CONSTANT AND VARIABLE OCCUPATIONS AND THEIR BEARING ON PROBLEMS OF VOCATIONAL EDUCATION

LEONARD P. AYRES, PH.D.

DIVISION OF EDUCATION
RUSSELL SAGE FOUNDATION
130 EAST TWENTY-SECOND STREET, NEW YORK CITY

Price 5 cents

3-14-35

Constant and Variable Occupations and Their Bearing on Problems of Vocational Education

It is commonly claimed that systems of vocational education should be primarily designed to train children to enter the local industries. But when we study industries and occupations in a number of localities, we find that some of the ways by which men and women earn their livings are common to all of them, while others engage many workers in some places and few or none in other places. From the viewpoint of vocational education this seems an important consideration. If there are certain occupations which offer opportunities for employment to a considerable number of workers everywhere, we ought to know which those occupations are. Such occupations which we find everywhere engaging the services of considerable and fairly constant proportions of the workers may perhaps properly be termed "constant occupations" and by contrast those which are not of this character may be termed "variable occupations."

In connection with other studies of problems affecting vocational education the Division of Education of the Sage Foundation has recently conducted a brief study to determine which occupations may fairly be termed constant occupations and the degree in which they are entitled to this classification. The study seems to demonstrate that the classification is a valid one. The constant occupations are in the main those which are necessary to maintain the many branches of that enlarged municipal housekeeping which must go on wherever large numbers of people live together in one place. For example, house painting must be carried on in the city where the house is, while paint may be manufactured anywhere. Thus house painting is a constant occupation, but the manufacture of paint is a variable one. Similarly the baking of bread must be carried on by each community, but crackers can be baked somewhere else and brought to the city. Shoe repairing must be carried on in the city where the shoes are worn, but the shoe manufacturing of the entire country may be confined to a few cities. Similarly the occupa-

tions of the butcher and the baker are constant occupations because they are everywhere represented by considerable numbers of people; while the work of the candle-stick-maker is a variable occupation.

The inquiry conducted by the Foundation consisted of an analysis of the occupational data published by the Twelfth Census for cities of more than 50,000 population. A study was made of the data concerning the number of people engaged in each of 140 separate occupations in each of these cities. As a result it was found that there are 20 occupations which are constant in the sense that the number of men workers in each is everywhere at least equal to one for each thousand people in the population.

It was discovered, for example, that among men workers the occupation of being a barber is the most constant of all occupations. Throughout our cities there are almost invariably three barbers for each thousand people in the general population and this remains true almost regardless of the varying social or commercial characteristics of the different cities. Thus if any one had been conversant with this fact and had known ahead of time that Gary, Indiana, would be a city of 40,000 population, he might have predicted with almost certain accuracy that there would be in that city 120 barbers, not many more and not many less.

In conducting the study an arbitrary criterion was adopted whereby occupations were considered constant if they were represented in every city without exception by at least one worker for every thousand people in the population. For each of the 140 occupations ratios were worked out for each of the 78 cities, so as to find the city having the lowest proportion of all, the city mid way between the lowest and the highest, and the city having the highest proportion of workers in each given occupation. This process showed that there are 20 constant occupations among men workers as listed in Table 1.

In a similar way the analysis of the data for women wage earners showed that there are seven constant occupations among women. These are shown in Table 2, in which all of the conditions are the same as stated in the title of Table 1.

It is almost certain that if these data were brought entirely up to date one occupation would be added to each of these lists. The one added to the list of constant occupations among the men

TABLE I.—NUMBER OF MEN WORKERS AMONG EACH 10,000 OF POPULATION IN EACH OF 20 CONSTANT OCCUPATIONS IN CITIES HAVING RESPECTIVELY THE LOWEST, MEDIAN, AND HIGHEST PROPORTIONS OF WORKERS IN EACH OF THE OCCUPATIONS. THE CITIES ARE THOSE OF OVER 50,000 POPULATION IN 1900. THE OCCUPATIONS INCLUDE ALL IN WHICH THE NUMBER OF WORKERS IS IN EVERY CITY MORE THAN TEN FOR EACH 10,000 OF POPULATION, AND THEY ARE LISTED IN THE DESCENDING ORDER OF THE PROPORTION OF WORKERS IN THE AVERAGE (MEDIAN) CITIES

