

A STUDY OF THE EXPENDITURES
FOR SCIENCE, MATHEMATICS, AND MODERN FOREIGN LANGUAGES
UNDER TITLE III OF THE NATIONAL DEFENSE EDUCATION ACT
IN THE STATE OF KANSAS (1959-1962)

by

EDWARD GLENN HIGHTOWER

B. S., Oklahoma State University, 1962

A MASTER'S REPORT

submitted in partial fulfillment of the

requirements for the degree

MASTER OF SCIENCE

Department of Education

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1963

Approved by:

Burl Hunt

Major Professor

LD
266B
R4

Docu-
ments

ACKNOWLEDGEMENTS

The writer wishes to express his sincere appreciation to Dr. Burl Hunt, major professor, and to Dr. Charles Peccolo for their invaluable assistance in the preparation of this report.

TABLE OF CONTENTS

	PAGE
INTRODUCTION	1
Statement of the Problem	1
Importance of the Study	2
Definitions of Terms Used	2
REVIEW OF THE LITERATURE	6
Literature on Federal Aid	6
Limitations of Previous Studies	8
PROCEDURES USED	9
ANALYSIS OF RESULTS	15
School Participation	15
Expenditures by Schools with Enrollments Under 99	17
Expenditures by Schools with Enrollments 100-299	19
Expenditures by Schools with Enrollments 300-999	21
Expenditures by Schools with Enrollments 1,000-4,999	23
Comparison of Expenditures	25
SUMMARY AND CONCLUSIONS	29
Summary	29
Conclusions	32
BIBLIOGRAPHY	33
APPENDIX	36
A. General Review of Title III in Kansas	37
B. Standards for Equipment and Materials	41
C. Schools and Information Related to the Random Samples	45

LIST OF TABLES

TABLE	PAGE
I. Number and Per Cent of Schools in Each Class and the Number and Per Cent of Participating Schools in Each Class in the Kansas Title III Program	16
II. Amount and Per Cent of Expenditures by Categories by Schools with Enrollments Under 99 for 1959-1960, 1960-1961, 1961-1962	18
III. Amount and Per Cent of Expenditures by Categories by Schools with Enrollments 100-299 for 1959-1960, 1960-1961, 1961-1962	20
IV. Amount and Per Cent of Expenditures by Categories by Schools with Enrollments 300-999 for 1959-1960, 1960-1961, 1961-1962	22
V. Amount and Per Cent of Expenditures by Categories by Schools with Enrollments 1,000-4,999 for 1959-1960, 1960-1961, 1961-1962	24
VI. Average Project Expenditure Per School by Class for Kansas Title III Participants, 1959-1962	25
VII. Estimated Science Expenditure Per Pupil and Per School by the Kansas Title III Participants, 1960-1961	26
VIII. A Summary of Approved Title III Projects in Kansas, 1958-1962	40

INTRODUCTION

The National Defense Education Act was signed into Public Law 85-864 by the President of the United States on September 2, 1958. A subsection of Title III, one of the ten Titles of the National Defense Education Act, provided financial assistance for local projects in public elementary or secondary schools or junior colleges. This financial assistance was provided on a dollar-for-dollar matching basis for local effort to acquire equipment and materials for the areas of science, mathematics, and modern foreign languages. The Congress deemed these areas of study to be critical to the national security.

In Title III, the responsibility for planning programs of improvement and for selection of materials and equipment was placed upon the local unit. Title III placed upon the State Department of Public Instruction the responsibility for developing standards for instructional equipment and materials and for establishing procedures through which local school systems could benefit from the Act while observing its legal limitations.

Statement of the Problem

The purpose of this report was to present:

1. An analysis of the expenditures in eighteen designated categories by size of schools.
2. A comparison of these expenditures by categories and by size of school.
3. The amount of school participation and estimated per pupil expenditures for science by size of school.

Importance of the Study

Today, when high-quality education is being seriously linked with the national survival, it becomes increasingly important that the existing programs (Title III) be examined. If this is done, future decisions and judgments can be based upon actual knowledge. Decisions based on assumptions are not sufficient in the realm of educational planning. The Title III program has made it possible for secondary schools to acquire equipment and materials in science, mathematics, and modern foreign languages essential to facilitate student learning. The expenditures for equipment and materials actually acquired by the schools are of prime importance to school personnel and program (administrators, taxpayers, supervisors, students, and the curricula). An awareness of the expenditures under Title III by school personnel will enable them to better plan future acquisitions, to improve existing conditions, and to expend available monies more efficiently. It is the expenditures of these monies which to a great extent determine the program of instruction.

Definition of Terms Used

Title III. For the purposes of this report Title III refers to only one of the three authorized programs, and it is as follows:

Grants to state educational agencies for local projects in public elementary or secondary schools or junior colleges. Grants are for the acquisition of laboratory or other special equipment for science, mathematics, or modern language teaching, including audio-visual

and printed materials, and minor remodeling of laboratory or other space to be used for such equipment.¹

Equipment. Equipment eligible for purchase through projects means fixed or movable articles, not an integral part of a building, which are particularly appropriate for providing instruction in science, mathematics, or modern foreign languages, and which are to be used by teachers in teaching or by students in learning in such courses in an instructional situation in a classroom or laboratory in an elementary or secondary school. The term does not include ordinary storage facilities, furniture, or equipment which are appropriate for furnishing or equipping general classrooms. "Equipment" includes "materials," as that term is defined in the following paragraph, and audio-visual equipment such as motion picture and slide projectors and recording equipment to be used in instructional programs of science, mathematics, or modern foreign language. Equipment does not include non-specialized classroom furniture.

Materials. Materials means film, filmstrips, slides, tapes, discs, and recordings; books, pamphlets, and periodicals for reference use (other than textbooks as will be defined in the next paragraph), and other printed materials, such as maps and charts, which are particularly appropriate as media for instruction in the fields of science, mathematics, or modern foreign language, or one of the branches of one of them.

¹George L. Cleland, "A Progress Report of NDEA Title III Activities in Kansas 1958-1961," The Impact of Title III on Kansas Schools (September, 1962), p. 8.

As distinguished from supplies, materials are items which with reasonable care and use may be expected to last for more than one year. (For example, chemicals, biological specimens for dissection, live specimens, textbooks, and workbooks are not reimbursable.)

Textbook. "Textbook" means a book, workbook, or manual, a copy of which is expected to be available for the individual use of each pupil.

Mathematics. "Mathematics" means the study of shape, arrangement, and number through units of courses normally required of pupils in elementary grades, or for high school graduation, or for admission to post-high school institutions and through elective courses when taught by certified teachers of mathematics for those grades or subjects.

Modern Foreign Language. A language, other than English, which is in current use as a common medium of communication by some substantial segment of the world population is considered to be modern foreign language. (Latin is not a modern foreign language.)

Science. Science includes physical and biological science, but not the social sciences.

Project. Project, as applied to the acquisition of laboratory equipment (including, if necessary, minor remodeling), means a proposal submitted by a local educational agency, or agencies, or other public school authority, or authorities, below the state level.

Minor Remodeling. Remodeling is considered as "minor remodeling" if it is: (1) needed to make effective use of equipment acquired through an approved project of which the minor remodeling is a part; (2) performed within the space in which the equipment is to be used; and (3) performed in a previously completed building. The cost of building maintenance may not be included as minor remodeling.

Schools. The term as used in this study denotes public school districts which operate secondary schools. Excluded are state, Federal, and non-public secondary schools.

REVIEW OF THE LITERATURE

Literature on Federal Aid

The major concern of most articles dealing with federal aid to education has been the issue of the loss of local and state control. This concern may be somewhat justified by the following facts. Presently the range of the Federal Government's concern and the level of its participation in educational services are illustrated by approximately 600 educational activities in more than 156 programs.² Over fifty major administrative units in twenty-two Federal departments and agencies reported expenditures in programs which provided funds for educational activities of the states.³

To deal more specifically with the National Defense Education Act itself, some persons believe that money designated especially for the areas of mathematics, science, and modern foreign languages cannot help but provide Federal control over school curricula. This control would be a result of the increase in expenditures in the above-mentioned areas, while other areas of the curricula will not experience this increase. The Executive Committee of the American Association of School Administrators⁴ was opposed to the National Defense Education Act because it was

²United States Department on Health, Education, and Welfare, Federal Funds for Education (Washington: Government Printing Office, 1962), pp. 1-32.

