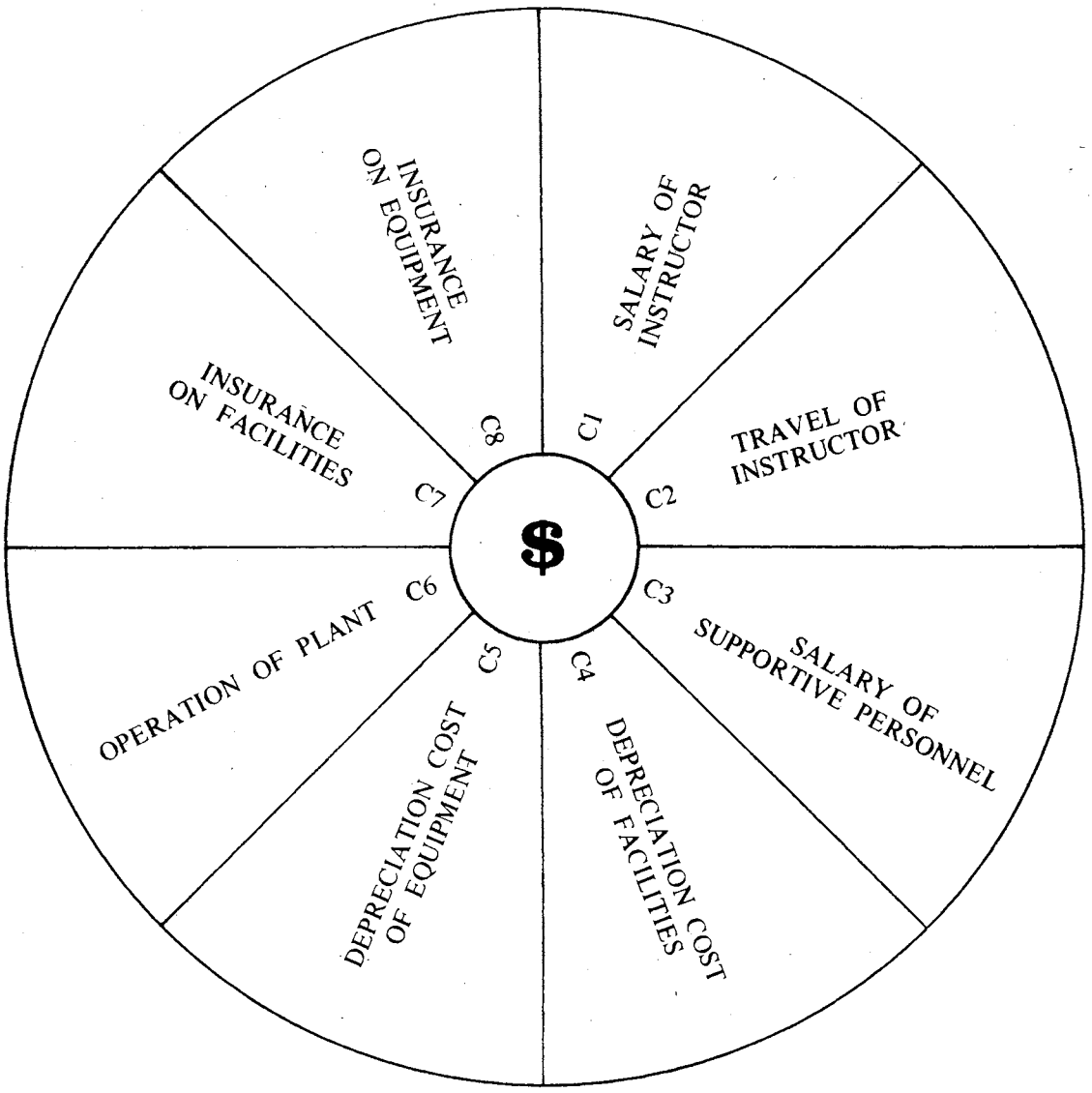
All the cost information presented in the study was compiled from data obtained from Oklahoma's public schools. Copies of the data collecting instruments are given in Appendix B and C. The cost information represents the majority of public schools in Oklahoma which have vocational and technical education programs and was based on the 1970-1971 school year.

Development of the Annual Operating Cost Procedure

An important aspect of the research effort was the development and validation of the annual operating cost procedure which was applied to the information received from the schools to determine the average annual operating cost of vocational and technical education programs in Oklahoma. Consultations with utility company representatives, insurance company representatives, economists, and visitations to selected schools provided needed information concerning certain cost items in the procedure.

The Annual Cost Classification on the following page gives the cost items that were considered in computing the average annual operating cost of selected vocational and technical education programs. The sum

Annual Cost Classification



The sum of C1, C2, C3, C4, C5, C6, C7, C8, = $(Annual Operating Cost)

of the cost items yields the annual operating cost of a program. Each cost item was determined as follows:

C1 Salary of Instructor represents the state average for the yearly salary of an instructor for each program as determined from the information obtained from page 1-D of the instrument in Appendix B. The salary of only one instructor per program was calculated. Some schools may have more than one instructor in particular programs; however, in order to provide continuity the cost of one instructor was shown per program.

C2 Travel of Instructor represents the state average for travel expense of the instructor in each program. The information was obtained from page 1-G of the instrument in Appendix B. The travel expense for each instructor varies from program to program depending upon the amount of traveling the instructor does during the year.

C3 Salary of Supportive Personnel represents the state average for each program's prorated share of the salaries of the supportive personnel in a school. Included in the supportive personnel costs are the salaries of the administrators, secretaries, counselors, librarians, custodians, etc. The information was obtained from page 1-H of the instrument in Appendix B.

C4 Depreciation Cost of Facilities = $\frac{\text{Value of buildings}}{\text{Life expectancy of buildings}}$

The state average value of the facility for each program was depreciated over thirty years using the above straight-line depreciation method which is commonly used by economists in depreciating buildings. Thirty years was considered the

average life of vocational and technical education program facilities. The state average value of the facility for each program was obtained from page 1-E of the instrument in Appendix B.

C5 Depreciation Cost of Equipment = $\frac{\text{Value of equipment - Salvage value}}{\text{Life expectancy of the equipment}}$

The above formula is the straight line depreciation method for depreciating equipment. The state average value of equipment for each program was determined from the information submitted from the schools on page 1-F of the instrument in Appendix B.

C6 Operation of Plant. Included under operation of plant are the costs of power and water for each program's facility. The cost of consumable supplies used in each program is also included under operation of plant. Considerable research effort was expended in determining the cost of operation of plant; each phase of operation of plant was determined as shown below.

Power Consumption. Power consumption consists of the heating, air conditioning, and electrical consumption of the equipment and lights in the vocational and technical education program facilities. Each aspect of power consumption was determined as follows:

a. Heating. This aspect of power consumption represents the cost of heating each program's facility. It was assumed that the average facility had natural gas heating. A sales engineer of the Oklahoma Natural Gas Company, was contacted in order to ascertain the proper way to prorate the cost of heating each program's facility. The cost of heating programs that

are conducted strictly in a classroom differs from the cost of heating programs that are conducted in shop facilities. The need for air changes in the shop facilities cause them to have a higher heating cost than classroom facilities. Exhaust fans are used to create the air changes that are necessary in shop facilities.

For those programs conducted strictly in a classroom where no exhaust fans are present, the heating cost was determined as follows: A facility that was 50' by 75' and contained 3,750 $ft.^2$ (square feet of floor space) was used in the calculation. The height of the ceiling in the facility was 12'. The first step was to calculate the amount of heat loss through the walls and roof and because of infiltration. This was done as follows: Heat loss through walls = 50' + 75' = 125' x 12' (ht. of ceiling) = 1,500 $ft.^2$ of wall. (The assumption was made that 30 percent of the wall space was glass.) 1,050 $ft.^2$ masonry x 20 BTU (heat loss/$ft.^2$ from 0° to 70°) = 21,000 BTU. 450 $ft.^2$ glass x 75 BTU (heat loss/$ft.^2$/hr. from 0° to 70°) = 60,000 BTU. Total heat loss through walls = 21,000 BTU (masonry) + 60,000 BTU (glass) = 81,000 BTU. Heat loss through roof = 50' x 75' = 3,750 $ft.^2$ x 20 BTU (heat loss/$ft.^2$/hr. from 0° to 70°) = 75,000 BTU. Heat loss due to infiltration = 1 BTU per cubic foot ($ft.^3$) of total volume = 3,750 $ft.^2$ of floor

space x 12' (ht. of ceiling) = 45,000 BTU. Total heat loss = 81,000 BTU (walls) + 75,000 BTU (roof) + 45,000 BTU (infiltration) = 201,000 BTU/hr./yr. from 0^{o} to 70^{o}.

The next step was to compute the cubic feet ($ft.^{3}$) of air heated in a year. The following formula was used to do this where:

BTU = British Thermal Unit

deg. da. = degree days

htg. eff. = heating efficiency

$ft.^{3}$ = cubic feet

$$\frac{201{,}000 \text{ BTU heat loss/hr./yr.} \times 3{,}660 \text{ deg. da./yr.} \times 24 \text{ hr./da.}}{(70^{o} - 0^{o}) \times 80\% \text{ htg. eff.} \times 1{,}000 \text{ BTU/ft.}^{3} \times 1{,}000 \text{ ft.}^{3}/1{,}000 \text{ ft.}^{3}} = 314{,}000 \text{ ft.}^{3}\text{/yr.}$$

The gas rate of \$.50/1,000 $ft.^{3}$ of air heated was considered an average rate and was multiplied by the 314,000 $ft.^{3}$ to obtain the yearly heating cost of \$157.00. The \$157.00 was divided by 45,000 $ft.^{3}$ of space in the facility to obtain the heating cost/$ft.^{3}$ of .35 cent. The .35 cent was multiplied by the amount of $ft.^{3}$ of space in the facility of each average vocational and technical education program that is conducted strictly in the classroom. The number of $ft.^{2}$ in each program's facility was multiplied by the height of the ceiling to obtain the amount of $ft.^{3}$ (cubic feet). The assumption was made that the height of the ceiling in those programs conducted strictly in a classroom was 10'.

For the vocational and technical education programs that are conducted in shop facilities, the presence of exhaust fans and air changes was taken into consideration. The same facility described previously was utilized in this calculation.

The assumption was made that an exhaust fan changes 5,000 ft.^{3} of air per minute (cfm). It takes 18 BTU's to raise 1,000 ft.^{3} of air 1° F. Therefore, the BTU heat loss was calculated as follows:

$$5{,}000 \text{ cfm} \times 60 \text{ min./hr.} \times \frac{18}{1{,}000} \times 70^\circ = 378{,}800 \text{ BTU/hr./yr. from } 0^\circ \text{ to } 70^\circ$$

The next step was to calculate the ft.^{3} of air heated in a year due to the air changes caused by the exhaust fans. This was done as follows:

$$\frac{378{,}000 \text{ BTU heat loss/hr./yr.} \times 3{,}600 \text{ deg. da./yr.} \times 24 \text{ hr./da.}}{(70^\circ - 0^\circ) \times 80\% \text{ htg. eff.} \times 1{,}000 \text{ BTU/ft.}^3 \times 1{,}000 \text{ ft.}^3/1{,}000 \text{ ft.}^3} = 580{,}000 \text{ ft.}^3\text{/yr.}$$

The gas rate of $.50/1,000 ft.^{3} was multiplied by 580,000 ft.^{3} to obtain a cost of $290.00 required to heat the air as a result of air changes. The $290.00 was divided by 45,000 ft.^{3} of space in the facility to obtain a cost of heating due to the presence of exhaust fans and, consequently, air changes of .65 cent/ft.^{3}.

The cost of heating the shop facilities must include the .65 cent/ft.^{3}, the cost of heating the air changes, as well as the original cost of .35 cent/ft.^{3}, which was the cost due to heat loss

through the walls, ceiling, roof, and infiltration. By adding the .35 cent and .65 cent, a cost of one cent/ft.^{3} was derived for the shop facilities. The one cent/ft.^{3} was multiplied by the amount of ft.^{3} of space in each average vocational and technical education program shop facility to arrive at the cost of heating each facility. The number of ft.^{2} in each program's facility was multiplied by the height of the ceiling to obtain the amount of ft.^{3} of space. The assumption was made that the height of the ceiling in shop facilities was 15'.

b. Air Conditioning. The cost of air conditioning was computed only for the classrooms in the area school programs. After considerable investigation, it was concluded that in an average situation the area school shop facilities, high school vocational and technical education program facilities, and the junior college vocational and technical education program facilities were not air conditioned.

