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THE ELIMINATION OF PUPILS FROM SCHOOL

BY EDWARD L. THORNDIKE
Professor of Educational Psychology, Teachers College, Columbia University

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TABLE OF CONTENTS.

LETTER OF TRANSMITTAL.

DEPARTMENT OF THE INTERIOR,
BUREAU OF EDUCATION,
Washington, October 26, 1907.

SIR: I have the honor to transmit herewith the manuscript of a monograph entitled "The Elimination of Pupils from School," by Prof. Edward L. Thorndike, of Columbia University, and to recommend its publication as the next issue of the Bulletin of the Bureau of Education.

The rapid dwindling of classes in the upper grades of our grammar and high schools has been often noted, and many suggestions as to the improvement of our system of education have been emphasized by reference to this tendency. It is clear that after all that has been done the attendance of pupils, particularly in our elementary schools, is still in an unsatisfactory condition, and this condition becomes more unsatisfactory in the later years of the school course. In order, however, that we may base any safe conclusions upon these facts of current observation, it is necessary that the facts should be more exactly determined and more carefully analyzed. Some important studies have been made in this field within the past ten or fifteen years. They have tended to show the danger of unqualified and sweeping statements with reference to the withdrawal of pupils from school, and to show also the difficulty of ascertaining the exact condition of our school attendance with the statistical methods and materials available.

Professor Thorndike's monograph, presented herewith, carries this inquiry much further than it has been carried in any previous study. Proceeding by well-defined methods of modern statistical investigation, it shows clearly the necessary limits of our exact knowledge of the subject, but points out also the conclusions which may be drawn from such records as are obtainable. The bearing of Professor Thorndike's computations and estimates upon the immediate problems of school administration are suggested briefly in his monograph. I may call especial attention here to the following:

While the attendance in the upper grades of our elementary schools does not make a good showing even yet in comparison with the attendance in the schools of some European countries, and the provision for

so-called continuation schools in this country falls behind that found in some portions of Europe, these unfavorable indications are in a measure offset by the notably large attendance in our American high schools.

While there is a marked falling off of attendance in the upper grades of the schools in all of the cities to which this inquiry extends, it is found that the variations between different cities are surprisingly great. The fact that some cities approach much more nearly than others to an ideal standard of school attendance offers ground of encouragement. It gives reason to hope that, bad as the present conditions appear in many parts of the country, they can be greatly improved by means which are already available.

Very respectfully,

ELMER ELLSWORTH BROWN,
Commissioner.

THE SECRETARY OF THE INTERIOR.

THE ELIMINATION OF PUPILS FROM SCHOOL.

§ 1. *Introduction.*

What pupils stay in school, how long they stay, what grades they reach, and why they leave, are questions of obvious significance for any educational system. The facts concerning them decide in great measure the service performed by the system. A system in which laziness and stupidity eliminate pupils is better than one in which they are eliminated by poverty. A system which holds 60 out of 100 till the eighth grade is presumably better or more fortunate than one which holds only 20. If two systems keep pupils in school equally long so far as years go, and one of the two systems gets 15 out of 100 through the high school while the other gets only 5, the latter system is probably somewhere guilty of waste.

The facts really needed for an adequate study of these general questions are the educational histories of 500 to 1,000 children (chosen at random from the 6 to 8 year olds) in each of 20 or 30 communities, each of the individual histories to cover at least the years from 8 to 18. If these histories were studied in connection with the characteristics of each community's educational endeavor, and in connection also with the economic, social, and intellectual environment of the individuals concerned, we could know exactly the general tendency of elimination in this country, the variability of different communities in respect to it, the causes of these variations, and at least some of the ways to keep more of the children and more of the worthy children in school.

For four years the author has been gathering and studying such data as he could obtain from printed reports and the like concerning various aspects of the general question, in the hope of eventually making specific studies in some cities with data of the desirable sort just described, and so being able to interpret the facts already given in print. It has proved impracticable for him to obtain these educational life histories of individuals. It therefore seems best to report briefly the facts at hand, in the hope that others may be encouraged to secure and study the more important individual histories.

The facts at the basis of this report are:

(1) Registration statistics by grade in elementary and high schools.

(2) Registration statistics by age in elementary and high schools.

(3) Registration statistics by grade and sex in high schools.
(4) Registration statistics by age and sex in high schools.
(5) Registration statistics by grade in colleges.

Such facts are instructive, provided one uses them with full cognizance of their meaning and likelihood of error. Otherwise they may be seriously misleading. For example, the registration for grades 5 to 8 in Springfield for 1903 was as follows:

Grade 5	1,072	Grade 7	799
Grade 6	986	Grade 8	633

This does not mean that of 1,072 pupils in the fifth grade 633 will remain on till the eighth; for it to mean that, there must be a stationary school population. The eighth grade in 1903 should be compared not with the lower grades of 1903, but with the fifth grade of 1900, the sixth grade of 1901, and the seventh grade of 1902. Doing this, we get (instead of 1,072, 986, 799, and 633) 904, 892, 768, and 633.

But these figures, though far nearer the truth, are by no means necessarily a true measure of the retention of the fifth grade pupils of 1900; for some of these 904 pupils of 1900 undoubtedly were held back two years in some grade and yet are staying on in school and will be in the eighth grade, but in 1904, conversely with some promoted rapidly. Also, some may have stayed out of school for a year or more and then reentered. Also, if 1,000 families, each with a child of about 13, moved to Springfield in 1902, the 633 of the 1903 eighth grade would not represent those remaining from the 904 of the 1900 fifth grade; in fact, conceivably, not one of them might be left in school, the 633 being entirely composed of the children of these new families.

In the second place, a true estimate of elimination requires not only public school statistics, but also measurements of the interchange between public and private schools. Luckily, this correction is in most American cities of little account.

My report for education below the colleges is based on data from public schools only. My estimates concern the school careers of children entering the public schools of cities of this class. Those who leave to enter private schools are probably balanced by those who enter later grades from the parochial and other private schools. The interchange between public and private schools may be, however, of varying influence in different cities, and unless we can estimate it accurately for each our comparison of individual cities will be to some extent in error.

In the third place, if we are to make statements concerning individual educational systems, such as individual cities, without risk of being unjust, we need figures from enough years to give a result precise enough to prevent rating any one city above any other when in the long run it would belong below it. Data that give a precise notion of

the general tendency of all urban communities together may give a very rough approximation for any single city.

For example, we find that, taking the sixth grade of 1903 and the seventh grade of 1904 in Springfield, the percentage of retention of the sixth in the seventh is 92.5. Taking the sixth grade of 1902 and the seventh grade of 1903 for Cambridge, the percentage of retention is 89.5. Fuller data reverse the positions of the two cities, however, for with four fifth to sixth grade successions for Springfield we get 85.9 86.1, 88.5, and 92.5, averaging 88.3, and with three such successions for Cambridge we get 89.9, 89.5, and 101.1, averaging 93.5.

Confronted by these and many other difficulties, one may choose between (1) studying elaborately each city's school statistics, vital statistics, and the like for the past decade until one gets a precise estimate of what has since happened to a thousand or so pupils who entered school in 1894–1896, or (2) going ahead with such registration statistics as one has, being careful to infer from them with due allowance for their proper meaning. The former choice is theoretically the one to make, but practically it necessitates a very great expense of time and money in the collection of back reports and the imposition upon school officers of many burdens in the way of information-giving. In fact, to be properly done, this work must be done, not for a twelve-year period past, but for the twelve-year period to come, and done by some permanent office, such as a State department or the United States Bureau of Education; for the back data required could not in some cases be got now, even with the utmost good will and labor of school and city officials. They have to be gathered at the time the facts exist and with the special aims of such a study in view.

The less satisfactory way, besides being by far the more practicable way, has the advantage of being harmless so long as we do not interpret or infer falsely. It is the way I am compelled to take. Moreover, if a large amount of time and money were to be spent, it could be put to greatest service in the study of individual pupils.

For the sake of the reader who is disappointed by this confession of my inability to give a straightforward account of how many pupils of those who entered, say, in 1894, dropped out grade by grade or year by year, and who fears that he will be perplexed by a mass of undigested statistics to come later, it may be said here at once that with all the intricacies and ambiguities of the facts it will be made abundantly clear that—

(1) At least 25 out of 100 children of the white population of our country who enter school stay only long enough to learn to read simple English, write such words as they commonly use, and perform the four operations for integers without serious errors. A fifth of the children (white) entering city schools stay only to the fifth grade.

(2) Of the children entering the public schools of our more favored cities over half probably never have a man teacher.

(3) Less than 1 in 10 graduate from the high school.

(4) Only about a third graduate from an elementary school of seven grades or more.

(5) Only about half have any teaching of consequence concerning the history of their own country or any other or concerning the world's literature, science, or art.

(6) In our city high schools, for 100 girls entering there are only 75 boys. During the high school course, moreover, the boys are eliminated more rapidly, so that in the last year there are 60 per cent more girls than boys.

(7) Though Germany and France, and perhaps England, do as well as the United States in keeping every one in school until he learns the rudiments or until he reaches 13, the United States is far more successful in retaining a fair percentage for a much longer and more extensive schooling.

(8) The failure of this country to provide education generally for the wage-earners is in part atoned for by the delay in requiring youth to go to work and their retention in school till the late teens.

(9) There is an enormous variability amongst cities in the amount of elimination, such that if all cities of over 8,000 inhabitants did as well as worthy citizens, good fortune, support of education, and wise administration now enable, say, Worcester, Cambridge, Malden, or Springfield, to do, the number of children remaining to, say, the seventh grade could be increased 40 per cent, and the number remaining to the fourth year class of the high school could be increased over 100 per cent.

(10) The superiority of one city over another in the retention of pupils is apparently caused far more by the nature of the population than by any peculiarities in the curricula or schemes of administration of the schools.

(11) The high schools are being recognized by parents and pupils as simply the last four years of a general course, there being, so far as leaving school is concerned, no greater gap between the last elementary and the first high school grade than between the seventh and eighth elementary grades or the first and second high school grades.

(12) One main cause of elimination is incapacity for and lack of interest in the sort of intellectual work demanded by present courses of study.

PART I. ELIMINATION BY GRADES.

§2. *The Amount of Elimination.*

I estimate that the general tendency of American cities of 25,000 and over is, or was at about 1900, to keep in school out of 100 entering pupils[a] 90 till grade 4, 81 till grade 5, 68 till grade 6, 54 till grade 7, 40 till the last grammar grade (usually the eighth, but sometimes the ninth, and rarely the seventh), 27 till the first high school grade, 17 till the second, 12 till the third, and 8 till the fourth. Figure 1 shows graphically this general tendency. It will be remembered that the figures for public schools in the country as a whole are probably much lower than this.

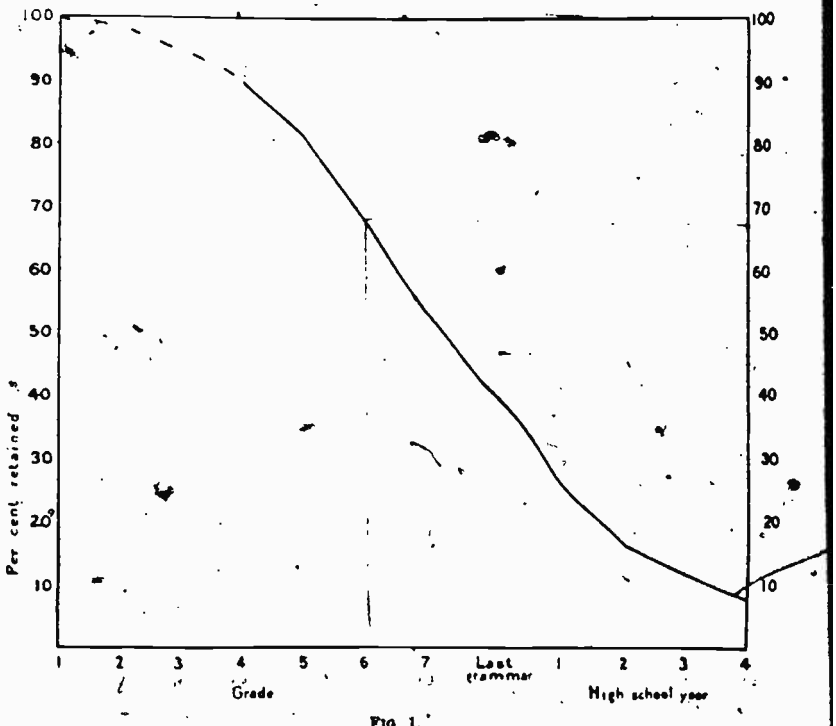

FIG. 1.

[a] Those eliminated by death are not considered in these figures. Allowance is made for such, the estimates being for entering pupils who live long enough to complete the course. Here and throughout the report, also, unless the contrary is specially stated, "children" or "pupils" includes white pupils only, in cities where the two races are taught in separate schools.

These figures really need no comment. I venture, however, to call attention to some common errors in educational thought and practice due to neglecting them. To provide free schooling through the high school for all children is not to educate all children. To compel pupils to attend till 14 is not to compel them to get a solid elementary education; not half of them do. The elementary school is not a preparatory school for the high school; only 1 in 4 of those entering the former enters the latter, and not 1 in 12 of those entering the former will graduate from the latter. The first years of the high school are not a preparation for its later years. The instruction in the first four elementary grades, especially in the third and fourth, designed for little children, is given to a great number of half-grown boys and girls 11 to 14 years old[a], whose interests it nowise suits.

