

ABSTRACT OF THESIS

EXTENDING VOCATIONAL
EDUCATION OPPORTUNITIES THROUGH THE CONTROL
OF INSTRUCTIONAL COSTS

Submitted by
Russell K. Britton

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EXTENDING VOCATIONAL EDUCATION OPPORTUNITIES THROUGH THE
CONTROL OF INSTRUCTIONAL COSTS

ABSTRACT

The administrators of vocational schools have found it increasingly difficult to secure enough local, state, and federal funds to meet the public demands for additional course offerings. These additional course offerings increase the instructional costs because the salaries of supervisor and teacher make up 75 percent to 85 percent of the ordinary school budget.

The problem arose in the Sheboygan Vocational and Adult School when students asked for courses that could not be given because funds were not available to pay instructional costs. It was important that any changes or savings made be based on accurate cost information. To secure comparable cost data it was decided to study similar vocational schools in Wisconsin. It was found that schools located in Wisconsin cities with a population of 25,000 to 45,000 would serve the purpose. This limited the study to nine schools.

The investigation received its direction by an analysis of the following problem:

How can the range of Vocational Education in the day school be extended by the control of instructional expenditures?

1. What type of instruction is given in the schools of this study?
2. What factors are to be considered in the cost of instruction?
3. What are the actual instructional costs of the schools in this study?
4. What method can be used to equate instructional costs?
5. What are the equated costs for the different subjects for different schools?
6. To what extent do like subjects in different schools vary in the cost of instruction?
7. What method can be applied to instructional cost data in the different school subjects to develop an acceptable standard for comparison in each subject?
8. What are instructional cost standards for different subjects?
9. What are the differences between the standard instructional costs and the equated instructional of each subject in each school?
10. What are the results of applying these instructional cost findings to each school in the study?

Form Letter I was sent to the directors of the nine schools asking for official course offering lists. All subjects that did not appear three or more times were considered non-comparative. The three instructional cost factors are: salary of teacher, salary of supervisor, and cost of educational supplies as given by Engelhardt and Engelhardt (5:247-52).

Having found the comparable subjects, it was necessary to secure information regarding them from the Wisconsin State Department of Vocational and Adult Education. This information included the salaries of supervisor and teacher, the number of hours each course was given per day, the number of days in the school year, and the number of students enrolled in each course. These data were substituted in the following formula:

$$\frac{\text{Pro-rated Salary of Teacher and Supervisor}}{\text{Number of Pupils Enrolled in Class}} \times \frac{\text{Number of Class Hours Held per Year}}{\text{Number of Class Hours Held per Year}} = \text{Student Hour Cost}$$

This formula for equating instructional costs was used in the studies of Arundel (1), Clark (2), and Hull (14).

The table that follows is reproduced from Table 7 and gives the standard, the lowest and the highest pupil hour cost for each subject in this study.

AVERAGE, LOWEST, AND HIGHEST COST OF SUBJECTS PER
PUPIL-HOUR

Subject	Average	Lowest	Highest
English - - - - -	\$.0334	\$.0058	\$.0811
Mathematics - - - - -	.0349	.0077	.0754
Cooperatives - - - - -	.0576	.0444	.0707
Social science - - - - -	.0231	.0081	.0503
Related science - - - - -	.0499	.0163	.0930
Foods - - - - -	.0701	.0341	.1362
Clothing - - - - -	.0533	.0118	.1358
Hygiene - - - - -	.0606	.0330	.1137
Art in the home - - - - -	.0961	.0351	.3540
Consumer information - - - - -	.0741	.0214	.1644
Auto mechanics - - - - -	.1383	.0382	.2403
Drafting - - - - -	.1337	.0566	.3553
Sheet metal - - - - -	.1573	.0647	.2161
General metal - - - - -	.2079	.1242	.3242
Machine shop - - - - -	.1143	.0472	.1520
Electricity - - - - -	.1329	.0435	.3323
Printing - - - - -	.1755	.0607	.2503
Woodwork - - - - -	.1305	.0921	.2967

The instructional cost of commercial subjects as given by the vocational schools is paid out of money coming from state aid. This money is given for the salaries of teachers regardless of subject classification. Because there is no federal money involved in these classes, there is no detailed accounting required of the local board by the State Department of Vocational and Adult Education. Such data as could be obtained are reported in Table 5.

Since the amount of money for supplies is so small and general accounting practices are maintained by

each school to the satisfaction of the auditors, the educational supply costs were omitted from the pro-rated cost of instruction.

The crucial part of the investigation was the examination of the data to see if educational opportunities could be given to more students within the current classes, and if additional subjects could be offered without increasing the total instruction costs. It was found in the analysis of Tables 3, 4, and 6 that specific factors effect the equated costs. These factors are the length of school year, the number of hours in the school day, the number of students enrolled, and the salaries of teacher and supervisor.

The factor that had the greatest influence on equated costs was the number of people enrolled. Increasing the number of students in a class results in an immediate lowering of the student hour cost. It is shown in Table 6 that drafting given in school D cost \$.3553 per student hour. The average cost for drafting in the Wisconsin schools was \$.1337 per student hour. Makepeace (17) found that drafting given in the Los Angeles high schools cost \$.0560 per hour when the average enrollment was 23.17. It is fair to conclude that the average cost per hour of \$.1337 is very liberal, but that effective training can be given for less than the average of the nine vocational schools. Because of this, a larger number of students could be given

effective training while the instructional cost would remain the same.

The second factor considered was the length of the school day and its effect upon extending educational opportunities. It was found that the Wisconsin schools had an average school day of six and three-quarter hours while the longest day was eight hours and the shortest day was six hours. If the school day of those below the average were increased to the average length, it was found that 135 additional hours would be made available in a school year of 180 days. Makepeace (17:25) found that in the Los Angeles high schools the teachers had 7.69 assigned hours, including home room duty. If the vocational schools lengthened the day to the average they would be giving .94 hours less than is given in the Los Angeles schools. This additional time could be used in extending the present classes or it could be used for offering new courses.

The third factor that has a bearing on equated costs is the length of the school year. The schools of this study are required by law to hold school a minimum of 180 days. This practice is very general, since only two schools have periods of 185 days or more. The vocational schools have patterned themselves after the secondary schools by holding school five days per week. The school year could be increased by holding classes a part of the sixth day; but if the instructor has a full

schedule for the entire week, it could not be expected that his services could be secured without extra compensation. This plan is not feasible because of the established precedent of having a five-day school week and because the extra compensation for teachers would increase the total cost of instruction and absorb any savings that might be made elsewhere.

The last factor that affects equated instruction costs is the pre-rated salaries of teacher and supervisor. It was found that costs were too high when compared to the student hours taught. This condition could be remedied by increasing the enrollment, lengthening the school day or arranging schedules so that expensive classes be given alternate semesters or alternate years. The time that is freed by this plan could be utilized in offering additional courses. This would provide an extension of educational opportunities without increasing the cost of instruction.

It was found by interview that directors gave one-half or more of their time to supervision. The salaries of the directors are based on the size of the school, the extent of the responsibility involved, and the financial ability of the community. Pryor (28) found that principals should reorganize their work so that at least one-half of their time could be devoted to supervisory work. Because of the effort of the directors to meet the recommendation of Pryor (28) and

because of the limiting factors in each local situation; it has been concluded that no saving could be made by reducing these salaries.

The nine trade and industry coordinators reported in this study are employed by the local vocational schools for the work outlined in Bulletin I, Vocational Education Series (31:59). Their work consists of contacting industries, meeting with private groups and service organizations for the purpose of securing information regarding the training requirements of industry and various training needs of the community. This information is used in rearranging or reorganizing the school programs so that they meet the community needs and industrial requirements. It was found that the average number of students per coordinator was 292, and that the average cost of coordination was \$6.02 per student per year. It was shown (Table 8, Chapter IV) that six of the nine coordinators would have free time by reorganizing their work on the basis of the average load per day. Because of the coordinator's relation to the school and the community, and because of the information he has available regarding technological changes and occupational trends, it has been suggested that the free time be utilized in extending the occupational adjustment program. Hinderman (13:203) recommends that the maximum load of a counselor should be 100 students and that at least two 48-minute periods should

be devoted to this work if it is to be effectively given. If the coordinator does not have time to handle the entire group, other staff members could be enlisted to assist in this important work under the supervision of the coordinator.

The answers to questions three to ten have revealed that all of the nine vocational schools could extend their services on present budgets if they adjusted their class enrollments, class schedules, their plan of teacher assignment, and their allocation of coordinator time with the standard presented in this study. There is an opportunity to give instruction to more students in present classes and to give additional course offerings or extend present services without increasing the total cost of instruction.

There is a lack of information regarding the following related subjects:

1. Effective accounting practices for educational supplies.
2. A comprehensive occupational adjustment program for small schools.
3. Maximum teacher and supervisor loads.

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I HEREBY RECOMMEND THAT THE THESIS PREPARED UNDER MY
SUPERVISION BY RUSSELL K. BRITTON
ENTITLED EXTENDING VOCATIONAL EDUCATION OPPORTUNITIES
THROUGH THE CONTROL OF INSTRUCTIONAL COSTS

BE ACCEPTED AS FULFILLING THIS PART OF THE REQUIREMENTS FOR THE
DEGREE OF MASTER OF SCIENCE

MAJORING IN TRADE AND INDUSTRIAL EDUCATION

CREDITS 3.5

H. A. Nierbray
In Charge of Thesis

APPROVED *J. B. ...*
Head of Department

Recommendation concurred in

Committee on Final Examination

Committee on Graduate Work

J. B. ...
R. Braigo
W. ...
H. A. Nierbray
Gilbert L. Beth

Alvin Keizer

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EXTENDING VOCATIONAL EDUCATION OPPORTUNITIES THROUGH THE
CONTROL OF INSTRUCTIONAL COSTS

Chapter I
INTRODUCTION

The vocational school administrators have found it increasingly difficult in the past ten years to secure enough local, state, and federal money to finance their present school programs. (27:5) During this time there has been an insistent public demand for new vocational courses. Such additional class offerings would raise the instruction and instructional supply costs, and the outlay for equipment.

These demands for a more extensive curricula may be ignored entirely if no money is available for them, or the courses may be given by using inferior instructors without proper supplies or equipment. On the other hand a careful study of the cost of subject offerings may show ways of making definite savings without injuring the current program. (17:7) These savings could then be used to meet some of the more urgent

demands for additional course offerings without increasing the total cost.