The assumption was made that the air conditioning in the area school classrooms was electrically operated; therefore, a sales engineer of the Oklahoma Gas and Electric Company was consulted in order to ascertain the appropriate technique for allocating the cost of air conditioning for school programs.

It was estimated that the air conditioning electrical requirements in an average situation were

1,200 kilowatt hours per ton per season. The air conditioning season each year is from April through November. On the average, one ton of air conditioning is required for each 325 feet of facility floor space. The number of square feet in each area school program's classroom was divided by 325 feet to obtain the number of tons of air conditioning required. The number of tons required was multiplied by 1,200 kilowatt hours per ton to arrive at the total number of kilowatt hours consumed in each school program's classroom. The number of kilowatt hours was then multiplied by 2 1/2 cents per kilowatt hour to obtain the electrical cost of air conditioning.

The sales engineer at Oklahoma Gas and Electric indicated that 2 1/2 cents per kilowatt hour was an adequate state-wide average rate to charge for the electrical consumption in school programs.

c. Electrical Consumption of Equipment and Lights. This aspect of power consumption represents electrical consumption of the equipment and lights in the vocational and technical education program facilities. Data pertaining to the electrical consumption of equipment and lights was obtained from schools considered to have average vocational and technical education programs. Oklahoma State Department of Vocational and Technical Education personnel were consulted in order to determine which schools to

visit. Visits were made to twelve programs in eight high schools, fourteen programs in ten area schools, and six programs in three junior colleges. The instrument in Appendix C was used to collect the necessary information.

To determine the electrical consumption of the equipment in a particular program, the horsepower or volts and amps of each piece of equipment in the program's facility was obtained. If the horsepower rating for the equipment was given, the electrical consumption was calculated by one of the following formulas:

> If the motor was smaller than one-half horsepower, 1,200 was multiplied by the horsepower rating to obtain the number of watts. The 1,200 is a power factor that is used when the motor is smaller than one-half horsepower in order to compensate for power loss in the motor.
>
> If the motor was one-half horsepower or greater, 1,000 was multiplied by the horsepower rating to obtain the watts. The 1,000 is a power factor that is used when the motor is one-half horsepower or larger in order to compensate for power loss in the motor.

Kilowatt hours were then computed by the following formulas:

$$\text{Watt Hours} = \text{Watts} \times \text{Hours of Operation}$$

$$\text{Kilowatt Hours} = \frac{\text{Watts} \times \text{Hours}}{1{,}000}$$

In those instances where voltage and amperage of a particular piece of equipment was obtained instead of horsepower rating, the following formulas were used to determine electrical consumption.

Volts x Amps = Watts

Watt Hours = Watts x Hours of Operation

$$\text{Kilowatt Hours} = \frac{\text{Watts x Hours}}{1{,}000}$$

The average number of hours per day each piece of equipment in a program was in use was obtained from the program's instructor. This was then multiplied by 175 days to obtain the number of hours each piece of equipment was in operation during the school year. It was considered that 175 days was the average number of days during the school year that the equipment in vocational and technical education programs was in use.

After the appropriate formulas were used to calculate the number of kilowatt hours consumed by each piece of equipment in a program, the number of kilowatt hours was multiplied by 2 1/2 cents per kilowatt hour to obtain the electrical consumption cost of the equipment in each program.

In regards to the electrical cost of the lighting in each vocational and technical education program, the number of watts of the lights in each program investigated was determined as shown on page 2 of the instrument in Appendix C. The following formula was then used to determine the electrical consumption of the lights in each program.

Watt Hours = Watts x Hours of Operation

$$\text{Kilowatt Hours} = \frac{\text{Watts x Hours}}{1{,}000}$$

In determining the yearly hours of operation, it was assumed that the lights in each program were in use eight hours a day for 250 days a year. After the calculation of the number of kilowatt hours consumed in each program was made, the kilowatt hours were multiplied by 2 1/2 cents per kilowatt hour to determine the electrical consumption cost of the lighting in each program.

Water. The city offices of three towns in Oklahoma were contacted in regard to the rates charged for water consumption in their respective towns. Towns of differing populations were selected. An average of the water rates charged in the three towns was used in this study. These average rates were:

First one thousand gallons	- $1.00 per thousand
Next one thousand gallons	- $ .70 per thousand
Next six thousand gallons	- $ .60 per thousand
Next ten thousand gallons	- $ .50 per thousand
Next thirty thousand gallons	- $ .40 per thousand
Next seventy-five thousand gallons	- $ .35 per thousand
Over one hundred twenty-three thousand gallons	- $ .25 per thousand

It was considered that the vocational and technical education shop programs in the high schools, area schools, and junior colleges had similar amounts of water consumption.

It was estimated that consumption in a shop program would be about 31,000 gallons a year at a cost of $15.10. This figure was considered to be the yearly cost of water for each vocational and technical education shop program regardless of whether it was a high school, area school, or junior college program. The home economics, cosmetology, and licensed practical nursing programs were also considered to have a yearly water consumption of $15.10 each.

Vocational and technical education programs which use hardly any water were considered to have yearly water consumption amounts of eight thousand gallons per program at a cost of $5.30 per program. The programs considered to be in this category were drafting, business and office education, electronics, distributive education, and industrial cooperative training.

Consumable Supplies. This phase of operation of plant represents the cost of consumable supplies used in each average vocational and technical education program in a year. Consumable supplies are defined as those supplies that are used up during the year. Welding rods and cleaning solvent are examples of sonsumable supplies. The cost of consumable supplies for each program investigated was obtained from the instructors of programs visited in regard to the cost of operation of plant.

The costs of each facet of operation of plant (power, water, and consumable supplies) were added together to obtain the

annual cost of operation of plant in each vocational and technical education program.

C7 Insurance of Facilities = Average Value x 1%

$$\text{Average value} = \frac{\text{Value of facilities}}{2}$$

The state average value of the facilities for each program was determined from page 1-E of the instrument in Appendix B. An average value was computed by dividing the value of facilities by two. This was multiplied by one percent to arrive at the annual insurance cost of facilities.

A survey was made of several insurance companies to determine the insurance rate to charge for facilities and equipment. One percent was determined to be an average rate to charge for the insurance on buildings and equipment.

C8 $\text{Insurance of Equipment} = \frac{\text{Value of equipment} + \text{Salvage value}}{2}$

After the state average value of the equipment for each program was determined from page 1-F of the instrument in Appendix B, the salvage value was added to it. This was then divided by two and multiplied by one percent to arrive at the annual insurance cost on equipment for each program.

Data Collecting Instruments

Two data collecting instruments were used in the study. The instrument in Appendix B was used to collect all cost information except that pertaining to operation of plant. The instrument was sent to every high school, area school, and junior college in Oklahoma which have

vocational and technical education programs. Approximately 95 percent of the schools returned the instrument.

The instrument in Appendix C was used to obtain information pertaining to the electrical consumption cost of equipment and lights in average vocational and technical education programs. Visits were made to twelve programs in eight high schools, fourteen programs in ten area schools, and six programs in three junior colleges.

Analysis of Data

After the average annual operating cost was computed for each vocational and technical education program investigated, a panel of Oklahoma public school administrators critiqued the findings of the study. The panel consisted of two high school, two area school, and two junior college administrators. The selection of the administrators was based upon their knowledge of vocational and technical education program costs.

CHAPTER IV

PRESENTATION AND ANALYSIS OF THE DATA

Introduction

This chapter is devoted to the presentation of the average annual operating cost of vocational and technical education programs in Oklahoma's public schools. Average annual operating cost is defined as the state average of the amount of capital required to operate and maintain a vocational or technical education program in an average school for a one year period. Since a separate cost was computed for the high school, area school, and junior college programs, the information is presented accordingly.

State Average Annual Operating Cost of High School Programs

The cost procedure outlined in Chapter III was applied to the cost information received from the high schools to arrive at the state average annual operating cost of selected vocational and technical education programs in Oklahoma's high schools. The vocational agriculture program on the following page was used to illustrate the annual cost computation of a high school program. It should be noted that the vocational agriculture program is a twelve month program, whereas, the other high school vocational and technical education programs are ten month programs. Each of the cost items in the vocational agriculture program was determined as follows:

TABLE I

STATE AVERAGE ANNUAL OPERATION COST FOR THE HIGH SCHOOL VOCATIONAL AGRICULTURE PROGRAM*[1]

Expense Areas	Average Annual Operating Cost
Salary	$ 8,824.77
Travel	649.66
Salary of Supportive Personnel	1,640.73
Depreciation of Facilities	797.00
Depreciation of Equipment	687.36
Operation of Plant	1,561.16
Annual Insurance of Facilities	119.55
Annual Insurance of Equipment	51.55
TOTAL	$14,331.78

* Note: These data are to be used as one input into cost-benefit analysis.

[1]Represents a 12-month program

C1 Salary of $8,824.77 reflects the state average salary for high school vocational agriculture instructors.

C2 Travel of $649.66 represents the state average travel expense for vocational agriculture instructors.

C3 Salary of supportive personnel of $1,640.73 represents the state average for the vocational agriculture program's prorated share of the cost of supportive personnel in Oklahoma's high schools.

C4 Depreciation of facilities = $\frac{\text{Value of building}}{\text{Life expectancy of buildings}}$ =

$$\frac{\$23,910.00}{30} = \$797.00$$

The state average value of the vocational agriculture facilities was $23,910.00. Depreciated over thirty years, this amounted to the yearly depreciation cost of $797.00.

C5 Depreciation of equipment = $\frac{\text{Value of equipment - Salvage value}}{\text{Life expectancy of equipment}}$ =

$$\frac{\$8,591.98 - \$1,718.40}{10} = \frac{\$6,873.58}{10} =$$

$687.36.

The state average value of the vocational agriculture equipment was $8,591.98. A salvage value of $1,718.40 was subtracted from the $8,591.98 leaving $6,873.58, which was depreciated over ten years for the yearly depreciation cost of $687.36.

C6 Operation of plant represents the annual cost of power, water, and consumable supplies in an average vocational agriculture program. Each facet of operation of plant is discussed on the following page.

Power Consumption. Included under power consumption are the costs of heating, air conditioning, and the electrical consumption cost of the equipment and lights. Each aspect of power consumption was determined as follows:

a. Heating = Cubic feet of space x rate per cubic foot = 40,800 x 1¢ = $408.00

The state average number of square feet in the vocational agriculture facility was 2,720. This was multiplied by 15', the average height of ceilings in vocational and technical education shop program facilities, to obtain 40,800 cubic feet of space. This was multiplied by one cent, the heating cost per cubic foot of space in shop program facilities to compute the annual cost of heating in the average vocational agriculture facility of $408.00.

b. Air Conditioning. The assumption was made that the average high school vocational and technical education program facility was not air conditioned; therefore, no cost is shown for air conditioning in the average high school vocational agriculture program.

c. Electrical Consumption Costs of Equipment and Lights. The electrical consumption costs of the equipment and lights in the average vocational agriculture program were $238.06 and $300.00 respectively. The following formulas, which were discussed in Chapter III, were utilized to obtain the electrical consumption cost of the equipment and lights in the vocational and technical education programs.

When the number of watts was not listed on the equipment, one of the following methods was used to obtain the number of watts:

If the horsepower rating for the equipment was given, the number of watts was obtained by the use of the following formulas:

(1) Motors smaller than one-half horsepower: 1,200 (a power factor) was multiplied by the horsepower rating to obtain the number of watts.

(2) Motors one-half horsepower or greater: 1,000 (a power factor) was multiplied by the horsepower rating to obtain the watts.

In those instances where voltage and amperage of a particular piece of equipment was obtained instead of horsepower rating, the following formula was used to calculate the number of watts:

Volts x Amps = Watts

Watt Hours = Watts x Hours of Operation

$$\text{Kilowatt Hours} = \frac{\text{Watts x Hours}}{1{,}000}$$

Electrical Consumption Cost =

Kilowatt Hours x 2 1/2 cents (rate per kilowatt hour)

The necessary information was obtained through the use of the first page of the instrument in Appendix C. The electrical consumption cost of each piece of equipment in the average vocational agriculture program was computed using the appropriate formula.