Our statistics of elimination also help to reveal the true explanation of the relative backwardness of the United States in public provision for technical and trade education. The fact is that the class who attend the Fortbildungsschule in Germany and the special classes in sciences, arts, and industries in England, are in our country not obliged or allowed to earn a living at so early an age, but are in regular attendance in public high schools. From 14 to 18 more of our boys and girls are in regular day schools than are in day, evening, and special classes together in England. We have neglected technical and trade education partly because we were slow to appreciate its value, but also because national prosperity allowed us to leave a large proportion of pupils in school altogether till 16 or 17, and the high value of intelligent, though untrained, labor in our country allowed us to give them all what we regarded as the best sort of education—the traditional academy course. It is significant that our appreciation of the value of technical, industrial, and trade education as a part of public school work was manifested first in courses absorbing all the pupils' time (i. e., in manual training and commercial high schools), rather than in continuation schools or special classes. If we fail to give the better quarter of boys and girls 14, 15, 16, and 17 years old a chance to study the technical and industrial arts outside of working hours, it is in large measure because they are studying something else all day in the higher grammar grades and public high schools.

It is not advisable to discuss the general tendency to elimination in great detail, for the reason that the varied cases of it furnished by particular cities offer more instructive information. Table 1 shows the

[a] The evidence of this fact comes from comparing the age elimination to be given later with the grade elimination.

facts concerning 23 cities.[a] Figure 2 shows graphically the great differences that obtain among these cities.

In the case of each of these cities I have registration figures from enough years to warrant the conclusion that if we knew the facts for ten years the chances are 10 to 1 that my figure in the given case would not vary by 6 per cent of its amount. For these cities I have also been able to estimate the growth of population and the change in the tendency to keep children in school, with reasonable exactitude, so that in correcting the registration figures so as to infer from the number of children in the different grades the successive grade populations, I am confident that errors of over 5 per cent of the given per cent are very few. I am unable to measure exactly how reliable my corrections are, because the interchange between private and public schools, the quality of families moving in and moving out from the city, and the exact birth rates are not ascertainable. Also the number of children entering school is not given, but has to be inferred from the number in the first, second, and third grades. The data used in making the estimates are given in Parts IV and V, so that the student who doubts the substantial accuracy of my estimates can, for any or all cities, estimate for himself. It will, I think, be safe to trust that in nine cases out of ten the perfect and entire educational history of every child entering school in say 1894, 1895, and 1896 would give results that would not vary from my estimates by 8 per cent of their amount.

I judge therefore that inferences concerning the elimination in different grades or concerning the elimination in different cities are safe except when the difference in question is decidedly small. For instance, there is not one chance in millions that Baltimore gives its pupils as extensive an education, measured in years, as Worcester does, or that in general the number of pupils dropping out by the last grammar grade would be as low as 50 per cent.

To Table 1 and Figure 2, then, I refer the reader for the facts concerning the amount of elimination by grades in American cities. In Part IV additional facts are given.

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[a] These 23 cities are not a random selection from American cities, though they are a random selection so far as the author's influence is concerned. He simply took from all the published reports at his disposal all those where the appropriate statistics were given for enough years close to 1900 to give a sufficiently precise measure for the tendency in the city at that period. He rejected no city for any other reason than the absence of the data, and chose no city for any other reason than that the data concerning it were available in the Teachers College Library.

These 23 cities are then a random selection of those that formally report registration by grades. That they represent such cities accurately is demonstrable not only a priori from the laws of probability, but also by a comparison of the results calculated from them with similar results calculated from a nearly complete list of such cities, but with data for a single year only.

Certain important cities, for which data were not available at the time when the main investigation was made, are made the subject of a special report in Section 14.

Concerning these cities I have nothing to offer as to the causes of elimination that is sufficiently in advance of the opinion of good local observers to warrant publication. Poverty is one cause, but I am unable to assign any exact measure of its amount of influence. Incapacity for and lack of interest in school studies is another. This can be to some extent measured by careful treatment of the facts of grade elimination as related to age. In Connecticut, for instance, a 14-year-old who has got to the ninth or tenth grade is over twice as likely to progress two grades farther as is a 14-year-old whose lack of capacity or interest, or both, have prevented his getting beyond the fifth grade. Or to make the comparison differently, of the sixth or seventh grade population in Connecticut, the 14-year-olds are over one and a third times as likely to progress two grades farther as are the 15 and 16 year olds. A child who does not get beyond the fourth grade by 14 has in Connecticut less than 1 chance in 30 of progressing to the eighth grade as against 20 out of 30 in the case of his brighter or more fortunate fellow who at the same age has reached the seventh grade. The large number entering the first high school grade and the small number remaining through that grade bear further witness to the influence of lack of capacity and interest. The individual scholarship records of those who leave school grade by grade give a still better demonstration.

§ 3. *The Variability Amongst Cities.*

Table 1 and Figure 2 show the great variability among cities, some giving their pupils fully two grades more of school than others. The table shows further that the time at which the large losses occur varies amongst cities, some losing many in the early grades but holding their own or even recouping, like Minneapolis, thenceforth; some, like Cleveland, holding a large majority of their pupils for a while and then losing them very rapidly. It shows the universal prevalence of the rule that pupils leave in considerable numbers from almost the beginning of the elementary school course. It shows that in very few cities is there any specially large drop between the last grade of the elementary and the first grade of the high school.

This variability among cities is not due to chance, but to differences in the efficiency of the school systems or in the nature and circumstances of the cities' populations. There is a somewhat close relation between ability to keep pupils in the schools and other features of a school system which would be regarded as marks of efficiency, such as the cost per pupil or the percentage of expenditures devoted to teachers' salaries. And there can be no doubt that wisdom in the management of a city's schools improves its status with respect to the retention of pupils. In the opinion of the author, however, the charac-

ter of the cities' populations is far more important than the character of their educational administrations as a cause of the variability of the elimination.

TABLE 1.—*Estimated percentage of pupils entering school who continue to the fourth, fifth, etc., grades in each of 23 cities.*

	Grammar school grade.						High school year.			
	4.	5.	6.	7.	8.	9.	1.	2.	3.	4.
Baltimore	71.0	53.0	32.0	22.0	14.4	.....	8.2	5.0	3.0	2.3
Boston	85.0	80.5	76.3	65.8	52.2	47.0	31.3	15.7	12.5	6.3
Cambridge	90.3	82.0	62.9	57.8	55.7	41.9	29.4	21.0	15.8	13.9
Chicago	86.3	85.2	62.3	49.2	35.0	.....	14.0	9.8	5.6	5.5
Cleveland	97.2	79.6	61.9	45.3	33.1	.....	19.9	12.6	10.0	7.4
Denver	98.0	86.0	78.0	57.0	44.0	.....	.....	.....	.....	.....
Jersey City	75.9	65.5	50.6	35.6	26.4	.....	9.2	5.0	2.9	2.4
Kansas City, Mo	96.5	75.3	62.4	49.4	.....	.....	40.0	25.9	17.6	16.5
Los Angeles	95.4	95.0	80.0	61.5	45.1	.....	39.0	21.6	11.7	6.2
Malden	96.7	85.4	79.8	65.9	62.4	54.0	42.8	28.9	18.5	14.9
Minneapolis	85.7	69.7	57.1	45.7	32.0	.....	24.0	16.0	12.6	10.3
Newport	91.7	85.6	71.4	58.1	53.0	44.9	35.7	23.5	12.0	8.2
Newark	78.0	58.3	45.8	33.3	25.0	.....	17.9	8.3	5.6	3.8
New Haven	85.0	70.0	68.0	57.0	35.0	.....	24.0	17.0	14.0	9.1
New York	90.0	77.0	58.0	43.0	33.7	.....	.....	.....	.....	.....
Paterson	86.4	71.8	52.4	32.0	19.4	.....	10.9	6.8	5.1	3.7
St. Louis (white)	94.0	63.0	35.0	27.0	21.0	.....	14.1	4.2	4.1	3.2
Springfield	99.0	82.4	78.0	66.2	53.4	38.5	30.0	24.6	18.2	12.8
Trenton	86.6	73.2	57.3	48.0	30.6	.....	22.0	15.2	14.2	11.6
Washington (white)	93.4	86.9	70.6	57.5	52.1	.....	.....	.....	.....	.....
Waterbury	84.0	81.0	64.0	54.0	43.0	.....	32.0	26.0	14.0	8.0
Wilmington	90.6	81.1	73.8	51.6	39.0	.....	33.7	11.6	8.4	.....
Worcester	99.0	94.0	94.0	72.0	72.0	58.0	43.0	34.5	28.3	26.4
Medians	90.0	80.5	63.0	51.5	[a]37.0	.....	27.0	16.0	12.5	8.0
Medians estimated in view of this and all other available information	90.0	81.0	68.0	54.0	[b]40.0		27.0	17.0	12.0	8.0

[a] Median of last grammar grades (7, 8, or 9) 38.5.

[b] Last grammar.

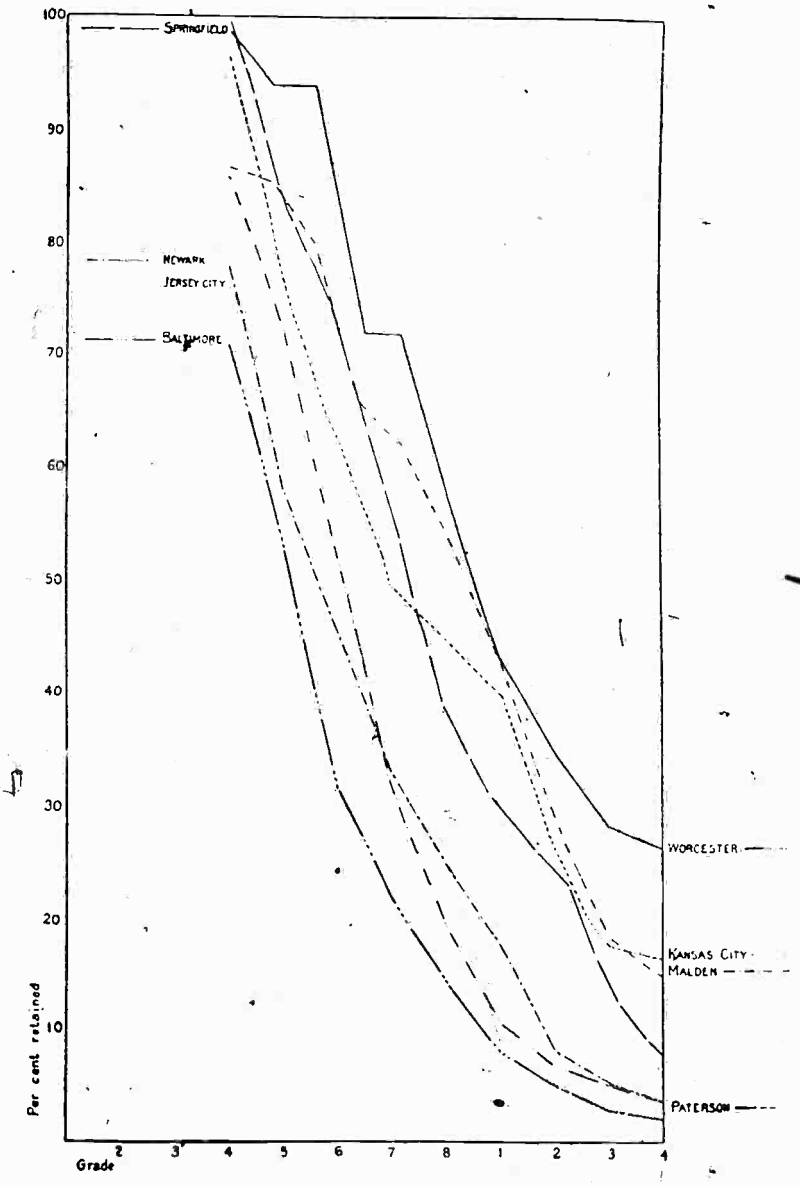

FIG. 2.

§ 4. *The Course of Elimination.*

To fully realize the course of elimination—that is, the relative amounts of elimination grade by grade—one needs to look at the facts from three points of view. We may ask, first, "Of 100 pupils entering school, how many drop out at each grade?" Second, "Of 100 pupils

in any grade, how many are lost before the next grade?" Third, "Considering the force producing elimination as increasing grade by grade by the addition of new causes and the retention of all the old, how much increase in this eliminating force is there grade by grade?" In the third case we regard the 100 pupils entering school as each to be eliminated from school as soon as the forces that cause elimination get strong enough to overcome the resistance each case offers.

In examining any one of the sets of figures given in the answers to these questions the reader must not forget that the step from the seventh to the last grammar grade is credited with the elimination of two grades in a number of the cities, and that if only cities with an eighth-grade system had been used the drop from the seventh to the last grammar grade would be a little less. I give the figures per hundred.

The answer to the first question is as follows (see also Fig. 3):

Per cent of those entering school eliminated.

	Per cent.
From fourth grade to fifth	9
From fifth grade to sixth	13
From sixth grade to seventh	14
From seventh to last grammar grade	14
From last grammar grade to first high school year	13
From first high school year to second	10
From second high school year to third	5
From third high school year to fourth	4

According to it the drop is greatest from the sixth to the seventh grade, and much the smallest from the second to the third and from the third to the fourth high school. But obviously, even if from the third to the fourth high school grade every pupil in the third were eliminated—even if, that is, elimination were infinitely strong there—the drop would by this first method of figuring be only 12. The gross numbers dropped are then in a certain sense inadequate.

The answer to the second question is as follows (see also Fig. 4):

Per cent of those in a given grade not continuing to next grade.

	Per cent.
In fourth grade not continuing to fifth	10
In fifth grade not continuing to sixth	16
In sixth grade not continuing to seventh	20.6
In seventh grade not continuing to last grammar grade	26
In last grammar grade not continuing to high school	32.5
In first high school year not continuing to second	37
In second high school year not continuing to third	29.4
In third high school year not continuing to fourth	33.3

According to it the strength of elimination is greatest from the first to the second high school grade.

The two answers are both true and when taken together will not mislead an intelligent reader. I should perhaps apologize for proceeding to describe the results of looking at the data from the third point of view, which is a new one and may perplex the nonstatistical reader. Such a one may skip the next few paragraphs (to top of p. 21).