In Wisconsin any city of 5,000 population or over may have a vocational school. To support this school the local board for vocational and adult education is given power to levy taxes to cover the estimated budget for the coming year but the levy cannot exceed one and one-half mills. This restriction upon the tax levy places a limit on the amount of money available for continuing or extending vocational offerings. If the number of offerings is to be increased and if each is to be effectively given, wise use of available money will be necessary.

The problem of providing other subject offerings without new funds came to the attention of the administrators of the Sheboygan Vocational and Adult School in Sheboygan, Wisconsin. It was important that any changes that were made should be based on accurate cost information. (27:50) Information relative to the cost of certain classes was not available in a form that could be used. The cost information would show where unnecessary expenditures were being made. When these expenditures were stopped the money saved could be diverted and used in providing additional class offerings. Other vocational schools in Wisconsin could use similar information to free some vocational funds to extend their class offerings.

Statement of the problem

The purpose of this study is to find ways of using vocational school funds so that some money can be released to extend the present course offerings. A large part of the budget is spent on teachers' and supervisors' salaries and on educational supplies. Therefore, this is a study of the cost of instruction of vocational classes which are given in comparable Wisconsin vocational schools.

Delimitation of the problem

Wisconsin cities with a population of 25,000 to 45,000 were chosen to give a uniform field of study. Because of the population limitation, nine schools were selected. The cities and their populations are shown in Table 1, Chapter IV.

To further limit the study no subjects were compared unless they were given in three or more vocational schools. Only the cost of instruction, of supervision, and of instructional supplies was included. (20:77) The school year of 1937-38 was chosen because the instructional cost records were complete and available for that year.

The direction of the investigation is given by the analysis of the problem which follows.

Analysis of the problem

How can the range of Vocational Educational opportunities in the day school be extended by the control of instructional expenditures?

1. What types of instruction are given in the schools of this study?
2. What factors are to be considered in the cost of instruction?
3. What are the instructional costs of the schools in this study?
4. What method can be used to equate instructional costs?
5. What are the equated costs for the different subjects for the different schools?
6. To what extent do like subjects in different schools vary in the cost of instruction?
7. What method can be applied to instructional cost data in the different school subjects to develop an acceptable standard for comparison in each subject?
8. What are the instructional cost standards for the different subjects?
9. What are the differences between the standard instructional costs and the equated instructional costs of each subject in each school?
10. What are the results of applying these instructional cost findings to each school in the study?

A number of cost studies have been made and the following chapter will review some of the pertinent research findings.

Chapter II

REVIEW OF LITERATURE

A review of research literature was made to find pertinent materials that bear on subordinate questions two and five.

Research findings that have a bearing on question two, "What factors are to be considered in the cost of instruction," are given below:

Engelhardt and Engelhardt (5:247-52), in 1927, summarized research findings and methods of dividing educational costs into budgetary items and reliable cost factors. As a result of this work they recommended the use of budgetary items and the lists of cost factors given in Report Form 8-010, Bureau of Education, Department of Interior, 1925. The budgetary items of the report are: administration, instruction, coordination, activities, auxiliary agencies, plant operation, fixed charges, maintenance of school plant, capital outlay, and debt service.

The following are cost factors of instruction:

Instruction. This includes a statement of all items of expense concerned directly in teaching or aiding in the teaching of children, or improving the quality of teaching such as salaries and expenses of supervisors and

principals, teachers' salaries, expense of teachers institutes, cost of free textbooks, stationery, and other supplies used in instruction.

Supervision. General supervision of instruction shall be defined as that group of activities which has to do with the actual improvement of instruction through direct contact with the principal or teacher. In case a supervisor renders service ... in more than one kind of school, charge his salary, clerk hire, and other expense to the type of school in which he gives the greater portion of his time. If his time is equally divided, charge such expenditure to both types of schools.

Supplies. Supplies are those things which, when once used, are actually or constructively consumed, including writing paper, drawing paper, blank books, chalk, ink, pencils, pens, adhesives, fasteners, carbon paper, rubber stamps, typewriter supplies, magazines, test tubes, filter papers, polishing and abrading supplies, drugs, chemicals, cleansers, laboratory supplies, food supplies, wood, metal, and newspapers. Freight and cartage expense should be included. Payment for textbooks sold to pupils should not be reported. Library books (not free) should be reported under capital outlay.

The findings of this study will be used to determine the scope of instructional costs in all the schools of the present study.

O'Dell (25:102-28) in 1933 studied the unit cost of school supplies in two school systems, each for a specified period and with total enrollment of 1,900 students. He found that the curriculum influenced the kind and amount of supplies, that standardization of supply lists reduced instructional supply costs by \$.505 per pupil, and that no advantage could be gained

by purchasing supplies for more than one year. Many forms were used in collecting data. One form is shown in the appendix, Form 6.

The supply requisition record form used in O'Dell's study will be a particular aid in developing a similar form for recording instructional supply data from the schools in the present study.

The following research findings have a bearing on question five, "What are the equated costs of the different subjects for different schools?"

Hull (14:40) in 1934 investigated the per pupil cost of instruction in 30 Missouri high schools by analyzing the cost data of the schools from 1926 to 1932. The factors used in determining the per pupil cost were teachers' salaries, the size of the classes, number of meetings in the weekly program of the pupil, and the number of class meetings in the weekly program of the teacher. The four factors were the ones that proved reliable for making comparisons between the per pupil cost of instruction in different subjects. Hull reported that cost data from different subjects in different schools must be equated before comparisons can be made. His method of equating cost data is given in the formula shown in the appendix.

The foregoing will assist in the present study by providing a partial list of cost factors and a technique for equating instructional cost for comparative

purposes.

Clark (2:42-3) in 1935 investigated unit costs in 16 Kansas high schools by analyzing the cost of 1,000 hours of instruction in each subject offered by the different schools. He applied a standard list of cost factors to the data and found the unit cost of vocational and academic classes. The cost per 1,000 hours of instruction, the average enrollment, and the cost per class room hour are given in the table shown in the appendix. From these data Clark made specific recommendations covering class size, subject offerings, and their frequency.

The classroom hour cost and the enrollment data will assist in the present study by providing some comparison of instructional cost between the schools in this study and in 16 Kansas high schools.

Arundel (1:1-26) in 1932 analyzed the total vocational and secondary school budgets of Cincinnati for the purpose of securing vocational training costs. In the appendix an equation worked out by Hull is followed by an example in which the average per pupil cost is \$49.28. Dividing \$49.28 by the computed average number of student hours gives the following average pupil-hour cost:

Computed number of hours = 448

$$\frac{\$49.28}{448} = \$.11 \text{ the average cost of student-hour per subject}$$

By using this procedure, but using the total instructional cost for all subjects, Arundel reported that the student-hour cost for vocational training was \$0.1097. He found that student-hour costs were reliable when comparing instructional costs between vocational classes, as it eliminated the irregularities caused by the part-time, half-time, and full-time students in the same class.

The results will aid the present study by providing a comparison of the student-hour cost of instruction between the schools of this study and the Cincinnati schools, and by establishing a factor to be added to the per student cost formula developed by Hull (14:40).

Makepeace (17:28-34) in 1931 studied the instructional costs of vocational subjects in the Los Angeles high schools by analyzing the total enrollment, total teaching periods, and total salaries of teachers and supervisors. From these data Makepeace made recommendations regarding the size of class, instruction cost per pupil hour, and the wise use of school money. In Chapter IV is a table that gives the total salary, total enrollment, average enrollment, the per student cost per period, and the range of costs per student period for all vocational classes.

The findings of this study will be useful in making a comparative study of the per student cost of

vocational subjects in the Los Angeles high schools and the schools of this study.

The review of research did not reveal complete answers to any of the subordinate questions, but it did provide a number of forms, techniques, and standards of comparison. Complete answers to the subordinate questions will be sought according to the methods described in the following chapter.

Chapter III

MATERIALS AND METHODS

In the preceding chapter it was shown that some studies have been made of pupil hour costs. The subordinate questions two and five have been answered in part by research studies reported in the previous chapter. To complete the answers to the problem of extending vocational educational opportunities by controlling the expenditures in the day school, required certain information that was available but not in usable form.

Source of materials

This information was secured from two sources; the Wisconsin State Department for Vocational and Adult Education and the official records of the local schools for vocational and adult education. The first agency has control of the disbursement of all vocational money coming from the state and federal governments. Reimbursement on vocational classes is made to the local boards when the classes meet the requirements of the State Plan. Authenticity of these data is assured because the records of the State Vocational Department are audited by the state auditor and federal matching funds

are paid on the basis of this audit. The material secured from these records were: the salaries of teachers and supervisors, the number of hours each course was given each day, the number of days in the school year, the number of hours each teacher taught, and the number of students enrolled in each course. The technique used was the compilation and transfer of data from the records to simple tabular forms. Like data were taken from the reports of the nine schools in this study to provide adequate material.

Records of the local boards for vocational and adult education are the second source of data. The local boards are legally appointed and are given the responsibility of maintaining, operating, and fostering vocational education in their cities. Carrying out these duties involves the expenditure of federal, state, and local funds. The data secured from this source are valid because the financial records must be audited and approved. Official course offerings listed from these records were used.

Methods, devices, and techniques used in making the study

The following methods, devices, and techniques were applied to the above sources to secure answers to the unanswered subordinate questions. The three methods employed were adapted from the research studies reported

by Arundel (1), Clark (2), and Hull (14). The procedure for equating instructional costs as given in Chapter II was taken from these investigations.

To supplement the methods just mentioned, one device was used in the present study. The device was taken from an investigation by O'Dell (25:102-28) in which he studied educational supply costs. The tabular forms used in this study were taken from O'Dell's work but were slightly modified to fit various conditions found in collecting vocational school data.

The technique reported by Engelhardt and Engelhardt (5:247-52) on the breakdown of budgetary items was used to select instructional cost factors. This study of budgetary items provided the basis for the Bureau of Education's Report Form 8-010 in 1925. The instructional cost factors given in Chapter II were used to delimit this study.

The interview was the second technique used in gathering data for this study. It was used to secure specific information regarding course content of the subjects in the course offering lists from the nine schools. For example, the list from one school gave a course as "Sewing I", while another list gave the course title as "Garments for Spring". The course content of the second was clarified by meeting with the director and asking for a detailed description of course

content. This showed the second course to include learning activities identical with "Sewing I". Another example is that one commercial division listed a course as "Shorthand" while in another school a course was listed as "Dictation and Transcription". By the interview technique these two courses were found to have different names but the same course content.