³Ibid.

⁴A. H. Rice, "NDEA Is an Unwise Compromise," Nations Schools, LXVII (February, 1961), pp. 61-62.

cumbersome, expensive to administer, and had too much red tape. A similar reaction was reported by Campbell⁵ in a study of forty-five school districts in Illinois.

Without attempting to enumerate the arguments connected with the National Defense Education Act, and the question of Federal control of education, Sherwin Sherris states:

. . . The significant question should be, "Is Federal control inherently bad?" Those persons who answer this immediately as "yes" are assuming that the Federal government is a giant, impersonal machine which has no aim but to crush the individual and his hopes and dreams. It can be argued that the real concern for the individual is lost when the government is in control. But even though some liberties are lost, is it not possible that there is another aspect to the issue?⁶

It is this other aspect that must be considered. One phase of this aspect is the recognition of the attitude with which programs such as the National Defense Education Act are presented. From the very first, it has been the feeling on the part of the Office of Education that the NDEA has been administered in accordance with the principle, reaffirmed by the Congress, that states and local communities have and must retain control over and primary responsibility for public education.⁷

⁵R. F. Campbell and S. P. Hencley, "Accept NDEA Money, but with Doubts and Reservations," Nations Schools, LXVI (October, 1960), pp. 80-85.

⁶Sherwin S. Sherris, "The Semantics of Federal Aid and Federal Control," Phi Delta Kappa, XLIII (September, 1961), pp. 34-37.

⁷United States Department of Health, Education, and Welfare, Report on the National Defense Education Act, Fiscal Year Ending June 30, 1959 (Washington: Government Printing Office, 1960), p. 1.

Limitations of Previous Studies

The study by Dr. H. A. Smith⁸ established 110 mutually exclusive categories to which equipment and materials could be assigned. These categories were grouped into nineteen major divisions to facilitate analysis of expenditures. Approved projects of all schools were studied, and the individual items placed in the appropriate category. The percentages of the total expenditures were computed for each of the categories and major divisions. A limitation of the study by Smith was the fact that it covered only the first fiscal year of the program. The study in this report avoids this limitation by making an analysis of the expenditures for the three-year period, 1959-1962.

A second study of the impact of Title III was made by Procunior⁹ in Illinois. No attempt was made to categorize the expenditures for equipment and materials in this study. In addition, the programs in the states of Illinois and Kansas are not comparable at the state level of operation.

⁸Herbert A. Smith, "Purchases under Title III of the National Defense Education Act," Bulletin of Education (The University of Kansas Publications School of Education, Vol. XVI, May, 1962), pp. 123-130.

⁹Robert Procunior, "The Impact of Title III, NDEA, on Programs in the Public Schools of Illinois", (Ph. D. Dissertation, University of Indiana, 1962).

PROCEDURES USED

The schools in this study were selected from those Kansas secondary schools which had an approved Title III project on file in the State Department of Public Instruction for the three-year period. The schools were classified so that the enrollments would coincide with the system used by the State Department in their reports to the United States Office of Education.

The four classes of schools were as follows:

1. Enrollment of under 99.
2. Enrollment of 100-299.
3. Enrollment of 300-999.
4. Enrollment of 1,000-4,999.

Since there were only six schools with enrollments of more than 5,000, these schools were excluded from the study.

The schools in each class were listed alphabetically for each of the three years included in the study. Numbers were assigned to the schools in each of the respective lists. A table of random numbers¹⁰ was used to take a random sample for each class for the respective years. The sample sizes ranged from 10 to 30 per cent of the populations in each class. This variation was due to the large population of some of the classes and the time available to make a practical study. There were 1,026 projects on file with the State Department pertinent to this study.

¹⁰The Rand Corporation, A Million Random Digits, (The Free Press, Glencoe, Illinois, 1955).

The classification system used by Smith¹¹ was adapted for the purposes of this report. Equipment was classified according to the major function for which it was designed. This method was used as a guide in this report, due largely to the nature of the project application forms. Few schools indicated specifically in what course the equipment was to be used. In many instances, equipment can be used in several different subject areas. Examples would be beakers and other glassware, and metersticks, all of which can be used in any of the science courses, while metersticks are also used in mathematics.

The equipment and materials purchased under NDEA were divided into 18 divisions. These divisions and major types of items included in each are listed below. The divisions are numbered (10-27) for convenience.

10. Printed Materials - including books, periodicals, and other miscellaneous printed materials.

11. Furniture - including portable teacher demonstration desks, stationary teacher desks.

12. Minor Remodeling and Installation - including room-darkening provisions, installation of utilities, fume hood installation, installation of furniture or equipment, room wiring, and others.

13. Language and Audio-Visual Equipment and Materials - including charts and maps, models, microprojectors and accessories, overhead projectors and accessories, opaque projectors and accessories, slide or

¹¹Smith, op. cit.

filmstrip projectors and accessories, motion picture projectors and accessories, phonograph players, tape recorders, magnetic disc recorders, or playbacks, pre-recorded magnetic tape, blank magnetic tape (reel or cartridge), phonograph records or discs, bulk tape erasers, projection screens, black-out curtains, motion picture films, filmstrips, slides or transparencies, student preamplifiers and student consoles, amplifiers and accessories, microphones and accessories, headphones, jack boxes and jacks, loudspeakers, television receivers, language laboratory master consoles, control centers and accessories, communications systems and language laboratories, and others.

14. Measuring and Indicating Devices - including meters, gauges, and accessories, balances and accessories (including weights), thermometers, barometers, hygrometers, hydrometers, anemometers, devices for the volumetric measurement of liquids, metersticks or rulers, calipers, timing devices, photometers and accessories, and others, including dividers and protractors.

15. Kits - specialized kits and general kits.

16. Equipment and Materials Related to the Study of Mathematics - including chalkboard teacher demonstration materials or devices, counting materials or devices, student slide rules, and others.

17. Equipment and Materials Related to the Study of Mechanics and Motion - including simple machines and accessories, sample crane boom, and others.

18. Equipment and Materials Related to the Study of Fluids,

Gases, Buoyancy, Pressure, or Density - including pumps and accessories, density or specific gravity materials, and others.

19. Equipment and Materials Related to the Study of Heat - including heat source and accessories, steam generators and accessories, calorimeters and accessories, expansion apparatus, materials and accessories, and others.

20. Equipment and Materials Related to the Study of Light, Sound, and Wave Motion - including illuminators and light sources, lenses, magnifiers, prisms, mirrors, filters, binoculars, reflectors, telescopes, and accessories, cameras and photographic equipment and accessories, optical benches and accessories, photometers, spectrosopes, spectrometers, and accessories, tuning forks and accessories, color glass slides, and others.

21. Equipment and Materials Related to the Study of Electricity, Magnetism, or Electronics - including power supplies and storage batteries, motors, generators, and accessories, electrostatic materials and equipment, pith balls, oscilloscopes, rheostats, resistors, capacitors, coils or transformers, magnets, electromagnets, and accessories, and others.

22. Equipment and Materials Related to the Study of Radiation, or Atomic and Nuclear Science - including radiation counters, cloud chambers and accessories, and others.

23. Equipment and Materials Related to the Study of Astronomy (Not Including Telescopes) - including planetaria and others.

24. Equipment and Materials Related to the Study of Biology - including aquaria, vivaria, terraria, cages, etc., and accessories, zoological or botanical specimens and mounts, prepared microscope slides, dissecting instruments and accessories, microscope slides and materials or equipment for the preparation of microscope slides, microscopes, and others.

25. Equipment and Materials Related to the Study of Earth Science - including rock, mineral, ore or fossil collections, and others.

26. General Equipment and Materials - including polyethylene materials, porcelainware, glassware, and tubing, tongs, clamps, rods, rings, supports and stands, boxes, cabinets, cases, cans, trays, baskets or containers, test tube racks, laboratory wagons or carts, and others.

This system of categorizing purchased items required that each project application be thoroughly checked so that the individual expenditures for items would be placed in the appropriate category. The original project applications made by the schools in the random samples for Title III support were manually checked to determine what equipment had been acquired and what minor remodeling had been done. Then, each item expenditure was entered into the proper category.

