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INDUSTRIAL EDUCATION

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By

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INDUSTRIAL EDUCATION[1]

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CAUSES STIMULATING THE DEVELOPMENT OF INDUSTRIAL EDUCATION

The past two years have witnessed a continued and an increasing emphasis upon vocational-industrial and manual-arts types of work in the school curriculum, and a further adjustment of the work to make it a still more effective factor in the realization of the aims of the public schools. In general there has been considerable growth in the enrollments in these types of courses. In the vocational-industrial courses the increase in enrollment is particularly noticeable in part-time and evening classes. This is indicative of the growing recognition of the value of these types of classes in a vocational-industrial program. Manual arts in the junior high school grades is more and more becoming a required subject. In the senior high school grades a more thoughtful consideration than formerly is now generally given to the organization of courses in accordance with the needs of the different groups and with regard to specific ways in which the training may function in contributing to the objectives of the secondary school.

The housing facilities for shop work and other types of industrial courses have been improved in many places. During the biennium there was an increased realization of the fact that efficient work can not be carried on without adequate shop rooms and equipment. This is indicated by the number of schools that have erected new vocational buildings, built additions to their present ones, or made provisions for shops in new academic buildings. In some sections of the country shops have been provided in new gymnasium buildings.

[1] This chapter does not deal with the administration of vocational-industrial education provided by the Smith-Hughes law. The reports of the Federal Board for Vocational Education cover this subject.

The stimulation of the industrial education program is due to a number of causes. Among the most important ones are:

1. *An increased effort to make the public-school program democratic in fact as well as in name.*—There is a growing demand that the secondary schools assume their full responsibility for meeting the needs of the various groups of students contained within their rapidly increasing enrollments. In the 36 years from 1890 to 1926 the population of the continental United States increased 86 per cent, while the college and university enrollment increased about 550 per cent, and the secondary school enrollment increased almost 1,100 per cent. The student body of the secondary school is no longer the selected unified group it once was, and with the inclusion, in large numbers, of groups with different attitudes, aptitudes, and opportunities relative to life occupational interests there is the necessity for providing educational training that will have functional values corresponding to the group needs and will be commensurate with the time, effort, and money expended.

In 1926 public-school enrollment in the tenth grade, or the second year of the 4-year high school, was only 52 per cent of the enrollment in the seventh grade. Evidently an important factor contributing to school-leaving during these grades was the lack of a sufficient variety of courses to meet the needs of the different groups included in the school enrollment. A specific example of this situation, together with a plan for meeting it, is found in a certain comparatively large city. In this particular school system in the year 1927–28 there were 90 per cent as many pupils enrolled in the first year of the 4-year high-school system as were enrolled in the last year of the elementary schools, but the enrollment in the second year high school was 27.5 per cent less than in the first year. The superintendent and school board realizing the situation took immediate steps to provide enlarged opportunities in industrial arts, vocational-industrial, and technical subjects with which more nearly to meet the needs of the cosmopolitan character of the secondary school student body. A well-known educator and president of a large State university recently said that "Democratic society has insisted on the school offering training in many lines. * * * Each individual is entitled to that educational opportunity which corresponds to his ability and power to achieve."

2. *A fuller recognition of individual differences.*—Individual differences which are fundamental to a consideration of types of training that should be provided consist not only of differences in I. Q. and mental alertness, but differences in attitudes, aptitudes, and opportunities relative to life occupational interests as they are conditioned by economic and other environmental circumstances. The probability of success in any contemplated line of work is conditioned

not only by mentality as determined by standardized intelligence tests, but also by the opportunity to achieve and the willingness to achieve. The assumption that an individual with a high I. Q. should, because of that fact, train for some one of the professions is just as fallacious as is the practice of putting an individual with a low I. Q. into a shop representing a trade that requires a high degree of skill and ready technical knowledge, with the expectation that he will make good in competition with others with liberal mental endowments. In both instances good mentality is essential to efficiency, and in both instances interest and effort are important factors in ultimate success. It is true, however, that occupational activities vary in their complexity. The less complex activities do not require so high a degree of intelligence as the more complex activities do. It is in these less complex occupations, whether in the field of manufacturing, building, merchandising, commerce, or the professions, that the individual with the lower I. Q. will find his optimum opportunity for success.

During the past two years progress was made toward solving some of the problems connected with individual differences as related to training and placement. Contributions to this end have come from studies and practices of an experimental or pioneer nature carried on by the industrial education, the guidance and placement, and the research divisions in the public schools; by the employment and personnel divisions of industrial plants; and by industrial associations interested in the training and up-grading of employees in the industries they represent. The most important contributions have included studies dealing with the following subjects:

(*a*) Occupational levels. These studies have furnished valuable information relative to the technical knowledge and skill required for employment in the different levels of a major occupational division of work.

(*b*) Job analyses made for instructional purposes. Job analyses made by persons with practical experience who have a knowledge of the learning process have added during the past two years very materially to our knowledge of the abilities necessary to do the jobs included in a particular occupation.

(*c*) Success factors. Considerable attention has been given to the types of abilities that make for success in different occupations. In addition to the factors of skill and technical knowledge, which are essential, there are other factors of a personal character such as specific interests, temperament, emotional stability, and social adjustment which are frequently the causes of success or failure. Little information relative to these questions has been compiled and published, but teachers of vocational subjects, production foremen, and

employment officers are accumulating valuable information of an empirical character on these problems as a part of their observations based upon experience. These various types of studies and experimental practices have set forth more clearly the feasibility of providing vocational-industrial courses and the possibilities which such courses have for vocational efficiency. These have resulted in a stimulation of industrial education in the public schools, especially in the cooperation of the schools with industry in providing practical types of training.