The justification for the third point of view is that we have no right to subdivide the eliminating force sectionally into pieces or amounts corresponding each to a one-grade step. The amount of force eliminating the pupils, say, in the second high school year, is to a large extent the sum of all the forces that act in the fourth, fifth, sixth, seventh, etc., grades, plus a new amount, the addition of which so strengthens the eliminating force that pupils not driven out of school by the amount of force operating in the first high school grade are driven out now.

It is true, however, that it is not quite accurate to regard the eliminating force as thus always retaining all the strength with which it operated in the lower grades and adding new forces in the case of the higher grades. To some extent the higher grade loses from the old forces. For example, the temporary financial difficulties of certain families exert an eliminating force in, say, the fifth grade, and ten boys thereby leave school. These difficulties later disappear, so that had the boys not left in the fifth they might have withstood all the eliminating force of the eighth grade. If the almost exclusive employment of women teachers is a part of the eliminating force in the elementary school, the high school would, in so far as it had men teachers, have less eliminating force to contend with. It is also the case that the entire state of affairs is otherwise arbitrarily simplified in our simple mechanical hypothesis of force overcoming resistance. Still, there is enough truth in the hypothesis to justify us in seeing how, according to it, we should regard the course of elimination.

The first step is to find out how the 1,000 pupils entering school differ with respect to ease of being eliminated or, thinking in the opposite direction, in resistance to eliminating forces. But we can not find this out exactly without elaborate researches involving greater labor than the present one.

We have reason to believe, however, that, starting with the amount of the eliminating forces which will just suffice to cause the withdrawal of a very small percentage of pupils, say, one in a thousand, and adding thereto successive equal increments of eliminating force, the number of pupils eliminated by each such successive equal step of increase will be at first small, then larger, then larger still, up to a certain point, then smaller, then smaller still, then still smaller, on to a point where the combination of forces causing withdrawal is so strong that the pupil least inclined by nature to leave school does withdraw. We can, that is, frame a reasonably probable hypothesis

concerning the relation between the amount of eliminating force and the proportion (that is, the relative frequency) of pupils who will be eliminated thereby. A quantitative statement of such an hypothesis concerning the relation between the force of elimination and the number eliminated may be given in a graphic or numerical distribution of pupils entering school with respect to ease of being eliminated.

The hypothesis I suggest is that the distribution of resistance to elimination in children entering school is of the form shown in Fig. 6.[a] The hypothesis is, then, that if we scale the amount of the eliminating force on a horizontal line, letting *Fl* equal the force which will just eliminate the one pupil out of a thousand entering school who is easiest to eliminate, and *Fm* equal the force which will eliminate the pupil who is hardest to eliminate, the proportion of pupils who will be eliminated by any degree of eliminating force, *X*, between *Fl* and *Fm*, will be represented by the area of Fig. 6 which lies to the left of the perpendicular erected at the point on the horizontal line which corresponds to the amount of *X*. For instance, if we call the increase in force from *Fl* to *Fm* *C*, a force of $Fl + \frac{1}{2}\ C$ will eliminate about 82 per cent of the pupils who enter school.

Our problem is, now, to make the reverse calculation, and from the fact that by the fifth grade 19 per cent have been eliminated, to infer the amount of force operative by the fifth grade, and so on for other grades. After this is done the differences between these amounts will give us the increases in eliminating force grade by grade, on the hypothesis stated above.

As a result of such a calculation, we have the following increases in the eliminating force grade by grade given in terms of hundredths of *Fm-Fl*. (See also Fig. 5.)

Increase in eliminating force.	$\frac{Fm-Fl}{100}$
Increase from fourth grade to fifth	5
Increase from fifth grade to sixth	8
Increase from sixth grade to seventh	6
Increase from seventh grade to last grammar grade	8
Increase from last grammar grade to high school	8
Increase from first high school year to second	7
Increase from second high school year to third	5
Increase from third high school year to fourth	5

[a] The reader will understand that the shape of this curve is not demonstrated by any facts presented in the text, but is itself a representation of the hypothesis to be assumed.

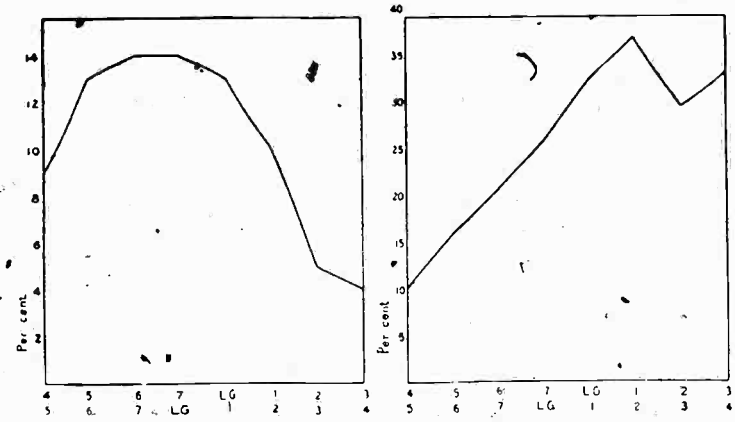

FIG. 3.

FIG. 4.

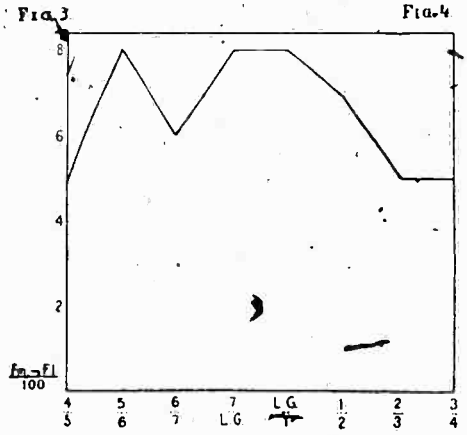

FIG. 5.

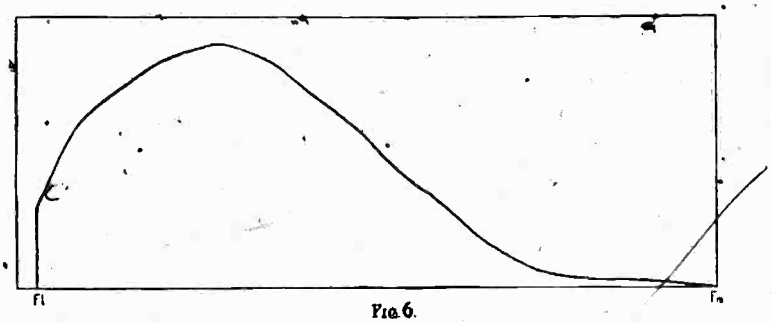

FIG. 6.

FIG. 3.—The course of elimination by the per cent of those entering school at the beginning that is eliminated in each grade.

FIG. 4.—The course of elimination by the per cent of those in any given grade that is eliminated by the next grade.

FIG. 5.—The course of elimination by the increase in the eliminating force grade by grade (certain hypotheses being made about the nature of the eliminating force).

FIG. 6.—The form of distribution of pupils entering school with respect to resistance to eliminating forces. The height of the curved line above any point of the base line represents the relative frequency of those who require, in order to be eliminated, the amount of eliminating force represented by *F1* + that point's distance to the right of *F1*.

The general course of the elimination is worthy of comment from several points of view. First of all, it is in somewhat sharp contrast with the same fact in England and Germany, and probably also in France. In England and Germany there is no greater elimination during the grades corresponding roughly to our grades 4 to 7, but then there is a very sudden and large drop, further continuance in day school being largely a result of one single cause—social position. In our 23 cities, on the contrary, the progress from an elementary to a higher school is demonstrably easy and customary, two-thirds of the pupils in the last grammar grade continuing to the high school. Such a state of affairs, true also of New York City, could hardly be found in a single large European city. Besides the obvious gain in the increased amount of education given, the American system has the advantage of selecting the recipients of higher education from a far greater number.

In the second place, as has just been indicated, there is no special gap between the elementary school and the high school. Graduation from the former is not a specially important educational goal. The drop between the last grammar and the first high school grade is not notably greater than either the drop a grade earlier or the drop a grade later. The high school is treated as a sequel of the elementary school to the same degree that the last grades of the elementary school are treated as a sequel to the early grades.

The third matter of importance is that the high school, which attracts so many, holds so few. Something in the mental or social and economic status of the pupil who enters the high school, or in the nature of the particular kinds of education given in high schools, is at fault. The fact that the elimination is so great in the first year of the high school gives evidence that a large share of the fault lies with the kind of education given in the high schools. One can hardly suppose that very many of the parents who send children on to the high school do so with no expectation of keeping them there over a year, or that a large number of the children who complete the elementary school course and make a trial of the high school are so stupid or uninterested in being educated that they had better be got rid of in the first year.

The last general feature of the course of elimination is its comparative steadiness. It is a common opinion that when a legal-age law is enacted with a 14-year requirement, the result is that a large proportion of those entering school will remain through the next to the last or the last grammar grade. It is also a common opinion that a sharp line divides those who thus remain as long as they are compelled to from those who stay on till they are through the high school or take some suitable opportunity for work or further study. How false both of these opinions are the facts show. Compare *a*, Figure 7,

which would represent the amount of elimination if such opinions were true, with the reality, *b*. The dropping due to passing the legal limit does not in fact make any very clear showing in the figure, first of all because the law is more or less evaded in the case of children much below the limit, and is evaded rather freely by children within a few months of the limit; second, because children who are close to graduation are often left in school till they graduate in spite of the need of their economic assistance; and, third, and most important, because these 13-year-olds are found in large numbers in grade 6, and even 5, and it is precisely these dull or backward or uninterested or unfortunate children who are old enough to work, have no prospect of graduating, and are made to learn childish lessons, who drop out from school. So the legal-age elimination is well spread over the grades. Moreover, those who stay on past 14 are of a wide range of ability, interest, and wealth. There exists every gradation from the pupil sure to leave school as soon as the law allows to the pupil who is almost as sure to finish the high school as he is to live at all.

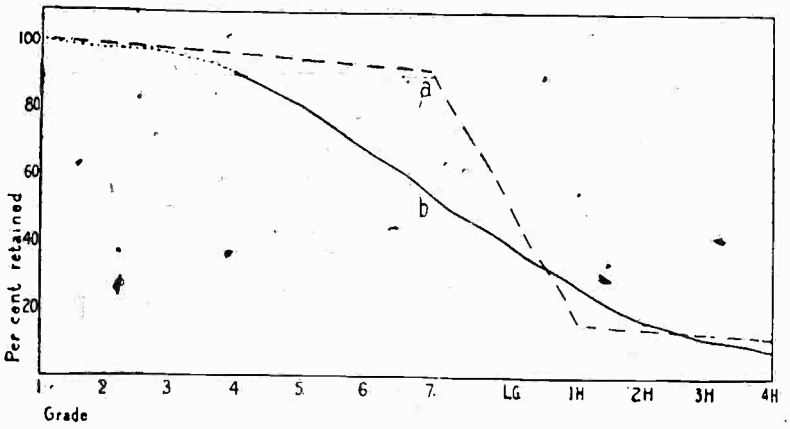

FIG. 7.

This gradualness of the elimination is a symptom that equality of educational opportunity is by no means a pretense, and that the differences in expectation of education of children born to a bishop, a storekeeper, a carpenter, and an unskilled laborer are minimized to a far greater extent than in any of the large European nations.[a]

[a] The definite figures showing these differences are given by Dr. A. J. Jones in The Continuation School in the United States (No. 1 of Bulletin for 1907, Bureau of Education).

PART II. ELIMINATION BY AGES.

§ 5. *The Amount of Elimination.*

The amount and course of elimination by age and the variability of cities with respect to it are less important than the same facts concerning elimination by grade. So I shall simply give the general facts with very brief discussions. I have attempted to make the necessary allowances so as to present not mere school populations by age, but an estimate of the actual elimination year by year from the 8-year-olds who were in the schools of cities of 25,000 or over, say, in 1895. In Part V will be found the original data and an account of the process of inferring from them the actual elimination.

My study concerns 8-year-olds (1) of large cities, (2) in the public schools, and (3) in the case of cities where separate schools for the colored race are maintained, of the white children only. I also do not count elimination by death. Such being the conditions, I estimate that of one hundred 8-year-olds living long enough, the number retained till any given age is as follows:

Percentage of 8-year-olds retained.

	Per-centage.		Per-centage.
10 years old	100	15 years old	47
11 years old	98	16 years old	30
12 years old	97	17 years old	16.5
13 years old	88	18 years old	8.6
14 years old	70		

Figure 8 shows the amount of elimination with respect to age at a glance.

These figures complete the proof of the provision in regular day schools for boys and girls who, in England and Germany, have to be at work with only scanty schooling in special classes. They show the readiness of a large proportion, almost a majority, of parents to neglect the opportunity to withdraw their children at the legal age limit. They also show the very considerable number of the violations of the law, a number which would probably be somewhat increased if false reports of age were not present. The legal age limit has evidently a less effect than we have been in the habit of supposing. Its service is now to prevent the folly of a minority of families rather than to set a standard for the community as a whole.

The importance of the fact that pupils stay so long and yet progress only to so low grades has been recognized by wise administrative officers. It means, of course, that many pupils are held back unduly, or that the work which they are given to do but fail to do is unsuited to them. Rapid-promotion systems, special classes, careful regulation of promotion, the substitution of industrial and trade schools or courses for the regular school, and the like will be used by efficient school officers to make retention to a late age mean also retention to a valuable education.