Some degree of judgment was necessary in order to determine the function of a piece of equipment. Equipment catalogs facilitated this process.

After the project applications were checked, the expenditures in each category by class of schools were totaled for the respective years.

The percentage of the total sample expenditures was determined for each category. These percentages were then compared with the percentages in the other categories by classes and years, respectively.

Information concerning the individual school expenditures and variances are found in Appendix C.

ANALYSIS OF RESULTS

School Participation

Less than 53.7 per cent of the 540 secondary schools in Kansas have participated in the Title III program during any single year from 1959-1962. Table I illustrates the number and per cent of secondary schools by class, and the number and per cent of participating schools by class. The per cent of participation is based upon the number of schools in 1961-1962.

There are 237 schools in the class under 99. The maximum number of participating schools in this class in a given year was 98 in 1959-1960. This was 41.4 per cent of the schools in this class. In the class 100-299, approximately 54 per cent of the 202 schools have participated each year. About 76 per cent of the class 300-999 have participated each year, and 80-82.5 per cent of the class 1,000-4,999 have participated each year.

The number of schools in any class which participated in a given year remain relatively constant with one exception. This exception is found in the class under 99. It is noted that there has been a 7.7 per cent decrease in the number of schools participating since 1959. It is also pointed out that it is this class which includes 43.9 per cent of the secondary schools in Kansas.

TABLE I

NUMBER AND PER CENT OF SCHOOLS IN EACH CLASS
AND NUMBER AND PER CENT OF PARTICIPATING SCHOOLS IN EACH CLASS
IN THE KANSAS TITLE III PROGRAM

Class	Total number of schools			Number of participating schools			Per cent of total number			Per cent of participants by class			
	61-62	59-60	60-61	61-62	59-60	60-61	61-62	59-60	60-61	61-62	59-60	60-61	61-62
Under 99	237	98	84	80	43.9	41.4	35.4	33.7					
100-299	179	95	102	95	33.2	53.1	57.0	53.1					
300-999	84	64	60	68	15.5	76.2	75.0	80.9					
1,000-4,999	40	33	32	33	7.4	82.5	80.0	82.5					
Totals	540	290	278	276	100.0	53.7	51.5	51.1					

NOTE: This table is based upon the number of schools in Kansas in 1961-1962.

Expenditures of Schools with Enrollments Under 99

Table II shows the amount and per cent expended for equipment and materials by schools with enrollments under 99. The five categories accounting for the largest percentage of the total expenditures were:

1. Furniture.
2. Minor Remodeling and Installation.
3. Audio-visual and Language Equipment and Materials.
4. Equipment Related to the Study of Biology.
5. General Equipment and Materials.

These categories accounted for 83.5 per cent, 91.4 per cent, and 90.8 per cent of the total expenditures for 1959-1960, 1960-1961, and 1961-1962, respectively. For the three-year period, these five categories accounted for 89.6 per cent of the expenditures by the schools in this class.

The major expenditures occurred in the category for furniture, with an average of 34.2 per cent. The next category in order of total spent was that for minor remodeling (23.9 per cent). The audio-visual aids category (13.6 per cent) was the third of the five categories. Many of the schools in this class had projects consisting of a single item; for instance, a movie projector or model of the human body. (The individual cost of such items is high, usually in excess of \$350.) Biology equipment was one of the major areas (10.1 per cent) in amount spent, mainly because of the cost of microscopes. General equipment accounted

TABLE III

AMOUNT AND PER CENT OF EXPENDITURES BY CATEGORIES BY SCHOOLS WITH ENROLLMENTS UNDER 99
FOR 1959-1960, 1960-1961, 1961-1962

Category	Classification of equipment	1959-1960		1960-1961		1961-1962		3-year average Per cent
		Amount \$	Per cent n = 21	Amount \$	Per cent n = 20	Amount \$	Per cent n = 15	
10	Printed Materials	119	0.7	596	2.4	577	1.4	1.6
11	Furniture	4,541	27.8	10,436	42.8	13,025	31.5	34.2
12	Minor Remodeling and Installation	1,845	11.3	3,488	14.3	14,289	34.6	23.9
13	Audio-Visual and Language Equipment and Materials	3,073	18.8	4,062	16.6	4,053	9.8	13.6
14	Measuring and Indicating Devices	863	5.3	473	1.9	966	2.3	2.8
15	Kits	14	0.08	26	.1	181	0.4	0.3
16	Related to Mathematics	56	0.3	232	1.0	73	0.2	0.4
17	Mechanics and Motion	172	1.0	365	1.5	338	0.8	1.1
18	Related to Study of Fluids, Gases, Pressure, and Density	135	0.8	160	0.7	94	0.2	0.5
19	Related to Study of Heat	235	1.4	35	0.1	79	0.2	0.4
20	Related to Study of Light, Sound, and Wave Motion	260	1.6	35	0.1	375	1.0	0.8
21	Electronics, Electricity, Magnetism	728	4.5	133	0.5	1,014	2.4	2.3
22	Radiation, Atomic or Nuclear Sciences	32	0.2	7	—	40	0.1	0.1
23	Study of Astronomy	31	0.2	—	—	—	—	—
24	Study of Biology	1,902	11.7	2,450	10.0	3,910	9.5	10.1
25	Earth Science	—	—	10	—	9	—	—
26	General Equipment and Materials	2,265	13.9	1,876	7.7	2,226	5.4	7.8
27	Unclassifiable	28	0.2	22	0.1	35	0.1	0.1
Sample totals		\$16,299	99.8	\$24,406	99.8	\$41,284	99.9	100.0

for an average of 7.3 per cent of the project expenditures.

Additional information concerning the schools and expenditures can be found in Appendix C.

Expenditures by Schools of Enrollment 100-299

Table III illustrates the expenditures and percentages in each category for the schools in this class. Over the three-year period the categories representing audio-visual aids (24.8 per cent) and furniture (43.3 per cent) accounted for the largest percentages (68.1 per cent) of expenditures. The audio-visual category was large, due mainly to the establishing of language labs in many schools of this class. Biology was the third of the major areas of expenditures with an average of 11.7 per cent. Minor remodeling accounted for only 4.1 per cent of the expenditures in this class, and the general equipment category dropped to 3.6 per cent of the expenditures.

Electronics equipment had an increase in expenditures. This category averaged 3.4 per cent of the total expenditures. The category for books in this class averaged just over 2.5 per cent of the total expenditures. Measuring devices accounted for only 1.3 per cent of the total expenditures, yet this category included a majority of the items purchased through many of the projects. Generally speaking, the items in that category are among the least inexpensive.

Additional information concerning the schools in this sample can be found in Appendix C.

TABLE III

AMOUNT AND PER CENT OF EXPENDITURES BY CATEGORIES BY SCHOOLS WITH ENROLLMENTS 100-299
FOR 1959-1960, 1960-1961, 1961-1962

Category	Classification of equipment	1959-1960		1960-1961		1961-1962		5-year average
		Amount	Per cent	Amount	Per cent	Amount	Per cent	
10	Printed Materials	\$ 951	6.1	\$ 432	1.5	\$ 221	3.0	3.1
11	Furniture	2,788	17.9	19,298	68.8	24	0.3	43.3
12	Minor Remodeling and Installation	551	3.5	1,061	3.8	500	6.8	4.1
13	Audio-Visual and Language Equipment and Materials	6,044	38.9	2,441	8.6	4,188	57.5	24.8
14	Measuring and Indicating Devices	164	1.0	388	1.4	108	1.5	1.3
15	Kits	738	4.8	25	0.1	15	0.2	1.5
16	Related to Mathematics	83	0.5	225	0.8	---	---	0.6
17	Mechanics and Motion	48	0.3	78	0.3	---	---	0.2
18	Related to Study of Fluids, Gases, Pressure, and Density	57	0.4	202	0.7	161	2.2	0.8
19	Related to Study of Heat	---	---	---	---	---	---	---
20	Related to Study of Light, Sound, and Wave Motion	135	0.9	342	1.2	112	1.5	1.2
21	Electronics, Electricity, Magnetism	820	5.3	418	1.5	424	5.8	3.3
22	Radiation, Atomic or Nuclear Sciences	10	---	4	---	---	---	---
23	Study of Astronomy	120	0.8	---	---	---	---	0.2
24	Study of Biology	2,772	17.3	1,806	6.4	1,420	19.5	11.7
25	Earth Science	5	---	10	---	---	---	---
26	General Equipment and Materials	234	0.2	1,500	5.3	111	1.5	3.6
27	Unclassifiable	10	---	36	0.1	---	---	0.1
Sample totals		\$15,530	98.4	\$28,266	100.5	\$ 7,284	99.8	99.8