3. *Growth of the junior high school movement.*—The junior high school movement started about 1909. In 1926 there were 1,109 junior high schools and in addition 1,149 junior high school departments in connection with senior high schools. The rapid growth previously made in the junior high school development was continued during 1926–1928. The growth of the junior high school movement has been accompanied by a very material increase in the manual arts work due, first, to the philosophy of the junior high school, which emphasizes the need for providing for individual and group differences, for exploration and discovery of aptitudes and interests, and for an enriched curriculum of general education; and second, to the flexibility of the instructional organization which more easily permits the introduction of shop courses.

4. *Increased recognition of the need for training in abilities necessary for the intelligent use and care of industrial products and services in common use about the home and in connection with leisure time and avocational activities.*—These desired abilities relate both to specific knowledge of an industrial character and to mechanical manipulation. As examples of circumstances which have contributed to the need for such training we may note the increased use of electrical and mechanical appliances in the home, of conventional drawings and symbols as a means of representing ideas in literature and plans dealing with the construction of homes, and of the automobile and the consequent need for abilities relating to its purchase, care, and operation. Courses in these subjects, when carefully organized for the purpose, are of great value in developing abilities which the consumer should have.

Information received by special reports to the Bureau of Education is to the effect that among the most common subjects added during the past two years by school systems to their industrial arts programs are home mechanics, auto mechanics, drafting, and electricity. A number of schools enroll girls in some types of these courses.

5. *Recognition of the economic returns to the State by those who go to work.*—A more general recognition of the early economic return to the State by those who early leave the full-time school to

enter upon employment in the trades and industries was during the past two years an important factor influencing the increase of vocational-industrial courses in the public schools. Such training should be provided not only because the State owes it to these individuals as a social service but also because it pays a financial return on the investment in the way of increased economic wealth.

In 1920, according to the United States Census report for that year, there were 41,614,248 persons 10 years of age and over who were gainfully employed. Of those gainfully employed 30.8 per cent were engaged in manufacturing and mechanical pursuits; 26.3 per cent in agriculture, forestry, and animal husbandry; and 5.2 per cent in professional service. In 1919 there were 10,812,736 persons engaged in manufacturing industries only, of whom 79.4 per cent were males and 20.6 per cent were females. Of this number 120,919 were under 16 years of age. Of these 53.3 per cent were male and 46.7 per cent were female.

6. *Growth of industries.*—The United States is rapidly becoming an industrial nation as evidenced by shifts in population centers. The States which have made the larger relative gains in population since 1910 are, almost without exception, the industrial ones, while the States making the smaller relative gains are quite generally those in which agriculture is the dominant industry.

7. *Cooperative relations with industry.*—During the past two years the cooperative relations developed with industry for the promotion of vocational education have resulted in many places in the enlargement and improvement of the vocational program. These mutually helpful relationships, based on a common interest and for a common purpose, have expressed themselves in various ways, among which may be mentioned:

(1) The establishment of contact or advisory committees, composed of employers and employees, for the purpose of securing their advice and cooperation in the determination of the courses to be offered, the content and instructional material for the courses, the selection of trainees, and the selection and qualifications of instructors.

(2) The participation of industry in the programs of educational organizations resulting in a better understanding by the public schools of the training needs of industry, and a better appreciation by industry of the possibilities of training in and through cooperation with the public schools, all of which is conducive to the development of a feasible vocational-industrial program.

(3) The appointment of coordinators for part-time students who act in an official advisory capacity between industry and the school relative to the employment work and the school training of the in-

dividual students, thus bringing about a unified plan of procedure for work and training. Sometimes the coordinators are men from the industries, and in some instances carry on the work of coordination without expense to the school.

(4) The supplying of suitable equipment by industry for specific types of vocational-industrial courses. For example, in the building-stone industries some of the companies producing building stone or doing construction work in stone have supplied schools with granite, marble, or limestone to be used for instructional purposes together with necessary machines and tools.

(5) *Foremen conferences.*—The growth of foremen conferences as a part of the local vocational-industrial program has had a stimulating effect upon the development of trade courses. There are a number of reasons why this is true. Through such conferences the school gains a very intimate insight as to the kinds of trade courses the local community most needs; often valuable information is obtained as to what the content of such courses should be, and frequently there is discovered a valuable source of supply of trade teachers.

8. *Improvement of mechanical devices.*—Inventions and improvements in machines and mechanical processes are creating needs for additional training courses which are demanding inclusion in the industrial programs of the public schools. For example, the advance in aviation and radio work has already caused courses in some phases of these subjects to be introduced into a number of schools. Scientific discoveries and the invention of labor-saving machinery and tools are constantly bringing about changes in manufacturing processes and creating a demand for trained mechanics. All these change-producing forces have been quite active during the past two years.

9. *Research studies and job analyses.*—Studies by industrial organizations, made for the purpose of increasing efficiency in production, for rating and up-grading employees, and for the selection and training of employees, together with job analyses for instructional purposes made by persons interested in the development of unit courses of training, all have contributed content material for trade courses and thereby have stimulated the organization of such courses.

10. *Universal need for highly skilled mechanics.*—There is a universal demand in the industries for men who can fill positions requiring a high degree of skill and technical knowledge, such as tool and dye makers and builders of precision tools and machines. It is necessary that men for these positions be trained in our own country, as other countries, such as England, Germany, and Russia, are in the same condition as the United States, their demand for such skilled artisans exceeding their supply. The increased use of machines for

performing operations previously done by hand and the demand for refinements in machines to meet the need for machine products worked to smaller dimensions are constantly increasing the need for high-skilled tool and machine builders the world over.