The review of research gave partial answers to subordinate questions two and five. The procedure given below was used to secure the remaining information needed to solve this problem.

The form letter shown in the appendix was sent to each of the directors of Vocational Education in the nine cities studied, requesting official course offering lists from their school for 1937-38. These courses offered were tabulated on Form 2, as shown in the appendix. The tabulation was then inspected and subjects that did not appear in the vertical columns three or more times were eliminated from this comparison. This procedure answered question one completely. The remaining courses were listed under four main headings; trade and industrial, homemaking, commercial, and general subjects.

The complete answer to questions three and four were secured from the records of the Wisconsin State Department for vocational and adult education. The data pertaining to teacher and supervisor salaries, the number of hours each course was given each day, the

of days in the school year, the number of hours each teacher taught, and the number of students enrolled in each course were taken from these records. The technique reported by Engelhardt and Engelhardt (5:247-52) for prorating teacher and supervisor salaries was applied to the data secured from the records of the State Department to answer question number two. Computations on the data secured from the Wisconsin State Department were made to secure the total number of student hours of instruction per year, the prorated salaries of teachers and supervisors per subject, the total teaching hours per teacher per year, the number of enrollees per course, and the cost per student-hour per subject in each school. These computations provided complete answers to questions five and six.

The equating method outlined in Chapter III was used to reduce all costs of instruction to a common basis for comparative purposes. Satisfactory answers to questions seven and eight were obtained when comparisons were made between like subjects in different schools and with the standard cost for that subject in all schools. The standard subject-cost is an average of the equated costs for that subject. In an interview with Professor Clark of the Colorado State College of Agriculture and Mechanic Arts, it was found advisable to consider average costs as a standard because of the

similar geographic location of the cities and because each city is governed by the same vocational school laws and regulations.

These results were inspected to find similarities and differences in the six cost items. This information was called for in questions nine and ten. The methods and techniques just described were applied to the two sources to provide data needed to solve this problem. The findings are given in Chapter IV.

Chapter IV

FINDINGS

In Chapter II of this study the problem of extending vocational education opportunities in day school by controlling instructional expenditures was partially answered by using the technique reported by Engelhardt and Engelhardt (5:247-52), to pro-rate the teachers' and instructors' salaries. The study was delimited by using only instructional cost factors as explained in Chapter II. The problem was answered further by using the instructional cost equating methods reported by Arundel (1), Clark (2), and Hull (14) as shown in Chapter II. Each of the findings given in the following pages will be used to complete answers to the remaining question, three to ten.

The cities studied and their population are shown in Table 1.

Table 1.--WISCONSIN CITIES WITH POPULATION BETWEEN 25,000
AND 45,000 -- 1930 CENSUS

Cities	Population	Cities	Population
Appleton - - -	25,267	Oshkosh - - -	40,108
Eau Claire - -	26,287	Sheboygan - -	39,251
Fond du Lac - -	26,495	Superior - - -	36,113
Green Bay - - -	37,415	West Allis - -	34,671
La Crosse - - -	39,614		

Appleton, with a population of 25,267, is the smallest city, while Oshkosh, with a population of 40,108 is the largest. The average population is 32,797.

The course offering lists secured from the directors of the nine school are shown in Table 2. The subjects offered by the schools are given along one side of the table and the names of the schools are shown on the other. The presence of an "x" in any cell indicates that the specified school offered that subject. Only those subjects that were offered in three or more schools were used in making comparisons. The subjects are listed under the four main headings of Trade and Industry, Homemaking, Commercial, and General.

Table 2.--SUBJECT OFFERING BY SCHOOLS

School	TRADE AND INDUSTRY	COMMERCIAL	HOMEMAKING	GENERAL
Appleton -	X X X X X X X X	X X X X X X X X	X X X X X X X X	X X X X X X X X
Eau Claire	X X X X X X X	X X X X X X X X	X X X X X X X X	X X X X X X X X
Fond du Lac	X X X X X X X	X X X X X X X X	X X X X X X X X	X X X X X X X X
Green Bay -	X X X X X X X X	X X X X X X X X	X X X X X X X X	X X X X X X X X
La Crosse -	X X X X X X X X	X X X X X X X X	X X X X X X X X	X X X X X X X X
Oshkosh - -	X X X X X X X X	X X X X X X X X	X X X X X X X X	X X X X X X X X
Sheboygan -	X X X X X X X X	X X X X X X X X	X X X X X X X X	X X X X X X X X
Superior -	X X X X X X X X	X X X X X X X X	X X X X X X X X	X X X X X X X X
West Allis	X X X X X X X X	X X X X X X X X	X X X X X X X X	X X X X X X X X
Total -	8 8 8 9 7 1 8 4 5 2 2	2 9 9 6 5 9 9 6 7 5 4 4	9 9 9 6 2 9 1 9 2 9	9 1 1 1 1 1 7 1 2 7 2 1 7

The cost data given in Tables 3, 4, and 6 are for the vocational school subjects. The method of reading these tables is as follows: select the subject for which information is wanted. The school is listed in the column on the left. By reading to the right, the total pro-rated cost of instruction for that subject is given. The next column shows the total number of student hours given in any one school, while the last column on the right is the equated cost of instruction per pupil-hour. For example, in Table 3, the English given in school D cost \$288.00 for the year. They gave 8,550 hours of instruction and the pupil-hour cost was \$.0337 per hour. By referring to the bottom line under each subject, the averages for each column are found. Tables for the other subjects are read in the same way.

Table 3 gives cost data for the five general subjects. It will be noted that only schools B, G, and I offered Cooperatives as organized classes while other general subjects were offered by most of the schools. Social science and English were given more hours per year than the other subjects. The average unit cost per pupil-hour was less for these two subjects, while Cooperatives had the highest pupil-hour cost. It is shown that the pro-rated costs vary considerably for the same subject given in different schools. For example, school A paid \$754.00 for 82,215 hours of instruction

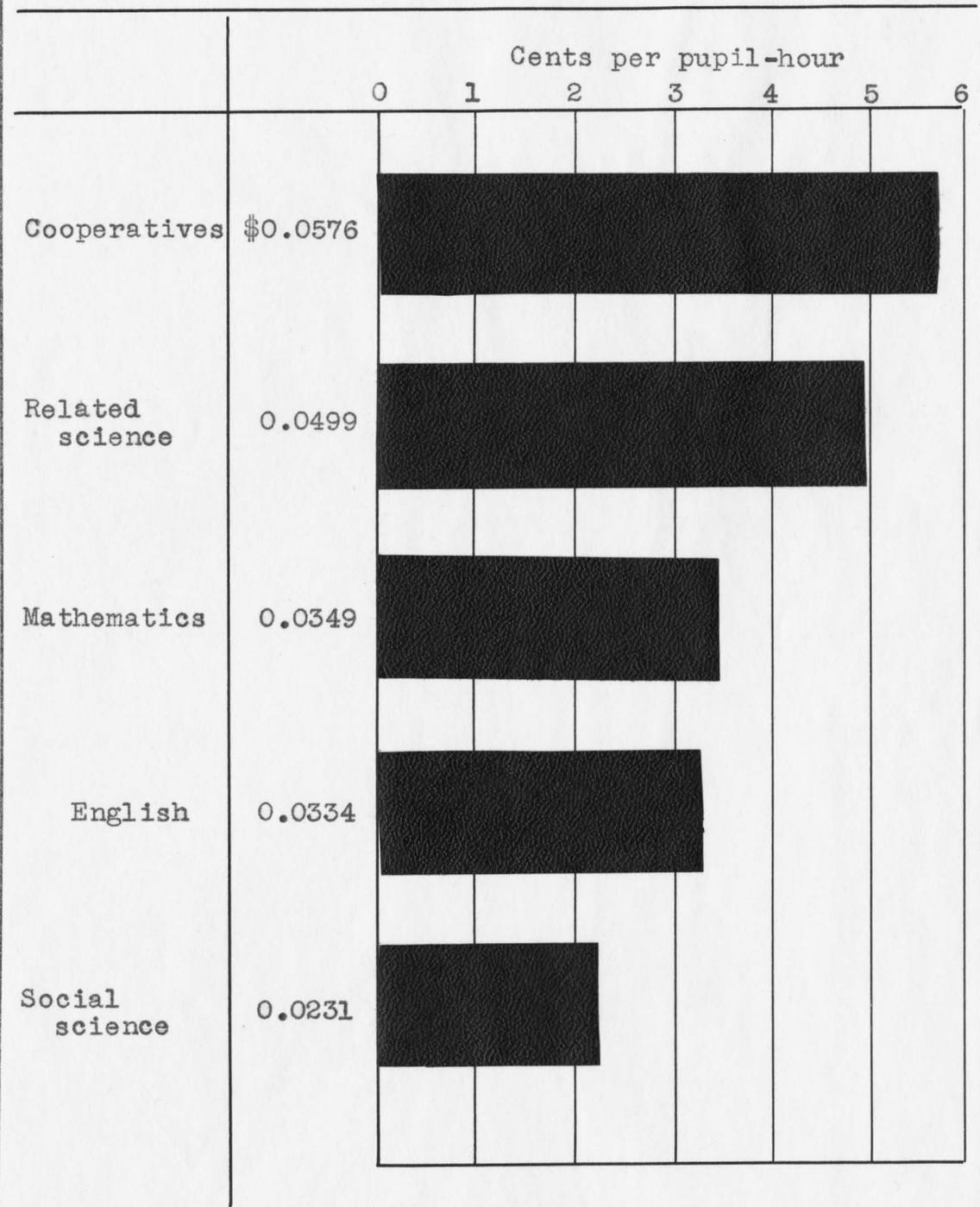


Figure 1.--Average pupil-hour cost for General Subjects

Table 3.--UNIT COSTS OF INSTRUCTION IN GENERAL SUBJECTS

The unit cost is cost per pupil-hour.

