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EDUCATIONAL SPECIFICATIONS FOR
SECONDARY SCHOOL SHOPS

by

Harold Herman Koch

A DISSERTATION

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In Partial Fulfillment of Requirements

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Department of Educational Administration

Under the Supervision of Professor Merle A. Stoneman

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Educational Specifications for

Secondary School Shops

BY

Harold Herman Koch

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APPROVED BY

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PREVIEW

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CHAPTER I

INTRODUCTION

American schools are faced with the greatest challenge in their history. In addition to meeting the demands of a rapidly increasing student enrollment, there is the problem of adapting the educational program to the ever-widening range of student interests and abilities. A report of a Panel of Consultants on Vocational Education explained the challenge which confronts the schools:

The public schools of the United States now enroll nearly "all the children of all the people," an enviable accomplishment that has taken more than a century to achieve. The American people have created and supported these schools to give their children a better life, and this the schools have done. They have given a large proportion of American children not only the literacy indispensable to effective citizenship but also some knowledge of the world about them, a foundation for further learning, the habits of safe healthful living, a respect for individual dignity, and the practice of friendly cooperation, as well as an introduction to appreciation and practice of the arts. The American people expect all this of their schools, and more. Parents also expect their children to learn how to make a living, preferably a better living than they have managed to provide.¹

In May of 1962, the Educational Statistics Branch, Office of Education, released a report which estimated that of every ten students now enrolled in the elementary grades, three will probably not attain high school graduation. Furthermore, of the other seven boys and girls who will finish high school, three will not go on to college, and only two of the four who enter college will receive baccalaureate

¹United States Department of Health, Education, and Welfare, Education For A Changing World of Work, A Report Prepared by a Panel of Consultants on Vocational Education (Washington, D. C.: United States Printing Office, 1963), p. 3.

degrees.¹ Thus, six out of ten youngsters now in the elementary schools who are expected to drop out of school or terminate their education at the end of the twelfth grade, and the two who do not graduate from college, are a major concern to all interested in education. According to estimates released by the United States Department of Labor, twenty-six million young people will enter the labor force in this decade; they will account for nearly ninety per cent of the growth in the labor force during the 1960's.²

If schools are to meet the needs of the students mentioned above, and at the same time provide a comprehensive education for all students, a well planned educational program has to be formulated. An integral portion of the total program is provision for industrial arts, vocational education, and technical education. Before this phase of the program can meet adequately the needs of the students, well planned facilities have to be provided.

For many years the schools were oriented to developing only the academic skills, and the child used his hands only to write or hold a book. To teach manual skills was not quite educationally respectable and was not considered a duty of the schools. Therefore, shops and laboratories made their appearance late in the long history of free public education, school buildings all over the country giving evidence of how late. Space was clumsily added to old buildings, often dug into their basements.³ Even in more modern buildings, shop planning was

¹Ibid.

²Ibid.

³Lawrence B. Perkins and Walter D. Cocking, Schools, (New York: Reinhold, 1949), p. 102.

largely lacking.¹

A very definite and noticeable change in present day school plant planning is the inclusion of facilities for industrial arts, vocational education, and technical education programs.²

Need for the Study

Educational planning for shops in the past was limited to the drawing of layouts showing space and equipment requirements. With this type of planning the facilities rigidly controlled the classroom activities, and in many schools hindered the instructional program. Throughout the nation this practice was still followed by some planners of school shops during the early 1960's. Frequently schools accepted the proposals of architects, or copied designs of shops built in other communities, without any local planning. These practices were brought about by lack of experience on the part of administrators and shop teachers in planning shop facilities, and, thus, greatly hindered the activities carried on in the shop program.

This limitation of experience on the part of school administrators and shop instructors in planning shops created a demand for guide lines to follow. Such guide lines could be made available in a set of educational specifications for designing school shops formulated by valid research.

¹Ibid.

²Chris H. Groneman, "Facilities For the New Industrial Education Program", School Board Journal, CXLVI, (March, 1963), p. 39.

According to the National Council on Schoolhouse Construction, educational specifications serve the following purposes:

1. The primary purpose of educational specifications is to serve as a concise and comprehensive guide to architects in developing sketches, preliminary plans, detailed layouts, working drawings and architectural specifications for a school building project.
2. They may serve as a stimulus to cooperative curriculum improvement involving both educators and lay citizens with the specification being a summarization of such work. Educational specifications may define existing educational programs, point out desired future programs, and recommend first steps in reaching these long term goals. These specifications may well be an expression of the hopes and desires of a community for the future education of youth.
3. One frequently overlooked purpose of educational specifications is that of guiding the board of education and school staff in the evaluation of the architect's tentative solutions to specific educational problems.¹

School shops house an integral part of the total school program, and should be planned with the same exactness as classrooms or other special areas in educational facilities. This will be possible when educational specifications for designing shops are developed in each community planning new facilities.

