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Appendix A

Number Employed in Elementary and Secondary Education

PUBLIC SCHOOLS

The chief source of information on the number of teachers is necessarily the *Biennial Survey* of the United States Office of Education. The reported number of teachers, principals, and supervisors, the basic series, requires adjustment. It is the sum of teaching positions and principals and supervisors in recent years, and the sum of teachers or teaching positions and principals and supervisors in earlier years. The distinction between positions and employees seems clear, but throughout the period when both are given, the same number is reported for both classes in more than half of the states (34 in 1936). It is not known whether the number represents positions or employees in these cases. Since in at least some cases it probably refers to positions, the number in teaching is underestimated: the number of teachers runs about 10 percent higher than the number of positions in New York, for example. Only positions are reported in recent years, and this change imparts a downward bias to the series. The series used here consists of supervisors and principals plus 'employed' teachers,[1] plus also teachers in special schools.

Moreover, the series for principals and supervisors seem unreliable. Some fluctuations in state data are given in the adjoining

PRINCIPALS

	1930	*1932*	*1934*
Arizona	171		176
California	2,741	1,028	935
Iowa	281	465	290
Maryland		206	204
Texas	6,849	2,571	2,672

table. Nothing has been done to correct these figures since the obvious year-to-year changes in classification were apparently offset in good part by changes in the reported number of teachers.

The numbers reported in administrative offices also defy credi-

PROFESSIONAL ADMINISTRATIVE EMPLOYEES

	1926	*1928*	*1930*	*1932*
Mississippi	1,444	1,676	1,902	187
Idaho	126	4,694	177	380
Arizona	61	153	71	39
Pennsylvania	500	1,300	1,111	1,232
West Virginia	305	590	2,077	421

[1]The former two are estimated from the latter before 1920.

bility. In 1941-42, when reports were relatively complete and detailed, there were 20,518 professional employees. There does not seem to be any tolerably accurate method of estimating the number for the entire period.

Professional Employees	
State offices of education	1,885
Superintendents	14,949
Other professional employees	3,684
Total	20,518

The statistical work of the Office of Education has been unsatisfactory in many respects, as the foregoing examples may suggest. The Office does not fully distinguish the figures it estimates from those it collects (for example, in recent *Surveys* it does not state that school enrollment by grade in Rhode Island is estimated). The descriptions of statistics are sometimes misleading (as when a figure is given for the number of "full-time equivalent" college teachers which, in 1938, included 28 percent of such teachers not reduced to a full-time basis). The preference for medians over means (which makes combination of data so difficult) has been shown in many studies, and is indeed pervasive in educational statistics; the practice of reporting open-end classes in frequency distributions is equally popular and deplorable. The general practice of obtaining almost universal coverage on some series biennially, rather than devoting the same resources to less frequent surveys of wider scope supplemented by annual samples, has severely handicapped the student of education. The delays in publication have been great: by June 1, 1949, for example, only one chapter of the *Biennial Survey* for 1945-46 had been published. Improvements are now being made in the statistical work of the Office; it is to be hoped that they will eventually include a thorough reworking of the most important series for at least the last five decades.

PRIVATE SCHOOLS

The number of teachers in private schools is based upon the *Biennial Survey*, but obvious understatements after 1918 (e.g., in 1934) are corrected by estimating the total from the number of teachers in Catholic schools. Teachers in elementary schools in 1905 and 1915 are interpolated on the basis of the trend in their ratio to public school teachers. The early years are probably underreported. This suspicion is strengthened by the enrollment figures: in 1920 the *Biennial Survey* gives a total for all private schools that is 227,000 less than the enrollment in Catholic

schools. The data in the *Survey* imply also a higher student-teacher ratio in private than in public schools in 1900, and a lower ratio in 1920. Enrollment in 1940 was 2.6 million, of which 2.3 million were in Catholic schools.

COMPARISON WITH THE POPULATION CENSUSES

The decennial Census of Occupations reports teachers (except for music, dancing art, etc.) and their numbers may be compared with those given in Table 1 of the text. The agreement is not quite as excellent as the figures suggest. The Census category

Teachers (thousands)	*1900*	*1910*	*1920*	*1930*	*1940*
Population Census	440	595	752	1,044	1,056
Biennial Survey	480	594	773	985	1,015

includes business schools, governesses, administrative officers, correspondence schools, vocational schools, and, of course, unemployed teachers. The Census figure should therefore be 5 or 10 percent higher than the Office of Education figure, but is not in the first three decennial Censuses. Nevertheless, the Census data confirm the general findings from the *Biennial Survey*.