English				Mathematics				Related science			
School	Pro-rated cost	Total pupil hours	Unit cost	School	Pro-rated cost	Total pupil hours	Unit cost	School	Pro-rated cost	Total pupil hours	Unit cost
A - -	\$754	85215	\$.0088	A - -	\$554	72345	\$.0077	A - -	\$498	19276	\$.0258
B - -	450			B - -	173	3870	.0447	B - -			
C - -	279	48260	.0058	C - -	150	7352	.0204	C - -	247	15200	.0163
D - -	288	8550	.0337	D - -				D - -	265	2850	.0930
E - -	385	4748	.0811	E - -	358	4746	.0754	E - -	280	3610	.0776
F - -	1186	40350	.0294	F - -	401	17500	.0229	F - -	485	16920	.0287
G - -	337	10892	.0309	G - -	400	13748	.0291	G - -	285	4920	.0579
H - -	82			H - -	82			H - -	82		
I - -	600	13500	.0444	I - -	600	13500	.0444	I - -			
Average	484.55	30216.43	.0334	Average	339.75	19008.71	.0349	Average	306	10462.67	.0499
Cooperatives				Social science							
School	Pro-rated cost	Total pupil hours	Unit cost	School	Pro-rated cost	Total pupil hours	Unit cost				
A - -	\$			A - -	\$585	72462	\$.0081				
B - -	450	7812	.0570	B - -							
C - -				C - -	454	17556	.0259				
D - -				D - -	608	49742	.0122				
E - -				E - -	290	5770	.0503				
F - -				F - -	875	25800	.0339				
G - -	200	2828	.0707	G - -	301	29072	.0104				
H - -				H - -	82						
I - -	300	6750	.0444	I - -	300	14250	.0211				
Average	258	4789	.0576	Average	436.88	30664.57	.0231				

and school F paid \$1186.00 for 40,350 hours of instruction in the same subject.

Following Table 3 is Figure 1 which summarizes, in graphic form, the average unit cost per pupil-hour for the general subjects. The average unit cost for Cooperatives was \$.0576 and for Social Science was \$.0231. There was an \$.0345 difference in the cost of the least and most expensive subjects.

The homemaking costs in Table 4 are for the five subjects selected for analysis. Each of these subjects was given in each of the nine schools. From this cost information it will be found that the difference between the most expensive average unit cost and the least expensive is \$0.0428. The subject "Art in the Home" was given fewer hours than other subjects and clothing was given the most hours. It is shown that the most expensive class was "Art in the Home" which cost \$0.0961 per pupil-hour and Clothing was low with an average pupil-hour cost of \$0.0533.

Figure 2 graphically presents the average pupil-hour costs as they appear in Table 4. It will be seen that a very small difference exists between the cost of the Consumer Information and Foods subjects.

Table 4.--UNIT COSTS OF INSTRUCTION IN HOME MAKING SUBJECTS

The unit cost is cost per pupil-hour.

Hygiene				Consumer information				Clothing			
School	Pro-rated cost	Total pupil hours	Unit cost	School	Pro-rated cost	Total pupil hours	Unit cost	School	Pro-rated cost	Total pupil hours	Unit cost
A - -	\$673	20397	\$.0330	A - -	\$341	15934	\$.0214	A - -	\$2100	34823	\$.0603
B - -	56	792	.0707	B - -	232	2080	.1115	B - -	434	8316	.0522
C - -	264	5424	.0487	C - -	775	10070	.0770	C - -	3244	193283	.0168
D - -	710	19494	.0364	D - -	112	2384	.0470	D - -	773	12420	.0622
E - -	197	2390	.0824	E - -	237	4548	.0521	E - -	1104	8131	.1358
F - -	292	4021	.0726	F - -	171	1875	.0912	F - -	884	11580	.0763
G - -	121	2556	.0473	G - -	142	2076	.0684	G - -	549	15438	.0356
H - -	298	2620	.1137	H - -	226	1375	.1644	H - -	237	8258	.0287
I - -	153	3785	.0404	I - -	272	8037	.0338	I - -	312	26512	.0118
Average	307.33	6831	.0606	Average	278.67	5375.44	.0741	Average	1070.78	35417.89	.0533
Art in the home				Foods							
School	Pro-rated cost	Total pupil hours	Unit cost	School	Pro-rated cost	Total pupil hours	Unit cost				
A - -	\$625	7948	\$.0786	A - -	\$2848	30502	\$.0701				
B - -	446	1260	.3540	B - -	446	8316	.0536				
C - -	490	13980	.0351	C - -	1622	43373	.0374				
D - -	105	1752	.0599	D - -	606	17752	.0341				
E - -	116	2054	.0565	E - -	1104	9770	.1130				
F - -	184	1875	.0981	F - -	879	11295	.0778				
G - -	185	3838	.0482	G - -	1133	22537	.0503				
H - -	132	1644	.0808	H - -	1574	11560	.1362				
I - -	206	3823	.0539	I - -	670	19312	.0347				
Average	276.56	4241.56	.0961	Average	1209.11	19376.33	.0701				

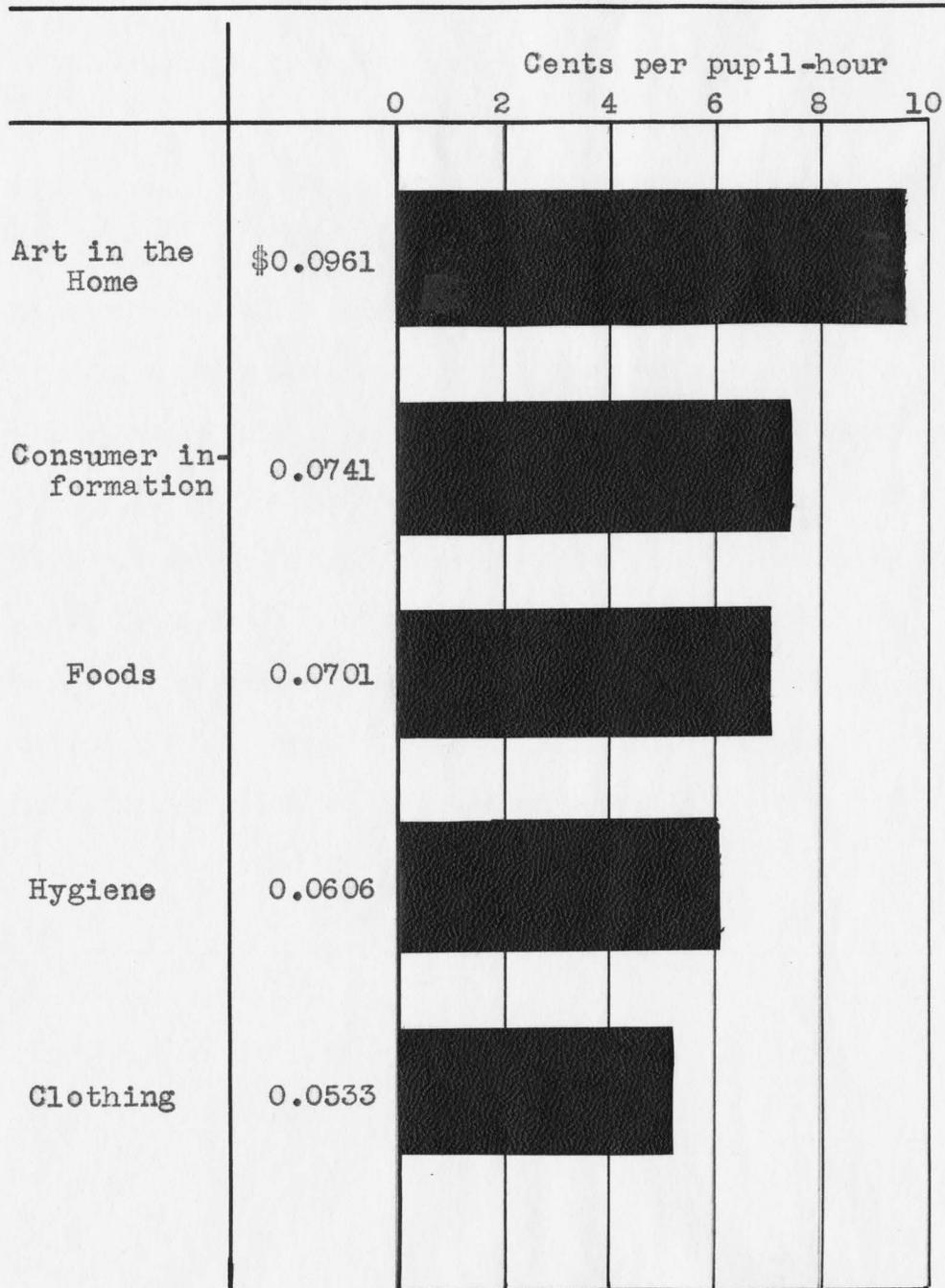


Figure 2.--Average per hour cost for Homemaking Subjects

The findings for commercial subjects are given in Table 5.

The commercial subject data were not available in a complete form for all schools. In Wisconsin, State aid is given to vocational schools according to classification. The schools studied are in the second division and they receive a pro-rated amount of money based on a thirty thousand dollar pay roll. This money is given to aid day school instruction regardless of subject classification. Since there is no Federal reimbursement to the local vocational school for commercial subjects, there is no detailed accounting of money required of the local school by the Wisconsin State Department of Vocational and Adult Education. Such data as could be obtained are reported in Table 5, but no comments will be made relative to pupil-hour costs.

Table 5.--COST OF INSTRUCTION IN COMMERCIAL SUBJECTS

The unit cost is cost per pupil-hour.

Typing				Business English				Shorthand			
School	Pro-rated cost	Total pupil hours	Unit cost	School	Pro-rated cost	Total pupil hours	Unit cost	School	Pro-rated cost	Total pupil hours	Unit cost
A - -	\$		\$	A - -	\$		\$	A - -	\$		\$
B - -	780	92340	.0084	B - -	281	34200	.0082	B - -	548	43320	.0126
C - -				C - -				C - -			
D - -				D - -				D - -			
E - -				E - -				E - -			
F - -	1156			F - -	483			F - -	895		
G - -				G - -				G - -	812	83600	.0097
H - -	1092	83600	.0130	H - -	170	137160	.0012	H - -			
I - -				I - -	129			I - -			
Commercial arithmetic				Bookkeeping							
School	Pro-rated cost	Total pupil hours	Unit cost	School	Pro-rated cost	Total pupil hours	Unit cost				
A - -	\$		\$	A - -	\$		\$				
B - -	148	58140	.0025	B - -	429	85500	.0050				
C - -				C - -							
D - -				D - -							
E - -				E - -							
F - -	280			F - -	533						
G - -	672			G - -							
H - -	95	102600	.0009	H - -	672	151200	.0044				
I - -				I - -	576						

Table 6 gives cost data for eight subjects in the Trade and Industry classification. It will be seen that the trade subjects are more expensive than General or Homemaking subjects. Fourteen to twenty thousand hours average are given in each of these subjects, while in the other two classifications the variation is much larger. Sheet Metal and General Metal are each given in three schools, while Woodworking is the only subject given in all schools. It is interesting to note that pro-rated instructional costs are much higher for all trade subjects than those in other classifications.