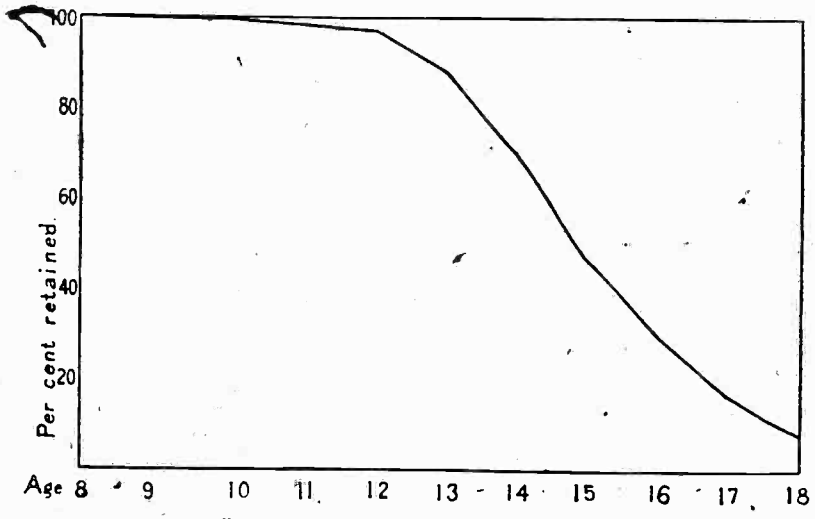

FIG. 8. Amount of elimination with respect to age.

At first sight it seems strange that so many pupils should stay in school till 10, 11, 12, 13, and 14, and so few till the fourth, fifth, sixth, and seventh and eighth grades. How, for instance, can we have 97 per cent of the 8-year-olds staying till they are 12, but only 68 per cent of those in the second grade staying till the sixth grade?

The fact is due to two main causes: (1) The second grade is harder than the later grades, more pupils staying a year and a half or two years in it than in the later ones; as a result, the percentages of retention of pupils in the later grades are a little lower when based on the second grade population than they would be if based on the number of pupils beginning school. (2) The elimination of pupils in any grade, but specially in the lower ones, is largely of older pupils. If we recall, for instance, the fact that in the sixth school grade in Connecticut in 1903 as many pupils were 13 or over as were under 12, we may understand that the 33 per cent of elimination before the sixth grade could take place largely at the expense of children 13 or more years old.

I have calculated what would be the grade retention if the age retention were 1,000 7 years old, 1,000 8 years old, 1,000 9 years old, 998 10 years old, 980 11 years old, 970 12 years old, 880 13 years old, 700 14 years old, 470 15 years old, 300 16 years old, 165 17 years old, and 86 18 years old (with the proper number 5 and 6 years old added), on the hypothesis that the per cents of children of given ages in the different grades is as found in the 1903 Connecticut report. The resulting figures are close to those obtained in the previous study, the discrepancy being due presumably to cause 1 just mentioned, that is, to the fact that "per cent retained of those in grade 2" will give somewhat lower figures than "per cent retained of those beginning school." The study of the age retention thus really verifies the approximate accuracy of the results of the study of grade retention.

The essential facts are given in Figure 9 and the legend beneath it. The details are given in Table 2.

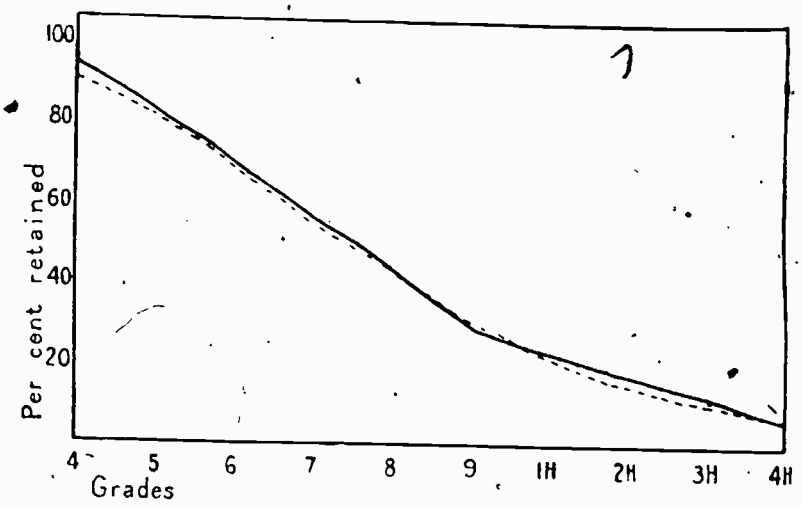

FIG. 9.—The continuous line shows the retention in the different grades (4 to 4 H. S.) as calculated on the basis of the age retention stated in the text and the age-grade distribution found in Connecticut in 1903. The dotted line shows the retention in the different grades as stated in the text, Part I, §2.

TABLE 2.—*Showing the grade retention when the age retentions of the text are distributed according to the age-grade relation found in Connecticut in 1903.*

Age.	Grade.						
	Kindergarten.	1.	2.	3.	4.	5.	6.
3 and 4 years	160.0	60.0					
5 years	242.0	358.0	12.0	1.2			
6 years	82.0	639.0	120.0	12.0	2.2	0.1	
7 years	21.0	472.0	382.0	107.0	15.8	.9	0.1
8 years	3.0	203.0	366.0	310.0	99.0	16.0	3.2
9 years	1.2	67.0	215.0	342.0	206.0	82.0	20.0
10 years	.6	31.0	97.0	231.0	310.0	224.0	86.0
11 years	.3	14.3	40.0	121.0	233.0	274.0	192.0
12 years	.2	7.3	21.6	63.3	147.0	224.0	240.0
13 years	.1	7.1	11.5	32.3	85.0	152.0	206.0
14 years	.1	1.6	4.3	10.2	26.2	54.0	98.0
15 years	.1	.4	1.0	2.7	7.1	12.0	31.0
16 years			.1	.4	1.4	2.4	6.5
17 years			.1	.1	2	.9	1.1
18 years						.1	.2
Over 18 (estimated)							
Totals		1,861	1,271	1,233	1,191	1,052	884
In per cents of grade 2					93.7	82	69.6
Per cents obtained in direct study					90	81	68

Age.	Grade.						
	7.	8.	9.	10.	11.	12.	13.
3 and 4 years							
5 years							
6 years							
7 years							
8 years	0.1	0.1					
9 years	3.5	.8	0.3	0.1			
10 years	16.6	3.4	.3	.1			
11 years	80.0	19.2	3.3	.5	0.1		
12 years	166.0	73.5	18.1	7.1	.5		
13 years	220.0	144.0	64.0	21.8	7.4	0.5	
14 years	143.0	173.0	111.0	60.0	17.0	2.3	0.2
15 years	64.0	106.0	90.0	80.0	47.0	20.0	1.6
16 years	16.0	38.0	52.6	70.0	65.0	38.0	8.9
17 years	2.9	7.4	14.0	33.0	40.5	47.0	17.4
18 years	.2	1.1	3.5	9.0	19.0	32.0	21.0
Over 18 (estimated)				5.0	10.0	20.0	20.0
Total	712	566	363	287	207	160	70
In per cents of grade 2	56.1	44.6	28.6	22.6	16.3	12.6	5.5
Per cents obtained in direct study[a]	54	40	27	17	12	8	

[a] In the Connecticut report grade 9 is a composite of the first high school grade of some cities and towns and the last grammar grade of others; Grade 10 is a composite of second high and first high, and so on, grade 13 being the last high school grade of only a part of the cities. Hence the per cents 44.6 to 5.5 do not fit the per cents 40 to 8, but run beyond them at both ends.

§ 6. *The Variability amongst Cities.*

The variability amongst cities is discussed in Part V. It is large in amount. Comparing three cities which retain very high percentages with three cities which retain very low percentages, we find that the former keep one and a half times as many pupils to 14, twice as many to 15, three times as many to 16, and three and a half times as many to 17 and 18. As in the case of grade elimination, local differences in the nature of the pupils themselves are probably more important causes of this variability than differences in the administration of the school systems.

§ 7. *The Course of Elimination.*

The general course of elimination with increased age is for this group of cities such that practically no pupils drop out before 12, but that of 100 in school at 8, 9 leave while only 12 years old, 18 while 13 years old, 23 while 14, 17 while 15, 13 or 14 while 16, and 8 while 17. Or 9 per cent of those in school at 12 leave before they reach 13, 20.5 per cent of those 13 leave before they reach 14, 33 per cent of those 14 leave before they reach 15, 36 per cent of those 15 leave before they reach 16, 45 per cent of those 16 leave before they reach 17, and 48 per cent of those 17 leave before they reach 18.

Considering the causes producing elimination as increasing by the addition of new forces and the preservation of all the old, and considering the form of distribution of the 8-year-olds with respect to the amount of force remaining to eliminate them to be that of Figure 6, and calling the force required to eliminate the most easily eliminated pupil *Fl*, and the force required to eliminate all but the last out of a hundred *Fm*, and calling *Fm*–*Fl* equal to *C*, the increases in eliminating force for the different years are, in terms of hundredths of *C*, as follows:

Increase in eliminating force at different ages.

	Increase.		Increase.
Eleventh year.. Twelfth year...	3	Fifteenth year	17.5
		Sixteenth year	14
Thirteenth year	10	Seventeenth year	14+
Fourteenth year	15	Eighteenth year	14–

PART III. SPECIAL REPORTS.

§ 8. *Elimination with Respect to Sex.*

Through the kindness of many high-school principals I have secured additional data concerning the elimination of pupils in the high school, data in which the facts for the two sexes are separated.

Table 3 gives (1) the ratio of the number of boys in the second, third, and fourth grades of the high school to the number of boys in the first (lowest) grade for each high school, (2) the same for girls, and (3) the ratio of the number of boys in the lowest grade of the high school to the number of girls in the same grade. For the reason that in these cities the number of inhabitants 15 to 19 years of age equals or exceeds the number 10 to 14, and for the general reasons given in discussing the elimination by age, these ratios can be used without correction for a rough estimate of elimination from the public schools. The effect of adding also facts from the private school attendance of pupils belonging to these cities would be, I believe, indifferent with respect to the more rapid elimination of boys. In any case it would be slight.

Table 4 gives these same data (in the form of percentages instead of ratios) distributed so as to show the great variability in high school elimination. The medians at the foot of the table measure the extent to which in general the girls outlive the boys in the high school.

TABLE 3.—*Retention by grades in the case of high schools for the sexes separately.*

[$\frac{2}{1}$ = the second grade's population divided by the first grade's; similarly, for $\frac{3}{1}$, $\frac{4}{1}$, etc.]

	Boys.			Girls.			
	$\frac{2}{1}$	$\frac{3}{1}$	$\frac{4}{1}$	$\frac{2}{1}$	$\frac{3}{1}$	$\frac{4}{1}$	$\frac{1B}{1G}$
Allentown, Pa.	0.693	0.572	.....	0.530	0.454	.....	0.765
Atlantic City, N. J.	.703	.500	0.217	.513	.372	0.244	.949
Auburn, N. Y.	.723	.325	.181	.859	.370	.304	.902
Bay City, Mich.	.521	.313	.125	.577	.321	.227	.701
Bayonne, N. J.	.816	.053	.068	.794	.476	.206	.905
Binghamton, N. Y.	.647	.396	.245	.844	.402	.279	.946
Birmingham, Ala.	.552	.388	.104	.856	.423	.309	.690
Boston, Mass.	.740	.403	.235	.611	.494	.331	.692
Brockton, Mass.	.667	.390	.215	.729	.396	.419	.837
Canton, Ohio.	.684	.496	.214	.827	.417	.331	.921
Chattanooga, Tenn.	.400	.418	(?)0	.526	.003	.154	.706
Chester, Pa.	.606	.151	.169	.716	.376	.205	.750
Council Bluffs, Iowa.	.707	.346	.360	.684	.596	.377	.658
Dallas, Tex.	.466	.311	.243	.700	.371	.312	.632
Davenport, Iowa.	.392	.210	.168	.539	.362	.335	.941
Dubuque, Iowa.	.536	.288	.192	.705	.296	.295	1.025
Duluth, Minn.	.701	.351	.409	.590	.366	.339	.749
East St. Louis, Ill.	.303	.257	.242	.406	.368	.168	.528

TABLE 3.—*Retention by grades in the case of high schools for the sexes separately*—Cont'd.

[½—the second grade's population divided by the first grade's; similarly, for ⅓, ¼, etc.]

	Boys.			Girls.			
	2/1	3/1	4/1	2/1	3/1	4/1	1B/1G
Elizabeth, N. J.	0.767	0.302	0.209	0.684	0.619	0.387	0.566
Elmira, N. Y.	.862	.517	.422	1.009	.598	.581	.991
Erie, N. Y.	.789	.356	.308	.615	.482	.511	.771
Fitchburg, Mass.	.647	.384	.242	.832	.579	.442	1.042
Galveston, Tex.	.429	.400	.257	.703	.392	.378	.473
Gloucester, Mass.	.677	.677	.645	.735	.691	.721	.912
Harrisburg, Pa.	.769	.602	.443	.766	.545	.283	.717
Haverhill, Mass.	.924	.636	.471	.821	.621	.579	.695
Joliet, Ill.	.532	.344	.250	.560	.320	.236	.640
Johnstown, Pa.	.625	.516	.313	.701	.597	.286	.831
Macon, Ga.	.500	.190		.642	.431		.679
Montgomery, Ala.	.156	.031	.0	.585	.536	.250	.381
New Britain, Conn.	.925	.510	.453	.938	1.016	.344	.828
Newton Center, Mass.	.905	.762	.612	.661	.684	.544	.737
Norfolk, Va.	.521	.417	.167	.477	.408	.279	.558
Oakland, Cal.	.581	.375	.250	.653	.472	.317	.604
Portland, Me.	.599	.536	.248	.734	.563	.375	1.133
Riverside, Cal.	.900	.673	.491	.543	.500	.300	.786
Rockford, Ill.	.952	.414	.299	.802	.522	.478	.765
Saginaw, Mich.	.599	.197	.233	.177	.264	.295	.581
Salem, Mass.	.581	.368	.274	.841	.660	.490	1.245
San Antonio, Tex.	1.260	.766	.300	1.190	1.130	.365	.405
Savannah, Ga.	.783	.367		.605	.269		.504
South Bend, Ind.	.674	.202	.109	.842	.307	.347	.881
South Omaha, Nebr.	.474	.195	.088	.886	.426	.276	.655
Spokane, Wash.	.843	.433	.433	.827	.431	.371	.594
Tacoma, Wash.	.401	.217	.179	.438	.189	.165	.800
Topeka, Kans.	.900	.350	.436	.633	.321	.358	.582
Wheeling, W. Va.	.572	.476	.333	.472	.445	.236	.583
Wilkes-Barre, Pa.	.760	.342	.302	.828	.461	.268	.896
Yonkers, N. Y.	1.022	.578	.433	.981	.583	.524	.874
Medians	.66	.39	.25	.70	.45	.31	.75

In calculating the medians only those cities with a course of at least four years have been used. That is, of the above list Allentown, Macon, and Savannah have not been used. It is probable, in fact almost certain, that for San Antonio, Tex., the first, second, third, and fourth grades, as reported, do not represent the same status as in the other cities.