VARIETY IN COURSES AND INSTRUCTIONAL ORGANIZATION

A study of the industrial program in the public schools during the past two years shows an increase in the variety of courses offered. Instruction is now given in subjects which a few years ago would have met with no consideration from most superintendents. There was also further development and modification of plans for the organization, administration, supervision, and instruction relative to industrial courses. Information collected by the Bureau of Education shows that a number of schools have introduced courses in some phase of aviation. For example, the Joliet (Ill.) Township High School now offers a course in aeronautics in which the theory of flying is stressed. Instruction relative to airplane engines is given in connection with the fourth-year work in auto mechanics. Other examples of the newer types of courses follow:

The Frank Wiggins Trade School, Los Angeles, Calif., offers a janitors' engineering course for men employed in janitorial work. The course covers heating, lighting, and ventilating from the standpoint of a janitor's responsibilities. Owing to the demand for service men in the radio industry the vocational education board of Essex County, N. J., made a survey of the radio manufacturing industries in the county. On the basis of this information specific courses were organized in the trade schools of the county to train for production and service jobs in the radio industry. The Santa Barbara (Calif.) High School offers a course in stagecraft in which the students learn to construct scenery, do painting and decorating, and electric wiring for illumination. The high school at Stockton, Calif., offers a course in foundry practice in cooperation with a large harvester company. The instruction is carried on in the factory of the company by an expert foreman. Students for the course are carefully selected with reference to their aptitudes and interest for the work. The Union High School, Fort Bragg, Calif., has developed a plan of vocational and industrial education in cooperation with local industries. The program includes courses in power-plant engineering, laundry work, and linotype work. Bedford (Ind.) High School, in the center of the oolitic limestone industry, offers a course in stone drafting together with work in the actual production of finished materials for buildings. The local companies cooperate with the high school and furnish a mill and necessary equipment for doing production jobs.

IMPROVED HOUSING FACILITIES

Special reports from State boards of education and information from various other sources indicate that during 1926–1928 there was considerable activity in providing additional housing facilities. A comparatively large number of new buildings for industrial work were erected, additions made to old buildings, and shop facilities provided in new elementary and high-school buildings. For example, New York State added about 15 new buildings for industrial education work and provided for shops in about 50 new school buildings. Michigan made provision for shops in 55 new school buildings and erected a few buildings for industrial work. Some States which have a comparatively small program in industrial work made noticeable progress in providing room for shops. For example, Utah added shop facilities in 19 buildings, New Hampshire in 13, Wyoming in 12, and Arkansas in 11. There is a tendency in some States to provide shops in new gymnasium buildings, underneath the inclined seating space and facing the outside of the building. When properly incorporated in the original plans this arrangement is very satisfactory for shop space.

Among the new buildings for industrial and technical work may be mentioned the Central Trades School building, Pittsburgh, Pa., erected at a cost of more than $2,000,000; the new building erected at Syracuse, N. Y., for the exclusive use of continuation school pupils, at a cost of approximately $250,000; the new technical high-school building, Washington, D. C., which cost for building, grounds, and equipment $3,500,000; the new addition to the Lathrop Trade School, Kansas City, Mo., costing about $80,000; the large addition to the Milwaukee (Wis.) Vocational School, which probably makes this the largest school building in the United States devoted exclusively to vocational and vocational-related subjects; the new shop building at Santa Barbara, Calif.; the vocational school building, Pensauken Township, N. J., costing $1,000,000; and the new vocational high school, Minneapolis, Minn., at a cost of $1,600,000.

Notwithstanding the progress made in providing housing facilities for industrial work many reports indicate that additional shops and classrooms are necessary in order to meet the increased demand for enrollment in this type of work.

PART-TIME AND EVENING SCHOOLS

Part-time and evening classes rendered a large service during the past two years in supplying effective training for many whose needs were great. There is a growing recognition of the value of evening trade-extension courses for employed persons and of part-time courses

for employed young people. In addition to the increased enrollment in these types of courses during the past two years, considerable development has taken place with respect to the improvement of instruction, supervision, equipment, and housing facilities. A number of the larger cities have constructed new buildings in which to take care of the increasing enrollment in part-time classes. There is also a general tendency to raise the qualifications for teachers in part-time and evening classes. The continuation schools of New York City are now on a par with the high schools with respect to personnel. The principals of these schools are appointed in the same manner as the regular high-school principals and the principals and teachers are on the same salary schedule.

In some places the growth in enrollment in evening and part-time classes has been quite impressive and is significant of the value attached to such courses by the public. For example, the enrollment of building-trades apprentices in evening classes in New Jersey increased from 100 five years ago to 2,500 at the present time. Both employers and employees cooperate in making the courses successful. Some of the trade organizations pay the necessary enrollment charges of their students. In some places in New Jersey apprenticeship agreements have been made with the school. This is especially true for the printing and carpentry trades.

In 1928 there was an increase of 9,500 pupils in the compulsory continuation schools of New York City. There are 15 centers for continuation classes for employed young people between 14 and 17 years of age. Practically all of the subjects offered in the evening classes are offered in the continuation classes. Vocational guidance and placement work is carried on. During the 1927 school year, 2,356 boys and girls, who were enrolled in part-time courses in five New York City high schools offering cooperative courses, earned $151,439. The students were in school and in employment on alternate weeks.