Occupation	LOWEST CITY		MEDIAN CITY		HIGHEST CITY	
	City	Workers per 10,000 pop.	City	Workers per 10,000 pop.	City	Workers per 10,000 pop.
Laborers	Lynn, Mass.	138	Syracuse, N. Y.	373	Seattle, Wash.	801
Merchants, retail	Scranton, Pa.	83	Louisville, Ky.	146	Los Angeles, Cal.	230
Clerks	Lawrence, Mass.	56	Camden, N. J.	146	Washington, D. C.	413
Draymen	Harrisburg, Pa.	69	Bridgeport, Ct.	124	Memphis, Tenn.	236
Salesmen	Wilmington, Del.	57	Albany, N. Y.	118	Somerville, Mass.	234
Carpenters	Cincinnati, O.	68	Paterson, N. J.	113	Seattle, Wash.	233
Steam R. R. men	New Bedford, Mass.	22	Salt Lake City, Utah	109	Harrisburg, Pa.	493
Machinists	Duluth, Minn.	24	New Bedford, Mass.	79	Elizabeth, N. J.	349
Painters	Pittsburgh, Pa.	37	St. Paul, Minn.	66	Dayton, O.	99
Bookkeepers	Lowell, Mass.	20	Columbus, O.	59	Omaha, Neb.	99
Waiters	Manchester, N. H.	12	Columbus, O.	56	Seattle, Wash.	238
Engineers	Atlanta, Ga.	25	New York, N. Y.	48	Duluth, Minn.	164
Printers	Fall River, Mass.	14	Louisville, Ky.	40	Washington, D. C.	102
Blacksmiths	New York, N. Y.	21	Bridgeport, Ct.	36	Wilmington, Del.	65
Masons	San Francisco, Cal.	15	Cleveland, O.	35	St. Joseph, Mo.	63
Barbers	Fall River, Mass.	21	Oakland, Cal.	29	Kansas City, Mo.	43
Plumbers	New Orleans, La.	13	Lowell, Mass.	29	Albany, N. Y.	55
Street R. R. men	Manchester, N. H.	12	Columbus, O.	26	St. Louis, Mo.	59
Shoemakers	Des Moines, Ia.	11	Springfield, Mass.	23	Lynn, Mass.	922
Bakers	Kansas City, Kan.	10	St. Joseph, Mo.	22	Hoboken, N. J.	37

TABLE 2.—NUMBER OF WOMEN WORKERS AMONG EACH 10,000 OF POPULATION IN EACH OF SEVEN CONSTANT OCCUPATIONS IN CITIES OF OVER 50,000 POPULATION IN 1900

Occupation	LOWEST CITY		MEDIAN CITY		HIGHEST CITY	
	City	Workers per 10,000 pop.	City	Workers per 10,000 pop.	City	Workers per 10,000 pop.
Servants . . .	Fall River, Mass.	98	Detroit, Mich.	244	Memphis, Tenn.	519
Dressmakers . .	Kansas City, Kansas	40	Portland, Me.	87	Charleston, S. C.	175
Teachers . . .	Kansas City, Kansas	29	Lynn, Mass.	47	Des Moines, Ia.	83
Saleswomen . .	Manchester, N. H.	19	Harrisburg, Pa.	43	Boston, Mass.	92
Laundresses . .	Lawrence, Mass.	27	Chicago, Ill.	39	Savannah, Ga.	588
Nurses . . .	Fall River, Mass.	13	Somerville, Mass.	26	Atlanta, Ga.	85
Housekeepers . .	San Antonio, Texas	10	Bridgeport, Ct.	21	Lowell, Mass.	46

would be that of the chauffeur and the one added to the list of women's occupations would be the stenographer-typewriter. These occupations together with the 20 occupations for men and seven for women that have been listed may be termed constant occupations in the sense that in every city without exception they engage the services of more than one person for each thousand people in the population. In the aggregate they include more than one-half of the people engaged in gainful occupations in these cities.