PUBLIC NONACADEMIC EMPLOYEES

There are no continuous or complete data on nonacademic employees of public schools (and even less information for those of private schools); the *Biennial Survey*, for example, started to report numbers only in 1938, and only a third of the states reported in that year. The more important categories can be roughly estimated:

1) Janitors. The *Biennial Survey* figures for 1938 can be 'blown up' on the basis of teachers in reporting states, to yield a total of 112,000. The addition of carpenters, painters, etc. raises the total to 120,000. Alternatively, payrolls are reported in the *Biennial Survey*, and average salaries can be calculated from the salary tabulations of the National Education Association (available back to 1925), and dividing the former by the latter we get about 109,000. Both are probably underestimates, since part-time workers are incompletely reported in the *Biennial Survey* and the second procedure yields only 'full-time equivalent' employees.

2) Bus drivers. Using the 'blow-up' of *Biennial Survey* data, the number in 1938 was 91,000. Using the number of school buses (given in *Bus Facts*) multiplied by the average number of em-

ployees per bus (as given in the 1935 Census of Motor Transportation) yields 87,000 employees.

3) Other (nurses, attendance officers, clerical help, etc.). From the salary tabulations of the National Education Association a ratio to teachers can be estimated, to yield about 33,000 other employees in 1938. A 'blow-up' of the 1941-42 *Biennial Survey* data, which are more complete, yields a slightly larger figure for 1942.

It appears, therefore, that full- and part-time employees numbered about 250,000 in 1940, or a quarter of the number of teachers.

Estimating the number of janitors from payroll data, the ratio to teachers appears to be fairly constant since 1925. Using the ratio of drivers to buses to estimate bus drivers, the number drops to 15,000 in 1924, the first year in which an estimate of the number of buses is available, and the number may be presumed to have approached zero during the first World War. In the roughest of fashions these and other considerations suggest the following estimates for nonacademic personnel: in 1900, one-eighth of teachers (or 60,000); in 1910, two-fifteenths (or 80,000); in 1920, one-sixth (or 115,000); in 1930, one fifth (or 200,000); and in 1940, one-fourth (or 250,000). But the figures are so dubious that only two conclusions are safe: the number has always been large, and it has been rising more rapidly than the number of teachers.

Appendix B

Effect of Legislation on Enrollments

Two types of legislation have served directly to increase the proportion of older children attending school: compulsory school attendance laws and laws fixing the minimum age for employment in various industries. The first compulsory school attendance law was enacted in Massachusetts in 1842. Many states joined this movement in the last quarter of the century, and by 1900, 32 states and the District of Columbia had some sort of legislation requiring school attendance. The last of the remaining 16 states (15 of which were in the South) had passed compulsory attendance laws by 1919.

It is very difficult to summarize briefly the requirements imposed by these laws. Idaho may serve as an example: attendance

is required of children from 8 to 18 (inclusive) for the full school term, but exceptions are made for children who (a) are 15 or older and have completed the 8th grade; (b) are 15 or older and whose help is necessary to support themselves or their parents or "where it would be for the best interest of such child to be relieved from the provisions of this article"; and (c) whose bodily or mental condition would interfere with regular school attendance. Several states waive the requirements if the child must walk more than 2, 2.5, or 3 miles to school; many states exempt children over a certain minimum age or school grade who have employment; and exceptions are sometimes made for children of widows, pages in legislatures, etc. These exceptions have been whittled down through time; consequently, the comparison of legislation in 1900, 1920, and 1940 (summarized in Table A) probably underestimates the growing scope of these laws. Moreover, the minimum term of school attendance required in 1900 was usually very short;[2] by 1920, 36 states required attendance for the entire school year; and in 1940 this requirement was universal.

TABLE A

Distribution of States by Maximum Age through which Children were Required to Attend Full-time Schools

MAXIMUM AGE	*1900*	*1920*	*1940*
12		2	
13	1		
14	13	9	2
15	5	7	2
16	3	29	31
17		2	8
18			6
Number of states	22	49	49
Mean age in states with laws	14.5	15.4	16.3

Along with the increase in the maximum age of compulsory attendance has gone a widening prohibition on child labor. The laws are too diverse to be summarized in a neat tabulation but it is easy to convey an impression of the great expansion of this form of control between 1900 and 1940. In the early year, 6 states had no legislation, 13 prohibited only work in mines, 5 prohibited only such employments as tight-rope walking, and no state had a minimum age for employment higher than 14. By

[2]The required terms were 12 weeks per year in 10 states, 16 weeks per year in 6 states, 20 weeks per year in 2 states, 28 weeks per year in 1 state, a full term in 1 state.

1940 every state except Wyoming had a minimum age of 14 or more for work in the broader class of factories, mines, and mercantile establishments. In 36 states the maximum age for compulsory school attendance is higher than the minimum age at which a child can work in a factory or store, and in all except one of the remaining states these ages are equal.

