COLLEGE OF ENGINEERING, UNIVERSITY OF CINCINNATI.

CIVIL ENGINEERING COOPERATIVE STUDENT ON RAILROAD CONSTRUCTION.
Industrial Education in Cincinnati

Description and Views of the Work

in the

Continuation Schools
High Schools
Ohio Mechanics Institute
University of Cincinnati

CINCINNATI, OHIO
1911
Industrial Education in Cincinnati

In welcoming the National Society for the Promotion of Industrial Education on the occasion of its fifth annual convention, Cincinnati takes pride in pointing to her achievements in the field which the Society is so carefully and successfully fostering, and in emphasizing the fact that in no city in America may be found better opportunities for studying the different practical phases of the great work which the Society stands pledged to promote.

THE CONTINUATION SCHOOLS.

It was felt for years by local manufacturers that there was need for a greater number of intelligent and technically trained mechanics; that the general efficiency of their establishments would be greatly increased, and their employees greatly benefited, if their apprentices could in some way be interested in the technical details of their work, thus adding intelligent understanding to their mechanical skill.
TRIGONOMETRY APPLIED IN THE SHOP. CONTINUATION SCHOOL APPRENTICE.

This sentiment finally crystallized when the officials of two leading manufacturing firms devised the plan of engaging a teacher who should have a practical as well as a technical knowledge of shop work—a man who not only was a scholar, but also a skilled mechanic, and who could, without the aid of the usual text books, convey to his pupils the technical knowledge necessary to solve any mechanical problems that might present themselves during the course of their work. To this teacher then was entrusted the technical education of all the apprentices in the two shops, two hours being set aside twice a week for the beginners to receive instruction in theoretical mechanics. For two years these shops pursued this method of training their apprentices, and the results more than justified the innovation and experiment.

By the end of the two years referred to, this movement had attracted so much attention from other Cincinnati manufacturers that there arose a demand for a more elaborate working out of the plan, so that all beginners in the machine shops might share in the benefits of this practical technical education while they were earning their way in life.

Conferences between leading manufacturers and the officials of the City’s educational departments were held, conditions and possibilities discussed, and in the end plans were agreed upon by which the City was to provide the necessary teachers and general equipment for a school of industrial instruction, while the manufacturers pledged themselves to send a sufficient number of apprentices to justify the establishment of the school.

Thus was established Cincinnati’s first Continuation School for machine shop apprentices. This school was opened in September, 1909, under the jurisdiction and supervision of the Board of Education.

MACHINE SHOP CONTINUATION SCHOOL.

The attendance averages some 200 a week, coming in squads of about 22. Each group of boys comes for one-half day—four hours—each week. They are paid their usual wages for attendance by their employers, and are docked when absent or late. A weekly report is made by the school to the employers in time for their payrolls. The school operates forty-eight weeks a year and four and a half days a week. Two additional half-days are given the teachers to visit shops, see the boys at work, talk to the foreman, and gather materials for the Course of Study. Two teachers are employed, both experienced shopmen and expert teachers. The cost of the school is about $3,000 a year, or $15 per boy. Twenty-one shops cooperate with the school.

The students are classified as closely as possible into four groups, according to their year of apprenticeship. The more immature come the early part of the week, and the advanced students the latter part of the week. The course is four years long, corresponding to the term of apprenticeship.

First Year subjects: Shop Arithmetic, Spelling, Reading, Composition, Reading Blueprints, Drawing, Geographical Relations of the Shop Materials, and Civics.

Second Year: Objective Geometry; Science—Iron, its Manufacture and Founding; Blueprints, Mechanical and Freehand Drawing; Shop Practice—Shop Conventions and Necessities; Civics and the reading of lives of the world’s improvers.

Third Year: Geometry and Algebra, Physics, Shop Practice, Foreman’s Question Box, Drawing, Civics and Economic History and Literature.

WOODWARD HIGH SCHOOL.
Fourth Year: Trigonometry and Applied Mathematics; Shop Chemistry; Shop Practice—visiting of industrial plants and discussing observations, especially of economy and waste; Culture—the man as a wage-earner and citizen; debates.

No machine work is done in the school. The boys get that in the shop and in the Night School machine shop, which many of them attend voluntarily.

When the boys return to the shops they are quizzed by workmen and foremen, and the lessons in the school are discussed in the shops. The result has been that so many workmen desire to have the advantage of such schooling that the school has been opened at night for mature workers in the iron industry. The same course is given them four nights a week. The attendance is about 60 different persons a week in the night classes. On Friday nights a session for foremen is held, about 40 attending, and various shop problems are discussed. It will be seen that the influence of the school is far reaching. All the work done in the school is closely related to the work in the shop.

The last period each day is given to general culture. The school is supplied with a piano, a stereopticon and slides, sets of books on civics and industries, maps, pictures, etc.

At the end of the course the boy is given a diploma. The school has been given six rooms at the school building on Ninth street.
COMPULSORY CONTINUATION SCHOOLS.

Cincinnati secured legislation requiring boys and girls who go to work before they are through the eighth grade to continue in day school from 4 to 8 hours a week, until they are 16. These schools were opened in September, 1911, in 12 centers, and enroll some 1,200 students. These pupils are now being classified as to the vocation followed, and will receive expert industrial instruction on the completion of the classification.

EVENING INDUSTRIAL COURSES.

A great increase in evening school attendance has come with the introduction of organized courses in industrial education. The following courses of this class are open:

Industrial Courses for men: A four-year course in mechanical and architectural drawing, a four-year course in pattern making, a two-year course in smithy and forge work, a two-year course in machine shop, in electrical work, in cabinet making and turning, and a preliminary course in elementary woodwork. Number in these courses at present, 957.