In 1928 the Boston Continuation School made a study of 1,200 of the 1,600 girls enrolled in its courses. It was found that they left school beginning with the sixth grade and the dropping-out process continued in succeeding grades through the eleventh. The model grade for leaving school was the eighth. The largest number was employed in candy factories, the artificial flower business, and in the food products industries and service. The greatest number of calls for help came from candy and other manufacturing industries where the work was of a light nature. Factory work paid the highest wages. The weekly wages ranged from $8 to $15.

The Washburne Continuation School, Chicago, Ill., is a part-time school for boys, operating on an 8-hour day schedule. Both con-

tinuation and apprenticeship pupils, ranging from 14 to 17 years of age, are enrolled under the compulsory part-time school law, and attend school once a week. In December, 1927, the number of apprentices distributed among the trades represented was as follows: Carpenters, 575; electricians, 524; machinists, 157; sheet metal workers, 105; painters and decorators, 256; steam fitters, 377. The subjects offered the apprentice group are: English, mathematics, civics, applied science, drawing, estimating, and other trade-related subjects. Shops are maintained for sheet metal, steam fitting, woodworking, painting, baking, electricity, and paperhanging. Much of the equipment for the school was donated by industry.

There are coordinators for the apprentice boys who articulate the work of the school with that of industry. The coordinators are usually men from the industries. The organizations to which the apprentices are responsible are usually very strict in the enforcement of the apprenticeship contract, and if a boy fails to make good in school or fails to attend regularly, his apprenticeship is taken away from him. There is a large waiting list for the steamfitters' course.

Provisions made in 1928 in the laws of the State of New York relative to part-time and evening instruction represent some progressive tendencies toward providing legal regulations affecting these types of public-school courses. The law provides that minors from 14 to 17 years of age, who have received employment certificates and are employed, shall attend upon part-time day instruction. This provision, however, applies only to cities of 20,000 or more inhabitants and to school districts which have 200 or more employed minors under 17 years of age. Boards of education in cities with smaller population may require attendance of minors upon part-time instruction. Attendance upon full-time instruction is required up to 14 years of age, and until 16 years of age if not employed. City school boards are empowered to require attendance of minors from 16 to 17 years of age who are not employed in the full-time day school. In cities coming under the provision of this law, but whose boards of education do not require unemployed minors over 16 years of age to attend the full-time day school, such minors between 16 and 17 years of age, not voluntarily attending upon full-time day instruction, are required to be in attendance upon part-time day instruction.

For part-time day classes at least four hours of instruction per week during the time that the full-time day schools are in session are required. The law definitely limits the time of day during which part-time instruction shall be given by stating that it shall be between 8 a. m. and 5 p. m., on the days that the regular full-time classes are in session, and between 8 a. m. and 12 o'clock noon on Saturday. The law empowers local school authorities, upon the

request of employers, to substitute a half-time system for groups of employed minors in a given occupation.

The law is specific in its definition of what constitutes lawful absence from part-time instruction and provides that unlawful absences shall be made up by hours of attendance in excess of those otherwise required. It also sets up procedure for determining whether an individual is mentally or physically unable to attend school or to benefit by instruction. The law states that school subjects shall be included for the enlargement of the civic, vocational intelligence, and skill of the part-time pupils. The State department of education is given the power to alter the subjects taught.

Evening schools in cities with population of 100,000 or more are required to be in session for at least 100 nights; in cities with population between 50,000 and 100,000, for at least 75 nights; and in other cities and school districts having 20 or more minors who under the law are required to attend upon evening instruction, 50 nights. In school systems which provide evening instruction in accordance with the State law, minors between 17 and 21 years of age who are unable to use the English language to a degree of efficiency comparable with the abilities required for the completion of the fifth year of the elementary school, and who are not attending the full-time day school, are required to attend upon evening instruction.

AGE FOR ENTERING EMPLOYMENT INCREASING

A number of factors are operating in most parts of the country which tend to increase the age at which young people enter upon full-time employment in the industries. Among the causes contributing toward this end is the increasing responsibility placed upon employers by the operation of liability laws. This has resulted in firms in a number of instances refusing to employ persons as young as they previously did in certain positions. Especially is this true for types of work which involve any particular hazard, such as work about power machinery and certain kinds of production jobs in the steel mills. Then, too, the attitude of labor has influenced this tendency by the stand it has taken for the education of the youth of the country, which means more years in school and a later entry upon employment.

Some employers' associations have also taken a stand favorable to increasing the age for entering the industries. For example, The National Association of Manufacturers has gone on record as favoring employment of children between the ages of 14 and 16 only when certain requirements are met relative to physical fitness, educational training, regulations for hours of work, and prohibited employment in dangerous occupations. Compulsory school laws also

affect the situation by holding children either in the full-time school or in part-time classes for an increasing number of years. Thirty-one States have now enacted some form of compulsory part-time law. A few States have made 18 the minimum age for school leaving. Certain exemptions, however, are provided. The inclusion in high schools, in technical schools, and in trade and other vocational schools of types of work which make an appeal to larger numbers than these schools formerly did, has resulted in increasing the holding power of the schools. The results from these causes and some other subtle influences are that the flow from school to full-time employment has been slowed down for the younger ages.

PRINTING

Printing is one of the school subjects that showed considerable growth during the past two years. This is in keeping with the development of the printing industry, which now ranks among the largest in the United States with respect to wages paid. The American Type Founders' Co. estimates that there are 450,000 persons employed in the printing industry and that the annual payroll amounts to $560,000,000.