Forty-one Less Constant Occupations

An inspection of the list of occupations that we have termed constant will suffice to show that many trades, businesses and professions which are represented in every city have not been included. For example, such common occupations as those of the physician, clergyman, lawyer, journalist, and milliner have not been listed. This is because while these and other occupations are everywhere represented they are not invariably found in a large enough proportion so that their workers number at least one in every thousand of population. If, however, we reduce our lower limit so as to include all occupations employing more than one in 10,000 of the population in every city we shall add some 31 occupations to our list among the men workers and 10 more for the women workers. These 31 less constant occupations among the men are listed in Table 3, in the descending order of the proportion of workers in the average (median) city. In a similar way the 10 less constant occupations among women are listed in Table 4.

Occupations that are Equally Constant

If we consider merely the figures that have been presented in these four tables we shall note some curious and interesting facts concerning the relative importance of different occupations as shown by the number of workers employed. For example, it will be noted in Table 3 that hucksters and physicians are represented by precisely the same proportion of workers in the cities where they are least frequent, the median cities and the cities in which they have the largest representation. The same thing is true of clergymen and sextons for whom the data will be found in the same table.

TABLE 3.—NUMBER OF MEN WORKERS AMONG EACH 10,000 OF POPULATION IN EACH OF 31 OCCUPATIONS IN CITIES HAVING RESPECTIVELY THE LOWEST, MEDIAN, AND HIGHEST PROPORTIONS OF WORKERS IN EACH OF THE OCCUPATIONS. THE CITIES ARE THOSE OF OVER 50,000 POPULATION IN 1900. THE OCCUPATIONS INCLUDE ALL IN WHICH THE NUMBER OF WORKERS IS IN EVERY CITY MORE THAN ONE BUT LESS THAN TEN FOR EACH 10,000 OF POPULATION AND THEY ARE LISTED IN THE DESCENDING ORDER OF THE PROPORTION OF WORKERS IN THE AVERAGE (MEDIAN) CITIES

Occupation	LOWEST CITY		MEDIAN CITY		HIGHEST CITY	
	City	Workers per 10,000 pop.	City	Workers per 10,000 pop.	City	Workers per 10,000 pop.
Iron Workers	San Antonio, Tex.	9	Rochester, N. Y.	51	Reading, Pa.	389
Commercial travellers	Fall River, Mass.	4	Louisville, Ky.	29	Des Moines, Ia.	99
Tailors, etc.	Elizabeth, N. J.	9	Reading, Pa.	28	Rochester, N. Y.	165
Butchers	Portland, Me.	4	Evansville, Ind.	26	St. Joseph, Mo.	116
Hucksters	Lynn, Mass.	8	Somerville, Mass.	22	Hartford, Ct.	50
Physicians	Hoboken, N. J.	8	Minneapolis, Minn.	22	Los Angeles, Cal.	50
Lawyers	Fall River, Mass.	4	Utica, N. Y.	20	Seattle, Wash.	58
Laborers (agri.)	Wilkes-Barre, Pa.	6	Utica, N. Y.	19	Los Angeles, Cal.	69
Tinplate workers	Fall River, Mass.	5	New York, N. Y.	18	Baltimore, Md.	50
Messengers	Manchester, N. H.	3	Utica, N. Y.	17	Washington, D. C.	48
Officials (bank)	Fall River, Mass.	7	Cincinnati, O.	16	Des Moines, Ia.	47
Tobacco workers	Charleston, S. C.	2	Buffalo, N. Y.	16	Louisville, Ky.	137
Electricians	Fall River, Mass.	5	Omaha, Neb.	14	Lynn, Mass.	48
Clergymen	Hoboken, N. J.	6	Trenton, N. J.	13	Des Moines, Ia.	29
Janitors, sextons	New Orleans, La.	6	Fall River, Mass.	13	Cambridge, Mass.	29
Merchants, wholesale	Paterson, N. J.	3	Cambridge, Mass.	13	Kansas City, Mo.	41
Hostlers	Elizabeth, N. J.	2	St. Paul, Minn.	13	Evansville, Ind.	46
Officials (gov.)	Troy, N. Y.	6	Charleston, S. C.	12	Washington, D. C.	32
Musicians	Kansas City, Kan.	5	St. Paul, Minn.	11	Portland, Ore.	25
Engineers (civil)	Manchester, N. H.	4	Richmond, Va.	11	Seattle, Wash.	45
Laundrymen	Scranton, Pa.	3	Des Moines, Ia.	11	Portland, Ore.	92
Bankers, brokers	Trenton, N. J.	3	Philadelphia, Pa.	11	Los Angeles, Cal.	51
Stonecutters	Elizabeth, N. J.	3	Wilmington, Del.	10	Cambridge, Mass.	20
Teachers	Jersey City, N. J.	6	Springfield, Mass.	9	Cambridge, Mass.	30
Upholsterers	Duluth, Minn.	2	Peoria, Ill.	9	Baltimore, Md.	11
Confectioners	Manchester, N. H.	2	Memphis, Tenn.	7	St. Joseph, Mo.	18
Gardeners, florists	Memphis, Tenn.	2	Peoria, Ill.	7	Portland, Ore.	29
Journalists	Providence, R. I.	3	Nashville, Tenn.	6	Washington, D. C.	14
Restaurant keepers	Milwaukee, Wis.	2	Trenton, N. J.	5	San Francisco, Cal.	18
Dentists	Jersey City, N. J.	2	St. Louis, Mo.	5	Oakland, Cal.	16
Photographers	Charleston, S. C.	1	Manchester, N. H.	5	Los Angeles, Cal.	11