Metal Lathe

Watts = 1 Horsepower x 1,000 = 1,000

Watt Hours = 1,000 x 105 = 105,000

$$\text{Kilowatt hours} = \frac{105{,}000}{1{,}000} = 105$$

Hand Drills

Watts = 1/3 Horsepower x 1,200 = 396

Watt Hours = 396 x 87.50 = 34,650

Kilowatt Hours = $\frac{34,650}{1,000}$ = 34.65

Electrical Consumption Cost = 34.65 x 2 1/2¢ = $.87 x 2 (number of 1/3 Horsepower drills) = $1.74

Welders

Watts = 220 Volts x 35 Amps = 7,700 Watts

Watt Hours = 7,700 x 175 = 1,347,500

Kilowatt Hours = $\frac{1,347,500}{1,000}$ = 1,347.50

Electrical Consumption Cost = 1,347.50 x 2 1/2¢ = $33.69 x 6 (number of 220 Volt-35 Amp welders) = $202.14

Exhaust Fan

Watts = 1/2 Horsepower x 1,000 = 500

Watt Hours = 500 x 350 = 175,000

Kilowatt Hours = $\frac{175,000}{1,000}$ = 175

Electrical Consumption Cost = 175 x 2 1/2¢ = $4.38

Pedestal Fan

Watts = 1/2 Horsepower x 1,000 = 500

Watt Hours = 500 x 87.50 = 43,750

Kilowatt Hours = $\frac{43,750}{1,000}$ = 43.75

Electrical Consumption Cost = 43.75 x 2 1/2¢ = $1.09

Portable Disc Grinders

Watts = 1/3 Horsepower x 1,200 = 396

Watt Hours = 396 x 87.50 = 34,650

Kilowatt Hours = $\frac{34,650}{1,000}$ = 34.65

Electrical Consumption Cost = 34.65 x 2 1/2¢ = $87.00 x 2 (number of portable disc grinders) = $1.74

Total Electrical Consumption Cost = $2.63 (metal lathe) + $2.63 (drill press) + $19.69 (cutoff saw) + $1.65 (grinder) + $.37 (band saw) + $1.74 (two 1/3 Horsepower hand drills) + $202.14 (six 220 Volt-35 Amp Welders) + $4.38 (exhaust fan) + $1.09 (pedestal fan) + $1.74 (two portable disc grinders) = $238.06.

The electrical consumption cost of each piece of equipment in the average vocational agriculture program was added together for a total of $238.06.

In regards to the electrical consumption cost of the lighting in the average vocational agriculture program the number of watts and hours of operation of the lights was determined through the use of the instrument in Appendix C. The assumption was made that the lights in the average vocational and technical education program were in use eight hours a day for 250

days for a yearly total of 2,000 hours. The formulas discussed previously were applied to the information obtained to calculate the electrical consumption cost of the lights in the average vocational agriculture program of $300.00. The actual computation is shown below:

50 Watt Flourescent Tubes

Watt Hours = 50 x 2,000 = 100,000

Kilowatt Hours = $\frac{100,000}{1,000}$ = 100

Electrical Consumption Cost = 100 x 2 1/2¢ = $2.50 per tube x 120 (number of 50 watt tubes) = $300.00

Each aspect of power consumption was added together to obtain the yearly power consumption cost in the vocational agriculture program of $946.06. The actual calculation is shown below:

$408.00 (Heating) + $238.06 (Electrical consumption cost of equipment) + $300.00 (Electrical consumption cost of lights) = $946.06.

Water. It was considered that the average vocational agriculture program used about 600 gallons of water a week for a yearly water consumption of about 31,000 gallons. The yearly cost of 31,000 gallons was $15.10. The computation was made utilizing the following rates:

First one thousand gallons - $1.00 per thousand

Next one thousand gallons - $ .70 per thousand

Next six thousand gallons - $ .60 per thousand

Next ten thousand gallons - $ .50 per thousand

Next thirty thousand gallons - $ .40 per thousand

Consumable Supplies. $600.00 was estimated to be the amount of consumable supplies the average vocational agriculture program used in a year. The cost of consumable supplies was obtained from the instructor of the program visited.

The costs of each facet of operation of plant were added together for the annual cost of operation of plant of $1,561.16. The actual calculation is shown below:

Total Operation Cost = $946.06 (Power consumption) + $15.10 (Water) + $600.00 (Consumable supplies) = $1,561.16

C7 Annual insurance of facilities = Average value x 1%

$$\text{Average value} = \frac{\text{Value of facilities}}{2} = \frac{\$23,910.00}{2} =$$

$$\$11,955.00 \times .01 = \$119.55$$

The state average value of the facilities for the vocational agriculture program was $23,910.00 which was divided by two for an average value of $11,955.00. The $11,955.00 was multiplied by .01 to obtain the annual insurance cost on facilities of $119.55.

C8 Annual insurance of equipment = Average value x 1%

$$\text{Average value} = \frac{\text{Value of equipment + Salvage value}}{2} =$$

$$\frac{\$8,591.98 + \$1,718.40}{2} = \frac{\$10,310.38}{2} =$$

$$\$5,155.39 \times .01 = \$51.55.$$

A salvage value of $1,718.40 was added to the state average value of the equipment, which was $8,591.98 for a total of $10,310.38. This was divided by two for an average value of $5,155.39 which was multiplied by .01 for the insurance cost of equipment of $51.55.

Tables II through XII present the state average annual operating cost of the remainder of the selected vocational and technical education programs in Oklahoma's secondary high schools. The costs of the other high school vocational programs were determined by the same procedure as outlined for the vocational agriculture program. The cost items that required calculation were computed as shown in Appendix D, Tables XXXVII through XLI.

TABLE II

STATE AVERAGE ANNUAL OPERATING COST FOR THE HIGH SCHOOL AUTO MECHANICS PROGRAM*

Expense Areas	Average Annual Operating Cost
Salary	$ 7,686.00
Travel	150.34
Salary of Supportive Personnel	1,483.27
Depreciation of Facilities	1,058.20
Depreciation of Equipment	950.64
Operation of Plant	2,355.83
Annual Insurance of Facilities	158.73
Annual Insurance of Equipment	71.30
TOTAL	$13,914.31

* Note: These data are to be used as one input into cost-benefit analysis.

TABLE III

STATE AVERAGE ANNUAL OPERATING COST FOR THE HIGH SCHOOL BUSINESS AND OFFICE (COE) PROGRAM*

Expense Areas	Average Annual Operating Cost
Salary	$ 8,754.53
Travel	87.50
Salary of Supportive Personnel	1,724.50
Depreciation of Facilities	464.67
Depreciation of Equipment	1,187.28
Operation of Plant	445.23
Annual Insurance of Facilities	69.70
Annual Insurance of Equipment	89.05
TOTAL	$12,822.46

* Note: These data are to be used as one input into cost-benefit analysis.

TABLE IV

STATE AVERAGE ANNUAL OPERATING COST FOR THE HIGH SCHOOL CARPENTRY PROGRAM*

Expense Areas	Average Annual Operating Cost
Salary	$ 7,826.18
Travel	231.22
Salary of Supportive Personnel	1,463.53
Depreciation of Facilities	633.64
Depreciation of Equipment	568.13
Operation of Plant	1,216.39
Annual Insurance of Facilities	95.05
Annual Insurance of Equipment	42.61
TOTAL	$12,076.75

* Note: These data are to be used as one input into cost-benefit analysis.

TABLE V

STATE AVERAGE ANNUAL OPERATING COST FOR THE HIGH SCHOOL COSMETOLOGY PROGRAM*

Expense Areas	Average Annual Operating Cost
Salary	$ 7,835.38
Travel	53.57
Salary of Supportive Personnel	1,965.00
Depreciation of Facilities	618.25
Depreciation of Equipment	681.43
Operation of Plant	1,138.47
Annual Insurance of Facilities	92.74
Annual Insurance of Equipment	51.11
TOTAL	$12,435.95

* Note: These data are to be used as one input into cost-benefit analysis.

TABLE VI

STATE AVERAGE ANNUAL OPERATING COST FOR THE HIGH SCHOOL DISTRIBUTIVE EDUCATION PROGRAM*

Expense Areas	Average Annual Operating Cost
Salary	$ 8,463.51
Travel	118.10
Salary of Supportive Personnel	1,850.76
Depreciation of Facilities	548.60
Depreciation of Equipment	363.98
Operation of Plant	465.57
Annual Insurance of Facilities	82.29
Annual Insurance of Equipment	27.30
TOTAL	$11,920.11

* Note: These data are to be used as one input into cost-benefit analysis.

TABLE VII

STATE AVERAGE ANNUAL OPERATING COST FOR THE HIGH SCHOOL DRAFTING PROGRAM*

Expense Areas	Average Annual Operating Cost
Salary	$ 7,950.00
Travel	29.00
Salary of Supportive Personnel	1,990.40
Depreciation of Facilities	290.33
Depreciation of Equipment	439.19
Operation of Plant	609.68
Annual Insurance of Facilities	43.55
Annual Insurance of Equipment	32.94
TOTAL	$11,385.09

* Note: These data are to be used as one input into cost-benefit analysis.

TABLE VIII

STATE AVERAGE ANNUAL OPERATING COST FOR THE HIGH SCHOOL ELECTRONICS PROGRAM*

Expense Areas	Average Annual Operating Cost
Salary	$ 8,652.82
Travel	300.00
Salary of Supportive Personnel	2,000.00
Depreciation of Facilities	467.59
Depreciation of Equipment	1,652.26
Operation of Plant	718.35
Annual Insurance of Facilities	70.14
Annual Insurance of Equipment	123.92
TOTAL	$13,985.08

* Note: These data are to be used as one input into cost-benefit analysis.

TABLE IX

STATE AVERAGE ANNUAL OPERATING COST FOR THE HIGH SCHOOL HOME ECONOMICS PROGRAM*

Expense Areas	Average Annual Operating Cost
Salary	$ 7,624.72
Travel	140.02
Salary of Supportive Personnel	1,724.48
Depreciation of Facilities	603.31
Depreciation of Equipment	488.91
Operation of Plant	920.63
Annual Insurance of Facilities	90.50
Annual Insurance of Equipment	36.67
TOTAL	$11,629.24

* Note: These data are to be used as one input into cost-benefit analysis.

TABLE X

STATE AVERAGE ANNUAL OPERATING COST FOR THE HIGH SCHOOL INDUSTRIAL COOPERATIVE TRAINING PROGRAM*

Expense Areas	Average Annual Operating Cost
Salary	$ 8,870.48
Travel	152.27
Salary of Supportive Personnel	1,078.00
Depreciation of Facilities	436.75
Depreciation of Equipment	257.49
Operation of Plant	316.91
Annual Insurance of Facilities	65.51
Annual Insurance of Equipment	19.31
TOTAL	$11,196.72

* Note: These data are to be used as one input into cost-benefit analysis.

TABLE XI

STATE AVERAGE ANNUAL OPERATING COST FOR THE HIGH SCHOOL SMALL APPLIANCE REPAIR PROGRAM*

Expense Areas	Average Annual Operating Cost
Salary	$ 9,100.00
Travel	0
Salary of Supportive Personnel	1,600.00
Depreciation of Facilities	983.33
Depreciation of Equipment	740.00
Operation of Plant	852.10
Annual Insurance of Facilities	147.50
Annual Insurance of Equipment	55.50
TOTAL	$13,478.43

* Note: These data are to be used as one input into cost-benefit analysis.

TABLE XII

STATE AVERAGE ANNUAL OPERATING COST FOR THE HIGH SCHOOL WELDING PROGRAM*

Expense Areas	Average Annual Operating Cost
Salary	$ 8,193.75
Travel	37.50
Salary of Supportive Personnel	1,900.00
Depreciation of Facilities	561.90
Depreciation of Equipment	778.31
Operation of Plant	2,859.70
Annual Insurance of Facilities	84.29
Annual Insurance of Equipment	58.37
TOTAL	$14,473.82

* Note: These data are to be used as one input into cost-benefit analysis.

State Average Annual Operating Cost
of Area School Programs

The cost procedure outlined in Chapter III was applied to the cost information received from the area schools to obtain the state average annual operating cost of selected vocational and technical education programs in Oklahoma's area schools. The air conditioning and refrigeration program on the following page was used to illustrate the annual cost computation of an area school program. Each of the cost items in the air conditioning and refrigeration program was determined as follows:

C1 Salary of $8,708.33 represents the state average salary for air conditioning and refrigeration instructors.