Expenditures by Schools of Enrollment 300-999

Table IV illustrates the expenditures in each of the categories for this class. It is seen that five categories again accounted for more than eighty per cent of the expenditures. These five categories were those for furniture, general equipment, minor remodeling, audio-visual equipment and materials, and biology. Furniture accounted for an average of 43.4 per cent of all expenditures. Lab tables and teacher demonstration desks are so expensive that it does not take a great number of such acquisitions to create a large per cent. Biology expenditures continued to increase in percentage of total cost, accounting for an average of 13.6 per cent each year. This class had more books included in projects than did any of the other classes involved in the study. Books averaged 2.4 per cent of total expenditures. General equipment and glassware were not as great a per cent (2.9 per cent) of the expenditures as in previous classes. Electronics equipment had an average expenditure exceeding 3.0 per cent of the total. Audio-visual equipment accounted for an average of 13.7 per cent of the total expenditures. The expenditures for mathematics equipment increased to an average of 1.4 per cent.

The samples taken in this class for the years 1959-1960 and 1961-1962 yielded a sample average expenditure which differed greatly from that of the population average expenditure. These results will be found in the Appendix C.

TABLE IV

AMOUNT AND PER CENT OF EXPENDITURES BY CATEGORIES BY SCHOOLS WITH ENROLLMENTS 300-999
FOR 1959-1960, 1960-1961, 1961-1962

Category	Classification of equipment	1959-1960		1960-1961		1961-1962		3-year average
		Amount	Per cent	Amount	Per cent	Amount	Per cent	
10	Printed Materials	\$ 589	4.2	\$ 903	1.2	\$ 1,210	6.5	2.4
11	Furniture	3,117	22.4	39,082	50.4	5,619	30.2	43.4
12	Minor Remodeling and Installation	226	1.6	14,901	19.2	1,126	6.0	13.7
13	Audio-Visual and Language Equipment and Materials	4,256	30.6	5,887	7.6	4,964	26.6	13.7
14	Measuring and Indicating Devices	142	1.0	445	0.6	510	2.7	1.0
15	Kits	78	0.6	248	0.3	31	0.2	0.3
16	Related to Mathematics	590	4.2	127	0.1	826	4.4	1.4
17	Mechanics and Motion	---	---	180	0.2	22	0.1	0.2
18	Related to Study of Fluids, Gases, Pressure, and Density	31	0.2	215	0.3	216	1.2	0.4
19	Related to Study of Heat	80	0.6	51	0.1	70	0.4	0.2
20	Related to Study of Light, Sound, and Wave Motion	133	1.0	180	0.2	432	2.3	0.7
21	Electronics, Electricity, Magnetism	664	4.8	2,845	3.7	261	1.4	3.4
22	Radiation, Atomic or Nuclear Sciences	50	0.4	252	0.3	33	0.2	0.3
23	Study of Astronomy	---	---	96	0.1	205	1.1	0.3
24	Study of Biology	2,875	20.7	9,773	12.6	2,305	12.4	13.6
25	Earth Science	---	---	---	---	10	---	---
26	General Equipment and Materials	167	1.2	2,297	2.9	772	4.1	2.9
27	Unclassifiable	895	6.4	30	---	13	0.1	0.9
Sample totals		\$13,893	99.0	\$77,520	99.8	\$18,625	99.5	100.1

Expenditures by Schools of Enrollment 1,000-4,999

The expenditures in this class were more evenly distributed among the categories other than furniture, biology, audio-visual equipment, and general equipment than in the previous classes. Table V illustrates the expenditures and percentage of the total expenditure in each of the categories. Furniture and audio-visual equipment are the two areas in which major expenditures occurred. These two categories averaged 33.4 and 43.4 per cent, respectively, of the total expenditures (audio-visual aids was greatly increased by the expenditures for language laboratories and other related facilities). Correspondingly, student desks required in the language labs increased the per cent spent for furniture.

In terms of dollars spent, this class had the highest expenditures among the four classes for the biology category. However, the biology category was not highest in terms of percentage with an average of 7.7 per cent for the three-year period. The expenditures for books increased each year but averaged only 1.7 per cent.

It must be pointed out that one school, in the sample for 1959-1960, spent \$130,000 for language labs and equipment. Of this amount, \$32,000 was spent in the category for furniture (16 per cent) and \$88,000 was spent in the category for audio-visual equipment (48 per cent). This same school made over 20.0 per cent of the total approved project expenditures in 1959-1960.

TABLE V

AMOUNT AND PER CENT OF EXPENDITURES BY CATEGORIES BY SCHOOLS WITH ENROLLMENTS 1,000-4,999
FOR 1959-1960, 1960-1961, 1961-1962

Category	Classification of equipment	1959-1960		1960-1961		1961-1962		3-year average Per cent
		Amount	Per cent n = 10	Amount	Per cent n = 10	Amount	Per cent n = 10	
10	Printed Materials	\$ 2,263	1.2	\$ 1,108	2.4	\$ 2,428	2.6	1.7
11	Furniture	67,112	35.0	3,624	7.8	40,536	42.8	33.4
12	Minor Remodeling and Installation	5,100	2.6	5,147	11.1	689	0.7	3.3
13	Audio-Visual and Language Equipment and Materials	102,791	53.5	12,513	27.0	29,264	30.9	43.4
14	Measuring and Indicating Devices	1,802	0.9	1,582	3.4	1,682	1.8	1.5
15	Kits	213	0.1	586	1.3	1,331	1.4	0.6
16	Related to Mathematics	118	0.1	932	2.0	1,351	1.4	0.7
17	Mechanics and Motion	347	0.2	544	1.2	377	0.4	0.4
18	Related to Study of Fluids, Gases, Pressure, and Density	416	0.2	315	0.7	402	0.4	0.3
19	Related to Study of Heat	394	0.2	158	0.3	52	—	0.6
20	Related to Study of Light, Sound, and Wave Motion	791	0.4	2,426	5.2	497	0.5	1.1
21	Electronics, Electricity, Magnetism	3,256	1.7	2,437	5.2	1,159	1.2	2.0
22	Radiation, Atomic or Nuclear Sciences	344	0.2	36	0.1	88	0.1	0.1
23	Study of Astronomy	271	0.1	—	—	193	0.2	0.1
24	Study of Biology	4,734	2.5	11,444	24.6	9,441	10.0	7.7
25	Earth Science	205	0.1	9	—	4	—	0.1
26	General Equipment and Materials	1,627	0.8	3,511	7.6	4,985	5.3	3.0
27	Unclassifiable	221	0.1	39	0.1	183	0.2	0.1
Sample totals		\$192,005	99.9	\$46,411	100.0	\$94,662	100.3	100.1

The sample variance is extremely high as a result of such a project, and the range of project costs is over \$122,000, \$16,700, and \$42,000 for the years 1959-1960, 1960-1961, 1961-1962, respectively. Additional information concerning the sample schools in this class can be found in Appendix C.

Comparison of Expenditures

The fact that as school enrollment increases the average project size increases, is illustrated in Table VI. It should be noted that, with one exception, the average school expenditure has increased each year of the program. This exception occurred in the class 300-999. Each of the other three classes more than doubled their average project expenditure over the three-year period.