Statement of the Problem

The purpose of this study was to determine basic educational specifications necessary to serve as a concise and comprehensive guide

¹National Council on Schoolhouse Construction, Special Committee on Secondary School Plant, Secondary School Plant Planning, (Nashville, Tennessee: National Council on Schoolhouse Construction, 1957), pp. 6-7.

to educators and architects in designing modern school shops.

Definition of Terms Used

Educational Specifications. In this study educational specifications referred to specific details in the educational planning of school shops. Guide lines for formulating educational specifications were acquired from the literature, with the contributions of Herrick being the primary source.¹ These guide lines were as follows:

1. The purpose and objectives of the shop program.
2. Description of the educational activities carried out in the shop program to achieve the purpose and objectives established.
3. Description of shop load, including the procedures used to determine the potential enrollment in the shop program, and the recommended enrollment in each shop class.
4. Description of program organization and any method of instruction in a specific shop class which required additional shops or special space requirements. Program organization included scheduling for: (1) regular secondary shop classes, (2) post high school shop classes, (3) adult, apprenticeship, and manpower development programs, and (4) other special programs.
5. A list of required facilities, including shops, storage and auxiliary areas needed to house desired shop program.
6. Description of the quantitative and qualitative needs in each shop, storage and auxiliary area, including the following: (1) size, shape and number of teaching stations in each specific shop, (2) size, shape, and

¹John H. Herrick and others, From School Program to School Plants, (New York: Henry Holt and Company, 1956), pp. 127-130.

location and special features of each storage and auxiliary area, (3) requirements as to special comfort consideration, (4) services and utilities, (5) special considerations for heating, ventilation and exhaust systems; (6) special plumbing needs, (7) special space requirements, (8) shop arrangements and features for flexibility, (9) provision for exits and entrances, and (10) other important details which affect the instructional program.

7. Information regarding future needs for additional shops, or remodeling of present facilities to adapt to a change in shop program.
8. Preference or requirement with respect to location of different shops or a group of shops.

Delimitations

This study was limited to the following shops: (1) general, (2) automotive, (3) drafting, (4) electricity, (5) graphic arts, (6) machine, (7) sheet metal, and (8) woodworking.

Further delimitation was made to vocational-technical and comprehensive high schools at the secondary level constructed or modernized during the past ten years, and located in the mid-western section of the United States. Schools studied were selected from those recommended by state educational agencies in Colorado, Iowa, Kansas, and Missouri. Nebraska vocational-technical or comprehensive secondary schools were not included in the study because of limited shop programs or outdated facilities.

The Procedure

A thorough study of the literature has been made and reported

in Chapter II. The survey of literature revealed the historical development of industrial arts and vocational education, provisions for housing initial programs, and the modern approach to planning and providing adequate shops for industrial arts, and vocational and technical education. The modern approach gave special emphasis to what authorities in the field of school planning recommended in the planning of school shops.

School plant planning divisions of the Colorado, Iowa, Kansas, Missouri and Nebraska state educational agencies were contacted for the purpose of securing a list of technical and comprehensive secondary schools which offered comprehensive shop programs and were constructed or modernized during the past ten years. From the lists of recommended schools, thirteen were selected to be studied. The following criteria were used to make selections: (1) located in cities with a total population of approximately 10,000 or more, (2) located in cities of varying sizes, (3) most modern shop facilities in each state, (4) at least one-third of schools studied should be of the vocational-technical type, and (5) reputation established by school through shop program.

Principals of the thirteen schools selected were contacted and asked for assistance in carrying out the study. Ten schools indicated a willingness to assist with the study. Two of the thirteen schools did not return the questionnaire indicating whether or not they would assist with the study, and one school indicated a limited shop program and was not considered further in the study.

Plans were made to visit each school that had indicated a willingness to assist with the study. Prior to the visitation each school was given an advance notice as to the date of the visitation, and received a plan of investigation to be carried out in each school. The itinerary for each visitation included interviews with the principal, shop instructors, and vocational education director, if the school district had one. In addition, shops under study were visited and personal observations were made.

A questionnaire based upon the recommendations of authorities in the field of school plant planning, was developed and used in personal interviews with principals, shop instructors, and vocational education directors. During visits to individual shops, the questionnaire was used also to record observations. After the first visitation, some minor changes were made in the questionnaire to improve the instrument.

The data collected during visitations to the schools were examined, organized and are presented in Chapters III and IV.