C2 Travel of $151.56 represents the state average travel expense for air conditioning and refrigeration instructors.

C3 Salary of supportive personnel of $7,522.66 represents the state average for air conditioning and refrigeration program's prorated share of the cost of supportive personnel in Oklahoma's area schools.

C4 Depreciation of facilities = $\frac{\text{Value of buildings}}{\text{Life expectancy of buildings}}$ =

$$\frac{\$39,328.43}{30} = \$1,310.95$$

The state average value of the air conditioning and refrigeration facilities was $39,328.43. Depreciated over thirty years, this yielded the yearly depreciation cost of $1,310.95.

C5 Depreciation of equipment = $\frac{\text{Value of equipment - salvage value}}{\text{Life expectancy of equipment}}$ =

$$\frac{\$18,245.00 - \$3,649.00}{10} = \frac{\$14,596.00}{10} =$$

$1,459.60

TABLE XIII

STATE AVERAGE ANNUAL OPERATING COST FOR THE AREA SCHOOL AIR CONDITIONING AND REFRIGERATION PROGRAM*

Expense Areas	Average Annual Operating Cost
Salary	$ 8,708.33
Travel	151.56
Salary of Supportive Personnel	7,522.66
Depreciation of Facilities	1,310.95
Depreciation of Equipment	1,459.60
Operation of Plant	2,598.35
Annual Insurance of Facilities	196.64
Annual Insurance of Equipment	109.47
TOTAL	$22,057.56

* Note: These data are to be used as one input into cost-benefit analysis.

The average value of the air conditioning and refrigeration equipment was $18,245.00. A salvage value of $3,649.00 was subtracted from the $18,245.00 leaving $14,596.00 which was depreciated over ten years for the yearly depreciation cost of $1,459.60.

C6 Operation and maintenance of plant represents the annual cost of power, water, and consumable supplies in an average air conditioning and refrigeration program. Each facet of operation and maintenance of plant is discussed below.

Power Consumption. Included under power consumption are the costs of heating, air conditioning, and the electrical consumption cost of the equipment and lights. Each aspect of power consumption was determined as follows.

a. Heating = Cubic feet of space x rate per cubic foot =

41,040 x 1¢ = $410.40

The average number of square feet in the air conditioning and refrigeration facility was 2,736. This was multiplied by 15', the average height of ceilings in vocational and technical education shop program facilities, to obtain 41,040 cubic feet. This was multiplied by one cent, the heating cost per cubic foot of space in shop program facilities, to compute the annual cost of heating in the average air conditioning and refrigeration facility of $410.40.

b. Air Conditioning. The cost of air conditioning was computed only for the classrooms in the area school programs. For those programs that are conducted

strictly in a classroom--business and office education, cosmetology, distributive education, drafting, electronics, and licensed practical nursing--the average number of square feet varied from program to program; however, it was felt that each classroom which was an integral part of an on-going area school shop program contained a similar number of sqare feet. Four hundred was considered to be the average number of square feet in a classroom which was a part of an area school shop program. In calculating the air conditioning cost for the air conditioning and refrigeration program facility, it was considered that the air conditioning electrical requirements were 1,200 kilowatt hours per ton per season. The air conditioning season each year is from April through November. On the average, one ton of air conditioning is required for each 325 square feet of facility floor space; therefore, the 400 square feet in the classroom of the air conditioning and refrigeration program facility was divided by 325 square feet to obtain a requirement of 1.23 tons. The 1.23 tons multiplied by 1,200 kilowatt hours per ton yielded an annual electrical consumption of 1,476 kilowatt hours. The 1,476 kilowatt hours multiplied by 2 1/2 cents per kilowatt hour gave an annual electrical air conditioning cost of $36.90. The actual calculation is shown on the following page.

400 sq. ft. ÷ 325 sq. ft. = 1.23 tons

1.23 x 1,200 = 1,476 kilowatt hours

1,476 x 2 1/2 cents = $36.90

The other classrooms which were a part of an area school shop program were also considered to have an annual electrical air conditioning cost of $36.90.

c. Electrical Consumption Costs of Equipment and Lights. The electrical sonsumption costs of the equipment and lights in the average air conditioning and refrigeration program were $203.29 and $240.00 respectively. The following formulas, which were discussed in Chapter III, were utilized to obtain the electrical consumption cost of the equipment and lights in the vocational and technical education programs.

When the number of watts was not listed on the equipment, one of the following methods was used to obtain the number of watts:

If the horsepower rating for the equipment was given, the number of watts was obtained by the use of the following formulas:

(1) Motors smaller than one-half horsepower: 1,200 (a power factor) was multiplied by the horsepower rating to obtain the number of watts.

(2) Motors one-half horsepower or greater: 1,000 (a power factor) was multiplied by the horespower rating to obtain the number of watts.

In those instances where voltage and amperage of a particular piece of equipment was obtained instead of horsepower rating, the following formula was used to calculate the number of watts:

Volts x Amps = Watts

Watt Hours = Watts x Hours of Operation

$$\text{Kilowatt Hours} = \frac{\text{Watts x Hours}}{1{,}000}$$

Electrical Consumption Cost =

Kilowatt Hours x 2 1/2 cents (rate per kilowatt Hour)

The necessary information was obtained through the use of the first page of the instrument in Appendix C. The electrical consumption cost of each piece of equipment in the average air conditioning and refrigeration program was computed using the appropriate formula.

Electric Boards

Watts = 1 Horsepower x 1,000 = 1,000

Watt Hours = 1,000 x 420 = 420,000

$$\text{Kilowatt Hours} = \frac{420{,}000}{1{,}000} = 420$$

Electrical Consumption Cost = 420 x 2 1/2¢ = \$10.50 x 10 (number of electric boards) = \$105.00

Refrigeration Units

Watts = 1 Horsepower x 1,000 = 1,000

Watt Hours = 1,000 x 525 = 525,000

$$\text{Kilowatt Hours} = \frac{525{,}000}{1{,}000} = 525$$

Electrical Consumption Cost = 525 x 2 1/2¢ = \$13.13 x 7 (number of units) = \$91.91

Grinder

Watts = 1/2 Horsepower x 1,000 = 500

Watt Hours = 500 x 510 = 255,000

Kilowatt Hours = $\frac{255,000}{1,000}$ = 255

Electrical Consumption Cost = 255 x 2 1/2¢ = $6.38

Total Electrical Consumption Cost = $105.00 (ten 1 Horsepower electric boards) + $91.91 (seven 1 Horsepower refrigeration units) + $6.38 (grinder) = $203.29.

The electrical consumption cost of each piece of equipment in the average air conditioning and refrigeration program was added together for a total of $203.29.

In regards to the electrical consumption cost of the lighting in the average air conditioning and refrigeration program the number of watts and hours of operation of the lights was determined through the use of the instrument in Appendix C. The assumption was made that the lights in the average vocational and technical education program were in use eight hours a day for 250 days for a yearly total of 2,000 hours. The formulas discussed previously were applied to the information obtained to calculate the electrical consumption cost of the lights in the average air conditioning and refrigeration program of $240.00. The actual computations are shown on the following page:

50 Watt Flourescent Tubes

Watt Hours = 50 x 2,000 = 100,000

Kilowatt Hours = $\frac{100,000}{1,000}$ = 100

Electrical Consumption Cost = 100 x 2 1/2¢ = $2.50 per tube x 32 (number of 50 watt tubes) = $80

100 Watt Flourescent Tubes

Watt Hours = 100 x 2,000 = 200,000

Kilowatt Hours = $\frac{200,000}{1,000}$ = 200

Electrical Consumption Cost = 200 x 2 1/2¢ = $5.00 x 32 (number of 100 watt tubes) = $160.00

Total Electrical Consumption Cost = $80.00 + $160.00 = $240.00

Each aspect of power consumption was added together to obtain the yearly power consumption cost in the air conditioning and refrigeration program of $938.15. The actual computation is shown below:

$410.40 (Heating) + $36.90 (Air conditioning) + $203.29 (Electrical consumption cost of equipment) + $240.00 (Electrical consumption cost of lights) = $890.59.

Water. It was considered that the average air conditioning and refrigeration program used 600 gallons of water a

week for a yearly water consumption of about 31,000 gallons. The yearly cost for 31,000 gallons was $15.10. The calculation was made utilizing the rates below:

First one thousand gallons - $1.00 per thousand

Next one thousand gallons - $ .70 per thousand

Next six thousand gallons - $ .60 per thousand

Next ten thousand gallons - $ .50 per thousand

Next thrity thousand gallons - $ .40 per thousand

Consumable Supplies. $1,692.66 was the amount of consumable supplies the average air conditioning and refrigeration program used in a year. The cost of consumable supplies was obtained from the instructor of the program visited.

The costs of each phase of operation of plant were added together for the annual cost of operation of plant of $2,598.35. The actual calculation is shown below:

Total Operation Cost = $890.59 (Power consumption) + $15.10 (Water) + $1,692.66 (Consumable supplies) = $2,598.35

C7 Annual insurance of facilities = Average value x 1%

$$\text{Average value} = \frac{\text{Value of facilities}}{2} = \frac{\$39,328.43}{2} =$$

$$\$19,664.22 \times .01 = \$196.64$$

The state average value of the facilities for the air conditioning and refrigeration was $39,328.43, which was divided by two for an average value of $19,664.22. The $19,664.22 was multiplied by .01 for the annual insurance cost on facilities of $196.64.

C8 Annual insurance of equipment = Average value x 1%

$$\text{Average value} = \frac{\text{Value of equipment + Salvage value}}{2} =$$

$$\frac{\$18,245.00 + \$3,649.00}{2} = \frac{\$21,894.00}{2} =$$

$$\$10,947.00 \times .01 = \$109.47$$

A salvage value of $3,649.00 was added to the state average value of the equipment, which was $18,245.00, for a total of $21,894.00. This was divided by two for an average value of $10,947.00, which was multiplied by .01 for the insurance cost on equipment of $109.47.

Tables XIV through XXVI are devoted to the presentation of the state average annual operating cost of the remainder of the selected vocational and technical education programs in the area schools. The costs of the other area school programs were determined by the same procedure as outlined for the air conditioning and refrigeration program. The cost items that required calculation were computed as shown in Appendix E, Tables XLII through XLVI.

TABLE XIV

STATE AVERAGE ANNUAL OPERATING COST FOR THE AREA SCHOOL AIRCRAFT MECHANICS PROGRAM*

Expense Areas	Average Annual Operating Cost
Salary	$ 8,813.33
Travel	121.33
Salary of Supportive Personnel	6,339.23
Depreciation of Facilities	2,592.51
Depreciation of Equipment	1,884.27
Operation of Plant	2,985.30
Annual Insurance of Facilities	388.88
Annual Insurance of Equipment	141.32
TOTAL	$23,266.17

* Note: These data are to be used as one input into cost-benefit analysis.

TABLE XV

STATE AVERAGE ANNUAL OPERATING COST FOR THE AREA SCHOOL AUTO BODY REPAIR PROGRAM*

Expense Areas	Average Annual Operating Cost
Salary	$ 8,835.71
Travel	92.86
Salary of Supportive Personnel	7,824.01
Depreciation of Facilities	2,470.10
Depreciation of Equipment	1,208.35
Operation of Plant	3,335.22
Annual Insurance of Facilities	370.52
Annual Insurance of Equipment	90.63
TOTAL	$24,227.40

* Note: These data are to be used as one input into cost-benefit analysis.

TABLE XVI

STATE AVERAGE ANNUAL OPERATING COST FOR THE AREA SCHOOL AUTO MECHANICS PROGRAM*

Expense Areas	Average Annual Operating Cost
Salary	$ 8,863.63
Travel	101.18
Salary of Supportive Personnel	6,033.39
Depreciation of Facilities	2,925.99
Depreciation of Equipment	1,400.95
Operation of Plant	3,148.16
Annual Insurance of Facilities	438.90
Annual Insurance of Equipment	105.07
TOTAL	$23,017.27

* Note: These data are to be used as one input into cost-benefit analysis.