TABLE VI

AVERAGE PROJECT EXPENDITURE PER SCHOOL BY CLASS
FOR KANSAS TITLE III PARTICIPANTS 1959-1962

Class	Under 99	100-299	300-999	1,000-4,999
1959-1960	\$ 600.00	\$ 878.00	\$ —	\$ 7,549.00
1960-1961	1,431.00	2,240.00	4,890.00	10,200.00
1961-1962	1,374.00	2,580.00	3,250.00	15,890.00

Table VII illustrates the estimated expenditures per pupil enrolled in science courses by class of school for the year 1960-1961. The average expenditure per school in the class of under 99 is about one-eighth (1/8) of the average expenditure per school in the class

TABLE VII

ESTIMATED SCIENCE EXPENDITURE
PER PUPIL AND PER SCHOOL
BY THE KANSAS TITLE III PARTICIPANTS, 1960-1961

Class	Estimated enrollment in participating schools*	Estimated expenditure per pupil	Estimated expenditure per school
Under 99	2,704	\$ 44.20	\$ 1,422.00
100-299	8,670	20.30	1,750.00
300-999	16,180	13.00	3,510.00
1,000-4,999	15,710	19.00	9,344.00

NOTE: Amounts in dollars include only those amounts spent directly for science projects.

*Estimated enrollment is dependent on the assumption that the number of students enrolled in science is homogeneously distributed among the schools in the respective classes.

1,000-4,999. The class 100-299 experienced some increase in the total amount spent each year by the schools and the average expenditures per school also increased. The total cost of acquisitions made by schools in this class in 1960-1961 was \$228,440. This was twice the amount spent that same year by the schools in the class under 99. However, as seen in Table VII, the expenditure per pupil was less than one-half the amount spent by the smaller class schools per pupil. The decrease in expenditure per pupil should be noted, especially in view of the seeming tendency in this class to make acquisitions in such a manner as to completely equip a science room or laboratory classroom.

The schools in class 1,000-4,999 have an estimated expenditure per pupil which is one-third greater than the per pupil expenditure in the class 300-999. These two classes have nearly equal numbers of students enrolled in science, and account for nearly two-thirds of all the students enrolled in science in the four classes of schools.

With one exception, the total expenditures for science each year in each of the classes were greater than the totals for mathematics and modern foreign languages. The exception was in 1959-1960 for the class 1,000-4,999 when expenditures for mathematics and modern foreign languages were greater than those for science. There was a greater percentage (1.4 per cent) of money spent for equipment related to mathematics by the class 300-999 over the three-year period than by the other classes.

In comparing Table II, Table III, Table IV, and Table V, it was noted that the smaller schools spent a larger percentage of money in the categories for minor remodeling and furniture than did the larger schools. The class ninety-nine and under and class 1,000-4,999 had the largest percentage increase in average school expenditure per year, approximately 250 and 310 per cent increase, respectively.

The wide range of school expenditures must be kept in mind in every instance when considering the average figures for school expenditures. In every class each year, at least one school submitted a project which was far above the other individual project amounts submitted.

SUMMARY AND CONCLUSIONS

Summary

The purpose of this report was to study the expenditures made by the secondary schools of Kansas for acquisitions under Title III of the National Defense Education Act of 1958. The study was to provide information concerning:

1. The amount of school participation in the Title III program by class.
2. An analysis of the expenditures in each of eighteen categories by class of schools, and a comparison of school expenditures by class.
3. An estimated expenditure per pupil enrolled in science by class of schools for the year 1960-1961.

The secondary schools were separated into four classes based on enrollment. These classes were:

1. Schools of enrollment under 99.
2. Schools of enrollment 100-299.
3. Schools of enrollment 300-999.
4. Schools of enrollment 1,000-4,999.

A random sample was taken from each class for each of the three years. The entire sample, 146 schools, was 17 per cent of the population. Approved Title III project applications for the schools included in the samples were individually checked and the required data recorded. (Applications are on file at the State Department of Public Instruction.) The data was tabulated so that the expenditures in each class were

analyzed by class of school. The per cent of participating schools was used to estimate the expenditures per pupil enrolled in science by class of school.

The percentage participation (51-54 per cent) of the secondary schools in the Kansas Title III Program is small, although as school enrollment increases, the per cent of participation of those schools increases from less than 35 per cent for the class under 99 to more than 80 per cent for the class 1,000-4,999 in 1961-1962. The number of schools participating in the Title III program has decreased for class under 99 and remained relatively constant for the other three classes.

There are five areas in which the major part of the money is being spent. These are Furniture, Language and Audio-Visual Equipment and Materials, Equipment Related to the Study of Biology, General Equipment, and Minor Remodeling. The smaller schools (first two classes) spent a greater share for Minor Remodeling than the larger schools. Exact statements of percentages or totals for individual categories for all schools are not implied in the comparisons since Table II, Table III, Table IV, and Table V are based on random samples rather than the entire population of schools.

The expenditures for schools of enrollment under 99 averaged 34.2 per cent for Furniture, 23.9 per cent for Minor Remodeling, 13.6 per cent for Language and Audio-Visual Equipment, 10 per cent for Biology, and 7.8 per cent for General Equipment. The remaining 10.4 per cent of the expenditures occurred among the other 12 categories listed in the

Table II.

The expenditures for schools of enrollment 100-299 averaged 43.3 per cent for Furniture, 4 per cent for Minor Remodeling, 24.8 per cent for Language and Audio-Visual Equipment, 11.7 per cent for Biology, 5.5 per cent for General Equipment, and just over 3 per cent for both Printed Materials and Equipment Related to Electricity. The remaining 6.1 per cent was distributed among the other 11 categories.

The expenditures for schools of enrollment 300-999 averaged 43.4 per cent for Furniture, 13.7 per cent for Minor Remodeling, 15.7 per cent for Language and Audio-Visual Equipment, 13.6 per cent for Biology, 2.9 per cent for General Equipment, 2.4 per cent for Printed Materials, and 3.4 per cent for Equipment Related to Electricity. The remaining 6.9 per cent was distributed among the other 11 categories.

The expenditures for schools of enrollment 1,000-4,999 averaged 33.4 per cent for Furniture, 7.3 per cent for Minor Remodeling, 45.4 per cent for Language and Audio-Visual Equipment, 7.7 per cent for Biology, 3.0 per cent for General Equipment. The remaining 9.2 per cent was evenly distributed among the other ten categories.

Average school expenditures for projects increased each year of the program, with only one exception in the class 300-999. There was also an increase in project expenditure corresponding to increase in school enrollment. The average school expenditure for the class under 99 is only one-eighth ($1/8$) of the average expenditure in the class 1,000-4,999. However, in terms of per pupil expenditures for science, the

smaller expenditure represents an effort per pupil more than double the effort made by the larger class.

Conclusions

On the basis of the results of this report, it was concluded that:

1. There was a greater percentage of participation in the Title III program by the schools with enrollments of more than 300 students than by those schools having fewer than 300 students.

2. The categories related to furniture, minor remodeling, biology, general equipment, and audio-visual equipment accounted for approximately 90 per cent of the Title III expenditures.

3. The schools of enrollment under 300 students must develop avenues in addition to monetary expenditures for the purpose of improving their facilities and equipment.

BIBLIOGRAPHY

BIBLIOGRAPHY

- Breukelman, John and Ralph P. Frazier. "Offerings and Enrollments in the Secondary School Sciences in Kansas in 1960-1961," The Emporia State Research Studies. Kansas State Teachers College, Emporia, Kansas. (September, 1961), Vol. X, No. 1.
- Campbell, R. F. and S. P. Henckley. "Accept NDEA Money, But With Doubts and Reservations," Nations Schools. (October, 1960), Vol. LXVI, pp. 80-83.
- Cleland, George L. "Personal Interview," Director of Instructional Services.
- _____, "A Progress Report of NDEA Title III Activities in Kansas 1958-1961," The Impact of Title III on Kansas Schools. Kansas State Department of Public Instructional Services; September, 1962.
- _____, "Standards for Title III of National Defense Education Act," A Listing of Equipment, Materials and Minor Remodeling. Kansas State Department of Public Instructional Services; September, 1962.
- Council of Chief State School Officers. Standards for Materials and Equipment for the Improvement of Instruction in Science, Mathematics and Modern Foreign Languages. Conference Report, Washington, D. C., 1958, pp. 1-40.
- Derthick, Lawrence G. "Status Report on the National Defense Education Act at Midpoint: June 1960," Washington: U. S. Government Printing Office, June, 1960. Vol. 57528, pp. 1-22.
- Information Bulletin. "National Defense Education Act of 1958, Title III," Information for Local Schools. Unpublished Bulletin. (Mimeograph)
- Information Bulletin. "National Defense Education Act of 1958, Title III," Kansas State Department of Public Instructional Services, December, 1959, Topeka, Kansas.
- Kansas State Department of Public Instruction. "The Conference Study Report Summaries," Information About Kansas Schools. Topeka, Kansas. State Printer - 1956, pp. 1-33.
- National Science Teachers Association. "Action for Science under NDEA," Report of an Association Conference on the National Defense Education Act of 1958. 1201 16th Street, Washington 6, D. C., National Science Teachers Association, pp. 1-22.