According to a report of the United Typothetæ of America 28,537 students were enrolled in printing courses in the United States and Canada in 1926–27. Teachers of printing numbered 443 and institutions in which printing courses were offered, 369. The types and number of institutions offering instruction in printing were as follows: Academic high schools, 88; junior high schools, 86; technical high schools, 22; evening schools, 31; colleges and normal schools, 9; "plant" schools, 10; elementary schools, 29; continuation and part-time schools, 17. The time given to instruction varies greatly according to the school grade in which a course is offered, the objective of the course, and the practice of the school. The range is from 1 to 48 hours per week, and from 5 weeks to 6 years for completion of the course. The report estimates the value of school equipment for printing at $3,316,960.

New York City has enlarged its program in printing instruction in an effort to meet the demand for trained printers. There has been added to the Central Printing Trades Continuation School a department called the school for machine training, offering instruction in maintenance and repair to hand compositors who have had 4 years of experience in the composing room and have had at least 3 years of training in hand composition, of an apprentice grade, in some approved school.

The operation of the school for machine training is an excellent example of the cooperative relationships that may be established

between schools and industry for the purpose of offering instruction in industrial lines of work. The school is conducted under the direction of the board of education and has the cooperation of the New York Employers' Association, the New York Newspaper Publishers' Association, and Typographical Union No. 6. A board consisting of representatives of these four bodies administers the school under terms of a contract entered into between the four groups concerned. The board of education supplies space, custodial service, heat, light, power, and the instructors' salaries. The other parties to the contract agree to cooperate in providing the machine equipment and the supplies needed for instruction. They further aid in the selection of expert instructors and augment as much as is necessary the salaries paid by the board of education.

Students in the Central Printing Trades Continuation School who have completed three years of instruction in the school for printers' apprentices may take for their final year of apprenticeship training the course in machine training. Apprentices who elect this course are required to attend regularly in order to receive credit for a diploma. Attendance is for 6 hours per week, 3 hours of which are in the afternoon and the other 3 hours in the evening of the same day. The afternoon attendance is on the employers' time, while the evening attendance is on the time of the apprentice. The course runs 40 weeks per year. The Central Printing Trades Continuation School has also organized a school for printing pressmen and a newspaper pressmen's school. Both of these departments are operated along the same lines as is the department of machine training.

MODEL BOAT AND MODEL AIRPLANE BUILDING

Two types of project work included in manual arts courses showed a rapid growth in popularity during the past two years, namely model boat and model airplane building. Of approximately 200 representative school systems of cities having more than 10,000 inhabitants, reporting to the Bureau of Education, 42 per cent offered instruction in model boat building in the year 1927–28, and the same percentage offered work in model airplane building. A large number provide work in both. Seventy per cent of the cities having 100,000 or more inhabitants have courses in model boat building and 70 per cent in model airplane building, with a large number offering instruction in both. Of these cities, with a population between 10,000 and 25,000, only 32 per cent have work in boat building and only 32 per cent in airplane building. The reports indicate that these subjects enjoy about equal popularity in the school program, and that their frequency with respect to the size of cities represents a very regular curve which is in direct ratio to the size of the cities.

A number of schools hold yearly contests at which the boats are judged for design, quality of workmanship, and performance in the water. For example, the boats made in the manual arts department of the St. Petersburg (Fla.) High School are displayed before a committee from the local yacht club and a silver cup is awarded to the builder of the best boat. The Model Yacht Racing Association of America, which is a member of the International Model Yacht Racing Association, is doing much to promote interest in model boat building and sailing. Many articles have appeared in the periodicals on model boat building, and there are some books on this subject.

Detroit, Mich., was one of the first cities to provide a definite program in model airplane construction in the public schools. The work was introduced in 1923 and has proved to be of great interest to the boys, who frequently remain after the regular school hours for work on their planes. Student airplane clubs have been formed in a majority of the secondary schools of the city.

A number of cities hold local airplane tournaments which serve not only for a public display of the school's work and for the awarding of prizes but also for the selection of a contestant to be sent to a regional or national meet. The first national contest of the Airplane Model League of America was held in Detroit, Mich., in 1927. There were 259 contestants from different parts of the country. The expenses of some of them were borne by newspapers, civic clubs, or other local organizations. A number of valuable prizes were awarded. Two boys won trips to Europe as guests of The American Boy magazine.

The increased attention given to model boat and airplane building in the public schools during the past two years is in keeping with the theory that projects in the manual arts should be in harmony with the interest and ability levels of the pupils and that at least some of them should contribute to the pupils' leisure time and play activities.

SCHOOL EXHIBITS

The past two years have witnessed a growing interest in shop exhibits of the public schools. Periodical literature covering the time of the year when most schools are closing contained many notices of public displays of products of the industrial and manual arts shops of the public schools. This is having a beneficial effect on shop programs. Through such exhibits the attention of the public is called to the work the school is doing. A more intelligent and sympathetic understanding of the industrial education program is developed on the part of the parents, representatives of the local industries, and the general public. Usually this becomes a factor in crystalizing public opinion for the approval and support of the

industrial education program. As an example of local exhibits from the industrial school shops the display made in one of the Young Men's Christian Association buildings in Chicago in 1928 may be noted. Shop work from 35 elementary schools, junior high schools, and senior high schools was placed on exhibition and included miniature speed boats equipped with small motors, model airplanes, products of the print shop, electrical apparatus, art work, metal work, foundry work, basketry, radios, etc.

Sometimes regional exhibits are held. For example, there was held in May, 1928, at the Iowa College of Agriculture and Mechanic Arts, Ames, Iowa, an industrial arts judging contest and display in which more than 60 high schools of the State participated. The exhibits consisted of construction work in wood, metal, fiber, etc., and drawings from the mechanical drafting departments of the schools. The exhibits represented in a concrete way the industrial work carried on in the schools of the State. Prizes were awarded for the best exhibits in each of the different classes of projects included. An interesting feature of the plans governing the exhibit was the provision whereby the schools of the State were classified according to certain common characteristics, and each school entered its exhibits for competition with the schools in the same class to which it belonged. The classification for the schools was: Rural and consolidated schools, small-town junior high schools, small-town senior high schools, urban junior high schools, and urban senior high schools.