TABLE XVII

STATE AVERAGE ANNUAL OPERATING COST FOR THE AREA SCHOOL BUSINESS AND OFFICE PROGRAM*

Expense Areas	Average Annual Operating Cost
Salary	$ 8,864.29
Travel	151.56
Salary of Supportive Personnel	6,317.39
Depreciation of Facilities	905.29
Depreciation of Equipment	2,264.48
Operation of Plant	1,188.20
Annual Insurance of Facilities	135.79
Annual Insurance of Equipment	169.84
TOTAL	$19,996.84

* Note: These data are to be used as one input into cost-benefit analysis.

TABLE XVIII

STATE AVERAGE ANNUAL OPERATING COST FOR THE AREA SCHOOL CARPENTRY PROGRAM*

Expense Areas	Average Annual Operating Cost
Salary	$ 8,821.42
Travel	122.85
Salary of Supportive Personnel	6,259.87
Depreciation of Facilities	1,210.60
Depreciation of Equipment	799.91
Operation of Plant	1,243.09
Annual Insurance of Facilities	181.59
Annual Insurance of Equipment	59.99
TOTAL	$18,699.32

* Note: These data are to be used as one input into cost-benefit analysis.

TABLE XIX

STATE AVERAGE ANNUAL OPERATING COST FOR THE AREA SCHOOL COSMETOLOGY PROGRAM*

Expense Areas	Average Annual Operating Cost
Salary	$ 7,950.00
Travel	156.25
Salary of Supportive Personnel	7,049.90
Depreciation of Facilities	1,145.50
Depreciation of Equipment	937.23
Operation of Plant	1,479.50
Annual Insurance of Facilities	171.83
Annual Insurance of Equipment	70.29
TOTAL	$18,960.50

* Note: These data are to be used as one input into cost-benefit analysis.

TABLE XX

STATE AVERAGE ANNUAL OPERATING COST FOR THE AREA SCHOOL DIESEL MECHANICS PROGRAM*

Expense Areas	Average Annual Operating Cost
Salary	$ 8,670.06
Travel	110.00
Salary of Supportive Personnel	7,786.28
Depreciation of Facilities	2,822.37
Depreciation of Equipment	2,513.70
Operation of Plant	2,971.33
Annual Insurance of Facilities	423.36
Annual Insurance of Equipment	188.53
TOTAL	$25,485.63

* Note: These data are to be used as one input into cost-benefit analysis.

TABLE XXI

STATE AVERAGE ANNUAL OPERATING COST FOR THE AREA SCHOOL DISTRIBUTIVE EDUCATION PROGRAM*

Expense Areas	Average Annual Operating Cost
Salary	$ 8,000.00
Travel	300.00
Salary of Supportive Personnel	8,361.00
Depreciation of Facilities	963.33
Depreciation of Equipment	846.29
Operation of Plant	792.66
Annual Insurance of Facilities	144.50
Annual Insurance of Equipment	79.50
TOTAL	$19,487.28

* Note: These data are to be used as one input into cost-benefit analysis.

TABLE XXII

STATE AVERAGE ANNUAL OPERATING COST FOR THE AREA SCHOOL DRAFTING PROGRAM*

Expense Areas	Average Annual Operating Cost
Salary	$ 8,735.00
Travel	146.11
Salary of Supportive Personnel	7,007.89
Depreciation of Facilities	1,105.39
Depreciation of Equipment	1,067.04
Operation of Plant	879.69
Annual Insurance of Facilities	165.81
Annual Insurance of Equipment	80.03
TOTAL	$19,186.96

* Note: These data are to be used as one input into cost-benefit analysis.

TABLE XXIII

STATE AVERAGE ANNUAL OPERATING COST FOR THE AREA SCHOOL ELECTRONICS PROGRAM*

Expense Areas	Average Annual Operating Cost
Salary	$ 9,135.00
Travel	137.77
Salary of Supportive Personnel	6,257.01
Depreciation of Facilities	1,137.83
Depreciation of Equipment	3,270.02
Operation of Plant	1,437.38
Annual Insurance of Facilities	170.68
Annual Insurance of Equipment	245.30
TOTAL	$21,790.99

* Note: These data are to be used as one input into cost-benefit analysis.

TABLE XXIV

STATE AVERAGE ANNUAL OPERATING COST FOR THE AREA SCHOOL LICENSED PRACTICAL NURSING PROGRAM*

Expense Areas	Average Annual Operating Cost
Salary	$ 8,884.61
Travel	178.00
Salary of Supportive Personnel	6,867.60
Depreciation of Facilities	1,005.33
Depreciation of Equipment	577.20
Operation of Plant	927.18
Annual Insurance of Facilities	150.80
Annual Insurance of Equipment	43.29
TOTAL	$18,634.01

* Note: These data are to be used as one input into cost-benefit analysis.

TABLE XXV

STATE AVERAGE ANNUAL OPERATING COST FOR THE AREA SCHOOL MACHINE SHOP PROGRAM*

Expense Areas	Average Annual Operating Cost
Salary	$ 9,152.22
Travel	139.25
Salary of Supportive Personnel	6,033.39
Depreciation of Facilities	2,701.21
Depreciation of Equipment	9,984.96
Operation of Plant	6,082.38
Annual Insurance of Facilities	405.18
Annual Insurance of Equipment	748.87
TOTAL	$35,247.46

* Note: These data are to be used as one input into cost-benefit analysis.

TABLE XXVI

STATE AVERAGE ANNUAL OPERATING COST FOR THE AREA SCHOOL WELDING PROGRAM*

Expense Areas	Average Annual Operating Cost
Salary	$ 9,098.75
Travel	157.00
Salary of Supportive Personnel	6,145.67
Depreciation of Facilities	1,837.08
Depreciation of Equipment	1,925.74
Operation of Plant	5,106.68
Annual Insurance of Facilities	275.56
Annual Insurance of Equipment	144.43
TOTAL	$24,690.91

* Note: These data are to be used as one input into cost-benefit analysis.

State Average Annual Operating Cost
of Junior College Programs

The cost procedure outlined in Chapter III was applied to the cost information received from the junior colleges to obtain the state average annual operating cost of selected vocational and technical education programs in Oklahoma's junior colleges. The business and office education program on the following page was used to illustrate the annual cost computation of a junior college program. Each of the cost items in the business and office education program was determined as follows:

C1 Salary of $8,500.00 represents the state average salary for business and office education instructors.

C2 Travel of $250.00 represents the state average travel expense for business and office education instructors.

C3 Salary of supportive personnel of $7,460.00 represents the state average for the business and office education program's prorated share of the cost of supportive personnel in Oklahoma's junior colleges and technical institutes.

C4 Depreciation of facilities $= \frac{\text{Value of buildings}}{\text{Life expectancy of buildings}} =$

$$\frac{\$22,800.00}{30} = \$760.00$$

The state average value of the business and office education facilities was $22,800.00. Depreciated over thirty years, this yielded the yearly depreciation cost of $760.00.

C5 Depreciation of equipment $= \frac{\text{Value of equipment - Salvage Value}}{\text{Life expectancy of equipment}} =$

$$\frac{\$28,804.00 - \$5,760.80}{10} =$$

$$\frac{\$23,043.20}{10} = \$2,304.32.$$

TABLE XXVII

STATE AVERAGE ANNUAL OPERATING COST FOR THE JUNIOR COLLEGE BUSINESS AND OFFICE EDUCATION PROGRAM*

Expense Areas	Average Annual Operating Cost
Salary	$ 8,500.00
Travel	250.00
Salary of Supportive Personnel	7,460.00
Depreciation of Facilities	760.00
Depreciation of Equipment	2,304.32
Operation of Plant	872.00
Annual Insurance of Facilities	114.00
Annual Insurance of Equipment	172.82
TOTAL	$20,433.14

* Note: These data are to be used as one input into cost-benefit analysis.

The state average value of the business and office education equipment was $28,804.00. A salvage value of $5,760.80 was subtracted from the $28,804.00 leaving $23,043.20 which was depreciated over ten years for the yearly depreciation cost of $2,304.32.

C6 Operation of plant represents the annual cost of power, water and consumable supplies in an average business and office education program. Each facet of operation of plant is determined as follows:

Power Consumption. Included under power consumption are the costs of heating, air conditioning, and the electrical consumption cost of the equipment and lights. Each aspect of power consumption was determined as follows:

a. Heating = Cubic feet of facility space x rate per cubic foot = 19,000 x .35 cent = $66.50.

The state average number of square feet in the business and office education program was 1,900 square feet. This was multiplied by 10', the height of the average ceiling in vocational and technical education program classroom facilities, to obtain 19,000 cubic feet of space. This was multiplied by .35 cent, the heating cost per cubic foot of space in the classroom facilities, to compute the annual cost of heating the average business and office education facility of $66.50.

b. Air Conditioning. The assumption was made that the average junior college vocational and technical

education program was not air conditioned; therefore, no cost is shown for air conditioning in the average junior college business and office education program.

c. Electrical Consumption Costs of Equipment and Lights. The electrical consumption costs of the equipment and lights in the average business and office education program were $301.20 and $144.00 respectively. The following formulas, which were discussed in Chapter III, were utilized to obtain the electrical consumption cost of the equipment and lights in the vocational and technical education programs.

When the number of watts was not listed on the equipment, one of the following methods was used to obtain the number of watts:

If the horsepower rating for the equipment was given, the number of watts was obtained by the use of the following formulas:

(1) Motors smaller than one-half horsepower: 1,200 (a power factor) was multiplied by the horsepower rating to obtain the number of watts.

(2) Motors one-half horsepower or greater: 1,000 (a power factor) was multiplied by the horsepower rating to obtain the number of watts.

In those instances where voltage and amperage of a particular piece of equipment was obtained instead of horsepower rating, the following formula was used to calculate the number of watts:

$$\text{Volts} \times \text{Amps} = \text{Watts}$$

$$\text{Watt Hours} = \text{Watts} \times \text{Hours of Operation}$$

$$\text{Kilowatt Hours} = \frac{\text{Watts} \times \text{Hours}}{1{,}000}$$

Electrical Consumption Cost =

Kilowatt Hours x 2 1/2 cents (rate per kilowatt hour)

The necessary information was obtained through the use of the first page of the instrument in Appendix C. The electrical consumption cost of each piece of equipment in the average business and office education program was computed using the appropriate formula.

Typewriters

Watts = 115 Volts x 1.2 Amps = 138

Watt Hours = 138 x 700 = 96,600

Kilowatt Hours = $\frac{96,600}{1,000}$ = 96.60

Electrical Consumption Cost = 96.60 x 2 1/2¢ = $2.42 x 34 (number of typewriters) = $82.28

Adding Machines

Watts = 115 Volts x 2.5 Amps = 287.50

Watt Hours = 287.50 x 700 = 201,250

Kilowatt Hours = $\frac{201,250}{1,000}$ = 201.25

Electrical Consumption Cost = 201.25 x 2 1/2¢ = $5.02 x 30 (number of adding machines) = $150.90

Calculators

Watts = 100

Watt Hours = 100 x 300 = 30,000

Kilowatt Hours = $\frac{30,000}{1,000}$ = 30

Electrical Consumption Cost = 30 x 2 1/2¢ = $.75 x 19 (number of calculators) = $14.25

Ditto Machine

Watts = 115 Volts x 3 Amps = 345

Watt Hours = 345 x 227.50 = 78,487.50

Kilowatt Hours = $\frac{78,487.50}{1,000}$ = 78.49

Electrical Consumption Cost = 78.49 x 2 1/2¢ = $1.96

Posting Machines

Watts = 115 Volts x 4 Amps = 460

Watt Hours = 460 x 525 = 241,500

Kilowatt Hours = $\frac{241,500}{1,000}$ = 241.50

Electrical Consumption Cost = 241.50 x 2 1/2¢ = $6.04 x 2 (number of posting machines) = $12.08

Multiplier

Watts = 115 Volts x 2.5 Amps = 287.50

Watt Hours = 287.50 x 485 = 139,437.50

Kilowatt Hours = $\frac{139,437.50}{1,000}$ = 139.44

Electrical Consumption Cost = 139.44 x 2 1/2¢ = $3.49

Transcribers

Watts = 115 Volts x 3 Amps = 345

Watt Hours = 345 x 700 = 241,500

Kilowatt Hours = $\frac{241,500}{1,000}$ = 241.50

Electrical Consumption Cost = 241.50 x 2 1/2¢ = $6.04 x 6 (number of transcribers) = $36.24

Total Electrical Consumption Cost = $82.28 (thirty-four 115 Volt-1.2 Amp typewriters) + $150.90 (thirty 115 Volt-2.5 Amp adding machines) + $14.25 (nineteen 100 Watt calculators) + $1.96 (ditto machine) + $12.08 (two 115 Volt-4 Amp posting machines) + $3.49 (multiplier) + $36.24 (six 115 Volt-3 Amp transcribers) = $301.20.