- Procunior, Robert W. "The Impact of Title III, NDEA, on Programs in the Public Schools of Illinois." Published Doctoral dissertation, The University of Indiana, Bloomington, Indiana, 1962.
- Rand Corporation, The. A Million Random Limits. The Free Press Publishers, Glencoe, Illinois, 1955.
- "Report of Advisory Committee on Science Instruction in High Schools, October 25-26, 1962," California Schools, (December, 1962), Vol. XXXIII, No. 12, pp. 429-435.
- Rice, A. H. "NDEA Is an Unwise Compromise," Nations Schools, (February 1961), Vol. 67, pp. 61-62.
- Shermis, Sherwin S. "The Semantics of Federal Aid and Federal Control," Phi Delta Kappa, Vol. XLIII, (September, 1961), pp. 34-37.
- Smith, Herbert A. "Purchases Under Title III of the National Defense Education Act," Bulletin of Education, Lawrence, Kansas. The University of Kansas Publications, School of Education, May, 1962, Vol. XVI, pp. 123-130.
- State Department of Public Instruction, "Financial Directory of Kansas Public Schools," Statistical Services Station, Topeka, Kansas, December, 1962, pp. 1-61.
- United States Department of Health, Education and Welfare. Federal Funds for Education. Washington: Government Printing Office, 1962, Serial No. 633302 - 62, pp. 1-82.
- United States Department of Health, Education and Welfare. Financial Assistance for Strengthening Science, Mathematics, Language Instruction and Modern Foreign Language, Regulations: Sections 301-304 of Title III NDEA 1958, Vol. OE-22004, pp. 1-3, Washington: Government Printing Office, 1959.
- United States Department of Health, Education and Welfare. Report on the National Defense Education Act, Fiscal Year Ending June 30, 1959. Washington: Government Printing Office, 1960. Vol. OE-10004, pp. 1-18.

APPENDIX A

APPENDIX A

General Review of Title III Program

Throughout the nation many high schools which were inadequately provided with laboratory equipment were able to include general science, biology, physics, chemistry, advanced mathematics and modern foreign languages in their curricula. Science and modern foreign languages have received the greatest impetus from the acquisition of equipment. This is also true in Kansas, where more than 4.5 million dollars have been spent on science and modern foreign language projects since February, 1959.¹ Only 175 thousand dollars has been spent on mathematics.

Data coming into the United States Office of Education indicate that Title III has stimulated state and local schools to scrutinize their science, mathematics and language courses as they prepare and submit local projects.² This, of course, results in better course content and the removal of outdated equipment for the students.

In order to make funds available to the schools of the state, the NDEA requires that the State agency, which in Kansas is the State

¹George L. Cleland, "A Progress Report of NDEA Title III Activities in Kansas, 1958-1961," The Impact of Title III on Kansas Schools. Kansas State Department of Public Instructional Services, p. 9.

²Lawrence G. Derthick, "Status Report on the National Defense Education Act at Midpoint: June, 1960," (Washington: Government Printing Office, 1960), p. 4.

Department of Public Instruction, shall have charge of approving local projects and distributing funds. The state plan provides for an administrative and consultative organization within the Division of Instructional Services. The officer in charge of the program is George L. Cleland, Director of Instructional Services. The following personnel have been provided by the state plan as special consultants: One for science and mathematics, one for modern foreign languages, and one for the audio-visual aids. The Director of Curriculum and the Director of Instructional Services will each spend one-half time on the Title III program.

A local school system, after deciding on the plan for a local project, must request the project forms from the state department, fill them out in duplicate, and submit them for approval. If the project is approved, as 2,479 of some 2,600 projects have been, the local system may then make the proposed purchases. After payment is completed on the approved items, the local agency requests reimbursement forms and is reimbursed fifty per cent of the cost of the completed approved payments.

The State Department has made every effort to keep project application procedures simple and a minimum of trouble to the local administrator.³

For the three fiscal years since 1958-1959 there have been 1026 project applications by secondary schools in Kansas. These projects

³George L. Cleland, "Personal Interview".

are submitted in one of the three areas, science, mathematics, or modern foreign languages. In these projects, the schools may request approval for the acquisition of equipment and/or approval of minor remodeling. Both of these terms were defined earlier.

When all Kansas schools are considered, the relation of the distribution of projects in the three areas is as illustrated in Table VIII. It is easily seen that greatest emphasis has been in the area of the sciences. This is true in both the number of projects approved and in the total expenditures for science. Mathematics has a few more projects than does modern foreign languages, but total expenditures for mathematics is less than one-fourth of the total expenditures for modern foreign languages. This is largely due, of course, to the type and cost of equipment being purchased in the respective areas.

All Title III project applications must have an itemized listing of equipment with the quantity, description, and cost of each item given. The applications are examined and approved or disapproved, with the help of the program consultants, by Dr. G. L. Cleland, the head of the Title III program. This office has attempted to be as liberal as possible in allowing the schools to purchase the equipment that the local school itself deems necessary. It should be pointed, though, that the department urges all schools to plan projects with some serious concern for the standards for equipment, materials, and minor remodeling. These suggested standards for quality and quantity are found in Appendix B.

TABLE VIII

A SUMMARY OF APPROVED TITLE III PROJECTS IN KANSAS, 1958-1962

	1958-1959		1959-1961		1960-1961		1961-1962		Total	
	Number	Amount*	Number	Amount*	Number	Amount*	Number	Amount*	Number	Amount*
Science	248	\$599,704	497	\$637,918	497	\$1,293,350	495	\$1,088,652	1,773	\$5,619,624
(Per cent)	(84.4)	(90.6)	(75.1)	(67.4)	(67.4)	(81.6)	(67.1)	(72.7)	(71.5)	(77.2)
Mathematics	29	23,062	84	17,520	129	69,000	115	65,488	357	175,070
(Per cent)	(9.8)	(3.5)	(11.8)	(1.9)	(17.5)	(4.3)	(15.6)	(4.4)	(14.4)	(3.7)
Modern Foreign Language	17	39,427	93	290,245	111	223,285	128	343,008	349	895,965
(Per cent)	(5.8)	(5.9)	(13.1)	(30.7)	(15.1)	(14.1)	(17.3)	(22.9)	(14.1)	(19.1)
Totals	294	662,193	710	945,683	737	1,585,635	738	1,497,148	2,479	4,690,659
(Per cent)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)

*The amounts shown are for elementary and secondary schools. It should be remembered that Title III provides only one-half of an approved project's total cost.

APPENDIX B

APPENDIX B

Standards for Equipment and Materials

For classroom-laboratory installations, the quantity of equipment should be in keeping with the maximum class enrollment expected in the immediate future. Using the facilities to the maximum will be a factor in determining the quantity of equipment necessary, and getting the money's worth out of equipment acquired.

For portable equipment to be shared among various classes, the quantity depends on the amount of the present equipment, the nearness to each other of the various classrooms of science, mathematics, and modern foreign language, the size of the building, and number of floors. Sufficient equipment should be provided so that entire classes can be kept busy without transportation and other delays and disciplinary difficulties. Sufficient equipment should be provided so that it is accessible to every teacher without delay, and available daily if necessary. Sufficient equipment should be available to pupils so that they may have enough to use for individual and long-range projects.

Equipment may be of standard precision manufacture, or quality used equipment, but the local school assumes the responsibility for making the choice. The equipment should be durable as related to cost and projected useful life. Quality of performance is conditioned by quality of servicing and maintenance, hence provision should be made for expert servicing of equipment acquired under this plan. The

purchase agreement should include at least a year's guarantee, with provision for prompt servicing and/or substitute equipment for the years beyond the guarantee. At least annual inspection and servicing should be the minimum provided. The equipment should be operable at all times.