GUIDANCE

A great deal of attention has been given during the past two years to the theory and practice of guidance. Programs of teachers' meetings, research studies, and educational literature have dealt to a considerable extent with the problems of guidance in the public schools. With the growing realization of the importance of this work as a factor in the final satisfactory adjustment of the individual into a wage-earning life occupation, the general public has become greatly interested in the discussions of ways and means for making guidance effective. During the past two years a broader view has been taken of the problems involved and less emphasis has been placed upon a hasty attempt to guide inexperienced youth with limited practical training into specific occupations. More emphasis has been placed upon an educational guidance procedure covering a term of years, which aims through various forms of direct and indirect experience to furnish opportunities for the gradual development and discovery of aptitudes and interests and for gaining reliable information as to the training required for specific occupations and the employment

conditions in the occupations. Indirect experience includes reading, study, and observation relative to occupations; direct experience includes manipulative work in a variety of construction materials and in various mechanical operations performed in the school shops and in employment.

One means of providing indirect experience is the inclusion in the program of studies of a course in occupations, usually offered in one of the junior high-school years or in connection with the work in continuation school classes. As an evidence of the tendency to increase the emphasis placed upon occupational studies as a part of a general guidance program, reports to the Bureau of Education for 1927–28 from 215 representative school systems in cities having a population of 10,000 or more, show that slightly more than one-half offer a course in occupations. Of the cities reporting which have fewer than 50,000 population, 40.4 per cent offer such a course, while of the cities having more than 50,000 inhabitants 61 per cent offer a course in occupations. Reports covering the year 1925–26, showed that only about one-third offered a course in occupations, thus indicating a gain of approximately 16 per cent in the number of cities offering such a course.

Notwithstanding the increase in the number of schools offering courses in occupations, and the fact that many schools have teachers who do some counseling and make some contacts with industries for the purpose of finding employment for pupils seeking wage-earning positions, only a small percentage of schools have a coordinated and centralized program covering all phases of guidance. Fewer still have such a program under the direction of one person employed with reference to his special qualifications for the work. A complete guidance program includes studies in occupations, tryout and exploration in mechanical and manipulative types of work, counseling, placement, and follow-up work. In vocational guidance emphasis is placed on individual counseling.

Although the subject of vocational guidance has been discussed for years, its inclusion in local school programs is not general, and in many instances the procedure is varied and often experimental. However, there is a growing demand for the development of guidance work. The committee on resolutions of the National Education Association recommended, in 1927, "that educational and vocational guidance be considered a primary obligation of organized education."

A few State departments of education have outlined guidance programs for the schools of their States, and in some instances have issued bulletins and other publications giving suggestions for the organization of the guidance work and furnishing lists of reference material. A few large cities have made valuable contributions to the

literature suitable for use in courses in occupations, by the production of studies covering different occupations. Each study deals with the training and qualifications necessary for employment in the occupation, the nature of the work, employment and working conditions, wages, opportunities for advancement, and the future of the trade.

In the smaller schools, especially those in rural communities, it is more difficult to organize guidance work than in the large city schools with sufficient student bodies to warrant the employment of special personnel for the purpose and where there are local opportunities to place individuals in a large number of occupations. However, there are found occasionally in rural communities and in small cities practices which are based upon feasible and effective organization plans. During the school year of 1926–27 some citizens of Hunterdon County, N. J., effected the organization of the Hunterdon County vocational guidance committee, whose membership included representative citizens, five high-school principals, the county superintendent of schools, and the secretary of the Young Men's Christian Association of the county. In the beginning the aim of the committee was only to assist the graduates of the high schools in the county to find employment positions best suited to their abilities. However, it soon realized that successful placement was dependent upon the development of previous occupational information and guidance. Arrangements were made whereby the services of the professor of educational and vocational guidance at Rutgers University were secured to meet with the faculty of each of the high schools in the county for the purpose of outlining the essentials of a comprehensive guidance program.

A study was made of the educational and vocational interests of the seniors in each high school. Each senior received counsel relative to further education and to occupational employment. A questionnaire was developed and sent by the committee to former students who were already in employment. By this means information was secured as to age and grade at which pupils left school, reasons for leaving, the nature of initial jobs, promotions in employment, training necessary for particular jobs, etc. Rutgers University assisted in making a report on these questionnaire returns. Later, extension classes in guidance were organized for the teachers under the direction of the county superintendent and programs in guidance were planned for the schools, which are carried out under his direction.

The problem involved in educational guidance, especially in the junior high school, is not to get from pupils through printed tests information as to their present interests and aptitudes, based upon their very limited experiences, so much as it is to furnish them with

opportunities in the form of both direct and indirect experiences through which they may discover and build up aptitudes, interests, and attitudes relative to the choice of an occupation.

There are a number of studies that generally should be carried on by schools, the accumulated data from which would in the course of a few years throw a good deal of light upon some of the problems connected with guidance and placement. For example, there are needed more records as to activities carried on outside of school hours and as to employment for a few years after leaving school. A few schools have made studies relative to such questions. In 1927, according to a published report, a study was made of 758 boys representing a cross section of the student body of the Rindge Technical High School, Cambridge, Mass. Of this number 361 worked after school hours for pay and 397 did not. Of the working group 107 were compelled to work in order to remain in school and 254 worked in order that they might have the additional pleasures their earnings would afford. The workers were distributed in various common jobs. Sixty-four were employed on paper routes, 57 in commercial shops, 37 as errand boys, 7 in libraries, 3 in laboratories, 3 as music teachers, and the remainder in miscellaneous jobs of a common type.