Figure 3 graphically presents a summary of the average pupil-hour costs of Trade subjects. General Metal cost \$0.2079 per pupil-hour, while Machine Shop, the least expensive, cost \$0.1143 per pupil-hour. Four subjects--Auto Mechanics, Woodworking, Drafting, and Electricity--cost a little more than \$0.13 each, while the difference between the least expensive and the most expensive was \$0.0956 per pupil-hour.

Table 6.--COST OF INSTRUCTION IN TRADE AND INDUSTRY CLASSES
 The unit cost is cost per pupil-hour.

Auto mechanics				Drafting				Sheet metal			
School	Pro-rated cost	Total pupil hours	Unit cost	School	Pro-rated cost	Total pupil hours	Unit cost	School	Pro-rated cost	Total pupil hours	Unit cost
A - -	\$2009	25996	\$.0773	A - -	\$2909	39936	\$.0737	A - -	\$2214	10244	\$.2161
B - -	2594	23864	.1078	B - -	1606	9450	.1699	B - -			
C - -	1153	7068	.1631	C - -	2083	15120	.1378	C - -			
D - -				D - -	2228	6270	.3553	D - -	1533	23698	.0647
E - -	2207	9184	.2403	E - -	1407	12396	.1135	E - -			
F - -	1837	11940	.1539	F - -	2137	23430	.0912	F - -	2237	11700	.1912
G - -	2254	11552	.1951	G - -				G - -			
H - -	1416	37104	.0382	H - -	1384	23120	.0566	H - -			
I - -	2033	15696	.1295	I - -	400	5580	.0717	I - -			
Average	1937	17800	.1383	Average	1769	16787	.1337	Average	1994	15214	.1573
General metal				Machine shop				Electricity			
School	Pro-rated cost	Total pupil hours	Unit cost	School	Pro-rated cost	Total pupil hours	Unit cost	School	Pro-rated cost	Total pupil hours	Unit cost
A - -	\$2509	20202	\$.1242	A - -	\$2809	18468	\$.1520	A - -	\$2309	18486	\$.1249
B - -	2302	7101	.3242	B - -				B - -	2297	6912	.3323
C - -				C - -	941	8123	.1158	C - -	898	11248	.0798
D - -				D - -	1728	36590	.0472	D - -	1813	29792	.0609
E - -	2457	14025	.1752	E - -	1949	15828	.1231	E - -			
F - -				F - -	2237	25680	.0871	F - -	2237	12780	.1750
G - -				G - -	2379	13376	.1779	G - -			
H - -				H - -	1891	16344	.1157	H - -	501	11525	.0435
I - -				I - -	2537	26496	.0958	I - -	2537	22248	.1140
Average	2422	12732	.2079	Average	2058	20115	.1143	Average	1798	16141	.1329
Printing				Woodwork							
School	Pro-rated cost	Total pupil hours	Unit cost	School	Pro-rated cost	Total pupil hours	Unit cost				
A - -	\$2109	18720	\$.1127	A - -	\$2209	22854	\$.0967				
B - -				B - -	2675	21173	.1263				
C - -	1113	4446	.2503	C - -	954	6574	.1451				
D - -	2188	15352	.1425	D - -	2317	51756	.0448				
E - -	2716	10956	.2479	E - -	2707	16858	.1606				
F - -	2237	25200	.0889	F - -	2237	22920	.0976				
G - -	2321	15936	.1641	G - -	1804	6080	.2967				
H - -	672	17812	.0607	H - -	593	5364	.1105				
I - -	2106	17812	.1182	I - -	2537	27540	.0921				
Average	1932	14686	.1755	Average	2003	20124	.1305				

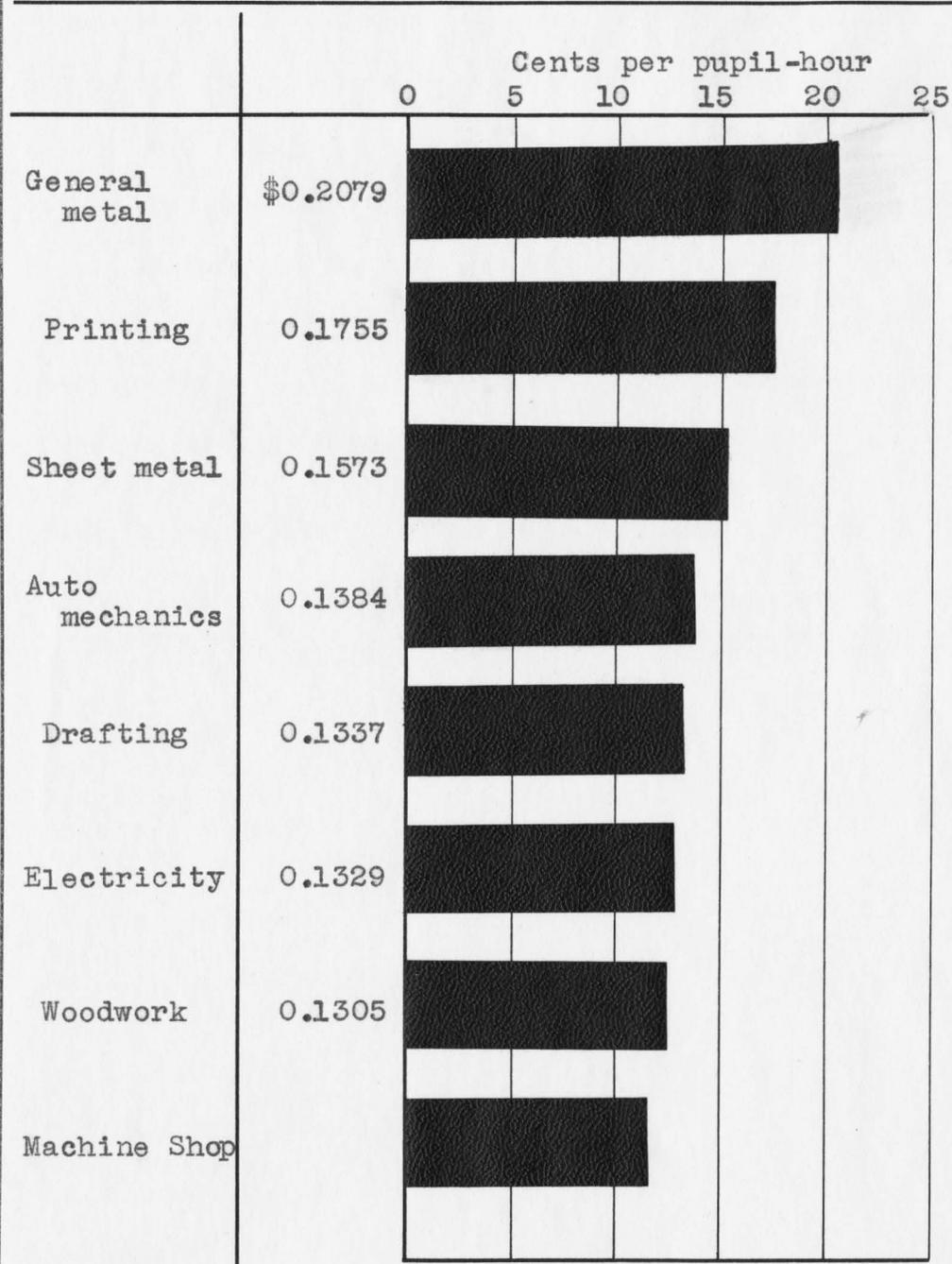


Figure 3.--Average per hour cost for Trade Subjects

Table 7 is a composite of the upper and lower extreme costs for each subject and the average unit cost per pupil hour for all vocational subjects studied, as taken from Tables 3, 4, and 6. The first column lists the subjects that were compared. The second column gives the unit cost or standard by which cost comparisons will be made in Chapter 5. The third and fourth columns give the lowest and highest cost per hour of instruction for each subject. A discussion of these average cost figures is given in the following chapter.

Table 7.--AVERAGE, LOWEST, AND HIGHEST COST OF SUBJECTS PER PUPIL-HOUR

Subject	Average	Lowest	Highest
English - - - - -	\$.0334	\$.0058	\$.0811
Mathematics - - - - -	.0349	.0077	.0754
Cooperatives - - - - -	.0576	.0444	.0707
Social science - - - - -	.0231	.0081	.0503
Related science - - - - -	.0499	.0163	.0930
Foods - - - - -	.0701	.0341	.1362
Clothing - - - - -	.0533	.0118	.1358
Hygiene - - - - -	.0606	.0330	.1137
Art in the Home - - - - -	.0961	.0351	.3540
Consumer information - - - - -	.0741	.0214	.1644
Auto mechanics - - - - -	.1383	.0382	.2403
Drafting - - - - -	.1337	.0566	.3553
Sheet metal - - - - -	.1573	.0647	.2161
General metal - - - - -	.2079	.1242	.3242
Machine shop - - - - -	.1143	.0472	.1520
Electricity - - - - -	.1329	.0435	.3323
Printing - - - - -	.1755	.0607	.2503
Woodwork - - - - -	.1305	.0921	.2967

Table 8 gives the number of students that each coordinator has per school. It will be noted that the average number of students is 292 and that three of the schools have more than the average. If 292 students comprise a full load for a seven-hour day, then six of the coordinators have from 15 minutes to three and three-quarter hours of time that could be made available. The average cost of coordination is \$6.02 per pupil per year. Five of the nine coordinators receive more than the average paid for coordination services. The highest cost is paid by school C, which is \$9.49 per student per year, while the lowest is \$3.43 as paid by school A.

Table 8.--NUMBER OF PUPILS AND THE COST OF COORDINATION
PER YEAR PER PUPIL

School	Number of students	Cost per pupil per year	Computed hours of free time
A - - - -	670	3.43	0.00
B - - - -	228	6.68	1.52
C - - - -	179	9.49	2.71
D - - - -	372	4.28	0.00
E - - - -	264	7.57	0.28
F - - - -	305	3.60	0.00
G - - - -	126	5.63	3.54
H - - - -	276	5.16	0.25
I - - - -	208	8.34	2.13
Average - - -	292	6.02	

A discussion of the findings follows in
Chapter V.