It is tempting to leap to the conclusion that these laws have been very effective in promoting school attendance. The percentage of children 15-18 inclusive enrolled in school was closely related in 1940 to the maximum age of compulsory school attendance (Table B). In both urban and rural-farm areas the absolute level of enrollment was higher in states with higher maximum ages for school attendance, and fell less rapidly with age. But the causal role of legislation is not so easily determined; the data in Table B are consistent with the views both that legislation compels higher enrollments and that states with high enrollments pass laws that reflect the more basic conditions leading to high enrollments.

TABLE B

Average by States of Percentage of Children Enrolled in Schools by Age and Maximum Age through which Attendance was Compulsory, 1940

MAXIMUM AGE OF COMPULSORY ATTENDANCE	AGE OF CHILDREN 15	16	17	18
		URBAN		
18	94.4	88.8	76.6	49.8
17	90.7	81.1	67.8	43.8
16	92.7	81.0	66.5	41.0
15	85.6	72.8	54.6	33.0
14	80.8	67.2	50.2	30.6
		FARM		
18	90.3	81.5	68.8	45.4
17	79.0	66.1	51.6	32.5
16	81.1	66.5	51.1	32.4
15	72.4	57.6	40.9	25.2
14	73.0	58.1	40.8	24.1

Of course both interpretations contain some truth. We can cite at least two kinds of evidence that the laws tend to increase enrollments. Enrollments are higher in cities with higher maximum ages of school attendance than in other cities in the same state.[3] Again, a jump in public school enrollments is often

[3] In Delaware, for example, the maximum age is 16 in Wilmington and 17 elsewhere. The effect on the percentages enrolled in school is clear.

	AGE OF CHILDREN 15	16	17	18
Wilmington	95.3	76.3	58.8	34.5
Other urban areas	95.8	75.2	64.6	36.8

apparent immediately after a higher compulsory age is set.[4] On the other hand, if we classify states by per capita income and the racial composition of the children (Table C)—both of which are in a sense more fundamental and persistent than school age legislation—within the cells there is no evidence of a correlation between legislation and school enrollments.[5]

TABLE C

Average Percentages of Children 16-17 Enrolled in Schools in 1940, by Percentage of Nonwhite Children in 1940 and Per Capita Income Payments in 1939

PER CAPITA INCOME	PERCENTAGE OF NONWHITE CHILDREN 0 to 5	5 to 15	15 & more
	PERCENTAGE ATTENDING SCHOOL		
$200-$400	71.7	57.8	55.6
400- 600	74.8	63.2	60.2
600- 825	73.3	75.2	56.7
	NUMBER OF STATES		
$200-$400	4	5	7
400- 600	16	2	3
600- 825	6	4	1

The effects of legislation cannot be separated without taking account of the many exceptions in the school attendance laws, and this intricate investigation is not necessary here. Our brief study suggests, however, that the influence of legislation is a relatively weak factor, whose presumptive significance comes largely from the correlation of maximum age in the statute with incomes and racial composition.

[4]For example, Wyoming increased the maximum age from 14 to 17 in 1923. The enrollments in secondary public schools were:

	ENROLLMENT	% INCREASE IN BIENNIUM
1918	3,376	
1920	4,476	32.6
1922	5,763	28.7
1924	8,634	49.8
1926	9,664	11.9
1928	10,644	10.1
1930	11,164	4.9

[5]The variance of the percentage of children enrolled in schools among the groups of states with various maximum ages of compulsory attendance may be compared with the variance within these groups. Although the former exceeds the latter, the variance ratio is only 1.20, with 11 and 25 degrees of freedom respectively (computed from the data underlying Table C); such a large ratio would occur by chance more than a fifth of the time. Even if income and ethnic factors are neglected, the results are the same when school enrollments in cities with populations exceeding 100,000 are analyzed. The ratio of the variance among groups of cities with different maximum ages to the variance within these groups is 1.26, with 3 and 82 degrees of freedom respectively; this ratio could arise by chance almost one-fifth of the time.

Appendix C

Academic Personnel in Higher Education

Again the chief source is the *Biennial Survey*. Since 1932 all professional employees are reported; before then only teaching staff (which excludes research, extension, and administration) was given. The ratio of teachers to all academic employees has been stable at about eight-tenths in recent years, but this ratio cannot be extrapolated backward. Extension teaching began about 1890, and full-time research was probably relatively less important early in our period.[1] The nonteaching staff was estimated roughly by extrapolating the percentage of extension to regular teachers back to zero in 1890, assuming the ratio of research staff to teachers was half as high in 1900 as in 1938, and holding the ratio of administrative staff to teachers constant. The figures in the text are reported numbers, not reduced to a full-time basis.[2] Duplications are excluded by use of the reported unduplicated totals in recent years.