The summarization of data collected and the formulation of conclusions are presented in Chapter IV.

It is anticipated that the outcome of this study will establish some basic educational specifications for designing modern school shops. The educational specifications should be of value to educators who must develop local educational specifications for new shop facilities.

CHAPTER II

REVIEW OF THE LITERATURE

In order to become familiarized with the problem of providing adequate school facilities for industrial arts, vocational education, and technical education, a review of the pertinent literature was undertaken. The types of publications examined included (1) textbooks, dealing with the history and development of industrial arts and vocational education; (2) textbooks for school building courses; (3) school plant planning guides and publications by leading authorities in the field of school plant planning; (4) professional magazines, pamphlets and yearbooks which discussed the planning of school shops; and (5) appropriate research studies involving the planning of school shops. The materials reviewed pertained to the historical development of industrial arts and vocational education with consideration of provisions for facilities to house early programs, and the more modern approach to planning and providing adequate shops for industrial arts, vocational and technical education.

Historical Development of Industrial Arts and Vocational Educational Programs and Facilities

To make clear the historical development of industrial education in the United States, it is necessary to distinguish clearly between the growth of the two major divisions of the field. The first division, industrial education, was the immediate product of the effort to find an

effective substitute for the traditional type of apprenticeship which was almost completely destroyed by the Industrial Revolution, Industrial-arts education was the evolved product of the manual-training movement.¹

The disappearance of the excellent craft apprenticeship of the colonial period and the failure of both industry and labor to find an adequate substitute worked a great hardship on children and young workers. As a direct result young workers lost their opportunities for educational development, the number of hours of work increased, and the evils of child labor emerged.² The rapid development of power machinery and the increased demands for goods led to a great demand for laborers. To meet this demand, factory operators employed young children for low wages. The conditions of employment became steadily worse and states began to enact legislation to correct the evils of child labor.³ As interest in the educational welfare of children increased, the need for organization of new types of schools for the education of workers became a necessity.

The early schools for industrial training were privately operated, because it was generally assumed that the teaching of trades should not

¹Arch O. Hicks, "Industrial Education", Encyclopedia of Educational Research (New York: The Macmillan Company, 1941), p. 603.

²Roy W. Roberts, Vocational and Practical Arts Education (New York: Harper and Brothers, 1957), p. 112.

³Ibid., p. 59.

be done at public expense.¹ The following is a partial list of the early trade schools:

Hoe and Company of New York City, 1812; New York Trade School, 1881; Westinghouse Machine Company, 1888; Williamson Free School of Mechanical Trades, 1888; General Electric Company, 1901.²

These schools performed an important educational service, but were too few in number and too restricted in the range of their offerings to make significant contributions to the solution of the rapidly growing problem of keeping American industry supplied with skilled mechanics. The training offered in each school was regulated by the needs of industry, with very little consideration for the needs of the students. The New York Trade School in 1897 was providing training in such trades as painting, bricklaying, plastering, stonecutting, electrical work, sheet metal cornice work and plumbing.³

The actual instructional processes were carried out in factory-like buildings or in the industrial shops of the community. The literature reveals no indication that actual planning of facilities was carried out to adapt buildings to the instructional needs of the students.

In the early nineteenth century, increasing demands of manufacturers, labor leaders and the general public led to the introduction of industrial education in the public schools.⁴ With the lessening of opposition to expenditures of public funds to teach trades, a great variety of

¹Charles A. Bennet, History of Manual and Industrial Education, 1870 to 1917 (Peoria: Charles A. Bennett Company, 1937), p. 511.

²Hicks, op. cit., p. 604.

³Roberts, op. cit., p. 116.

⁴Bennett, op. cit., p. 528.

experiments in industrial education developed.

According to Bennett, the following influences affected the types of industrial training introduced in the public schools:

In communities where the influence of labor unions was strong, efforts were chiefly toward providing some kind of preparatory trade or prevocational instructions for boys and girls under sixteen years of age while still in the public schools, and part-time improvement or industrial-continuation schools for those who had become workers in the industries. In communities where the trade-unions influence was not so strong, day-trade schools and part-time cooperative trade courses were established. The type of school to be started depended upon local conditions, especially with reference to manufacturing and labor interest, and the extent to which school men and boards of education had overcome their prejudices against vocational education.¹

With a footing in the public schools, industrial education expanded and many types of programs were established. The aim of the schools was to prepare students to enter their chosen trades. In order to accomplish this, the schools provided equipment and conditions resembling those found in factories. For this reason, the schools had more the air of a factory shop than a school shop. During this period of time the first indication of shop planning and provision for industrial education in the public schools appeared. Although planning was not comprehensive, it was the starting point for educational planning of school shops.²

National organizations and the Federal Government took an interest in industrial education. With the enactment of legislation, industrial education grew rapidly and became nation-wide in scope. This brought about greater demands upon the public school for facilities for a changing

¹Ibid., p. 528.