Chapter V

DISCUSSION

The preceding chapters have given data that are important to the vocational school administrators who are attempting to meet demands of more extensive curricula without additional money. (27:5) If money is to be freed to provide additional course offerings, the largest budgetary item should be closely inspected to determine any economies that can be effected.

Question two, "What factors are to be considered in the cost of instruction?" was answered by the investigation of Engelhardt and Engelhardt (5:247-52) who studied methods of dividing educational costs into budgetary items and cost factors. The cost factors of instruction are teacher and supervisor salaries, and educational supplies. The methods of pro-rating the salaries of teacher and supervisor as outlined were used in the present study. Educational supplies were given by Engelhardt and Engelhardt (5:247-52) as one of the factors of instructional cost.

It was planned in this study to add the supply costs per subject to the pre-rated salary of teacher and supervisor for equating all instructional costs.

In the process of drawing the actual supply costs from the requisitions, a number of difficulties arose. The principal difficulty was the lack of detailed information on educational supply costs. In a similar case, Huplits (13) found that of every one hundred dollars spent for schools, only two dollars were expended for supplies. Because of the small part of the budget involved in this cost, the supply accounting practices in the nine vocational schools were rather general in nature.

This seems to be true because:

1. Schools in this study made practically no attempt to allocate supply costs for single subjects.
2. The records that were kept satisfied the local boards who were responsible for spending school money.
3. The educational supplies constituted a comparatively small part of the budget.
4. The records that were kept satisfied the auditor of the financial reports.

In the nine vocational schools the general practice was to allow an amount of money for educational supplies for the entire school year, based on the previous years' experience. This money was spent as it was needed after the director's approval was given each requisition. The director was then responsible to the local board for money that was spent. In some schools, the members of the board were appointed to committees which served the school by checking on buildings,

grounds, repairs, new equipment, selection of teachers, general maintenance, and supply costs. In this way, the board members were kept aware of where and for what the money was being spent. While there were general accounting practices maintained, major emphasis was not given to detailed allocation of supply costs. In the light of these findings, the detailed analysis of accounting for supply costs has been omitted because the amount of money that could be released would be very small, if indeed any saving could be made.

Analysis of cost data

The important part of this investigation is the examination of the data to see if it is possible to give educational service to more students in present classes, or to give educational service to more students by offering additional subjects without increasing the instruction costs. A careful analysis of the data in Tables 3, 4, and 6, in Chapter IV, reveals specific factors that affect equated costs. These factors are the number of pupils enrolled in each class, the number of hours in the school day, the length of the school year, and the salaries of supervisor and teacher.

One means of extending educational opportunities is to increase the number of pupils enrolled in a given subject. This factor has the greatest influence on pupil-hour cost. Increasing the class size would affect

an immediate lowering of pupil-hour costs. Additional pupils in any class where enrollment is low allows the instructor to give the same training to a larger group without increasing the instructional cost of that class. An example is shown in Table 6, where school D paid \$2228 for teaching and supervising a class in drafting. Only 6270 hours of instruction were given that year. The equated cost for drafting in school D was \$.3553 per pupil-hour. The lowest cost for the same subject was \$.0566 per pupil-hour as given by school H, while the average cost per pupil-hour for the nine schools was \$.1337. This comparison indicates that school D was spending \$.2216 more per pupil-hour than the average cost and \$.2987 more than school H. If the number of pupils in school D drafting class had been increased so that the pupil hours of instruction given had equaled the average of 16,787 hours per year, the cost per pupil-hour would have approximated the average cost of \$.1337. The cost to school D would have remained the same. Instead of training seven drafting pupils, 19 could have been trained during this time without increasing the total cost.

Makepeace (37:28-43) found that drafting was given in the Los Angeles high schools for a cost of \$.0560 per hour to a class whose average enrollment was 23.17. It is reasonable to conclude that the average

cost per pupil-hour of \$.1337 as found in Wisconsin cities is very liberal and that effective instruction can be given to more pupils at the same cost without impairing the progress of the pupil or lowering the teaching standards. If, by increasing the number of pupils, the equated cost were lowered to the average cost for that subject, no hardship would be inflicted upon the quality of instruction given.

The drafting given in school H cost no more than drafting given in the Los Angeles high schools. This indicates that this subject can be given effectively at a pupil-hour rate that is less than the average for the nine Wisconsin Vocational Schools. Because of this, a larger number of pupils can be given effective training for the present outlay of money. The cost remains constant while more students receive training. The effective control of schedules and enrollment in day school makes it possible to provide more instruction without increasing the instruction budget.

The second factor that affects pro-rated costs of instruction is the number of hours in the school day. In the nine vocational schools, the average day is six and three-quarter hours long. The shortest day is six hours, while the longest school day is eight hours. When the school year has 180 days, the six-hour day provides 1,080 one-hour periods, while the eight-hour day

gives 1,440 one-hour periods. In a study of school costs, Makepeace (17:25) found that in the Los Angeles high schools, teachers had 7.69 assigned hours including home room duty. If the schools in this study would lengthen their school day to six and three-quarters hours, the average length for school days, or to seven hours, which would be 15 minutes more than the average, then 135 to 180 hours would be freed each year to give additional services.

Comparing the length of school day suggested for the Wisconsin schools with that in operation in Los Angeles high schools, it will be found that the latter is now requiring .69 hours more than the number suggested for Wisconsin. If the day were lengthened, the instructors' time could be used for additional course offerings. These offerings may be new in content or more time may be given to present classes. For example, the machine shop instructor may use the extra time to give his students supplementary work in "Heat treating". Thus, if the time were made available, it would not be difficult to schedule new classes or to extend others.

The third factor having a bearing on equated instructional costs is the length of the school year. The schools of this study are required by law to hold school for 180 days each year. The practice of having 180 days of school is quite general in the school of this study. Only two have periods of 185 days or more.

For the most part, vocational schools have patterned themselves after the public schools in holding school only five days each week. The school year could be increased by holding classes on the sixth morning. If some of the time that would be freed by lengthening the day could be scheduled for some subject the morning of the sixth day, there would be a real opportunity to extend educational services in day school. However, if a teacher's schedule were full for the entire week, it is not reasonable to ask for his services without extra compensation. This would raise the total instructional cost and defeat any gains made elsewhere. Because of the laws requiring a certain length school year and because of precedent established by having school only five days, this factor becomes the most inflexible one.

The last factor having a bearing on equated costs is the pro-rated salaries of supervisor and instructor. After analyzing the pro-rated instruction cost data (Tables 3, 4, and 6) it seems that some costs are high when considered in the light of student hours taught. For example, school A received 12,386 hours of instruction in social science for \$100, while school F received only 3,948 hours for the same cost. When compared in this way, school A is getting three times as much instruction per \$100 as school F. This condition should not exist. The teacher's time should be scheduled

so that pupil-hours taught would be equal to or above the average number of hours taught. When the cost of instruction for a subject increases above the average, something should be done to reduce the cost without inflicting a salary decrease upon the personnel. One way that this could be done is to adjust the schedules so that the more expensive classes would be given alternate semesters or alternate years. Enough students could be enrolled in the class during the semester or year that the subject is given to increase the number of student hours. The instructor's time would be made free during the remaining time. New courses could be offered during this time, thus extending the educational opportunities to meet the demands of students. For example, school B should give "Art in the Home" only a part of a semester each year because the equated cost of instruction is \$.354 per pupil-hour compared to the average cost of \$.0961 per pupil-hour. In this case, the pro-rated salary for school B was \$446, while the average for the nine schools was \$276.00. The pro-rated salary was not excessive, but the subject was given the entire semester with too few students enrolled in the class. By giving this class only part of each year, the teacher's time would have been free to teach other subjects to those students who would enroll in additional course offerings.

The salary of the supervisor is another item in instructional cost. In a study of the supervision done by principals in Texas high schools, Pryor (28: abstract 17-18) recommends that principals reorganize their work so that they will have one-half time for supervision of activities. In interviews with the directors of the nine vocational schools, it was found that half or more of their time was devoted to supervisory work. Therefore the amount of supervisory work done in the vocational schools by the directors is in keeping with the recommendation of Pryor. The salaries of the directors are determined by the local board for vocational and adult education on the basis of the size of the school, the difficulty and extent of the responsibilities involved, and the financial ability of the local community. Because of the limiting factors in each local situation and the procedure followed by the local board, it has been concluded that this item in the cost of instruction has been accurately determined.

In the Wisconsin Vocational Schools, there are nine people who devote all or part time to coordination work. These people serve in the trade and industry field. There were no coordinators in the other subjects of this study. The work of the coordinator is described in Bulletin I, Vocational Education Series (31:59) and is given in detail in the State Plans for Vocational

Education. Coordination includes such duties as contacting industries for the purpose of securing information regarding training needs, occupational and technological changes, plant safety, and production methods. The work of the coordinator in the community requires that he meet and work with groups interested in helping pupils in one way or another. Much of the direction that classes receive is through advisory committees which the coordinator must call together for conferences. Any information that is received by the coordinator should be used by the school in rearranging or reorganizing the course content of specific subjects so that the training received in the school will meet the specifications required by industry. Not more than 10 percent of his time may be devoted to keeping of records or doing administrative or supervision work. It is evident that the more students a school has, the more teachers it will need to care for the enrollees. The more students and teachers a school has, the more places in the community the coordinator will have to contact to secure information and to place students in jobs. The average student load in the Wisconsin schools is 292 per coordinator per year. The highest number of students is in school A, which has 670, while school G is the lowest with 126. By dividing the salary of the coordinators by the number of students which he served, it was found that the

average cost of coordinator was \$6.02 per pupil per year. School C paid \$9.49 per pupil, while A paid only \$3.43 per pupil for coordination. It is interesting to note (Table 8, Chapter IV) that six of the nine coordinators have less than the average load, and that on the basis of student load and salaries paid, six of the nine coordinators have from 15 minutes to three and one-half hours per day that could be used to promote additional school services.

The extension of the occupational adjustment service is an example of the new opportunities that schools might offer to students. Norton (24:172), after studying counseling systems in high school and vocational schools of New York, found that most vocational industrial schools were conscious of the necessity of an adequate advisory service, but that few of them had done anything to provide for the development of this program. This shows that the state that leads the nation in the amount of money spent for vocational education has done little to provide for occupational adjustment services in their schools. These facts are supported by the findings of 13 superintendents who made a study of the nation's secondary schools to see what was being done in the field of guidance, training, and placement.