Sufficient materials should be available to get the money's worth out of equipment acquired. Sufficient materials should be provided so that students may work on projects of individual and long-range nature. Sufficient materials should also be provided so that entire classes may be kept busy without delays and disciplinary difficulties. Improved methods of instruction will govern the amount of materials needed in any local situation.

Materials should have a high degree of usability and/or readability. They should be of good technical quality as related to cost. They should be of good authenticity and authorship. They should be of most recent edition and copyright date. Cut-rate and "free" materials should be evaluated carefully as to quality.

The basic consideration of the National Defense Education Act is for improved instruction. The equipment and materials requested for local projects are approved on that basis. Instructional materials should be located in or as near to the classroom as possible. Whether rented or owned, these materials should be available to teachers at the right time for maximum instructional value. Instructional materials, particularly audio-visual, should be utilized as integral elements of the classroom instructional program. Teachers of science, mathematics,

and modern foreign languages are to have primary access to all equipment and materials acquired under this program. Secondary access to the equipment is permissible for other classes.

Minor remodeling can be approved only when the changed facilities are designed to improve the usability of the equipment and materials acquired through the local project. Work space and storage space should be in keeping with the amount of equipment and materials of the project, and the prospects for immediate future growth. Spaces to be remodeled should be located close together, if possible, for common storage and easy exchange of equipment and materials. Remodeling for classroom purposes should take precedence over remodeling for multi-purpose use. Electric wiring and outlets should be provided in keeping with the facilities of the project, with a minimum of two outlets per room for projection purposes, and one outlet for each laboratory group. Ventilation suitable for warm days and chemical fumes, and in keeping with the number of persons in the room, should be provided.⁴

⁴Council of Chief State School Officers, Standards for Materials and Equipment for the Improvement of Instruction in Science, Mathematics, and Modern Foreign Languages, Conference Report (Washington, D. C., 1953).

APPENDIX C

CLASS 0 - 99

1959-1960

(All numbers rounded off to the nearest dollar)

Name of school	School expenditures Xn n = 21	(Xi - Xn)	(Xi - Xn) ²
Dover	\$ 845	+ 69	4,761
Grinnell.	174	- 602	362,404
Gypsum.	1,477	+ 701	491,401
Holyrood.	313	- 463	214,369
Meriden	618	- 158	24,964
Morland	700	- 76	5,776
Olpe.	401	- 375	14,025
Paradise.	194	- 582	338,724
Powhattan	1,095	+ 319	101,761
Udall	672	- 104	10,816
Robinson.	1,219	+ 443	196,249
Cottonwood Falls	250	- 526	276,676
Everest	190	- 577	332,929
Healy	451	- 325	105,625
Hamilton.	330	- 446	198,916
Ingalls	2,000	+ 1,224	1,498,176
Johnson	562	- 324	50,176
LaHarpe	1,890	+ 1,114	1,240,996
LeRoy	692	- 84	7,056
Longford.	2,006	+ 1,230	1,512,900
Morrowville	211	- 565	319,225
Totals	\$16,299		7,305,525

Range = \$1832

Average Xn = \$776

Variance = 365,426 = Sn²

Standard deviation = \$602 = Sn

CLASS 0 - 99

1960-1961

(All numbers rounded off to the nearest dollar)

Name of school	School expenditures		
	X_n $n = 20$	$(X_i - \bar{X}_n)$	$(X_i - \bar{X}_n)^2$
Basehor	\$ 650	- 570	324,900
Canton	304	- 916	839,056
Dwight	625	- 595	354,025
Easton	724	- 496	246,016
Everest	523	- 697	485,809
Gridley	889	- 331	109,561
Linwood	695	- 525	275,625
Prescott	927	- 293	85,849
Stanley	91	- 1,129	1,274,641
Utica	615	- 605	366,025
Bucyrus	1,579	+ 359	128,881
Clifton	2,342	+ 7,122	50,722,884
Glen Elder	918	- 302	91,204
McLouth	1,426	+ 206	42,436
Mount Hope	263	- 957	915,349
Rosalia	3,939	+ 3,676	13,512,976
Stillwell	684	- 536	287,296
Tampa	553	- 882	777,924
Tescott	342	- 878	770,384
Courtland	532	- 688	473,344
Totals	\$24,406		72,085,185

Range = \$8251
 Average X_n = \$1220
 X_n = \$1363
 Variance = S_n^2 = 3,793,957
 Standard deviation = S_n = \$1,940

CLASS 0 - 99

1961-1962

(All numbers rounded off to the nearest dollar)

Name of school	School expenditures X_n $n = 15$	$(X_i - X_n)$	$(X_i - X_n)^2$
Americus	\$ 1,577	- 1,117	1,380,625
Bison	840	- 1,912	3,655,744
Galva	638	- 2,314	5,354,596
Glasco	8,051	+ 5,299	28,079,401
Glen Elder	725	- 2,027	4,108,729
Gypsum	1,811	- 941	885,481
Munden	260	- 2,492	6,210,064
Pomona	5,170	+ 2,418	5,846,724
McDonald	12,746	+ 9,994	99,880,036
Englewood	3,895	- 1,143	1,306,449
Canton	2,657	- 95	9,025
Lehigh	612	- 2,140	4,579,600
Linwood	1,367	- 1,385	1,918,225
Olpe	604	- 2,148	4,615,904
Paxico	331	- 2,421	5,861,241
Totals	\$41,284		173,689,844

Range - \$12,436

Average X_n = \$2,752Variance = S_n^2 = $173,689,844/14$ = 12,406,417Standard deviation = S_n = \$3,525

CLASS 100 - 299

1959-1960

(All numbers rounded off to the nearest dollar)

Name of school	School expenditures X_n $n = 10$	$(X_i - X_n)$	$(X_i - X_n)^2$
Brewster	\$ 1,642	+ 89	7,921
Burns	526	- 1,027	1,054,729
Harper	284	- 1,269	1,610,361
Medicine Lodge .	1,391	- 162	26,244
Sterling	1,603	+ 50	2,500
Stockton	3,847	+ 2,294	5,262,436
Ulysses	2,810	+ 1,257	1,580,049
Wathena	400	- 1,153	1,329,409
Wheaton	2,394	+ 841	707,281
Ford	633	- 920	846,400
Totals	\$15,530		12,427,530

Range - \$3,563

Average $X_n =$ \$1,553Variance = $S_n^2 =$ 1,390,813Standard deviation = $S_n =$ \$1,175

CLASS 100 - 299

1960-1961

(All numbers rounded off to the nearest dollar)

Name of school	School expenditures X_n $n = 10$	$(X_i - X_n)$	$(X_i - X_n)^2$
Belle Plaine	\$ 814	- 1,932	3,732,624
Delphos	78	- 2,663	7,118,224
Denton	166	- 2,580	6,665,640
Ford	600	- 2,146	4,605,316
Harveyville	5,933	+ 3,187	10,156,969
Louisburg	5,507	+ 2,731	7,623,121
Overbrook	1,000	- 1,746	3,043,516
Phillipsburg	12,159	+ 9,413	88,604,569
Sterling	976	- 1,770	3,132,900
Wamego	1,033	- 1,713	2,954,369
Totals	\$28,266		137,622,243

Range = \$12,031

Average X_n = \$2,746Variance = S_n^2 = $137,622,243/9$ = 15,291,361Standard deviation = S_n = \$3,910

CLASS 100 - 299

1961-1962

(All numbers rounded off to the nearest dollar)

Name of school	School expenditures X_n $n = 10$	$(X_i - X_n)$	$(X_i - X_n)^2$
Bloom	\$ 83	- 645	416,025
Frankfort	554	- 174	30,276
Ford	1,023	+ 295	87,025
Harveyville	261	- 467	218,039
Kismet	750	+ 22	484
Onaga	1,052	+ 324	104,976
Sharon Springs	909	+ 181	32,761
Spearville	751	+ 23	529
Chase	1,151	+ 425	178,929
Esbon	750	+	484
Totals	\$7,284		1,069,578

Range - \$1,068

Average X_n = \$728Variance = S_n^2 = 118,842Standard deviation = S_n = \$345

CLASS 300 - 999

1959-1960

(All numbers rounded off to the nearest dollar)