In regards to the electrical consumption cost of the lighting in the average business and office education program the number of watts and hours of operation of the lights was determined through the use of the instrument in Appendix C. The assumption was made that the lights in the average vocational and technical education program were in use eight hours a day for 250 days for a yearly total of 2,000 hours. The formulas discussed previously were applied to the

information obtained to calculate the electrical consumption cost of the lights in the average business and office education program of $144.00. The actual computation is shown below:

60 Watt Flourescent Tubes

Watt Hours = 60 x 2,000 = 120,000

Kilowatt Hours = $\frac{120,000}{1,000}$ = 120

Electrical Consumption Cost = 120 x 2 1/2¢ = $3.00 per tube x 48 (number of 60 watt tubes) = $144.00

Each aspect of power consumption was added together to obtain the yearly power consumption cost in the business and office education program of $511.70. The actual calculation is shown below:

$66.50 (Heating) + $301.20 (Electrical consumption cost of equipment) + $144.00 (Electrical Consumption cost of lights) = $511.70.

Water. It was considered that the average business and office education program used about 8,000 gallons of water a year. The cost for 8,000 gallons was $5.30. The cost was determined utilizing the following rates:

First one thousand gallons - $1.00 per thousand

Next one thousand gallons - $ .70 per thousand

Next six thousand gallons - $ .60 per thousand

Consumable Supplies. $355.00 was the cost of the consumable supplies the average vocational business and office

education program used in a year. The cost of consumable supplies was obtained from the instructor of the program visited in regard to operation of plant.

The costs of each facet of operation of plant were added together for the annual cost of operation of plant of $872.00. The actual calculation is shown below:

Total Operation Cost = $511.70 (Power consumption) + $5.30 (Water) + $355.00 (Consumable supplies) = $872.00.

C7 Annual insurance of facilities = Average value x 1%

$$\text{Average value} = \frac{\text{Value of facilities}}{2} = \frac{\$22,800.00}{2} =$$

$$\$11,400.00 \times .01 = \$114.00.$$

The state average value of the facilities for the business and office education program was $22,800.00 which was divided by two for an average value of $11,400.00. By multiplying the $11,400.00 by .01, an annual insurance cost on facilities of $114.00 is derived.

C8 Annual insurance of equipment = Average value x 1%

$$\text{Average value} = \frac{\text{Value of equipment} + \text{Salvage value}}{2} =$$

$$\frac{\$28,804.00 + \$5,760.80}{2} = \$17,282.40 \times .01$$

$$= \$172.82.$$

The state owned junior colleges do not carry insurance on their buildings and equipment. However, since both state owned and community colleges are included in the determination of the average annual operating cost, the annual insurance cost of facilities and equipment was computed.

Tables XXVIII through XXXII present the average annual operating cost of the remainder of the selected vocational and technical education programs in Oklahoma's junior colleges. The costs of the other junior college programs were determined by the same procedure as outlined for the business and office education program. The cost items that required calculation were computed as shown in Appendix F, Tables XLVII through XI.

TABLE XXVIII

STATE AVERAGE ANNUAL OPERATING COST FOR THE JUNIOR COLLEGE DISTRIBUTIVE EDUCATION (MID-MANAGEMENT) PROGRAM*

Expense Areas	Average Annual Operating Cost
Salary	$ 8,825.00
Travel	533.00
Salary of Supportive Personnel	5,553.64
Depreciation of Facilities	942.83
Depreciation of Equipment	584.00
Operation of Plant	632.03
Annual Insurance of Facilities	141.43
Annual Insurance of Equipment	43.80
TOTAL	$17,255.73

* Note: These data are to be used as one input into cost-benefit analysis.

TABLE XXIX

STATE AVERAGE ANNUAL OPERATING COST FOR THE JUNIOR COLLEGE DRAFTING PROGRAM*

Expense Areas	Average Annual Operating Cost
Salary	$ 9,825.44
Travel	133.33
Salary of Supportive Personnel	4,766.58
Depreciation of Facilities	1,387.27
Depreciation of Equipment	1,024.56
Operation of Plant	793.38
Annual Insurance of Facilities	208.09
Annual Insurance of Equipment	76.84
TOTAL	$18,215.49

* Note: These data are to be used as one input into cost-benefit analysis.

TABLE XXX

STATE AVERAGE ANNUAL OPERATING COST FOR THE JUNIOR COLLEGE ELECTRONICS PROGRAM*

Expense Areas	Average Annual Operating Cost
Salary	$ 8,627.27
Travel	186.36
Salary of Supportive Personnel	5,148.99
Depreciation of Facilities	1,386.33
Depreciation of Equipment	4,269.82
Operation of Plant	1,284.71
Annual Insurance of Facilities	207.95
Annual Insurance of Equipment	320.24
TOTAL	$21,431.67

* Note: These data are to be used as one input into cost-benefit analysis.

TABLE XXXI

STATE AVERAGE ANNUAL OPERATING COST FOR THE JUNIOR COLLEGE ELECTRO-MECHANICAL PROGRAM*

Expense Areas	Average Annual Operating Cost
Salary	$ 9,583.33
Travel	125.00
Salary of Supportive Personnel	5,630.70
Depreciation of Facilities	983.93
Depreciation of Equipment	1,096.00
Operation of Plant	1,096.20
Annual Insurance of Facilities	140.84
Annual Insurance of Equipment	82.20
TOTAL	$18,738.20

* Note: These data are to be used as one input into cost-benefit analysis.

TABLE XXXII

STATE AVERAGE ANNUAL OPERATING COST FOR THE JUNIOR COLLEGE LICENSED PRACTICAL NURSING PROGRAM*

Expense Areas	Average Annual Operating Cost
Salary	$ 9,358.33
Travel	85.42
Salary of Supportive Personnel	4,935.06
Depreciation of Facilities	925.77
Depreciation of Equipment	695.23
Operation of Plant	924.90
Annual Insurance of Facilities	138.87
Annual Insurance of Equipment	52.14
TOTAL	$17,115.72

* Note: These data are to be used as one input into cost-benefit analysis.

The panel of public school administrators who analyzed the annual operating costs in this study felt the information was representative of average cost of programs and would serve as a guideline for the cost of vocational and technical education programs in Oklahoma. Since only realistic cost information is desirable for use in planning and appraising programs, the review of the cost data by the panel of administrators was a vital part of this study. The selection of the panel members was based upon their knowledge of vocational and technical education program costs.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This chapter consists of (1) a summary, which identifies the problems and describes how the objectives were fulfilled; (2) conclusions based on the research obtained; and (3) a discussion of areas for further research suggested in the course of this study.

Summary of the Study

This study represented an exploratory effort in determining the average annual operating cost of selected vocational and technical education programs in Oklahoma. Average annual operating cost is defined as the state average of the amount of capital required to operate and maintain a vocational or technical education program in a school for a one-year period.

Cost information obtained from Oklahoma's public schools provided the basis for the cost computations. The cost of most of the major vocational and technical education programs in Oklahoma was presented in the study. A separate cost was computed for the high school, area school, and junior college programs.

The following specific objectives were formulated to accomplish the major purpose of the study:

1. To develop a cost procedure that could be applied to the cost information received from Oklahoma's public schools to compute

the average annual operating cost of selected vocational and technical education programs in Oklahoma.

2. To develop and validate a method for determining each cost item used in the procedure.
3. To establish and validate costs for each vocational and technical education program selected.

The procedure which was applied to the cost information received from the public schools in order to determine the average annual operating cost of the vocational and technical education programs investigated is presented in Chapter III. Considerable research effort was expanded in order to validate each of the cost items in the procedure.

An important part of the study was the critiquing of the cost of programs by a panel of Oklahoma public school administrators. Two high school, two area school, and two junior college administrators analyzed the program costs in their particular areas. The general consensus of the panel was that the findings were representative of the average cost of programs and would serve as a guideline for the cost of vocational and technical education programs in Oklahoma.

A summary of the state average annual operating costs of the high school, area school, and junior college programs follows in Tables XXXIII, XXXIV, and XXXV.

TABLE XXXIII

STATE AVERAGE ANNUAL OPERATING COSTS OF SELECTED VOCATIONAL AND TECHNICAL EDUCATION PROGRAMS IN OKLAHOMA'S HIGH SCHOOLS

Occupational Program	Annual Operating Cost
Vocational Agriculture	$14,331.78
Auto Mechanics	13,914.31
Business and Office	12,822.46
Carpentry	12,076.75
Cosmetology	12,435.95
Distributive Education	11,920.11
Drafting	11,385.09
Electronics	13,985.08
Home Economics	11,629.24
Industrial Cooperative Training	11,196.72
Small Appliance Repair	13,478.43
Welding	14,473.82

TABLE XXXIV

STATE AVERAGE ANNUAL OPERATING COSTS OF SELECTED VOCATIONAL AND TECHNICAL EDUCATION PROGRAMS IN OKLAHOMA'S AREA SCHOOLS

Occupational Program	Annual Operating Cost
Air Conditioning and Refrigeration	$22,057.56
Aircraft Mechanics	23,266.17
Auto Body Repair	24,227.40
Auto Mechanics	23,017.27
Business and Office	19,996.84
Carpentry	18,699.32
Cosmetology	18,960.50
Diesel Mechanics	25,485.63
Distributive Education	19,487.28
Drafting	19,186.96
Electronics	21,790.99
Licensed Practical Nursing	18,634.01
Machine Shop	35,247.46
Welding	24,690.91

TABLE XXXV

STATE AVERAGE ANNUAL OPERATING COSTS OF SELECTED VOCATIONAL AND TECHNICAL EDUCATION PROGRAMS IN OKLAHOMA'S JUNIOR COLLEGES

Occupational Program	Annual Operating Cost
Business and Office	$20,433.14
Distributive Education	17,255.73
Drafting	18,215.49
Electronics	21,431.67
Electro-Mechanical	18,738.20
Licensed Practical Nursing	17,115.72

Conclusions

The average annual operating costs of vocational and technical education programs in Oklahoma presented in this thesis are felt to be realistic costs which adequately represent the average annual cost of the programs investigated. The procedure for determining the annual operating cost of vocational and technical education programs in this study can be used to determine the annual operating cost of any type of educational program in any state or country.

The cost information is an initial effort in providing annual costs of programs for Oklahoma that can be used by school administrators and the educational community as a general guideline to:

1. plan for future vocational and technical education programs;
2. assess the results of ongoing vocational and technical education programs; and
3. decide among alternative vocational and technical education programs.

Vocational and technical education programs cannot be evaluated with cost as the sole criteria. The cost of the program must be compared with the results of the program (number of students enrolled, number graduated, number placed on a related job) or the other benefits accruing from the program in order to determine the real worth of the program to a particular community. A program higher in cost may actually have a more desirable cost-effectiveness or cost-benefit ratio than a less expensive program.

However, the cost-effectiveness or cost-benefit ratio of vocational and technical education programs cannot be determined without first having suitable cost information available.

Recommendations

On the basis of data obtained for the study, certain general recommendations and areas of additional research were developed.

General Recommendations

1. Public school administrators should become more aware of the annual operating cost of educational programs.
2. Educational programs should be evaluated in terms of cost-effectiveness or cost-benefits.
3. Electric meters should be placed in individual vocational and technical education programs in order to better determine the amount of electrical consumption in a particular program.
4. An automated program cost system should be developed for Oklahoma.

Additional Research

It is recommended that cost-benefit studies pertaining to vocational and technical education programs in Oklahoma be conducted. The average annual operating costs presented in this thesis can provide the basis for the cost-related portions of the recommended studies. The annual cost procedure in this study can be utilized to update the data as needed.

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APPENDIX A

APPENDIX A

It has been stated previously that cost information generated as a result of this study cannot be used as the sole criterion in comparing vocational and technical education programs or appraising a particular program. The cost of the program must be compared with the results of the program or other benefits accruing from the program.