According to the National Occupational Conference Intrim Report, it was found that good training

programs existed throughout the nation but that guidance and placement services were relatively undeveloped. Additional personnel would be necessary to handle the guidance and placement work if this change were effected. The weakness of the guidance program is shown by the report that one large western city enrolled 80 percent of its students in academic or college preparatory courses which lead to the professions, while according to 1930 census, only 20 percent of the people can be gainfully employed in professional pursuits. (22:10-16) With the assistance of an adequate occupational adjustment program, this condition can be materially changed.

Because of the conditions that exist in the New York vocational schools and in secondary schools of the United States, it is concluded that Wisconsin schools have developed course content and training to a high level in both secondary and vocational schools but these schools are characterized by only partially developed guidance and placement services. These functions should be as effective as the training program of any school, otherwise the occupational adjustment service will become one sided. The free part of the coordinator's time, as shown in Table 8, could be utilized in extending guidance and placement services.

Hinderman (11:203) experimented with guidance in secondary schools by having a core program and a core

counselor with a load of 80 counselees. He compared the effectiveness with which the group made occupational adjustment to the effectiveness with which pupils in an organized, carefully conducted, traditional home room program made occupational adjustment. Among the findings reported were the facts that the maximum load of counselees that a counselor could advise effectively was 100, and that at least two 48-minute periods per day should be made available for this service.

From Table 8 it will be seen that six of the nine coordinators have from 15 minutes to three and one-half hours available each day and that the average coordinator has a load of 292 students. It seems that occupational adjustment services could be extended by utilizing the time of the coordinator which has been freed by reorganizing his work according to the established averages. Because of the type of work done by the coordinator, it is necessary for him to be very close to the activities of the school and community, to be aware of occupational and technological changes, and to know occupational trends of the local community.

Because the coordinator has these contacts and the immediate occupational information, he should assume the responsibility of organizing and extending guidance and placement service in local vocational schools. The time that he has available will not be

sufficient for him to counsel all the students in the school, but other members of the staff could be designated to assist in providing an adequate occupational adjustment program under the direction of the coordinator. If other coordinators are added to the school, a panel or committee could be formed to work out cooperatively the problems of giving adequate occupational adjustment service to all students of the school.

An example of this is school C. The coordinator has 179 students and when compared with the average work day has two and three-quarter hours free time. He could easily handle one-half of the group as an extension of the program while the remaining students could be given to another staff member; or if there was another coordinator employed to handle some other work, then his cooperation could be enlisted. The addition of this service to the vocational schools would provide work for the coordinator's free time without extra instructional cost and it would provide a much-needed extension of the occupational adjustment program which seems to be generally lacking.

The answers to questions three to ten have revealed that all of the nine vocational schools could extend their services on present budgets if they adjusted their class enrollments, their class schedules, their plan of teacher assignment, and their allocations

of coordinator time with the standards presented in this study. A summary of student hour cost standards is given in Table 7, Chapter IV. There is an opportunity to extend the services of vocational schools without increasing the instructional costs.

Problems for further study

Several closely related problems that bear on this subject have arisen. There seems to be a lack of information on the most effective practice of accounting for supplies. Whether supplies should be accounted for by the subject, by the teacher, or by the department should have further study toward standardization. The problem of establishing a comprehensive occupational adjustment service in a small school could be studied for determining what should be the requirements of people who do the work, how this service is to be effectively given, how the effects of such a program can be measured, and what the costs of such a program should be. Then, too, there is a need for information regarding the load for teacher and supervisor in vocational schools. Can the teaching load of a shop instructor be compared accurately with that of a science teacher? What is the normal load of a supervisor, and should the supervisor teach a part of the day? The answers to these problems would supply valuable information for administrators of vocational education.

Chapter VI

SUMMARY

The administrators of vocational schools have found it increasingly difficult to secure enough local, state, and federal funds to meet the public demands for additional course offerings. These additional course offerings increase the instructional costs because the salaries of supervisor and teacher make up 75 percent to 85 percent of the ordinary school budget.

The problem arose in the Sheboygan Vocational and Adult School when students asked for courses that could not be given because funds were not available to pay instructional costs. It was important that any changes or savings made be based on accurate cost information. To secure comparable cost data it was decided to study similar vocational schools in Wisconsin. It was found that schools located in Wisconsin cities with a population of 25,000 to 45,000 would serve the purpose. This limited the study to nine schools.

The investigation received its direction by an analysis of the following problem:

How can the range of Vocational Education in the day school be extended by the control of instructional expenditures?

1. What type of instruction is given in the schools of this study?
2. What factors are to be considered in the cost of instruction?
3. What are the actual instructional costs of the schools in this study?
4. What method can be used to equate instructional costs?
5. What are the equated costs for the different subjects for different schools?
6. To what extent do like subjects in different schools vary in the cost of instruction?
7. What method can be applied to instructional cost data in the different school subjects to develop an acceptable standard for comparison in each subject?
8. What are instructional cost standards for different subjects?
9. What are the differences between the standard instructional costs and the equated instructional costs of each subject in each school?
10. What are the results of applying these instructional cost findings to each school in the study?

Form Letter I was sent to the directors of the nine schools asking for official course offering lists. All subjects that did not appear three or more times were considered non-comparative. The three instructional cost factors are: salary of teacher, salary of supervisor, and cost of educational supplies as given by Engelhardt and Engelhardt (4:247-52).

Having found the comparable subjects, it was necessary to secure information regarding them from the

Wisconsin State Department of Vocational and Adult Education. This information included the salaries of supervisor and teacher, the number of hours each course was given per day, the number of days in the school year, and the number of students enrolled in each course.

These data were substituted in the following formula:

$$\frac{\text{Pro-rated Salary of Teacher and Supervisor}}{\text{Number of Pupils Enrolled in Class}} \times \frac{\text{Number of Class Hours Held per Year}}{\text{Number of Class Hours Held per Year}} = \text{Student Hour Cost}$$

This formula for equating instructional costs was used in the studies of Arundel (1), Clark (2), and Hull (14). It was found that general subjects had the lowest student hour cost (Table 3, Chapter IV) while homemaking was second (Table 4, Chapter IV) and the trade subjects were the most expensive (Table 6, Chapter IV).

The instructional cost of commercial subjects as given by the vocational schools is paid out of money coming from state aid. This money is given for the salaries of teachers regardless of subject classification. Because there is no federal money involved in these classes, there is no detailed accounting required of the local board by the State Department of Vocational and Adult Education. Such data as could be obtained are reported in Table 5. Since the amount of money for supplies is so small and general accounting practices are maintained by each school to the satisfaction of the

auditors, the educational supply costs were omitted from the pro-rated cost of instruction.

The crucial part of the investigation was the examination of the data to see if educational opportunities could be given to more students within the current classes, and if additional subjects could be offered, without increasing the total instruction costs. It was found in the analysis of Tables 3, 4, and 6 that specific factors effect the equated costs. These factors are: the length of school year, the number of hours in the school day, the number of students enrolled, and the salaries of teacher and supervisor.

The factor that had the greatest influence on equated costs was the number of people enrolled. Increasing the number of students in a class results in an immediate lowering of the student hour cost. It is shown in Table 6 that drafting given in school D cost \$.3553 per student hour. The average cost for drafting in the Wisconsin schools was \$.1337 per student hour. Makepeace (17) found that drafting given in the Los Angeles high schools cost \$.0560 per hour when the average enrollment was 23.17. It is fair to conclude that the average cost per hour of \$.1337 is very liberal, but that effective training can be given for less than the average of the nine vocational schools. Because of this, a larger number of students could be given effective

training while the instructional cost would remain the same .

The second factor considered was the length of the school day and its effect upon extending educational opportunities. It was found that the Wisconsin schools had an average school day of six and three-quarter hours while the longest day was eight hours and the shortest day was six hours. If the school day of those below the average were increased to the average length, it was found that 135 additional hours would be made available in a school year of 180 days. Makepeace (17:25) found that in the Los Angeles high schools the teachers had 7.69 assigned hours, including home room duty. If the vocational schools lengthened the day to the average they would be giving .94 hours less than is given in the Los Angeles schools. This additional time could be used in extending the present classes or it could be used for offering new courses.

The third factor that has a bearing on equated costs is the length of the school year. The schools of this study are required by law to hold school a minimum of 180 days. This practice is very general, since only two schools have periods of 185 days or more. The vocational schools have patterned themselves after the secondary schools by holding school five days per week. The school year could be increased by holding classes a part of the sixth day; but if the instructor has a full

schedule for the entire week, it could not be expected that his services could be secured without extra compensation. This plan is not feasible because of the established precedent of having a five-day school week and because the extra compensation for teachers would increase the total cost of instruction and absorb any savings that might be made elsewhere.

The last factor that affects equated instruction costs is the pro-rated salaries of teacher and supervisor; it was found that costs were too high when compared to the student hours taught. This condition could be remedied by increasing the enrollment, lengthening the school day or arranging schedules so that expensive classes be given alternate semesters or alternate years. The time that is freed by this plan could be utilized in offering additional courses. This would provide an extension of educational opportunities without increasing the cost of instruction.

It was found by interview that directors gave one-half or more of their time to supervision. The salaries of the directors are based on the size of the school, the extent of the responsibility involved; and the financial ability of the community. Pryor (28) found that principals should reorganize their work so that at least one-half their time could be devoted to supervisory work. Because of the effort of the directors

to meet the recommendation of Pryor (28) and because of the limiting factors in each local situation, it has been concluded that no saving could be made by reducing these salaries.

The nine trade and industry coordinators reported in this study are employed by the local vocational schools for the work outlined in Bulletin I, Vocational Education Series (31:59). Their work consists of contacting industries, meeting with private groups and service organizations for the purpose of securing information regarding the training requirements of industry and various training needs of the community. This information is used in rearranging or reorganizing the school programs so that they meet the community needs and industrial requirements. It was found that the average number of students per coordinator was 292, and that the average cost of coordination was \$6.02 per student per year. It was shown (Table 8, Chapter IV) that six of the nine coordinators would have free time by reorganizing their work on the basis of the average load per day. Because of the coordinator's relation to the school and the community, and because of the information he has available regarding technological changes and occupational trends, it has been suggested that the free time be utilized in extending the occupational adjustment program. Hinderman (13:203) recommends that

the maximum load of a counselor should be 100 students and that at least two 48-minute periods should be devoted to this work if it is to be effectively given. If the coordinator does not have time to handle the entire group, other staff members could be enlisted to assist in this important work under the supervision of the coordinator.