Name of school	School expenditures X_n $n = 10$	$(X_i - X_n)$	$(X_i - X_n)^2$
Benton	\$ 558	- 831	690,562
Coldwater	772	- 617	380,689
Ellis	1,497	+ 108	11,664
Erie	253	- 1,136	1,290,496
Fowler	1,012	- 377	142,129
Frontenac	3,351	+ 1,962	3,849,444
Hoisington	4,309	+ 2,920	8,520,640
Marion	447	- 942	887,364
Sabetha	1,330	- 59	3,481
Wellsville	364	- 1,025	1,050,625
Totals	\$13,893		16,827,093

Range - \$4,056

Average \bar{X}_n = \$1,389Variance = S_n^2 = 1,869,877Standard deviation = S_n = \$1,367

CLASS 300 - 999

1960-1961

(All numbers rounded off to the nearest dollar)

Name of school	School expenditures X_n $n = 11$	$(X_i - X_n)$	$(X_i - X_n)^2$
Bonner Springs .	\$ 6,678	- 369	136,161
Cimarron	4,856	- 2,181	4,756,761
Coldwater	645	- 6,402	40,985,604
Columbus	13,849	+ 6,802	46,267,204
Conway Springs .	6,411	- 636	404,436
Effingham	1,055	- 5,992	35,904,064
Gardner	1,754	- 5,293	28,015,849
Greensburg	1,942	- 5,105	26,061,025
Madison	6,233	- 814	662,596
Russell	31,234	+ 24,187	585,010,969
Wellsville	2,863	- 4,184	17,505,856
Totals	\$77,520		785,710,585

Range - \$30,539

Average X_n = \$7,047Variance = S_n^2 = 73,571,059Standard deviation = S_n = \$8,568

CLASS 300 - 999

1961-1962

(All numbers rounded off to the nearest dollar)

Name of school	School expenditures Xn n = 10	(Xi - Xn)	(Xi - Xn) ²
Cherryvale	\$ 500	- 1,363	1,857,769
Kingman	2,319	+ 456	207,936
Lyndon	5,715	+ 3,852	14,837,904
Peabody	167	- 1,696	2,876,416
Smith Center . . .	1,007	- 856	732,736
Buhler	5,647	+ 3,784	14,318,656
Holcomb	1,692	- 171	29,241
St. John	640	- 1,223	1,495,729
Clearwater	725	- 1,138	1,295,044
Coldwater	213	- 1,650	2,722,500
Totals	\$18,625		40,373,931

Range -- \$5,548

Average Xn = \$1,863

Variance = S_n^2 = 4,485,992Standard deviation = S_n = \$2,118

CLASS 1,000 - 4,999

1959-1960

(All numbers rounded off to the nearest dollar)

Name of school	School expenditures X_n $n = 10$	$(X_i - X_n)$	$(X_i - X_n)^2$
Atchison	\$ 14,657	- 6,677	44,582,329
Baxter Springs	951	- 20,383	415,466,689
Chanute	2,967	- 18,367	337,346,689
Derby	17,021	- 4,313	18,601,969
Dodge City	4,326	- 17,008	289,272,064
Emporia	19,016	- 2,318	5,373,124
Independence	991	- 20,343	413,837,649
Neodesha	8,353	- 12,981	168,506,361
Pittsburg	478	- 20,856	434,972,736
Wichita	123,245	+ 101,911	10,385,851,921
Totals	\$192,005		12,513,811,531

Range - \$122,767

Average X_n = \$21,334Variance = S_n^2 = 1,390,423,503Standard deviation = S_n = 37,310

CLASS 1,000 - 4,999

1960-1961

(All numbers rounded off to the nearest dollar)

Name of school	School expenditures		
	X_n $n = 9$	$(X_i - X_n)$	$(X_i - X_n)^2$
Arkansas City .	\$ 8,025	+ 2,868	8,225,424
Augusta	6,054	+ 897	804,609
El Dorado . . .	5,142	- 15	225
Emporia	16,964	+ 11,807	139,405,249
Great Bend . .	1,952	- 3,205	10,272,025
Independence .	4,898	- 259	67,081
Mulvane	2,270	- 2,887	8,334,769
Turner	220	- 4,937	24,373,969
Wakeeney (Trego)	886	- 4,271	18,241,441
Total	\$46,411		209,724,792

Range - \$16,744

Average X_n = \$5,157Variance = S_n^2 = 23,302,756Standard deviation = S_n = \$4,829

CLASS 1,000 - 4,999

1961-1962

(All numbers rounded off to the nearest dollar)

Name of school	School expenditures X_n $n = 9$	Deviation from $(X_i - X_n)$	$(X_i - X_n)^2$
Derby	\$11,396	955	912,025
Atchison	3,103	7,410	54,908,100
Abilene	2,936	7,522	55,028,452
Hays	8,230	2,288	5,234,944
Medicine Lodge .	6,464	4,054	16,434,916
McPherson	45,361	34,843	1,214,034,649
Fort Scott	5,975	4,543	20,638,849
Bethel	6,957	3,561	12,680,721
Wellington	4,175	6,543	40,233,649
Totals	\$94,662		1,220,106,305

Range - \$42,365

Average X_n = \$10,518Variance = S_n^2 = 135,567,367Standard deviation = S_n = \$36,810

A STUDY OF THE EXPENDITURES
FOR SCIENCE, MATHEMATICS, AND MODERN FOREIGN LANGUAGES
UNDER TITLE III OF THE NATIONAL DEFENSE EDUCATION ACT
IN THE STATE OF KANSAS (1959-1962)

by

EDWARD GLENN HIGHTOWER

B. S., Oklahoma State University, 1962

AN ABSTRACT OF A MASTER'S REPORT

submitted in partial fulfillment of the

requirements for the degree

MASTER OF SCIENCE

Department of Education

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1963

ABSTRACT

The purpose of this report was to study the expenditures made by the secondary schools of Kansas for acquisition under Title III of the National Defense Education Act of 1958. The study was to provide information concerning:

1. The school participation in the Title III program by class.
2. An analysis of the expenditures in each of eighteen categories by class of schools.
3. An estimated expenditure per pupil enrolled in science by class of schools for the year 1960-1961.

The secondary schools were separated into four classes:

(1) schools of enrollment under 99, (2) schools of enrollment 100-299, (3) schools of enrollment 300-999, and (4) schools of enrollment 1,000-4,999. A random sample was taken from each class for each of the three years. The total sample was 17 per cent of the schools. Approved Title III project applications for the schools included in the sample were individually checked and the required data recorded. The data was tabulated so that the expenditures in each class were analyzed by class of school. The per cent of participating schools was used to estimate the expenditures per pupil enrolled in science by class of school.

The percentage participation of the secondary schools in the Kansas Title III program was only 51-54 per cent. However, as school enrollment increases, the per cent of participation by class increases from 33.7 per cent for the class under 99 to 82.5 per cent for the class 1,000-4,999 in 1961-1962. The number of schools participating in the

Title III program has decreased for the class under 99, and remained relatively constant for the three larger classes.

There were five categories in which approximately 90 per cent of the money was spent. Those were for furniture, minor remodeling, language and audio-visual equipment, equipment related to the study of biology, and general equipment. The first two classes (class under 99 and class 100-299) spent a greater share for minor remodeling. Exact statements of percentages or totals for categories for all schools were not implied in the comparisons since they were based on random samples rather than the entire population.

Average school expenditures for projects increased each year of the program, with only one exception in the class 300-999. There was also an increase in project expenditure corresponding to increase in school enrollment. The average school expenditure for the class under 99 was only one-eighth ($1/8$) of the average expenditure in the class 1,000-4,999. However, in terms of per pupil expenditures for science, the smaller expenditure represented an effort per pupil which was more than double the effort made by the larger class.

On the basis of the results of this report, it was concluded that:

1. There was a greater percentage of participation in the Title III program by the schools with enrollments of more than 300 students than by those schools having fewer than 300 students.
2. The categories related to furniture, minor remodeling, biology, general equipment, and audio-visual equipment accounted for approximately 90 per cent of the Title III expenditures.

3. The schools of enrollment less than 300 students must develop avenues in addition to monetary expenditures for the purpose of improving their facilities and equipment.