TABLE 4.—NUMBER OF WOMEN WORKERS AMONG EACH 10,000 OF POPULATION IN EACH OF TEN OCCUPATIONS IN CITIES OF OVER 50,000 POPULATION IN 1900

Occupation	LOWEST CITY		MEDIAN CITY		HIGHEST CITY	
	City	Workers per 10,000 pop.	City	Workers per 10,000 pop.	City	Workers per 10,000 pop.
Stenographers	Fall River, Mass.	5	Louisville, Ky.	63	Omaha, Neb.	73
Seamstresses	Fall River, Mass.	4	Detroit, Mich.	32	St. Joseph, Mo.	200
Clerks	San Antonio, Tex.	7	Hoboken, N. J.	24	Washington, D. C.	168
Bookkeepers	San Antonio, Tex.	4	Newark, N. J.	22	Boston, Mass.	64
Milliners	San Antonio, Tex.	8	Columbus, O.	19	St. Joseph, Mo.	38
Boarding house keepers	Jersey City, N. J.	5	Salt Lake City, Utah	15	Savannah, Ga.	39
Musicians	Paterson, N. J.	4	Harrisburg, Pa.	11	Los Angeles, Cal.	28
Merchants, retail	St. Joseph, Mo.	3	Milwaukee, Wis.	9	Wilmington, Del.	24
Laborers	Somerville, Mass.	2	Cambridge, Mass.	6	Kansas City, Kan.	36
Telephone operators	Fall River, Mass.	2	Cincinnati, O.	5	Grand Rapids, Mich.	16

Cities Having Lowest and Highest Proportions of Workers In Many Occupations

We have noted that in the main the occupations that we have listed even as "less constant" are those occupations which are necessary to carry on the different branches of that enlarged municipal housekeeping which must be conducted wherever large numbers of people live together in communities. In other words these are the occupations that are necessary for the maintenance of community life. Nevertheless the proportion of workers engaged in any of these occupations is largely influenced by the social and economic characteristics of the city in which they work. Thus we find that in cities where the economic stress of earning a livelihood is great many occupations have few representatives, whereas in cities that are economically more fortunate these occupations are well represented. Among the 78 cities for which conditions were studied Fall River, Mass., and Manchester, N. H., best represent the conditions that exist where the strain of earning a living is severe while conditions in cities of the opposite sort are represented by Los Angeles and Washington.