It should be kept in mind that these grade populations, being records of one year only, do not give information sufficiently precise to allow inferences concerning small differences between cities to be made reliably.

TABLE 4.—*High school elimination by sex, as shown by the frequencies of different per cents of retention.*

Per cent of first grade retained.	Number of cities retaining the per cent to—					
	Second grade.		Third grade.		Fourth grade.	
	Boys.	Girls.	Boys.	Girls.	Boys.	Girls.
0 to 4 per cent			1		2	
5 to 9 per cent			1		2	
10 to 14 per cent					2	
15 to 19 per cent	1		3	1	7	3
20 to 24 per cent			3		10	7
25 to 29 per cent			2	2	5	9
30 to 34 per cent	2		7	3	6	11
35 to 39 per cent	2		9	9	1	6
40 to 44 per cent	3	2	6	8	6	2
45 to 49 per cent	2	3	2	5	3	2
50 to 54 per cent	4	4	5	4		3
55 to 59 per cent	5	4	1	6		2
60 to 64 per cent	4	3	1	3	2	
65 to 69 per cent	4	4	3	3		
70 to 74 per cent	5	8				1
75 to 79 per cent	4	2	2			
80 to 84 per cent	2	9				
85 to 89 per cent	1	3				
90 to 94 per cent	4	1				
95 to 99 per cent	1	1				
100 per cent and over	2	2		2		
Median per cents	**66**	**70**	**39**	**45**	**25**	**31**

The general meaning of these tables may be stated in very few words. For every 100 girls in the first-year class of city high schools there are only, in general, 75 boys; of 100 girls in the first-year class, 30 leave before the second-year class, 25 more before the third, and 14 more before the fourth. For 100 boys the corresponding figures are 34, 27, and 14. A third more girls enter and fewer girls drop out. The elimination is very much larger than that in colleges and steadier. Roughly, a third of each class leave before reaching the next higher class. Whatever causes produce it work, then, throughout the high school course, work more pronouncedly on boys than on girls, work more in the South than in the North.

§ 9. *Elimination in Schools for Colored Children.*

For proper treatment this topic demands a special investigation, with data much more comprehensive than I have been able to secure. The results from the limited information which I have (given in Tables 5 and 9) are, however, worth presenting, because so far as they go they support a definite hypothesis whose importance should stimulate further investigation. It is that in our cities colored pupils, in general, (1) are less capable at school work, but (2) they and their parents are more appreciative of educational opportunity.

The evidence for this hypothesis is that the colored pupils stay to a greater age, but to less advanced grades. In the two cities where I have both age and grade populations this fact is very clear. It was also found to be the case in New York City in a slight investigation (unpublished) made in my department some years ago. In so far as the course of study in the colored schools is less difficult than that for corresponding grades in the schools for whites, the first part of the hypothesis is strengthened; in so far as the course of study for the colored is more difficult, it is weakened.

There is a minor hypothesis which is possibly of even greater practical significance. It is that though in general colored pupils stay to less advanced grades, a small fraction of them stay to more advanced. That is, the higher retention of white pupils weakens in the later high school grades and tends to become negative. Supposing this hypothesis to be proven by further study, and supposing also that the conditions of promotion are not such as to make the passage to the later high school grades very easy in comparison with the passage to the later grammar and early high school grades, we should presumably explain it by a greater variability in capacity for and interest in school work among the colored than among the white pupils.

This greater variability would mean greater possibility of racial improvement in the future, and would recommend that in the present the range of educational opportunity for the colored pupils be made very wide, the higher levels of opportunity being of course properly restricted to the most fit.

TABLE 5.—*Ratios which the per cents of retention for colored pupils are to the per cents of retention for white pupils.*

[Taken directly from the age populations and grade populations without correction.]

	Elementary school grade.					High school year.			
	4.	5.	6.	7.	8.	1.	2.	3.	4.
Little Rock	0.75	0.02	0.68	0.54	0.53	0.57	0.58	0.60	0.79
Louisville	.84	.02	.63	.53	.48	.77	.72	.73	1.28
	Age.								
	10.	11.	12.	13.	14.	15.	16.	17.	18.
Little Rock	1.08	1.02	1.07	1.05	1.07	1.08	1.21	1.38	1.72
Louisville	1.06	1.09	1.15	1.29	1.58	1.42	2.54	2.05	1.83
	Elementary school grade.					High school year.			
	4.	5.	6.	7.	8.	1.	2.	3.	4.
Washington	0.82	0.73	0.81	0.66	0.58				
Houston	.57	.43	.37	.26					
Macon	.63	.47	.36						

§ 10. *Elimination in Colleges.*[a]

The amount and direction of the selection in colleges, while not of so great public concern as in the case of the common schools, is of enough moment to demand serious study, especially since common administrative practice neglects it possibly even more than it does the similar selection in the lower schools.

I shall give facts concerning the amount of the elimination and its points of incidence in 34 colleges, and concerning the variations among 14 of these institutions with respect to the length of time an entering student is likely to stay in them. The data allow certain interesting hypotheses concerning the relative importance of intellectual inability, sloth, distaste, and poverty as causes for the elimination of students from college.

The facts to be reported are of two sorts. First we may compare the size of the freshman class in, say, 1900, with that of the sophomore class in 1901, that of the junior class in 1902, and that of the senior class in 1903. This comparison does not truly represent the facts for any particular college, because of the entrance on advanced standing of students from other colleges, the transfer of students to other colleges, the completion of the course in a year more or less than the usual four years, the repetition of single years by students who do not complete the course, the transfer to and from the group "special students," and absence from college for a year or more followed by return and completion of the course. It does truly represent the facts for the group of colleges as a whole except in the one particular that these institutions, representing, as they do, the better sixth, or perhaps eighth, of the degree-granting colleges, are

[a] § 10 is reprinted from the *Educational Review*.

on the whole more likely to receive additions on advanced standing than to lose students to other colleges by transfer. The figures by this method of comparison will then show probably less elimination than actually occurs in these 34 colleges.

In the second method of comparison the actual careers of the members of a class who enter in, say, 1900–1901, are followed in the catalogues. We get thus for John Smith a record of, "entered as a freshman in 1900–1901, was a sophomore in 1901–2, was a sophomore again in 1902–3, is not in the catalogue of 1903–4 in any class." Subject to the errors of the catalogues themselves and of searching and copying, this method gives the life-history of any freshman in the college he enters. Of course this method does not give the tendency of an individual to stay in college, but only in the particular college which he enters. Transfers to other colleges appear as total eliminations. The method does have the advantages of telling something about the particular hold a college maintains on its own entering classes, and of checking the results from the former method of comparison.

We may call these two methods:

(1) The comparison of class populations.

(2) The comparison of class permanences.

The colleges studied by method (1) are:

Adelbert (Western Reserve University).	Dartmouth.	University of Colorado.
	De Pauw.	University of Illinois.
Allegheny.	Hamilton.	University of Iowa.
Amherst.	Harvard.	University of Minnesota.
Beloit.	Haverford.	University of Mississippi.
Boston University.	Hobart.	University of Tennessee.
Bowdoin.	Mt. Holyoke.	University of Wisconsin.
Brown.	Princeton.	Vassar.
College for Women (Western Reserve University).	Smith.	Washington University.
	Tufts.	Wellesley.
Cornell.	Union.	Wesleyan.
Columbia.	University of California.	Yale.

The colleges studied by method (2) are:

Amherst.	Hobart.	University of Wisconsin.
Beloit.	Princeton.	Vassar.
Bowdoin.	University of California.	Wesleyan.
Columbia.	University of Colorado.	Yale.
Harvard.	University of Tennessee.	

The facts are given in detail in Tables 6 and 7, which will repay somewhat careful study by the reader who will figure out from them the answers to the questions which arise in his mind. In brief, we find from the comparison of class populations in Table 6 that, if the size of the freshman class be taken as 100, the sophomore class of a year later ranges from 56 to 108; half of the classes are below 80; the

most frequent sizes are 70 to 74 and 80 to 84; 50 per cent of the classes are between 71 and 85. The junior class of two years later ranges from 30 to 104; half of the classes are below 68; the most frequent sizes are 65 to 69 and 75 to 79; 50 per cent of the classes are between 56 and 78. The senior class of three years later ranges from 29 to 93; half of the classes are below 70; the most frequent sizes are 70 to 75; 50 per cent of the classes are between 56.5 and 77.

The most striking facts are the extreme range, the great differences between institutions with respect to the proportion of students who leave college, and the apparent retention through the senior year of practically all the students who have remained till the junior year. These matters may best be reserved for discussion until the class permanences are compared.

TABLE 6.—*Class populations of American colleges.*

	$\frac{2}{1}$	$\frac{3}{1}$	$\frac{4}{1}$	$\frac{3}{2}$	$\frac{4}{2}$	$\frac{4}{3}$	Reliability of— $\frac{2}{1}$	$\frac{3}{1}$	$\frac{4}{1}$
University of Tennessee	64	36	29	56	45	81	8.4	10.5	10.7
University of Mississippi	74	53	35	72	47	66	13.5	5.5	12.4
Hobart	65	46	36	70	55	79	7.5	8.5	10.0
University of Colorado	58	46	45	79	77	97	8.1	7.0	8.1
Allegheny	61	31	46	51	75	147	8.4	5.4	8.1
[illegible]	67	56	48	84	71	86	a 10.0	a 10.0	a 10.0
University of Iowa	56	43	40	77	88	114	a 8.0	a 8.0	a 8.0
University of Minnesota	66	56	50	85	76	89	8.0	8.0	7.0
De Pauw	66	49	57	74	86	117	8.6	15.0	22.0
Beloit	83	65	59	78	72	91	4.0	4.6	3.4
Adelbert (Western Reserve)	72	64	60	89	83	94	3.6	7.8	6.4
Brown	74	60	61	81	83	102	1.5	1.5	11.4
Tufts	71	67	61	94	86	91	3.5	5.8	2.7
Wesleyan	81	69	66	85	81	96	4.3	6.4	3.6
Vassar	78	64	67	84	88	104	4.2	3.5	3.9
Wellesley	79	66	67	84	85	101	5.1	4.2	2.0
Dartmouth	91	72	69	79	76	96	5.0	5.8	5.8
Mount Holyoke	91	79	70	87	77	89	10.8	12.0	8.2
Washington University	74	67	71	91	96	106	a 12.0	a 12.0	a 12.0
Hamilton	84	76	72	90	86	95	4.2	5.0	.9
Amherst	89	75	73	85	82	97	3.0	2.9	2.8
University of Illinois	80	79	74	99	92	93	5.9	2.9	3.6
Columbia	82	83	74	102	91	89	0.0	8.5	11.0
Cornell	72	62	75	87	105	121	3.6	4.2	1.5
Smith	85	77	76	85	89	106	3.5	3.9	3.5
Harvard	108	82	77	76	71	94	.0	1.2	3.9
College for Women (Western Reserve)	84	76	78	90	93	103	2.0	3.6	9.2
Princeton	95	88	82	93	86	93	2.7	3.9	2.7
Haverford	82	89	83	84	100	120	4.4	1.5	9.3
Boston University	81	78	84	96	104	108	4.6	6.6	3.1
University of Wisconsin	74	78	84	105	114	108	1.2	8.5	4.3
Yale	90	85	90	94	100	106	3.2	4.4	2.7
University of California	92	105	91	113	98	87	2.6	12.0	9.2
Bowdoin	98	97	93	99	94	95	3.3	2.6	3.3
Range	56–108	31–105	29–93	51–113	45–114	66–147	.....	.....	.....
Limits including 50 per cent	71–85	56–78	56.5–77	79–93	76–93	91–106	.....	.....	.....
Median (below which are 50 per cent)	79.5	68	69.5	85	86	96	.....	.....	.....
Reliability of median	3.0	4.7	4.3	3.0	3.7	3.2	.....	.....	.....

a Approximate.

EXPLANATION OF TABLE 6.

In the column headed $\frac{2}{1}$ is given for each college the per cent that the number of students in the sophomore class is of that in the freshman class of the year before. In the column headed $\frac{3}{1}$ is given the per cent that the number of students in the junior class is of that in the freshman class of two years before. In the column headed $\frac{4}{1}$ is given the per cent that the number of students in the senior class is of the freshman class of three years before. The columns headed $\frac{3}{2}$, $\frac{4}{2}$, and $\frac{4}{3}$ give similarly the percentages of junior on sophomore of one year before, of senior on sophomore of two years before, and of senior on junior of one year before.

The colleges are arranged in the order of the percentages of senior on freshman of three years before (column 4).

The reliabilities of the percentages of sophomore, junior, and senior on the freshman population of one, two, and three years before are given in the form of figures, the meaning of which is in each case that the chances are less than one out of ten that the true percentage would vary from that given by more than the reliability figure given. For instance, the record of Tennessee should be read as follows: The sophomore class is most probably 64 per cent of the freshman, and there is not one chance in ten that if we had complete records this percentage would rise above 72.4 or fall below 55.6. The junior class is most probably 36 per cent of the freshman, and there is not one chance in ten that with complete knowledge this would rise above 46.5 or fall below 25.5. The senior class is most probably 29 per cent of the freshman and there is not one chance in ten that with complete information this would rise above 39.7 or fall below 18.3.