The answers to questions three to ten have revealed that all of the nine vocational schools could extend their services on present budgets if they adjusted their class enrollments, class schedules, their plan of teacher assignment, and their allocation of coordinator time with the standard presented in this study. There is an opportunity to give instruction to more students in present classes and to give additional course offerings or extend present services without increasing the total cost of instruction.

There is a lack of information regarding the following related subjects:

1. Effective accounting practices for educational supplies.
2. A comprehensive occupational adjustment program for small schools.
3. Maximum teacher and supervisor loads.

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Form 1

LETTER TO VOCATIONAL SCHOOL DIRECTORS

Dear Sir:

In writing a thesis for a Master of Science degree at Colorado State College, I have chosen an analysis of vocational school instructional costs. From this study will come recommendations pertaining to saving in costs of instruction and the extension of the vocational program by utilizing the money saved.

The necessary data are to be gathered from comparable Wisconsin cities. Comparisons will not be used when three or less schools are involved. Thus all information will be regarded as highly confidential and at no time will specific cases be divulged.

In order to select the schools to be included in this study, I would appreciate getting from you a complete copy of your vocational school program in 1937-38. The entire data will be tabulated and only those subjects that are offered in 80 percent of the schools will be used for comparative purposes.

At some later date, I would appreciate securing additional information and any suggestions that you may offer in working out this problem.

Sincerely yours,

Russell K. Britton

HULL'S METHOD OF EQUATING COST DATA

Hull's method of equating cost data is given in the following formula:

$$\frac{\text{(Average salary of teacher) } \times \text{ (number of class periods carried weekly by the average pupil)}}{\text{(Average class size) } \times \text{ (number of class periods carried weekly by the average teacher)}}$$

The simplest way to arrive at the per pupil cost is to divide the total cost of instruction by the total number of students. But in order to analyze the influence of any component parts of per pupil cost the four elements of the formula were used.

The steps for working out the formula for any given case and the example are as follows:

- a. Compute the average teacher's salary - \$1400
- b. Compute the average size class - 25
- c. Compute the average class periods per week for average teacher - 25
- d. Compute the average class period per week for average pupil - 22
- e. Substitute values in formula

$$\frac{1400 \times 22}{25 \times 25} = \$49.29 \text{ per pupil cost}$$

Thus the average per pupil cost of \$49.29 becomes a hypothetical norm that can be used in making comparisons with the actual cost per pupil.

Table 9.--AVERAGE ENROLLMENT, COST PER 1000 HOURS OF INSTRUCTION, AND CLASSROOM HOUR COST FOR SUBJECTS GIVEN IN 16 KANSAS HIGH SCHOOLS

From study of Byron M. Clark (2).

Subject	Average enrollment	Cost per 1000 hours of inst.	Classroom hour cost
Algebra II- -	11.1	\$146.00	\$.17
Woodwork II -	14.9	141.00	.19
Cooking I - -	15.1	121.00	.21
Cooking II -	13.8	118.00	.20
Typing I - -	16.4	109.00	.11
Shorthand - -	15.2	107.00	.15
Typing II - -	15.0	106.00	.06
Agriculture -	21.6	102.00	.15
Sewing II - -	12.0	99.00	.07
Sewing I - -	17.0	96.00	.11
Bookkeeping -	20.9	84.00	.18
Commercial arithmetic	21.5	75.00	.15
General science - -	29.3	70.00	.12
English - - -	25.3	69.00	.11
Algebra I - -	31.5	68.00	.11

Table 10.--INSTRUCTIONAL COST OF AVERAGE ENROLLMENT AND PER PUPIL COST OF VOCATIONAL CLASSES IN LOS ANGELES HIGH SCHOOLS

From study of Frank P. Makepeace (17).

Subject	Total cost	Average enrollment	Per pupil cost per period
Mechanical drawing -	\$55,533	22.9	\$ 7.37
Auto shop - - - - -	37,027	19.7	8.27
Printing - - - - -	33,929	16.2	11.19
Wood shop - - - - -	28,058	18.7	10.36
Electricity - - - - -	24,929	19.9	8.50
Agriculture - - - - -	23,055	20.8	8.83
Foundry - - - - -	12,052	18.7	10.16
Machine shop - - - - -	11,060	21.0	8.57
General shop - - - - -	8,254	18.9	8.64
Cabinet shop - - - - -	7,627	25.4	8.38
Sheet metal - - - - -	6,443	21.0	8.05
Aviation - - - - -	1,298	*00.00	9.34
Total - - - - -	249,265		

*Average not given.

Table 11.--THE RANGE IN INSTRUCTIONAL COST PER PUPIL PER PERIOD IN THE LOS ANGELES HIGH SCHOOLS

From study of Frank P. Makepeace (17).

Subject	Range
Agriculture - - - - -	\$5.21 to \$17.45
General shop - - - - -	6.96 to 21.22
Mechanical drawing - - - - -	4.44 to 13.51
Auto shop - - - - -	5.81 to 14.22
Cabinet shop - - - - -	5.98 to 15.06
Wood shop - - - - -	5.02 to 17.40
Foundry - - - - -	6.97 to 12.58
Printing - - - - -	6.18 to 23.50
Sheet metal - - - - -	6.56 to 10.27
Machine shop - - - - -	5.76 to 16.36
Electricity - - - - -	5.13 to 14.00

BIBLIOGRAPHY

1. Arundel, J.F. Vocational training costs: a study of the unit cost of vocational education in Cincinnati, Ohio. May 1932. Washington, U.S. Govt. print. off., 1932. 34 p. (U.S. Federal board for vocational education, Bulletin, No. 162; Trade and industrial series No. 47)
2. Clark, Byron M. Unit cost in Kansas high schools: a study of unit costs in 16 Kansas high schools. Master's thesis, 1935. Colorado state college of education. 87 p. ms.
3. Conboy, Cordelia E. A comparison of pupil costs in the high schools of Jennings county, Ind., for the school year 1930-31. Master's thesis, 1933. University of Cincinnati.
4. Cubberley, E.P. Public school administration. Boston, Houghton Mifflin company, 1929. 479 p.
5. Engelhardt, Nickolaus Louis, and Engelhardt, Fred. Public school business administration. New York, Teachers college, Columbia university, 1927. 1068 p.
6. Engelhardt, Fred. Public school organization and administration. Boston, Ginn and company, 1931. 595 p.
7. Fowlkes, John G. Handbook of financial accounting for schools. Eau Claire, Eau Claire book and stationery company, 1924.
8. Gans, R. Evaluation of the work of the new school education. Boston, Palmer company. May 1935.
9. Henry, D.R. A statistical comparison of the student-hour costs of instruction in 22 Chicago high schools. School review, 34:367, May 1926.
10. Henning, Paul H. Daily instructional cost per pupil in the high schools of Huntington county, Ind. Master's thesis, 1931. Indiana university. 100 p. ms.

- 11. Hinderman, Roy A. An experiment in secondary school guidance. Doctor's thesis, 1938. University of Wisconsin. 1,032 p. ms.
- 12. Hoessel, Sheldon W. Hourly costs of subjects taught in industrial arts departments of San Jose, Stockton, and Bakersfield for the year 1934-35. Master's thesis, 1936. Stanford university.
- 13. Huplits, Woodman E. Expense of instruction in first, second, third, and fourth class districts in the commonwealth of Pennsylvania of the fiscal year 1933-34. Master's thesis, 1937. Temple university. 3v.
- 14. Hull, J.D. Factors determining the per pupil cost of instruction in high schools. School review, 42:40-50, January 1934.
- 15. Land, John N. Distribution of costs in public schools of Hamburg, Pennsylvania. Master's thesis, 1935. University of Pennsylvania. 57 p. ms.
- 16. Land, S. Lewis. Trade associations, their services to education: a study of the function of the national trade association in the promotion of training in industry. Doctor's thesis, 1931. New York university. 141 p.
- 17. Makepeace, Frank G. Instructional costs in vocational subjects in the senior high schools in Los Angeles, California. Master's thesis, 1931. University of Southern California. 92 p. ms.
- 18. McKee, Walter F. Expenditures for textbooks and pupil supplies in Pine Level school. Master's thesis, 1936. University of Alabama. 79 p. ms.
- 19. Micheal, Roy A. Trade and industrial education in western Missouri. Master's thesis, 1932. Colorado state college of education. 74 p. ms.
- 20. Moehlman, Arthur B. Public school finance. Chicago, Rand McNally and company, 1927. 501 p.
- 21. Mort, Paul F. State support of public education. Washington, American council on education, 1933. 496 p.

22. National occupational conference. Occupational adjustment; Intrim report, 1938. New York, 104 p.
23. Norsted, Roy A. An analysis of educational costs in school districts of the iron ranges of Minnesota in 1925-30-35. Master's thesis, 1936. University of Minnesota. 90 p. ms.
24. Norton, Thomas L. Education for work. New York, McGraw-Hill book company, 1938. 263 p. (Report of the regent's inquiry into the character and cost of public education in the state of New York)
25. O'Dell, Clyde H. Unit costs and standardization of elementary school supplies. Doctor's thesis, 1933. Colorado state teachers' college. 450 p. ms.
26. Owens, Seth J. A study of the comparative costs of secondary education in Chantanqua county, Kansas. Master's thesis, 1932. University of Kansas. Annotation: U.S. Office of education. Bibliography of research studies in education, 1931-32, p. 155.
27. Parkes, George Henry. The comparative cost of vocational education in certain second class school districts in Pennsylvania. Doctor's thesis, 1939. Pennsylvania state college. 113 p. ms.
28. Pryor, Guy C. The principal as a supervisor in the high schools of Texas. Master's thesis, 1936. Southern Methodist university. Abstract: Southern Methodist university. Abstracts of theses, (1935-36), p. 17-18.
29. Richardson, H.D. Criteria for standardizing instructional supplies. American school board journal, 85:42,72,75-6, July 1932.
30. Swift, F.H. Studies in public school finance. Minneapolis, University of Minnesota, 1922. 198 p.
31. U.S. Office of education. Statement of policies for the administrators of vocational education. Revised February 1937. Washington, U.S. Govt. print. off., 1937. 137 p. (Vocational education bulletin, No. 1; general series No. 1)