Industrial Courses for women: A two-year course in cooking, in garment making, in millinery, in art needle-work, and a course in sewing. Number in these courses at present, 1,981.

HIGH SCHOOL INDUSTRIAL CLASSES.

Moreover, the City's direct interest in Industrial Education also finds encouragement in the Woodward and Hughes High Schools, each of which provides a Boys' Industrial, and a Girls' Industrial course. These technical courses are not college preparatory courses, but are vocational, all the subjects taken having a distinct value in preparing for vocations. They are as yet given only in the first two grades of the High Schools.

At the end of the second year these courses are to be conducted on the cooperative plan, week about in shop and school.

MANUAL TRAINING.

Besides the above industrial training system Cincinnati has the usual Manual Training and Domestic Science Departments in the Public Schools.

Manual Training shop work begins in the Sixth Grade, one hour a week, continues through the Seventh and Eighth Grades one and a half hours a week, and is optional in the High Schools, seven and a half hours a week.

Sewing is given in the Sixth and Seventh Grades, cooking in the Eighth, one and one-half hours a week. In the High Schools, Domestic Art (sewing, millinery and applied art) is given in the first two years, and Domestic Science in the last two years.
OHIO MECHANICS INSTITUTE.

Cincinnati’s pioneer industrial institution, the Ohio Mechanics Institute, offers still another departure in the matter of giving instruction to those desiring to become skilled artisans in various lines of craft. Here are combined technical and practical instructions in a varied line of mechanical and artistic pursuits. Workshops and studios are adjuncts to the classroom, and every feature of industrial work taught in the classes is carried out in practice in the laboratory, machine shop, foundry or studio, with all of which the institution is liberally and adequately provided in a most modern manner. Courses in Mechanics, Architecture, Science and Applied Art are taught. The special trade courses offered are machine work, pattern making, foundry work, forging and sheet metal work, cabinet making, interior decoration, glass mosaic work, china painting, lithography, clay modeling, stationary engineering, etc.

Students may pursue regular academic studies to obtain the requisite scholarship for any department of engineering. There are day and evening classes, and courses vary from one to six years, according to the requirement of the student, and the nature of the course. The faculty is made up of instructors who not only are expert mechanics, but who also are thoroughly grounded in all technical knowledge pertaining to the departments over which they have supervision. In conjunction with these instructors, experts from factories and other industrial institutions assist in the work of building up the intelligence of the students.
Another phase of Cincinnati's industrial educational plan is the cooperative system for the study of engineering, as established at the University of Cincinnati, which, by the way, is the only University in this country, and possibly in the world, controlled and supported by the City.

It is difficult to formulate a simple comprehensive statement of the principle underlying the cooperative system. Various attempts have been made to condense it into one sentence, as, for instance, "Hitching the school and shop abreast, rather than in tandem," "combining theory and practice." "The practical side of engineering, that is, the technique, can be learned only in a shop working under commercial conditions, and the theory underlying the technique can be taught only in a school by skilled teachers." Perhaps the best statement of the fundamental idea is this: "The practice of engineering can not be learned in a university; it can be learned only where engineer-

ing is practiced, namely, in the shop or field. The theory underlying the practice may be obtained outside of the university, but can be best obtained in an organized system of instruction under skilled teachers."

It should not require much argument to show that the practice and the theory underlying it should be taught simultaneously, if possible.

The cooperative courses are planned to combine and coordinate theory and practice. The theory is taught in the University, and the practice is obtained at the manufacturing plants of the city. Students in this course work alternate weeks at the University and at commercial shops. The classes are divided into two sections which alternate with each other by weeks, so that when one section is at the University, the other is at the shops. The length of the course is five years, the alternation being carried on eleven months of the year. The summer field work in Civil Engineering is full-time with coordination. Each student has a two weeks' vacation during the summer, and a week's vacation at Christmas.

The practical work at the shop is as carefully planned as the theoretical work at the University. In Mechanical, Electrical and Metallurgical Engineering the students follow, as nearly as possible, the path of the articles manufactured from the raw material to the finished product. In Civil Engineering the students work with structural iron companies, ferro-concrete companies and railroads.
In all cases the Dean of the Engineering College and the Professor of Civil, Electrical, Mechanical or Metallurgical Engineering, as the case may be, confer with the manufacturers in planning the course of shop work, so that the students get a logically and carefully arranged shop training. The work of the shops is coordinated with the work of the University by a special set of teachers called coordinators.

The shop coordinator is a college graduate acquainted with shop practice. He spends every morning at the University and every afternoon in the shops. His function is to make a direct weekly coordination of the work of the shop with the theory of the University.

A card system is employed by means of which everything the student does in the shop that exemplifies a theory taught in the University is called in detail to the attention of the teacher of theory, so that when the student comes to that particular theory, the exemplifications of which he has had in his practical work in the shop are called to his attention. It will be seen, then, that out of the student's own experience is drawn much of his course in mechanism, thermodynamics, machine design, strength of materials, shop economics, etc.

300 Students are enrolled in the following cooperative courses:

- Metallurgical Engineering,
- Civil Engineering,
- Mechanical Engineering,
- Chemical Engineering,
- Electrical Engineering.

All these various and varied features of the industrial educational system of Cincinnati now are in full sway and are particularly commended to the visitors to the Convention of the National Society for the Promotion of Industrial Education and to others who are interested in the further advancement of industrial education.