Intelligence scores for each were recorded and some comparisons made on this basis. It was found that there was no difference between the working group and the nonworking group relative to intelligence scores. The workers, judged by the number of failure marks received, were a little more successful in their school work. Of the two working groups, those who were obliged to work had better average school marks, had fewer failure marks, and more honor marks per pupil than did the group who worked to obtain extra spending money. The average school marks for the group obliged to work were higher than for either the nonworkers or the group which worked to earn additional spending money.

The David Ranken Junior School of Mechanical Trades, St. Louis, Mo., has compiled records of its graduates for approximately the past 15 years with reference to their remaining in the trade or a closely related line of work for which they were trained. These percentages for the different trades in which instruction is offered are as follows: Carpentry, 84 per cent; painting, 84 per cent; plumbing, 85 per cent; auto mechanics, 85 per cent; machine shop practice, 81 per cent; steam engineering, 77 per cent; patternmaking, 76 per cent; and electricity, 80 per cent.

A report received from the State Trade School, New Britain, Conn., based on a study of returns from 88 per cent of its graduates in the past 16 years, shows the following percentages of graduates remaining in the trade for which they were trained or in a closely re-

lated trade: Auto repair, 85 per cent; carpentry, 100; machine drafting, 98; electrical work, 79.4; machine trades, 95; masonry trades, 100; wood patternmaking, 78.7; printing, 100; plumbing, 100. Information on the question of the percentage remaining in the trade for which they were trained indicates that it varies with a number of factors, such as local employment conditions in the trades, local opportunities for obtaining employment in other than trade lines of work; and the source and character of the students coming to the trade school.

There is a growing demand that teachers in guidance work and those doing vocational counseling have specific training. New York City has set up special qualifications for teachers who serve as vocational counselors. They are required to pass an examination for a special license to become teachers of vocational and educational guidance subjects. The school board has created the position of director of guidance and placement, who supervises all the work for the city.

The Vocational Service for Juniors, a privately financed organization of New York City, has done much to aid the development of guidance and placement work in that city. Its specific aim is to aid young people to make adjustments to their future work, and to demonstrate to the public the value of such service. It provides scholarships to deserving children to enable them to go through high school or to take a vocational course in a trade school. For the school year 1926–27 this society maintained an average of 98 scholarships, ranging from $3 to $6 per week, throughout the school year. Of the 1927 scholarship graduates, 12 are making their way through college, 4 are working and continuing their education in evening college, and 5 are in the line of work for which they were trained.

It is interesting to note that during this year the society received 6,209 requests from employers for help. Of these, 37 per cent were for errand jobs, 23 per cent for semiskilled factory jobs; 15 per cent for office jobs; 10 per cent for mercantile jobs; 4 per cent for skilled clerical jobs; 3 per cent for trade jobs; and 2 per cent skilled factory jobs. The remaining 6 per cent were distributed between miscellaneous, part-time, and temporary types of work.

Courses in occupations and work in guidance and placement are constantly affected by changing conditions in the industries, such as the development of new machines and manufacturing processes, fluctuations in the demand for particular industrial products and services, and the creation of new types of products and services. In recent years there has been a large increase in distribution, assembling, and service jobs. The radio business is an example of this.

It is estimated that from 1920 to 1927 the number of persons engaged in manufacturing, assembling, distributing, and servicing radio products increased from 25,000 to 150,000; the number engaged in the production, distribution, and servicing of automotive products increased about three-quarters of a million; the number engaged in the motion-picture industry increased by 150,000; and the barbers and hairdressers increased from 216,000 to 385,000.

TESTS

Experimental and other forms of research studies carried on during the past two years indicate that the work of developing paper tests for discovering mechanical aptitudes is still in the experimental stage. The question has been raised of the validity of some tests which have been devised for this purpose and there is need of further experimental work to determine whether they really measure native mechanical ability. In fact, the whole question of developing paper tests that will have prognostic values sufficient to warrant their use for this particular purpose is still in the realm of the problematical. In the attempt to devise such tests it must be borne in mind that the ability to answer a list of questions about machines, apparatus, tools, and mechanical processes may or may not correlate highly with the ability to manipulate tools and materials. The information necessary for answering such questions correctly may or may not have been derived from experiences coming as a result of natural interests and abilities. The fundamental factor which brought such experiences into the pupil's life may have been the result, more or less, of chance and environmental circumstances.

The value of performance tests for determining mechanical ability should also be the subject of further research. Although such tests attempt in a direct and concrete manner to determine the pupil's mechanical ability by measuring the quality of workmanship shown on the test, it is not always certain to what extent the abilities manifested are due to native aptitudes or to skill acquired in practice. Moreover, the time and effort, both of the instructor and the pupil, required for giving such tests are important factors in determining the extent to which it is feasible to use them. There are some indications, however, that performance tests may be developed that will yield valuable information for the improvement of instruction, even though their value for discovering native mechanical ability may be exceedingly doubtful.

Progress was made during the past two years in the development of achievement or accomplishment tests in industrial educational subjects. Especially was this true for mechanical drafting in which

subject some objective tests were devised that seem to have value for determining pupil achievement. With the efforts that are now made to set up standards of accomplishment in industrial arts subjects in terms of given units of training, further development and refinement of ways and means for measuring accomplishment abilities may be expected.