The great differences in the reliabilities of the different percentages are due to the facts (1) that for some colleges only two, and for others as many as five, series of four classes were compared, and (2) that the classes vary so in size, and also (3) that the dropping out year by year is far more regular in some colleges than in others.

The figures for the reliabilities of the medians have the same significance, that there is only one chance out of ten that the median from perfect measures of the entire group of which these 34 colleges are a random sampling would differ from the obtained median by the amount stated.

The facts of class permanence emphasize the variability between institutions in the retention through the senior year of students who have remained through the junior year. This retention means often, however, that the student is engaged in professional studies though registered as a college senior. The facts are given in Table 7.

TABLE 7.—*Class permanences of 14 American colleges.*

	2/1	3/1	4/1
University of Tennessee	47	24	18
University of Colorado	52	34	29
Hobart	66	41	30
University of Wisconsin	73	63	53
Beloit	75	61	56
Columbia	83	72	60
Vassar	74	64	61
Wesleyan	78	67	63
Harvard	95	90	64
University of California			72
Amherst	94	78	73
Princeton	91	86	80
Bowdoin	95	84	81
Yale	90	84	82
Range	47–95	24–90	18–82
Limits including 50 per cent	73–91	61–84	53–73
Median	78	67	62
Reliability of median	7	6	7

EXPLANATION OF TABLE 7.

Columns 2/1, 3/1, and 4/1 refer to the continuance of entering students for two, three, and four years respectively.

The reliability measures mean, as in Table 6, that there is less than one chance in ten that the median obtained from complete knowledge of the group of which these 14 colleges are a random sampling would differ from the median given by more than the amount stated.

Using the facts of class permanence and our general knowledge of the arrangements of American colleges as a guide, we may now draw conclusions from the more elaborate facts of class populations.

It would be unwise to compare individual institutions at all minutely, because of the many modifying circumstances of registration systems, and because of the unreliability due to the small number of classes. Such a comparison should be made by the administrative officers of colleges, using for their own college the records of six or eight classes, which would give an unreliability of from three to less than one. Comparisons with the medians in Tables 6 and 7 would then be extremely significant.

Though the exact position of any individual college is not determined by this study, the fact of the great variability among colleges is. There can be no doubt that the inclusion of a hundred more colleges would even increase the diversity. There can be no doubt that some colleges are three times as likely as others to keep a student for four years. This variability—found also in the cost per student, in the number of instructors per hundred students, in the amount of prescribed course work, in the amount of professional work allowed to count toward the degree, and in almost every feature of college work—shows how variable is the work done by "the college," and how utterly unsettled are the ideas of college officers as to what work it should do. There can also be no doubt that a part of this variability is due not to the wealth or intellect of the entering students but to the attachment the college arouses. The movement of students during their course from small to large colleges, and the influence of geographical location with its related conditions, are also apparent.

The amount of elimination, though not comparable with that which occurs in city high schools (it is only one-half as great), is sufficient to make the practice of making freshman and sophomore courses introductory rather than general questionable, and to demonstrate that a college degree is a symptom of a certain degree of health, ambition, wealth, and capacity, as well as of training. Putting the facts of both populations and permanences together, we may conclude that the median continuance in some college of the classes entering these 34 colleges is, to a second year, 79 per cent; to a third year, 68 per cent; and to a fourth year, 66 per cent. The medians for all American colleges with an annual income of $30,000 or over would probably be lower. The percentages of all students continuing are probably slightly higher, because students entering the larger colleges are more likely to continue in college.[a]

Withdrawal from a college is most frequent in the first year,[b] and least frequent by far in the third.[c] Using the medians of Tables 6 and 7, we find that for 100 students in an entering class there are a year later 20 fewer, whereas the decrease from the third to the fourth year will be perhaps 2; of 100 students entering a college 22 will leave it after one year, 11 after the second, and only 5 after the third. These facts have two practical consequences of some moment. (1) Elimination by incapacity, indolence, and distaste is surely a chief cause of the first year's loss. This elimination is, I believe, more useful to the college than the elimination before admission by entrance

[a] This does not make the percentages of all students much higher than the median percentages for classes, because of a skewness in the distribution of continuance by classes. This can not be shown in detail here.

[b] Including the interval between the first and the second year.

[c] Including the interval between the third and the fourth year.

examinations. (2) The student within a year of his degree will almost universally give up a year to get it, and is thus penalized one year in the colleges where professional work will not count toward it. He may be given the worth of his time, but it would seem wiser for such colleges so to cooperate with universities in their neighborhood as to leave the student a free choice between a degree with a year's professional work to his credit or a degree with an additional year of academic courses. Thus of our list Beloit, Tufts, Wesleyan, and Haverford ought perhaps to obtain for their students the advantages of certain professional or advanced academic courses in Wisconsin, Harvard, Yale, and Pennsylvania, respectively.

The feminization of education which is said with much reason to be in prospect for America is not apparent in these records. The facts are not adequate, but, so far as they go, they show no marked difference between the sexes in continuance in college. The class populations of the 4 colleges for women in our list show medians differing by only + 2, + 3, and − 1 from the medians for the other 30. (See Table 8.) The length of time spent in Vassar in the case of Vassar students is almost at the median of the class permanences for the 14 colleges studied, the figures being 74, 64, and 61 for Vassar, and 78, 67, and 62 for the medians of the 14. In the case of the universities of Colorado, Tennessee, and Wisconsin, the proportion of students remaining four years was calculated separately for men and women. In the two former more men stayed; in the latter, more women. The differences thus about counterbalance each other and are slight. (See Table 8.) In so far as these three are a random sampling from colleges in general, we have a right to say that the most likely fact is that about 98 per cent as large a proportion of women as of men stayed four years, and that the chances are nine out of ten that the true ratio is not less than 88 nor more than 106.

TABLE 8.

A—CLASS POPULATIONS OF COLLEGES FOR WOMEN.

	2 1	3 1	4 1
Vassar	76	64	67
Wellesley	79	66	67
Mount Holyoke	91	79	70
College for Women (Western Reserve)	84	76	78
Medians	81.5	71	68.5
Corresponding medians for colleges for men and women	79.5	68	69.5

B—PERCENTAGES STAYING FOUR YEARS.

	Men.	Women.	Men-women.
University of Colorado	29.2	27.8	1.4
University of Tennessee	17.1	15.2	1.9
University of Wisconsin	47.8	53.7	−5.9

The purpose of Parts IV and V of my report is to give in convenient form for students of education, now and in the future, data concerning the elimination of pupils from school which could otherwise be collected only with great labor, and to give the critical reader of Parts I and II a means of working out for himself the answers to the questions which I discuss there.

The data are of course no more accurate than the census reports and school reports from which they come. I venture to remind the student that in the nature of the case comparisons between the single cities must be made with the utmost caution, since the exact ways in which the individual teachers and census recorders who actually get the facts do get them must necessarily be unknown, and since the general methods prescribed vary from city to city, and from year to year within the same city.

In spite of their inevitable lack of perfect precision and even approximate commensurability, the figures are far more enlightening than anybody's mere opinion. If used properly they will do much good and no harm, and, even if used crudely, will do much more good than harm.

PART IV. DATA ON ELIMINATION BY GRADES.

§ 11. *The Original School Grade Populations.*

The data which were gathered by the author concerning school grade populations are given in Table 9.

TABLE 9.—*Grade populations of American cities, each for several years.*

	Elementary school grade.									High school year.			
	1.	2.	3.	4.	5.	6.	7.	8.	9.	1.	2.	3.	4.
Baltimore, Md.:													
1898	18,373	11,592	9,484	8,272	6,447	4,022	2,471	1,640	.....	888	592	317	228
1899	18,622	11,361	9,545	8,516	6,274	4,265	2,512	1,519	.....	1,010	535	345	207
1902	17,102	12,375	10,305	8,585	6,200	4,274	2,863	2,023	.....	1,029	641	367	248
1904	16,676	12,000	10,456	8,701	6,668	4,611	3,082	1,992	.....	1,324	787	513	403
Boston, Mass.:													
1895	11,885	8,163	6,922	6,943	6,615	6,292	5,115	3,831	2,948	1,459	795	607	125
1896	11,675	8,401	6,804	7,236	6,531	5,545	4,983	3,891	2,966	1,320	818	576	209
1897	12,169	8,331	7,188	7,250	6,683	6,253	4,923	3,894	3,145	1,482	854	670	220
1904	13,511	10,608	9,160	9,000	8,330	8,039	6,534	5,283	4,141	2,716	1,601	1,286	621
Bridgeport, Conn.:													
1902	1,376	1,455	1,306	1,169	1,029	567	630	513	.....	[a] 328	.....	.....	.....
1903	1,495	1,447	1,289	1,168	904	753	667	416	.....	[a] 300	.....	.....	.....
1904	1,509	1,387	1,425	973	1,149	624	473	[b] 488	.....	[a] 316	.....	.....	.....
Cambridge, Mass.:													
1901	2,317	1,790	1,585	1,691	1,467	1,082	1,027	910	677	437	316	228	191
1902	2,406	1,778	1,641	1,658	1,449	1,120	973	993	705	464	305	250	196
1903	2,219	1,810	1,708	1,580	1,480	1,129	1,002	974	763	520	357	233	224
1904	2,209	1,845	1,706	1,669	1,464	1,158	1,141	952	661	568	373	292	210
Chicago, Ill.:													
1897	41,960	22,776	30,110	25,767	23,424	16,796	11,691	8,280	.....	3,535	2,233	1,494	1,169
1898	42,827	33,248	30,088	25,749	23,693	17,586	12,421	8,678	.....	2,905	2,346	1,540	1,138
1899	44,810	34,874	29,863	25,784	23,866	18,236	13,089	9,270	.....	3,880	2,455	1,615	1,238
1900	47,409	36,014	31,099	26,033	24,013	18,359	13,697	9,986	.....	4,032	2,592	1,742	1,294
1902	44,623	37,184	32,450	27,168	25,077	18,428	13,662	10,928	.....	4,176	2,495	1,511	1,306
Cleveland, Ohio:													
1898	12,257	8,074	7,851	7,267	5,875	4,637	3,488	2,373	.....	1,292	877	509	505
1902	12,619	8,663	8,590	8,108	6,522	5,278	3,583	2,472	.....	1,512	996	604	477
1903	12,904	9,094	8,838	8,952	6,900	5,511	3,893	2,708	.....	1,584	933	714	565
1904	13,411	9,437	9,352	9,256	7,424	6,051	4,312	2,820	.....	1,716	1,056	727	625
Columbus, Ohio:													
1887	2,738	1,334	1,328	1,350	1,226	907	659	508	.....	308	163	84	63
1890	2,452	1,443	1,384	1,299	1,230	1,031	737	593	.....	430	242	106	79
1898	2,492	1,685	1,789	1,826	1,776	1,560	1,238	1,006	.....	856	497	343	217
1903	3,968	2,303	2,554	2,474	2,263	1,884	1,471	1,132	.....	982	635	464	302
Denver, Colo.:													
1895	2,075	1,261	1,489	1,659	1,249	1,024	642	442	.....	.....	.....	.....	.....
1896	2,033	1,496	1,365	1,558	1,447	1,108	727	527	.....	.....	.....	.....	.....
1897	2,458	1,445	1,295	1,580	1,205	1,186	772	662	.....	.....	.....	.....	.....
1901	2,306	1,812	1,600	1,794	1,433	1,392	958	733	.....	.....	.....	.....	.....
Houston, Tex.:													
White—													
1890	452	379	322	292	240	116	114	.....	.....	.....	.....	.....	.....
1893	684	554	500	415	391	181	159	.....	.....	.....	.....	.....	.....
1896	638	633	749	519	441	318	212	.....	.....	.....	.....	.....	.....

Colored—													
1890	712	309	195	98	50	39	14						
1893	750	471	292	187	129	61	26						
1896	690	402	301	247	149	67	57						
Jersey City, N. J.:													
1897	5,634	3,516	3,575	2,679	2,391	1,888	1,055	770		315	168	88	84
1898	6,867	3,490	3,545	2,813	2,281	1,634	1,203	762		276	202	105	71
1899	6,944	3,924	3,437	2,808	2,338	1,692	1,169	851		267	166	112	89
1903	6,304	4,756	3,866	3,269	2,805	2,166	1,426	1,044		309	150	78	53
Kansas City, Mo.:													
1900	6,691	3,537	3,796	3,521	2,488	2,272	1,784			1,377	972	632	483
1901	7,059	3,607	3,554	3,670	2,857	2,238	1,693			1,396	897	622	543
1902	6,966	3,760	3,974	3,780	2,912	2,242	1,828			1,442	881	681	649
1903	7,492	3,739	4,004	3,960	2,974	2,399	1,941			1,449	912	682	546
Little Rock, Ark.:													
White—													
1895	516	408	397	417	313	285	175	189		136	73	44	29
1896	500	390	412	390	378	257	244	169		97	92	42	31
1897	620	417	379	431	314	279	230	165		121	78	38	31
Colored—													
1895	464	293	307	290	148	162	95	68		83	47	18	15
1896	546	372	297	265	177	161	106	57		52	34	24	20
1897	538	348	345	228	199	145	91	106		30	35	21	16
Los Angeles, Cal.:													
1898	3,290	3,022	2,620	2,093	1,989	1,570	1,253	865		678	403	169	111
1899	3,352	2,691	2,239	2,301	2,278	1,581	1,261	935		712	390	208	110
1900	3,659	2,750	2,564	2,406	2,462	1,731	1,339	882		771	355	218	122
1901	4,081	2,975	3,093	2,613	2,572	2,228	1,458	1,024		775	403	204	129
1903	5,692	3,486	4,092	3,477	3,242	2,734	2,102	1,439		1,038	449	243	161
Louisville, Ky.:													
White—													
1895	5,051	2,842	2,718	2,503	2,094	1,661	1,261	923					
1896	4,950	2,853	2,759	2,504	2,118	1,725	1,332	895		531	273	163	113
1898	5,227	2,901	2,936	2,646	2,347	1,673	1,414	1,047		523	311	199	96
Colored—													
1895	1,896	876	713	523	328	252	161	109					
1896	2,225	830	796	611	375	311	197	145		94	66	20	22
1898	1,980	763	737	691	457	347	238	146		127	50	52	51
Malden, Mass.:													
1898	984	615	583	615	574	474	344	325	252	186	103	79	66
1899	1,034	649	589	525	644	510	354	338	291	188	133	66	57
1902	1,280	663	701	574	559	516	428	309	325	259	190	108	76
1904	1,206	774	708	598	603	600	434	391	338	291	193	133	85
Macon, Ga.:													
White—													
1896	681	569	566	537	385	299	249			192	117	77	
1897	781	631	564	514	386	315	245			221	113	82	
Colored—													
1896	699	490	399	307	130	90							
1897	749	563	357	271	194	91							

[a] High school.