In each of the following 12 occupations the city of Fall River has a smaller proportion of workers than any other city of more than 50,000 population in the entire country:

commercial travelers	lawyers
tinsmiths	bank officials
electricians	printers
barbers	servants
nurses	stenographers
seamstresses	telephone operators

In a similar way we find the city of Manchester with a lower proportion of workers than any other of the cities in six occupations as follows:

messengers	civil engineers
confectioners	waiters
street railroad men	saleswomen

In contrast with Fall River and Manchester are Los Angeles and Washington. In Los Angeles we find six occupations employing a larger proportion of the population than is found in any city elsewhere. These occupations are the following:

physicians	agricultural laborers
bankers and brokers	photographers
retail merchants	musicians

Six occupations are found more numerously represented in Washington than in any other city. They are the following:

messengers	journalists
government officials	men clerks and copyists
printers	women clerks

The nature of the occupations so numerously represented in Washington indicates that the cause is to be found rather in the fact that the general business of the city consists of work pertaining to the activities of national government than in any extreme economic condition such as is found in Fall River or in Los Angeles.

Significance of Constant Occupations for Vocational Education

The facts that have been reviewed do not constitute a guide for the formulation of courses of vocational education. They do however throw additional light on some characteristics of occupations employing in the aggregate a considerable majority of all the wage earners in our larger cities. All such information is useful in helping secure a better fact-basis for our thinking and acting with respect to the problems of vocational education and vocational guidance. These data are presented as a contribution toward that end.

Pamphlet Publications of the Division of Education

(Numbers omitted are out of print)

No. 61. The Relation of Physical Defects to School Progress. 9 pp. Price, 5 cts.

No. 77. Why 250,000 Children Quit School. 30 pp. Price, 5 cts.

No. 94. Measurements as Applied to School Hygiene. 7 pp. Price, 5 cts.

No. 96. The New Attitude of the School Towards the Health of the Child. 8 pp. Price, 5 cts.

No. 99. Medical Inspection Legislation. 54 pp. Price, 20 cts.

No. 101. What American Cities Are Doing for the Health of School Children. 44 pp Price, 15 cts.

No. 107. The Binet-Simon Measuring Scale for Intelligence: Some Criticisms and Suggestions. 12 pp. Price, 5 cts.

No. 108. The Identification of the Misfit Child. 11 pp. Price, 5 cts.

No. 110. The Relative Responsibility of School and Society for the Over-Age Child. 6 pp. Price, 5 cts.

No. 111. The Money Cost of Repetition Versus the Money Saving Through Acceleration. 12 pp. Price, 5 cts.

No. 112. The Relation Between Entering Age and Subsequent Progress Among School Children. 9 pp. Price, 5 cts.

No. 113. A Scale for Measuring the Quality of Handwriting of School Children. 16 pp. Report, 5 cts. Scale, 5 cts.

No. 116. The Measurement of Educational Processes and Products. 9 pp. Price, 5 cts.

No. E124. A Comparative Study of Public School Systems in the Forty-eight States. 32 pp. Price, 15 cts.

No. E126. The Spelling Vocabularies of Personal and Business Letters. 16 pp. Price, 5 cts.

No. E128. Psychological Tests in Vocational Guidance. 6 pp. Price, 5 cts.

No. E130. The Effect of Promotion Rates on School Efficiency. 12 pp. Price, 5 cts.

No. E132. Fire Protection in Public Schools. 16 pp. Price, 10 cts.

No. E134. Open Air Schools. 16 pp. Price, 10 cts.

No. E135. Some Conditions Affecting Problems of Industrial Education in 78 American School Systems. 24 pp. Price, 5 cts.

No. E136. Constant and Variable Occupations and Their Bearing on Problems of Vocational Education. 12 pp. Price, 5 cts.

Bulletin E. The Division of Education of the Russell Sage Foundation. 8 pp. No charge.