A comparison may readily be made with the corresponding Census class:

	1900	*1910*	*1920*	*1930*	*1940*
Decennial Census	7,272	15,668	33,407	61,905	75,096
Biennial Survey	29,000	45,000	62,000	105,000	147,000

The discrepancy is very large, but is partly explicable in terms of differences in content. It has recently been inferred from the discrepancy that a large fraction (perhaps one-third) of faculty members have their major employment in another industry.[3] This inference seems less plausible than that graduate teaching and laboratory assistants are reported as employees to the Office of Education and as students to the Census, and that numerous teachers in religious seminaries, junior colleges, business schools, etc. are probably excluded by the Census from 'college presidents and professors'.

[1]The reported expenditures by public institutions of higher learning are first available in detail for 1928. The rise in the percentage of research to instructional expenditures from 5.9 in 1928 to 7.5 in 1935 may well be influenced by an increasing practice of budgeting research separately.

[2]The ratio of 'full-time equivalent' to all employees has been nine-tenths in recent years; no reduction was made in earlier years. The nature of the reduction to a full-time basis is ambiguous; each school makes its own decision, including the decision not to make the adjustment (see App. A).

[3]Report of the President's Commission on Higher Education (Washington, D. C., 1947), Part IV, 29.

Appendix D

College Teachers' Salaries

Salaries before 1935 are based on Viva Boothe's *Salaries and the Cost of Living in Twenty-seven State Universities and Colleges. 1913-32* (Ohio State University Press, 1932). Of the 27 institutions, 14 were land-grant schools. Median salaries in each school were reported, beginning in 1922, and their average taken. For 1914 (not 1913) through 1921, she estimated average medians from the reported maximum and minimum salaries in each institution, on the basis of the relationship among them in the 'twenties. and averaged these estimated medians. This procedure has been carried back to 1908, except that the average median was estimated directly from the average maxima and minima.[1]

Median salaries in land-grant colleges and universities are given in various reports of the Office of Education.[2] Those for individuals on a 9-month basis were chosen as a more appropriate continuation of Boothe's series than salaries of those on 11-12 month bases, since the 11-12 month basis is less common in non-land-grant schools. It is reassuring that the mean of the medians is fairly close to the mean calculated from the frequency distribution, in years when the latter is available (Table D).[3] The

Median Salaries for 9-month and All Teachers

	1929		*1930*		*1931*	
	All	9-month	All	9-month	All	9-month
Professors	$4,219	$4,348	$4,342	$4,407	$4,417	$4,480
Associate Profcssors	3,287	3,359	3,369	3,345	3,382	3,418
Assistant Professors	2,799	2,691	2,868	2,775	2,882	2,815
Instructors	2,066	2,003	2,102	1,995	2,094	2,069

[1]The data are in annual Bulletins of the Office of Education. Miss Boothe's average maximum and minimum for 1914 differ from those calculated from the reports (so the average medians are 2.5 to 3 percent higher for 1914 in her tables): the 1908-13 salaries were raised to splice them to her series. The discrepancy may be due to her editing of the reports. in the course of which she obtained corrected data from some schools. For 1908 and 1909 only maximum salaries were available.

[2]They are summarized in the Report of the President's Commission. VI. 39.

[3]The means in this table are $125 higher than those reported in the Twenty-eighth Annual Report of the National Bureau of Economic Research. 1948. p. 33. The data are reported by $250 class intervals. and in earlier work the calculations were made on the assumption that. because of the tendency to give round-number salaries. all salaries fell at the bottom of a class interval. Although this assumption is probably more reasonable than the conventional one of a uniform distribution within the interval. the evidence seemed insufficient to depart from standard practice.

close agreement between Boothe's and the land-grant series in 1929-31 is a trifle suspicious, for the state universities as a class have salaries that average appreciably less than those of land-grant institutions.

TABLE D

Three Salary Series for College Teachers

	1929	*1930*	*1931*	*1940*	*1942*
			PROFESSOR		
Boothe	$4,348	$4,407	$4,480		
Mean salary	4,480	4,568	4,620	$4,421	$4,475
Office of Education, 9-mo. basis	4,278	4,457	4,513	4,245	4,302
			ASSOCIATE PROFESSOR		
Boothe	3,359	3,345	3,418		
Mean salary	3,369	3,434	3,451	3,304	3,359
Office of Education, 9-mo. basis	3,342	3,349	3,362	3,272	3,324
			ASSISTANT PROFESSOR		
Boothe	2,003	1,995	2,069		
Mean salary	2,092	2,155	2,135	2,000	2,018
Office of Education, 9-mo. basis	2,047	2,060	2,066	1,937	1,862
			INSTRUCTOR		
Boothe	2,691	2,775	2,815		
Mean salary	2,872	2,917	2,920	2,733	2,758
Office of Education, 9-mo. basis	2,738	2,818	2,837	2,605	2,645