TEACHERS

The qualifications that should be set up for industrial arts teachers was the subject of discussion during the past two years. The results of this are reflected in the changes made by teacher-training institutions in their curricula, in the requirements by State boards of education for licenses to teach industrial arts subjects, and by the requirements for employment fixed by some local school boards. A few State teacher-training colleges now offer a 4-year curriculum for industrial arts teachers. Others have provided additional courses, particularly in special methods and shop organization. There is also a tendency for teacher-training schools to provide more shop work, especially with respect to the inclusion of a greater number of shop activities. This policy is in keeping with the increase in the number of junior high schools, as variety in shop activities in these schools is an important factor for realizing the exploratory objective of the junior high school. In some instances an effort was made to provide atleast some special work for junior-high-school teachers of industrial subjects. This is an apparent need, as the objectives, plan of shop organization, and methods of instruction vary quite decidedly from those of the senior high school.

Some local school systems are cooperating with State teacher-training institutions in providing extension courses for the upgrading of their industrial arts teachers. The State Teachers College, Santa Barbara, Calif., is offering a number of such courses. A course dealing with the organization, instruction, and activities of the general shop is very frequently included in the extension work carried on in connection with a local school system.

A conference composed of persons engaged in the training of industrial arts teachers in the State teachers colleges and representatives of the State Department of California was called in December, 1926, by the State superintendent for the purpose of considering some of the problems involved in training teachers of industrial arts subjects of a nonvocational type. It was unanimously agreed that 40 semester hours of shop work be prescribed as a basic course, with 10 electives in shop work, making a total of 50 semester hours of shop work required for a degree. The 40 hours of prescribed

shop work include woodwork, machine shop, auto mechanics, wood finishing, electricity, sheet metal, plumbing, leather work, forging and welding, mechanical and architectural drawing, and cement and concrete construction.

As a further example of higher requirements of industrial arts teachers, the State Department of Education of Pennsylvania has ruled that after 1931 all applicants for teaching industrial arts subjects must have three years of college work and that after 1932 such applicants will be required to hold a 4-year college degree.

During the past two years there was much activity manifested by teachers of industrial and manual arts subjects in teachers' clubs and other forms of teachers' organizations. More than a score of new local and regional organizations were formed during this period. These associations had some excellent programs and contributed in no small way to the promotion of industrial types of work, both in respect to the improvement of instruction and the organization of programs to meet existing needs.

SUMMARY OF SOME PRESENT CONDITIONS, TENDENCIES, AND PROBLEMS RELATIVE TO INDUSTRIAL EDUCATION

1. During the past two years the total number of different specific industrial courses offered by the public schools was materially increased. The tendency is still further to meet the needs of industry and labor by this means.

2. There is a growing tendency to regard vocational-industrial training as cooperative work with industry, in which the school, the parent, and the industry are vitally interested. School authorities are realizing the necessity of seeking the sympathetic cooperation of the industries, including employers and employees, in the development of their vocational-industrial programs.

3. The part-time program showed comparatively large development during the past two years. Part-time work, especially of the cooperative type, is regarded as a very effective method of training.

4. Some of the large cities are organizing their vocational courses with respect to housing and administration according to the trade; that is, on the basis of providing separate trades schools, such as an automobile trade school, a printing trades school, etc. Other cities are organizing trades schools wherein are housed and taught under the direction of one principal a variety of unit trades.

5. Compulsory part-time school attendance laws are increasing. Thirty-one States have enacted such laws.

6. Some studies have been made in occupational levels, but information on this subject is still very limited. Studies to determine the

occupational levels in the major occupational fields are very greatly needed for the light they would throw upon the need for specific training and opportunities for placement.

7. The question as to the kind and amount of training that should be provided for seriously retarded children is still almost wholly unsolved. Studies including all of the major occupational vocations should be made with a view to finding a field of employment for retarded children when given the necessary training.

8. Housing facilities for all types of industrial work were improved during the past two years. In some places there are definite plans for improving the housing facilities for part-time classes.

9. There is an increasing recognition of the need for special qualifications and training for the supervision of industrial arts courses.

10. There is a growing conviction that there should be vocational terminal courses in the junior college for some positions in the intermediate occupational levels in industry.

11. The requirements for obtaining a position as an industrial arts teacher are higher than formerly in respect to both academic and professional work, and to practical training.

12. There has been an increase in the number of schools using the general shop, with its variety of activities, as a type of organization for offering instruction in industrial arts in the junior high school grades.

13. Information from more than 200 representative school systems shows that there was an increase during the past two years of about 15 per cent in the number of schools offering a course in occupations.

14. The age at which youth enters upon full-time employment is increasing.

15. There is a tendency for more schools to offer a course in home mechanics or some type of general mechanics courses.

16. In a few schools girls are enrolled in home mechanics courses. There is an increasing tendency for girls to take work which will enable them better to perform mechanical tasks of a nonspecialized character in connection with home and leisure-time activities. There is also a demand for a type of training for girls which will qualify them to operate and care for mechanical and electrical machines and appliances which they will have occasion to use about the home and in their leisure time.

17. Projects in model boat and airplane construction are very popular in the junior high school.

18. The cost of instruction and the size of classes in industrial arts shop courses are studied in a number of schools by persons interested in the development and improvement of this type of work.

19. The attitude of industrial arts teachers and supervisors toward the use of mechanical aptitude tests is that of intelligent questioning and experimenting.

20. Much interest was manifested during the past two years on the part of industrial arts and vocational-industrial education teachers and supervisors in organizing and promoting the usefulness of local and regional clubs and associations for professional improvement and the development of all types of industrial education.

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