Table XXXVI presents an example of how the cost information in this study could be utilized. The costs of the state average high school, area school, and junior college drafting programs are compared with program results in terms of number of students enrolled, number graduated, and number placed on a related job.

TABLE XXXVI

COMPARISON OF DRAFTING PROGRAM COSTS AND RESULTS

Occupational Program	Annual Operating Cost	No. Enrolled 1971	Cost Per Enrollee	No. Grad. 1971	Cost Per Grad.	No. On Related Job	Cost Per Grad. On A Related Job
High School Drafting	$11,385.09	25	$455.40	15	$759.01	11	$1,035.01
Area School Drafting	19,186.96	42	456.83	25	767.48	20	959.35
Junior College Drafting	18,215.49	40	455.39	24	758.98	18	1,011.97

APPENDIX B

1-D

SALARY INFORMATION[1]

OE Code[2]	Occupational Area	For Fiscal Years				
		71	72	73	74	75
		Dollars	Dollars	Dollars	Dollars	Dollars
	Regular Programs					
	Special Programs[3]					

1. Estimate the total salary to be paid by the local school district or educational institution to the teachers in each of the respective programs planned for the next five year period that was listed in Form 1-C.

2. Do not fill in the OE Code.

3. The salary estimated with any of these programs should be in addition to the salary to be paid to an instructor in the above regular programs. If the program does not correspond to one of the above occupational areas, specify the program planned.

1-G

TRAVEL COST INFORMATION[1]

OE Code[2]	Occupational Area	For Fiscal Years				
		71	72	73	74	75
		Dollars	Dollars	Dollars	Dollars	Dollars
	Regular Programs					
	Special Programs[3]					

1. Estimate the travel cost to be paid by the local school district or educational institution for each of the respective programs planned for the next five-year period that was listed in Form 1-C.

2. Do not fill in the OE Code.

3. The travel cost estimated for any of these programs should be in addition to the cost listed above in the regular program. If the program does not correspond to one of the above occupational areas specify the program planned.

1-H

SALARY OF SUPPORTIVE PERSONNEL[1]

OE Code[2]	Occupational Area	For Fiscal Years				
		71	72	73	74	75
		Dollars	Dollars	Dollars	Dollars	Dollars
	Regular Programs					
	Special Programs[3]					

1. Estimate the salaries of supportive personnel to be paid by the local school district or educational institution for each of the respective programs planned for the next five-year period that was listed in Form 1-C. Salaries of supportive personnel are specific charges which cannot be attributed directly to a particular class, but are necessary for conducting all classes or programs. Examples: Administration, Vocational Guidance and Counseling, Secretaries, Librarians, and Custodians.

2. Do not fill in the OE Code.

3. The salaries of supportive personnel estimated for any of these programs should be in addition to the cost listed above in the regular program. If the program does not correspond to one of the above occupational areas, specify the program planned.

CONSTRUCTION COST[1]

OE CODE[2]	OCCUPATIONAL AREA	Value of Exist Fac.	Fiscal 71			Fiscal 72			Fiscal 73			Fiscal 74			Fiscal 75		
			Est. Sq. Feet	Nature of Const.[3]	Cost	Est. Sq. Feet	Nature of Const.[3]	Cost	Est. Sq. Feet	Nature of Const.[3]	Cost	Est. Sq. Feet	Nature of Const.[3]	Cost	Est. Sq. Feet	Nature of Const.[3]	Cost
	Regular																
	Special																

[1]Estimate the total construction cost associated with the respective programs listed in Form 1-C.

[2]Do not fill in the OE Code.

[3]A denotes acquisition; E denotes expansion; N denotes new construction.

[4]Construction costs estimated for any of these programs should be contributed directly to the special programs and not have been listed above to a regular program. If the program does not correspond to one of the above occupational areas, specify the program planned.

EQUIPMENT COST INFORMATION[1] 1-F

OE Code[2]	Occupational Area	Value of Existing Equipment Dollars	For Fiscal Years 71 Dollars	72 Dollars	73 Dollars	74 Dollars	75 Dollars
	Regular Programs						
	Special Programs						

1. Estimate the total equipment cost for each of the respective programs for the next five year period that was listed in Form 1-C.

2. Do not fill in the OE Code.

3. The equipment cost estimated for any of these programs should be in addition to the cost listed above in the regular program. If the program does not correspond to one of the above occupational areas, specify the program planned.

APPENDIX C

OCCUPATIONAL PROGRAM_____

Name of Equipment	No. Of Horse Power	Hours Per Day In Use	Days Per Year In Use

Type of Lights	Number of Lights	Watts

APPENDIX D

TABLE XXXVII

DEPRECIATION OF FACILITIES (HIGH SCHOOL PROGRAMS)

(30 Years @ No Salvage Value)

Occupational Program	Value of Facilities (Dollars)	Life Expectancy (Years)	Annual Depreciation Cost (Dollars)
Vocational Agriculture	23,910.00	30	797.00
Auto Mechanics	31,745.92	30	1,058.20
Business and Office	13,940.00	30	464.67
Carpentry	19,009.16	30	633.64
Cosmetology	18,547.48	30	618.25
Distributive Education	16,458.00	30	548.60
Drafting	8,710.00	30	290.33
Electronics	14,027.77	30	467.59
Home Economics	18,099.25	30	603.31
Industrial Cooperative Training	13,102.47	30	436.75
Small Appliance Repair	29,500.00	30	983.33
Welding	16,857.00	30	561.90

$$\text{Annual Depreciation Cost} = \frac{\text{Value of Buildings}}{\text{Life Expectancy of Buildings}}$$

TABLE XXXVIII

DEPRECIATION OF EQUIPMENT (HIGH SCHOOL PROGRAMS)

(10 Years @ 20 Percent Salvage Value)

Occupational Program	Value of Equipment (Dollars)	Salvage Value (Dollars)	Value Minus Salvage Value (Dollars)	Depreciation Cost (Annual) (Dollars)
Vocational Agriculture	8,591.98	1,718.40	6,873.58	687.36
Auto Mechanics	11,883.00	2,376.60	9,506.40	950.64
Business and Office	14,841.08	2,968.22	11,872.86	1,187.28
Carpentry	7,101.63	1,420.33	5,681.30	568.13
Cosmetology	8,517.92	1,703.58	6,814.34	681.43
Distributive Education	4,549.79	909.96	3,639.83	363.98
Drafting	5,489.83	1,097.97	4,391.86	439.19
Electronics	20,653.22	4,130.64	16,522.58	1,652.26
Home Economics	6,111.41	1,222.28	4,889.13	488.91
Industrial Cooperative Training	3,218.62	643.72	2,574.90	257.49
Small Appliance Repair	9,250.00	1,850.00	7,400.00	740.00
Welding	9,728.85	1,945.77	7,783.08	778.31

$$\text{Annual Depreciation} = \frac{\text{Value of Equipment} - \text{Salvage Value}}{\text{Life Expectancy of Equipment}}$$

TABLE XXXIX

OPERATION OF PLANT (HIGH SCHOOL PROGRAMS)

Occupational Program	Power Cost				Water Cost (Dollars)	Consumable Supplies Cost (Dollars)	Total Annual Cost (Dollars)
	Heating (Dollars)	Air Condi-tioning (Dollars)	Equipment (Dollars)	Lights (Dollars)			
Vocational Agriculture	408.00	0	238.06	300.00	15.10	600.00	1,561.16
Auto Mechanics	637.95	0	310.78	555.00	15.10	837.00	2,355.83
Business and Office (COE)	35.32	0	74.61	180.00	5.30	150.00	445.23
Carpentry	337.80	0	377.49	188.00	15.10	298.00	1,216.39
Cosmetology	69.09	0	434.28	320.00	15.10	300.00	1,138.47
Distributive Education	46.27	0	110.00	154.00	5.30	150.00	465.57
Drafting	39.38	0	35.00	230.00	5.30	300.00	609.68
Electronics	43.05	0	210.00	160.00	5.30	300.00	718.35
Home Economics	55.13	0	210.40	240.00	15.10	400.00	920.63
ICT	31.61	0	30.00	150.00	5.30	100.00	316.91
Small Appliance Repair	184.50	0	116.50	336.00	15.10	200.00	852.10
Welding	340.05	0	551.55	450.00	15.10	1,503.00	2,859.70

TABLE XL

ANNUAL INSURANCE OF FACILITIES (HIGH SCHOOL PROGRAMS)

Occupational Program	Value of Facilities (Dollars)	Average Value of Facilities (Dollars)	Insurance Rate (Percent)	Annual Insurance Cost (Dollars)
Vocational Agriculture	23,910.00	11,955.00	.01	119.55
Auto Mechanics	31,745.92	15,872.96	.01	158.73
Business and Office	13,940.00	6,970.00	.01	69.70
Carpentry	19,009.16	9,504.58	.01	95.05
Cosmetology	18,547.48	9,273.74	.01	92.74
Distributive Education	16,458.00	8,229.00	.01	82.29
Drafting	8,710.00	4,355.00	.01	43.55
Electronics	14,027.77	7,013.89	.01	70.14
Home Economics	18,099.25	9,049.63	.01	90.50
Industrial Cooperative Training	13,102.47	6,551.24	.01	65.51
Small Appliance Repair	29,500.00	14,750.00	.01	147.50
Welding	16,857.00	8,428.50	.01	84.29

Annual Insurance Cost of Facilities = Average Value x 1%

$$\text{Average Value} = \frac{\text{Value of Facilities}}{2}$$

TABLE XLI

ANNUAL INSURANCE OF EQUIPMENT (HIGH SCHOOL PROGRAMS)

Occupational Program	Value of Equipment (Dollars)	Salvage Value (Dollars)	Value of Equipment + Salvage Value (Dollars)	Average Value (Dollars)	Rate of Insurance (Percent)	Annual Insurance Cost (Dollars)
Vocational Agriculture	8,591.98	1,718.40	10,310.38	5,155.19	.01	51.55
Auto Mechanics	11,883.00	2,376.60	14,259.60	7,129.80	.01	71.30
Business and Office	14,841.08	2,968.22	17,809.30	8,904.65	.01	89.05
Carpentry	7,101.63	1,420.33	8,521.96	4,260.98	.01	42.61
Cosmetology	8,517.92	1,703.58	10,221.50	5,110.75	.01	51.11
Distributive Education	4,549.79	909.96	5,459.75	2,729.88	.01	27.30
Drafting	5,489.83	1,097.97	6,587.80	3,293.90	.01	32.94
Electronics	20,653.22	4,130.64	24,783.86	12,391.93	.01	123.92
Home Economics	6,111.41	1,222.28	7,333.69	3,666.85	.01	36.67
Industrial Cooperative Training	3,218.62	643.72	3,862.34	1,931.17	.01	19.31
Small Appliance Repair	9,250.00	1,850.00	11,100.00	5,550.00	.01	55.50
Welding	9,728.85	1,945.77	11,674.62	5,837.31	.01	58.37

Annual Insurance Cost = Average Value x 1%

$$\text{Average Value} = \frac{\text{Value of Equipment + Salvage Value}}{2}$$

APPENDIX E

TABLE XLII

DEPRECIATION OF FACILITIES (AREA SCHOOL PROGRAMS)

(30 Years @ No Salvage Value)

Occupational Program	Value of Facilities (Dollars)	Life Expectancy (Years)	Annual Depreciation Cost (Dollars)
Air Conditioning and Refrigeration	39,328.43	30	1,310.95
Aircraft Mechanics	77,775.33	30	2,592.51
Auto Body Reapir	74,103.14	30	2,470.10
Auto Mechanics	87,779.66	30	2,925.99
Business and Office	27,158.55	30	905.29
Carpentry	36,318.00	30	1,210.60
Cosmetology	34,365.00	30	1,145.50
Diesel Mechanics	84,671.00	30	2,822.37
Distributive Education	28,900.00	30	963.33
Drafting	33,161.55	30	1,105.39
Electronics	34,135.00	30	1,137.83
Licensed Practical Nursing	30,160.00	30	1,005.33
Machine Shop	81,036.33	30	2,701.21
Welding	55,112.50	30	1,837.08

$$\text{Annual Depreciation Cost} = \frac{\text{Value of Buildings}}{\text{Life Expectancy of Buildings}}$$

TABLE XLIII

DEPRECIATION OF EQUIPMENT (AREA SCHOOL PROGRAMS)

(10 Years @ 20 Percent Salvage Value)