²Ibid., p. 529.

program of instruction. These demands required a modern approach to the planning of industrial education shops.

Industrial arts is the evolved product of the manual training movement, and had its roots in the educational theories of the Renaissance and the Reformation and in the work of Comenius, Pestalozzi, Froebel, Rousseau, Della Vos, and Salomon.¹ The purpose of the early manual arts program was defined as follows:

Manual arts is a term used to describe such subjects as woodworking, mechanical drawing, metal work, printing, leather work, jewelry making, claywork, bookbinding, etc., when taught as a form of general education having for its chief purpose that developing within the pupil, through work in the school shops, manual skills and an appreciation of good design and construction by practice with a variety of exercises and practical projects of personal value.²

Industrial arts had its beginning as an organized enterprise during the 1870's when Calvin M. Woodward offered courses at Washington University in St. Louis.³ The following description was given of the earliest St. Louis school:

Professor Woodward secured the use of an old dormitory building, and transformed its interior into a group of instruction shops. The basement he fitted up for a blacksmith shop with one portable forge, supplied with a hand blower and all essential tools for forge work. On the first floor was a machine shop, 15 ft. by 36 ft., equipped with workbenches, iron vises, and tools for twelve students. There was also in the room an engine lathe, a speed lathe with slide rest, a lathe with circular scroll saw, a light wood lathe, a velocipede scroll saw, a planer, capable of dressing a piece seven inches square and nineteen inches long, a gear cutter, and a fair set of machinists tools. On the

¹Hicks, op. cit., p. 603.

²Harold G. Silvius and Estele H. Curry, Teaching Multiple Activities In Industrial Education (Bloomington: McKnight and McKnight Publishing Company, 1956), p. 7.

³Bennett, op. cit., p. 338.

second floor was a woodworking shop equipped with work benches, drawers, and tools for twenty students. Each student was provided with about four feet of bench room, a vise, a cupboard, a tool drawer, containing three planes, two chisels, a saw, a square, a hatchet, a gauge, and some special wood-carving tools. Tools less frequently used were kept in a general drawer. There was also an office for the instructor, two closets for the finish-up work and a storeroom for lumber.¹

The early training was offered to college students and some academy or secondary students. Professor Woodward saw the need for a combination of shopwork and academic courses for secondary school students as a means of supplementing liberal education with manual activity.²

The manual training offerings of Washington University gained popularity and were accepted by lay citizens from the beginning. By 1880 the demand was so great that the St. Louis Manual Training High School was constructed. It was a three story structure with facilities for a blacksmith shop, a machine shop, a turning shop, a carpentry shop, a drawing room, a physical science laboratory and rooms for academic subjects. Each shop was designed for twenty students to do the same kind of work at one time.³ The courses offered made it possible for a student to acquire manual and general education during his four years in the institution.

The success of the St. Louis Manual Training School led to the establishment of other manual training high schools in other cities and towns. The Commercial Club of Chicago founded the Chicago Manual

¹Ibid., p. 338-339.

²Roberts, op. cit., p. 72.

³Ibid.

Training School in 1884. The school was planned to house several hundred students in rooms for study and work. Shops were designed to accomodate twenty-four boys at one time.¹ The plan of instruction was similar to that of the St. Louis school. Early manual training schools were sponsored by colleges or by a group of citizens. The first change in the pattern of organization came in Baltimore, when a Manual Training High School was included as a part of the public schools system and supported at public expense.² This plan was well accepted and became the pattern followed in the establishment of other manual training schools.

As manual training grew in popularity there developed a tendency to offer a wider range of courses and more elective opportunities. This brought about some changes in the organization of the manual training high school. One was to include manual training in the academic high school, which resulted in the formulation of the comprehensive high school. The other change was an increase in technical subjects which resulted in designating some schools as technical high schools. The Peru, Illinois High School in 1884 was the first of the academic high schools to offer courses in manual training.³ By the turn of the century the procedure was followed in many towns and cities.

Technical high schools with specialized courses first appeared in Springfield, Massachusetts in 1898. Since this type of school was more adaptable to larger cities, they were established in large metropolitan areas.⁴

¹Charles H. Ham, Manual Training (New York: Harper and Brothers, 1886), p. 341-342.

²Roberts, op. cit., p. 75.

³Ibid., p. 86.

⁴Ibid.