[b] Eighth and Ninth grades.

TABLE 9.—*Grade populations of American cities, each for several years*—Continued.

	Elementary school grade.									High school year.			
	1.	2.	3.	4.	5.	6.	7.	8.	9.	1.	2.	3.	4.
Milwaukee, Wis.:													
1894	7,078	3,716	3,348	2,890	2,426	1,799	1,348	875					
1896	7,418	4,074	3,541	3,214	2,574	2,167	1,477	1,097					
1903	7,359	4,272	3,744	3,214	2,849	2,226	1,736	1,183					
Minneapolis, Minn.:													
1891	6,803	3,810	3,087	2,467	1,992	1,309	839	457					
1896	9,720	4,441	4,551	3,941	3,170	2,408	1,652	1,310		983	763	428	306
1899	11,146	4,544	4,645	3,875	3,197	2,510	1,650	1,067		933	568	441	287
1903	9,687	4,975	4,985	5,201	4,172	3,583	2,705	2,004		1,477	905	701	504
Newark, N. J.:													
1897	6,134	4,324	4,098	3,217	2,464	1,801	1,373	934		634	337	142	103
1898	6,043	4,626	4,028	3,409	2,530	1,778	1,238	904		691	428	212	119
1900	6,674	4,800	4,031	3,686	2,583	1,842	1,284	875		597	395	328	141
1902	7,342	5,239	4,363	3,543	2,851	2,002	1,290	980		782	255	231	207
1903	6,801	5,929	5,340	4,317	3,246	2,455	1,607	1,186					
New Haven, Conn.:													
1900	2,742	2,278	1,901	1,971	1,703	1,484	1,236	774		475	348	252	163
1901	2,858	2,269	2,025	2,041	1,793	1,509	1,249	727		551	320	295	172
New York, N. Y.:													
1895	40,998	35,943	29,203	23,198	19,603	13,068	10,770						
1898	54,619	37,138	30,992	29,673	21,145	14,255	12,001						
Brooklyn, N. Y.:													
1894	18,736	21,654	18,716	17,011	14,323	9,584	5,985	3,720					
1895	20,042	22,054	19,432	17,264	15,013	10,764	6,442	4,167					
1896	23,348	21,846	20,101	18,136	15,706	11,722	7,314	4,440					
Newport, R. I.:													
1896	495	335	356	331	297	184	160	165	108	104	66	31	21
1901	550	494	391	420	423	277	232	199	177	132	73	35	31
1903	487	451	453	431	357	368	228	200	184	161	91	42	24
Omaha, Nebr.:													
1895	3,221	2,147	1,990	1,989	1,723	1,392	1,031	764		555	255	158	95
1898	2,597	2,075	2,120	2,052	1,802	1,621	1,339	934		681	407	154	107
1899	2,802	2,209	2,035	2,264	1,764	1,609	1,377	993		685	333	199	116
1903	2,427	1,972	1,925	2,215	1,927	1,819	1,406	1,130		896	379	217	163
Passaic, N. J.:													
1898	779	472	410	291	208	150	105	54		50	26	35	19
1900	1,070	562	456	451	217	147	125	107		63	43	26	12
Paterson, N. J.:													
1892	2,074	1,716	1,526	1,113	787	632	348	247		208	142	68	40
1900	2,114	2,177	1,883	1,754	1,498	986	693	417					
1901	2,349	2,189	1,872	1,745	1,416	1,099	614	330		220	173	118	?
St. Louis, Mo.:													
White—													
1898	8,360	10,146	9,136	8,313	4,524	3,009	2,008	1,411		921	383	313	258

1900	7,459	10,083	9,267	8,456	5,484	2,995	2,169	1,365		1,103	328	328	234
1901	7,312	9,197	8,754	8,622	6,048	3,743	2,421	1,792		1,208	329	293	243
Colored—													
1898	434	561	691	410	226	131	112	83		81	50	59	39
1900	482	549	647	517	286	136	99	117		87	64	44	24
1901	466	556	553	537	275	206	107	132		105	51	37	46
Somerville, Mass.:													
1898	1,360	921	798	823	733	634	575	545	435	246	160	94	112
1904	1,384	964	847	834	824	668	560	458	398	261	177	130	94
1903	1,651	1,349	1,270	1,182	1,155	1,134	964	751	544	373	296	275	213
Springfield, Mass.:													
1900	1,717	1,066	1,294	1,107	904	884	621	463	390	293	206	142	83
1901	1,717	1,265	1,226	1,152	1,024	892	759	548	378	298	212	168	104
1902	1,685	1,297	1,276	1,088	1,135	903	768	653	416	274	191	158	105
1903	1,773	1,319	1,180	1,341	1,072	986	799	633	464	390	280	172	132
1904	1,610	1,314	1,265	1,349	1,025	984	912	639	478	433	335	207	121
Trenton, N. J.:													
1897	2,324	1,041	1,085	985	708	561	417	296		195	88	85	77
1899	2,331	1,149	1,148	929	835	631	470	299		191	95	143	100
1902	2,706	1,158	1,096	1,071	875	703	570	381					
Washington, D. C.:													
White—													
1900	8,192	5,673	5,662	5,171	4,619	3,719	3,176	2,752					
1901	8,405	5,870	5,522	5,370	4,651	3,834	3,138	2,762					
1902	8,561	6,266	5,667	5,385	4,804	3,942	3,172	2,839					
Colored—													
1900	628	353	444	309	247	201	131	104					
1901	563	427	341	413	230	249	134	108					
1902	572	434	377	272	317	187	164	120					
Waterbury, Conn.:													
1896	768	872	677	665	629	510	357	259		214	103	74	11
1898	762	686	811	627	582	538	384	286		192	143	21	37
1899	921	685	740	783	612	479	412	295		228	147	99	18
1900	1,015	834	707	717	725	482	364	321		192	162	104	35
1902	1,050	1,099	973	852	672	605	477	323		157	136	89	90
Wilmington, Del.:													
1895	1,406	1,106	976	901	775	719	551	356		252	139	92	
1896	1,629	1,057	1,116	935	812	738	547	393		267	110	109	
1897	1,510	1,211	1,105	996	885	744	571	412		299	139	67	
1898	1,506	1,209	1,106	1,014	866	768	511	398		291	153	67	
1904	1,431	1,266	1,283	1,251	1,128	1,046	715	469		419	121	111	
Woburn, Mass.:													
1897	467	329	299	319	236	250	237	190	146	107	61	73	30
1898	513	309	315	294	259	271	200	193	141	112	85	51	44
1899	474	346	319	281	270	233	218	174	168	166	83	67	28
Worcester, Mass.:													
1897	2,540	2,187	2,084	2,053	1,807	1,978	1,465	1,316	1,111				
1901	2,669	2,401	2,301	2,394	2,290	2,169	1,752	1,635	1,352	1,045	738	539	649
1902	2,748	2,561	1,963	2,445	2,366	2,221	1,600	1,825	1,325	957	638	456	649

§ 12. *The Reliability of the Data as Representative of the General Tendencies of the Cities.*

The data for the 23 cities concerning which I have attempted to estimate the elimination grade by grade are repeated in Table 10, in the form of the per cent which the number of pupils in any given grade is of the number in the first, second, and third grades divided by 3. The data for the 23 chosen represent the state of affairs in years clustering closely about 1900.

The per cents, being calculated from only a few years' records, only approximately represent the general tendency of each city as distinct from others. But the approximation is very close, close enough for all the purposes of this investigation. I have calculated the probable divergence of the obtained per cents from the true per cents (meaning by true those which would be obtained were the influence of chance differences between one year's records and another's altogether eliminated) for the sixth grade, eighth grade, ninth grade (where there is such), first high school, and fourth high school, for 16 of the 23 cities. The results, which are given in Table 11, show that in general the chances are even that the divergence will be less than 3 per cent of the amount. So far as the number of year's records goes, then, we have enough to eliminate chance as the cause of any general characteristic of the elimination, or of any but the very small differences found between the cities.

TABLE 10.—*School grade populations in terms of per cents of* $\frac{1+2+3}{3}$.

	Records used.	Elementary school grade.						High school year.			
		4.	5.	6.	7.	8.	9.	1.	2.	3.	4.
Baltimore	1898, 1899, 1902	63.6	47.4	28.9	19.7	13.0	.....	7.3	4.4	2.6	1.7
Boston	1895, 1896, 1897, 1904[a]	79.8	73.8	69.7	56.9	45.2	35.1	20.1	11.9	9.2	3.7
Cambridge	1901, 1902, 1903	85.3	76.1	57.6	52.0	49.8	37.1	18.6	13.1	9.8	8.5
Chicago	1897, 1898, 1899, 1900	76.0	72.0	53.7	38.6	27.4	.....	10.8	7.3	4.8	3.7
Cleveland	1898, 1901, 1903	82.1	65.2	52.1	37.0	25.5	.....	14.8	9.5	6.4	5.2
Denver	1895, 1896, 1897, 1901, 1903.[b]	93.0	78.9	69.3	49.4	37.5	.....	.....	.....	.....	.....
Jersey City	1897, 1898, 1899, 1903	62.6	53.7	39.0	26.4	18.5	.....	6.3	3.7	2.0	1.6
Kansas City, Mo.	1900, 1901, 1902	76.7	57.7	47.2	37.1	.....	.....	29.5	19.2	13.5	11.7
Los Angeles	1898, 1899, 1900, 1901	78.0	77.0	59.0	44.0	30.0	.....	24.2	12.8	6.6	3.9
Malden	1898, 1899, 1902	72.6	75.0	63.8	47.6	44.8	37.1	26.7	18.0	10.7	8.4
Minneapolis	1898, 1899, 1903	67.1	53.3	38.0	30.4	22.2	.....	17.2	11.3	8.0	5.5
Newport	1896, 1901, 1903	88.2	80.4	61.9	46.3	42.1	33.0	29.7	18.2	8.8	5.7
Newark	1897, 1898, 1900, 1902	67.3	50.6	36.1	25.2	12.9	.....	13.1	6.9	4.4	2.8
New Haven	1900, 1901	85.5	74.5	63.8	53.0	33.0	.....	21.9	14.2	11.7	7.1
New York	1895, 1896, 1903[c]	81.8	67.3	48.9	35.3	26.8	.....	.....	.....	.....	.....
Paterson	1900, 1901	83.3	69.5	49.6	30.4	18.8	.....	10.6	5.3	4.7	3.3
St. Louis (white)	1898, 1900, 1901	95.5	80.4	56.7	24.8	17.2	.....	12.2	[d]3.8	[d]3.5	[d]2.8
Springfield	1900, 1901, 1902, 1903	83.6	73.7	65.4	52.6	41.0	29.2	22.4	15.5	11.4	7.6
Trenton	1897, 1899, 1902	63.8	51.6	41.0	31.1	20.2	.....	13.4	6.7	7.2	6.1
Washington (white)	1900, 1901, 1902	80.0	71.0	57.0	47.0	42.9	.....	.....	.....	.....	.....
Waterbury	1896, 1898, 1899, 1900, 1902.	83.0	78.0	63.0	48.0	36.0	.....	23.8	16.7	9.4	4.6
Wilmington	1895, 1896, 1897, 1898, 1904.[e]	85.7	75.8	69.2	48.7	33.2	.....	26.8	10.0	7.5	.....
Worcester	1897, 1901, 1902	96.4	90.4	89.1	67.4	66.8	53.0	38.5	27.6	20.2	22.9

[a] The records for 1895, 1896, and 1897 together are given the same weight as the record for 1904.
[b] The records for 1895, 1896, 1897, and 1901 together are given the same weight as the record for 1903.
[c] The 1903 record is counted as of twice the weight of the 1898 and 1899 records together.
[d] I am doubtful of these three records, but am unable to find any error in them.
[e] The records for 1895, 1896, 1897, and 1898 together are given the same weight as the record for 1904.

TABLE 11.—*Median deviations of the obtained per cents on* $\frac{1+2+3}{3}$ *from the "true" per cents in the case of certain grades in 16 cities.*

[The entries are all somewhat too large, for they are necessarily calculated from the variation in the per cents on $\frac{1+2+3}{3}$ of single years. The obtained results of Table 10, however, are calculated from the per cents of the sums of the different year's grade populations to the sums of the (1+2+3)s divided by 3, and so give less scope to chance.]