Occupational Program	Value of Equipment (Dollars)	Salvage Value (Dollars)	Value Minus Salvage Value (Dollars)	Depreciation Cost (Annual) (Dollars)
Air Conditioning and Refrigeration	18,245.00	3,649.00	14,596.00	1,459.60
Aircraft Mechanics	23,553.33	4,710.67	18,842.66	1,884.27
Auto Body Repair	15,104.33	3,020.87	12,083.46	1,208.35
Auto Mechanics	17,511.90	3,502.38	14,009.52	1,400.95
Business and Office	28,306.00	5,661.20	22,644.80	2,264.48
Carpentry	9,998.85	1,999.77	7,999.08	799.91
Cosmetology	11,715.33	2,343.07	9,372.26	937.23
Diesel Mechanics	31,421.20	6,284.24	25,136.96	2,513.70
Distributive Education	13,250.00	2,650.00	10,600.00	1,060.00
Drafting	13,338.00	2,667.60	10,670.40	1,067.04
Electronics	40,884.00	8,176.80	32,707.20	3,270.72
Licensed Practical Nursing	7,215.00	1,443.00	5,772.00	577.20
Machine Shop	124,812.00	24,962.40	99,849.60	9,984.96
Welding	24,071.71	4,814.34	19,257.37	1,925.74

$$\text{Annual Depreciation} = \frac{\text{Value of Equipment - Salvage Value}}{\text{Life Expectancy of Equipment}}$$

TABLE XLIV

OPERATION OF PLANT (AREA SCHOOL PROGRAMS)

Occupational Program	Power Cost				Water Cost (Dollars)	Consumable Supplies Cost (Dollars)	Total Annual Cost (Dollars)
	Heating (Dollars)	Air Condi-tioning (Dollars)	Equipment (Dollars)	Lights (Dollars)			
Air Conditioning and Refrigeration	410.40	36.90	203.29	240.00	15.10	1,692.66	2,598.35
Aircraft Mechanics	630.00	36.90	243.30	560.00	15.10	1,500.00	2,985.30
Auto Body Repair	724.80	36.90	278.42	480.00	15.10	1,800.00	3,335.22
Auto Mechanics	783.45	36.90	547.71	565.00	15.10	1,200.00	3,148.16
Business and Office	77.98	205.80	387.12	162.00	5.30	350.00	1,188.20
Carpentry	304.80	36.90	400.00	185.00	15.10	301.29	1,243.09
Cosmetology	100.80	265.80	437.80	300.00	15.10	360.00	1,479.50
Diesel Mechanics	799.65	36.90	183.68	436.00	15.10	1,500.00	2,971.33
Distributive Education	57.75	152.40	165.21	162.00	5.30	250.00	792.66
Drafting	71.09	187.50	60.00	175.00	5.30	380.80	879.69
Electronics	85.58	226.50	350.00	170.00	5.30	600.00	1,437.38
Licensed Practical Nursing	99.58	262.50	160.00	170.00	15.10	220.00	927.18
Machine Shop	1,318.50	36.90	2,131.88	580.00	15.10	2,000.00	6,082.38
Welding	618.00	36.90	1,144.91	185.00	15.10	3,106.77	5,106.68

TABLE XLV

ANNUAL INSURANCE OF FACILITIES (AREA SCHOOL PROGRAMS)

Occupational Program	Value of Facilities (Dollars)	Average Value of Facilities (Dollars)	Insurance Rate (Percent)	Annual Insurance Cost (Dollars)
Air Conditioning and Refrigeration	39,328.43	19,664.22	.01	196.64
Aircraft Mechanics	77,775.33	38,887.67	.01	388.88
Auto Body Repair	74,103.14	37,051.57	.01	370.52
Auto Mechanics	87,779.66	43,889.83	.01	438.90
Business and Office	27,158.55	13,579.28	.01	135.79
Carpentry	36,318.00	18,159.00	.01	181.59
Cosmetology	34,365.00	17,182.50	.01	171.83
Diesel Mechanics	84,671.00	42,335.50	.01	423.36
Distributive Education	28,900.00	14,450.00	.01	144.50
Drafting	33,161.55	16,580.78	.01	165.81
Electronics	34,135.00	17,067.50	.01	170.68
Licensed Practical Nursing	30,160.00	15,080.00	.01	150.80
Machine Shop	81,036.33	40,518.17	.01	405.18
Welding	55,112.50	27,556.25	.01	275.56

Annual Insurance Cost of Facilities = Average Value x 1%

$$\text{Average Value} = \frac{\text{Value of Facilities}}{2}$$

TABLE XLVI

ANNUAL INSURANCE OF EQUIPMENT (AREA SCHOOL PROGRAMS)

Occupational Program	Value of Equipment (Dollars)	Salvage Value (Dollars)	Value of Equipment + Salvage Value (Dollars)	Average Value (Dollars)	Rate of Insurance (Percent)	Annual Insurance Cost (Dollars)
Air Conditioning and Refrigeration	18,245.00	3,649.00	21,894.00	10,947.00	.01	109.47
Aircraft Mechanics	23,553.33	4,710.67	28,264.00	14,132.00	.01	141.32
Auto Body Repair	15,104.33	3,020.87	18,125.20	9,062.60	.01	90.63
Auto Mechanics	17,511.90	3,502.38	21,014.28	10,507.14	.01	105.07
Business and Office	28,306.00	5,661.20	33,967.20	16,983.60	.01	169.84
Carpentry	9,998.85	1,999.77	11,998.62	5,999.31	.01	59.99
Cosmetology	11,715.33	2,343.07	14,058.40	7,029.20	.01	70.29
Diesel Mechanics	31,421.20	6,284.24	37,705.44	18,852.72	.01	188.53
Distributive Education	13,250.00	2,650.00	15,900.00	7,950.00	.01	79.50
Drafting	13,338.00	2,667.60	16,005.60	8,002.80	.01	80.03
Electronics	40,884.00	8,176.80	49,060.80	24,530.40	.01	245.30
Licensed Practical Nursing	7,215.00	1,443.00	8,658.00	4,329.00	.01	43.29
Machine Shop	124,812.00	24,962.40	149,774.40	74,887.20	.01	748.87
Welding	24,071.71	4,814.34	28,886.05	14,443.03	.01	144.43

Annual Insurance Cost = Average Value x 1%

$$\text{Average Value} = \frac{\text{Value of Equipment + Salvage Value}}{2}$$

APPENDIX F

TABLE XLVII

DEPRECIATION OF FACILITIES (JUNIOR COLLEGE PROGRAMS)

(30 Years @ No Salvage Value)

Occupational Program	Value of Facilities (Dollars)	Life Expectancy (Years)	Annual Depreciation Cost (Dollars)
Business and Office	22,800.00	30	760.00
Distributive Education	28,285.00	30	942.83
Drafting	41,618.00	30	1,387.27
Electronics	41,590.00	30	1,386.33
Electro-Mechanical	28,168.00	30	938.93
Licensed Practical Nursing	27,773.00	30	925.77

$$\text{Annual Depreciation Cost} = \frac{\text{Value of Buildings}}{\text{Life Expectancy of Buildings}}$$

TABLE XLVIII

DEPRECIATION OF EQUIPMENT (JUNIOR COLLEGE PROGRAMS)

(10 Years @ 20 Percent Salvage Value)

Occupational Program	Value of Equipment (Dollars)	Salvage Value (Dollars)	Value Minus Salvage Value (Dollars)	Depreciation Cost (Annual) (Dollars)
Business and Office	28,804.00	5,760.80	23,043.20	2,304.32
Distributive Education	7,300.00	1,460.00	5,840.00	584.00
Drafting	12,807.00	2,561.40	10,245.60	1,024.56
Electronics	53,372.80	10,674.56	42,698.24	4,269.82
Electro-Mechanical	13,700.00	2,740.00	10,960.00	1,096.00
Licensed Practical Nursing	8,690.33	1,738.07	6,952.26	695.23

$$\text{Annual Depreciation} = \frac{\text{Value of Equipment - Salvage Value}}{\text{Life Expectancy of Equipment}}$$

TABLE XLIX

OPERATION OF PLANT (JUNIOR COLLEGE PROGRAMS)

Occupational Program	Power Cost				Water Cost (Dollars)	Consumable Supplies Cost (Dollars)	Total Annual Cost (Dollars)
	Heating (Dollars)	Air Condi-tioning (Dollars)	Equipment (Dollars)	Lights (Dollars)			
Business and Office	66.50	0	301.20	144.00	5.30	355.00	872.00
Distributive Education	86.73	0	140.00	200.00	5.30	200.00	632.03
Drafting	103.08	0	66.00	244.00	5.30	375.00	793.38
Electronics	104.51	0	375.20	180.00	5.30	620.00	1,284.71
Electro-Mechanical	270.75	0	260.35	150.00	15.10	400.00	1,096.20
Licensed Practical Nursing	74.80	0	155.00	180.00	15.10	500.00	924.90

TABLE L

ANNUAL INSURANCE OF FACILITIES (JUNIOR COLLEGE PROGRAMS)

Occupational Program	Value of Facilities (Dollars)	Average Value of Facilities (Dollars)	Insurance Rate (Percent)	Annual Insurance Cost (Dollars)
Business and Office	22,800.00	11,400.00	.01	114.00
Distributive Education	28,285.00	14,142.50	.01	141.43
Drafting	41,618.00	20,809.00	.01	208.09
Electronics	41,590.00	20,795.00	.01	207.95
Electro-Mechanical	28,168.00	14,084.00	.01	140.84
Licensed Practical Nursing	27,773.00	13,886.50	.01	138.87

Annual Insurance Cost of Facilities = Average Value x 1%

$$\text{Average Value} = \frac{\text{Value of Facilities}}{2}$$

TABLE LI

ANNUAL INSURANCE OF EQUIPMENT (JUNIOR COLLEGE PROGRAMS)

Occupational Program	Value of Equipment (Dollars)	Salvage Value (Dollars)	Value of Equipment + Salvage Value (Dollars)	Average Value (Dollars)	Rate of Insurance (Percent)	Annual Insurance Cost (Dollars)
Business and Office	28,804.00	5,760.80	34,564.80	17,282.40	.01	172.82
Distributive Education	7,300.00	1,460.00	8,760.00	4,380.00	.01	43.80
Drafting	12,807.00	2,561.40	15,368.40	7,684.20	.01	76.84
Electronics	53,372.80	10,674.56	64,047.36	32,023.68	.01	320.24
Electro-Mechanical	13,700.00	2,740.00	16,440.00	8,220.00	.01	82.20
Licensed Practical Nursing	8,690.33	1,738.07	10,428.40	5,214.20	.01	52.14

Annual Insurance Cost = Average Value x 1%

$$\text{Average Value} = \frac{\text{Value of Equipment + Salvage Value}}{2}$$

VITA

John Dale Chumbley

Candidate for the Degree of

Doctor of Education

Thesis: A COST ANALYSIS OF SELECTED VOCATIONAL AND TECHNICAL EDUCATION PROGRAMS IN OKLAHOMA

Major Field: Agricultural Education

Biographical:

Personal Data: Born in Sherman, Texas, November 11, 1943, the son of David H. and Mary Chumbley

Education: Graduated from Tom Bean High School, Tom Bean, Texas, in May, 1962; received Bachelor of Science Degree in Technical Agriculture from East Texas State University in May, 1965; received Master of Education Degree from East Texas State University in August, 1970; completed the requirements for the Doctor of Education degree at Oklahoma State University in July, 1972.

Professional Experience: Teacher of Vocational Agriculture at Bland High School, Merit, Texas, from July, 1965 to July, 1966; Assistant County Extension Agricultural Agent in Johnston County, Texas, from July, 1966 until June, 1967; County Extension Youth Agent in Sedgwick County, Kansas, from June, 1967 to January, 1970; Graduate Teaching Assistant at East Texas State University, Commerce, Texas, from January, 1970 to August, 1970; Research Assistant, Oklahoma State University, Stillwater, Oklahoma, from September, 1970 until present.

Professional Organizations: National Vocational Agriculture Teachers Association, Texas Vocational Agriculture Teachers Association, Phi Delta Kappa, American Vocational Association, Oklahoma Vocational Association, National Association of County Extension Agricultural Agents, Texas Association of County Extension Agricultural Agents, National Association of County Extension Youth Agents, Kansas Association of County Extension Youth Agents.