	Elementary school grade.			High school year.	
	6.	8.	9.	1.	4.
Baltimore	0.5	0.5		0.2	0.04
Boston	2.0	.1	0.4	.5	.2
Cambridge	.4	.8	.6	.4	.25
Chicago	.3	.3		.4	.25
Cleveland					
Denver	1.3	1.7			
Jersey City	.5	.3		.3	.06
Kansas City, Mo.					
Los Angeles	1.4	.7		.6	.06
Malden	.3	1.4	1.6	1.7	.4
Minneapolis					
Newark	.4	.4		.3	.21
New Haven					
Newport	5.3	.3	1.9	1.3	.17
New York					
Paterson					
St. Louis (white)	1.8	.9		.7	.17
Springfield	1.8	1.1	.9	1.3	.25
Trenton					
Washington (white)	.6	.5			
Waterbury	1.7	1.1		1.4	.74
Wilmington	1.0	.6		.3	.8
Worcester	2.1	1.9		1.5	.42

§ 13. *The Process of Estimating Actual Elimination from the Facts of Grade Populations.*

To estimate from the data of Tables 9 and 10 the proportion of pupils entering school and living sufficiently long who continue to any given grade is a task of much intricacy. To do it with the adequacy and precision one would desire is, as has been said, impossible. My own estimates for 23 cities have been given in Table 1 (p. 15). These estimates involve the use of the facts of the school grade populations given in Table 9 corrected, (1) by data concerning the death rate during the school age; (2) by data concerning the growth of the cities; (3) by data concerning the school grade populations of successive years (that is, by the comparison of, say, the second grade population of 1898 with the third grade population of 1899, the fourth grade population of 1900, etc.); (4) by data concerning the relation between the first, second, and third grade populations and the number entering school in a year; and (5) by data concerning the intermigration of city and country children of school age. It would be unprofitable to anyone except the critical student of statistical problems for me to rehearse the details of this tedious process of corrections. I therefore give only the essentials.

The data concerning (1) the death rate, and (5) the gross result of it plus the migration of young people to and from cities, are given on page 55.

Data concerning the growth of the cities can be obtained to some extent by comparing the census of 1890 with the census of 1900. The increase of the 5 to 10 year olds of 1900 over the 5 to 10 year olds of 1890, for instance, is significant. Possibly useful data are the increases of the first, second, and third grade populations of the later years of Table 9 over the similar populations of the earlier years. These increases are caused not only by the growth of population, but also by any changes in the proportion of children who are sent to the public schools, and by any change in the degree to which grades 1, 2, and 3 require a longer time for completion than other grades.

Table 12 gives such data for the 23 cities.

The directly observed relations between the population of a given grade in a given year and the population of the next higher grade in the following year have been worked out in great detail for all of the 23 cities. Samples of the treatment (Springfield and Omaha) are shown in Table 13. If all other information were discarded and the problem was taken to be simply to trace one grade population through on the hypothesis that everyone moved ahead a grade a year and that no one moved out of or into the city, and that consequently the seventh grade of 1902 equaled the second grade of 1897, minus those who were eliminated up till 1902, and so on, the per cents thus obtained would be the final result. Such per cents have been given much weight in correcting the results from contemporaneous grade populations.

TABLE 12.—*Annual rate of increase of population for certain cities.* [a]

	Annual ratio of increase of 5 to 9 year olds, 1890-1900.	Annual ratio of increase of 10 to 14 year olds, 1890-1900.	Annual ratio of increase of grades 1, 2, and 3 from early to late records.
Baltimore	0.0125	0.0178	0.0025
Boston	.0338	.017	.013
Cambridge	.0342	.0196	.012
Chicago	.0596	.064	.02
Cleveland	.044	.037	.04
Denver	.052	.059	.03
Jersey City	.035	.018	.03
Kansas City, Mo	.022	.0285	.028
Los Angeles	.103	.092	.08
Malden			.053
Minneapolis	.0385	.0518	.04
Newport			.016
Newark	.0345	.027	.04
New Haven	.0395	.0266	.03
New York	.038	.032	.04
Paterson	.0367	.0214	.025
St. Louis (white)	.024	.023	.00
Springfield, Mass	.053	.0397	.016
Trenton	.030	.0252	.02
Washington (white)	.0107	.000	.02
Waterbury	.069	.06	.07
Wilmington	.0302	.0225	.018
Worcester	.0477	.0318	.014

[a] The annual ratios of increase in this table are approximate, being the ratios of increase for the given period of years divided by the number of years in the period.

TABLE 13.—*Samples of the data giving the directly observed relationships between the population of given grades and the population of the next higher grade a year later, a grade two steps higher two years later, and the like.*

[Each number in the first column shows the given grade. The numbers to the right show the per cents which higher grades taken in appropriate later years are of the given grade. For example, the sixth line in the case of Springfield should read: "For 1,000 pupils in the fourth grade in a given year there were in the fifth grade a year later, 987; in the sixth grade, two years later, 858; in the seventh grade, three years later, 793."]

SPRINGFIELD, MASS.[1]

Grade.	Elementary school grade.						High school year.			
	4.	5.	6.	7.	8.	9.	1.	2.	3.	4.
1+2+3										
3	80.0	78.8	72.4							
Do	102.0	78.3								
Do	97.1									
Fourth		76.5								
Do		98.4	90.3							
Do		98.7	85.8	79.3						
Do		92.3	81.4	72.0	57.6					
Fifth			98.7	85.0	70.0	52.9				
Sixth				85.9	73.9	52.5	49.0			
Seventh					88.3	67.0	62.8	54.0		
Eighth						81.6	59.2	56.2	44.7	
Ninth							78.5	50.3	45.3	31.9
High school year:										
First								72.3	54.0	45.1
Second									81.0	51.0
Third										73.3

OMAHA, NEBR.

Grade.	Elementary school grade.					High school year.			
	4.	5.	6.	7.	8.	1.	2.	3.	4.
1+2+3									
3		73.5	65.7				15.6		
Do				62.1					
Do			77.4						
Fourth				67.3	48.4				
Do		86.0				33.4			
Do					50.0				
Fifth					54.3	39.8			
Do			89.4				18.5		
Sixth						49.0	24.0		
Do							23.1		
Seventh							39.6	19.4	
Do								15.8	
Eighth								20.1	15.2

The hardest correction to make intelligently is that for the inequality of the different grades in length. Some systems apparently keep pupils nearly twice as long in the first grade as in the third. (It would of course be absurd to suppose that the great drop in grade populations from grade 1 to grade 2 is due to actual elimination from school.) The number of pupils entering school is in many cases less than the number in the first grade, and even less than one-third of the number in grades 1, 2, and 3.

Moreover, we have no assurance that the later grades are equal in respect to the proportion of pupils who take more than a year to complete them, though the differences are here probably small, and may be neglected for the purposes of this study. The main difficulty is in inferring from the number in grades 1, 2, and 3 the number beginning school in the course of a year.

My correction for this is arbitrary. I have simply made the estimate of the number of pupils beginning school for any city which

seemed most likely in view of the comparative sizes of the populations of grades 1, 2, 3, 4, and 5, and of whatever other relevant information I possessed concerning the city.

For instance, in Baltimore, where the grade populations are as follows:

	Population.		Population.
First grade	54,097	Fourth grade	25,373
Second grade	35,328	Fifth grade	18,921
Third grade	29,284		

and the $\frac{1+2+3}{3}$ figures 39,570, I have, in view of the other known facts about the city, taken the population of grade 2 as a measure of the number of pupils beginning school. In Denver, New Haven, St. Louis, Waterbury, and Worcester, I have judged that the $\frac{1+2+3}{3}$ figure was a correct representation of the number of pupils beginning school annually. In Trenton, where the first grade population is over twice the second in size, but the third practically equal to the second (the populations being respectively 7,361, 3,348, 3,329, and 2,985) I have taken a figure about 3 per cent larger than the second grade population as the correct representative of the number of pupils beginning school.

There is no doubt that in all this process of correction some injustice of considerable amount may have been done to one or two cities. It would be risky to use the small differences between, say, Minneapolis and Trenton (see Table 1, page 15) as proof that either city was better in holding pupils, because the differences are small, and because for these two cities the corrections for the five factors were among the largest in influence and the most insecure. In general, however, the emphasis of the various corrections is, I am confident, free from any serious error. The general degree of retention will not, I should say, vary more than 5 or 6 per cent from the amount stated. The average of the three or four highest and the average of the three or four lowest cities would maintain very nearly the same relation if the data were perfect individual histories of children instead of the complex we have been treating. Better data, less dependent on subjective opinion, would alter the exact amount of some of the quantitative estimates of Part I, but they would hardly alter any of the general statements made there.

I have worked over in a similar but less elaborate manner the data for cities given in the 1904 Report of the United States Commissioner of Education (p. 1312), and get as the estimated number of 100 entering pupils who remain to each grade the following:

	Median retention.		Median retention.
Fourth grade	90	First high school year	29.5
Fifth grade	82	Second high school year	17
Sixth grade	73	Third high school year	12
Seventh grade	58	Fourth high school year	7.55
Last grammar grade	41		

Making use of (1) the results just stated, and also of (2) certain results obtained by calculating the relations of grade populations given in the 1898 Report of the United States Commissioner of Education to the populations for appropriately higher grades given in the 1904 Report, and also (3) of the results for 46 high schools studied separately, in connection with the results from the elaborate study of 23 cities, we may take as the most probable general tendency to retention the following figures:

	Retention.		Retention.
Fourth grade	90	First high school year	27
[illegible]h grade	81	Second high school year	17
Sixth grade	68	Third high school year	12
Seventh grade	54	Fourth high school year	8
Last grammar grade	40		

How clearly they approximate to the true result for the cities of which those studies made a random sampling I can not state absolutely, but their median divergence from the true figures can hardly be over 3 per cent of the given amounts for grades 4 and 5, over 5 per cent of the given amounts for grades 6 and 7, or over 10 per cent of the given amounts for the remaining grades.

§14. *Additional Data.*

Since the main body of facts was collected and elaborated, I have been able to secure suitable information concerning ten more large cities and two suburban communities. I estimate that, for these cities, of a hundred pupils entering school and living till 18 years of age the number remaining to any given grade is as stated in the table below. It has not been possible to work these estimates out with as complete precautions as in the case of those in the main body of this report, but they are probably accurate within from 2 to 8 per cent.

TABLE 14.—*Per cent of entering pupils who remain to a given grade.*

	Elementary school grade.						High school year.			
	4.	5.	6.	7	8.	9.	1.	2.	3.	4.
Buffalo, N. Y.	100	93	78	65	52	.....	.....	.....	.....	10
Chelsea, Mass.	99	87	84	68	50	40	28	18	13	11
Cincinnati, Ohio	85	69	55	38	25	.....	14	8	6	5
Dayton, Ohio	96	84	66	53	38	.....	.....	.....	.....	9
Medford, Mass.	100	93	89	83	69	60	42	28	22	18
Milwaukee, Wis.	86	76	62	48	34	.....	14	8	7	.....
New Orleans, La.	90	66	45	31	20	.....	.....	.....	.....	.....
Philadelphia, Pa.[a]	71	56	38	26	18	.....	11	7	5	2.5
Portland, Me.	96	82	71	60	47	40	30	20	16	12
Salt Lake City, Utah	90	82	68	53	44	.....	22	14	9	7
Springfield, Ohio	100	92	76	60	46	.....	34	19	11	9
Syracuse, N. Y.	93	80	66	53	43	.....	.....	.....	.....	.....

[a] This is an estimate for pupils entering in 1895. The elimination of pupils has been growing less severe in recent years.

For the convenience of students of the general subject I add here (Table 15) the data of the 1904 Report of the United States Com-

missioner of Education put in the form of percentages on the first and second and third grade populations divided by 3, and the data given in the 1898 Report (Table 16):

TABLE 15.—*School grade populations of 1903 or 1904 in percentages of* $\frac{1+2+3}{3}$.

[Calculated from page 1312 of the 1904 Report of the United States Commissioner of Education.]

	Elementary school grade.						High school year.			
	4.	5.	6.	7.	8.	9.	1.	2.	3.	4.
Aurora	68	81	90	56	71	.....	40	28	23	18
Baltimore	67	51	36	24	15	.....	10	6	4	3
Beloit	88	75	77	58	55	.....	38	23	19	17
Beverly	96	84	81	73	66	39	37	29	17	18
Boston	81	75	72	58	48	37	25	15	11	5
Brockton	90	86	80	73	69	42	.....	.....	.....	.....
Cambridge	87	76	60	50	50	35	29	20	15	11
Camden	70	44	32	19	11	.....	4	4	3	2
Chester	75	74	72	41	26	.....	19	13	6	4
Chicago	71	66	49	36	29	.....	11	6	4	4
Chicopee	77	66	58	49	30	16	16	10	7	4
Cincinnati	77	64	52	38	28	.....	15	8	5	3
Cleveland	86	69	56	40	26	.....	16	10	7	6
Clinton	85	78	72	44	42	.....	33	13	13	10
Columbia	72	61	50	32	27	.....	25	11	6	.....
Columbus, Ohio	84	77	64	50	38	.....	33	21	16	10
Davenport	78	77	75	58	44	35	29	14	10	5
Denver	89	79	70	54	41	.....	.....	.....	.....	.....
Erie	75	54	32	16	.....	.....	.....	.....	.....	.....
Haverhill	108	94	88	73	57	50	29	23	17	16
Houston	75	60	53	34	.....	.....	34	12	9	8
Jersey City	66	57	44	29	21	.....	6	3	2	1
Johnstown	92	89	73	57	44	24	14	10	5	6
Kansas City, Kans.	80	61	56	49	35	.....	26	14	6	5
Kansas City, Mo.	78	59	47	38	.....	.....	29	18	13	10
Lacrosse	87	61	50	36	23	.....	.....	.....	.....	.....
Los Angeles	83	77	65	50	35	.....	25	10	6	4
Lynn	82	82	72	66	48	35	.....	.....	.....	.....
Madison	82	70	71	62	51	.....	49	37	32	21
Malden	67	67	67	48	44	38	33	21	15	9
Minneapolis	79	64	55	41	31	.....	23	14	11	7
Newark	72	54	41	26	19	.....	.....	.....	.....	.....
Newport	93	87	79	50	43	40	35	19	9	5
Newton	86	90	72	70	59	55	41	38	30	24
New York	86	72	53	37	28	.....	.....	.....	.....	.....
Ogden	106	83	74	56	42	.....	21	12	8	9
Omaha	106	93	86	67	54	.....	43	17	10	8
Pawtucket	75	65	44	33	28	22	.....	.....	.....	.....
Philadelphia	69	54	34	24	16	.....	.....	.....	.....	.....
Portland, Oreg.	102	91	81	67	42	36	.....	.....	.....	.....
Quincy	79	78	82	71	63	.....	28	26	12	10
Racine	84	79	49	35	35	.....	21	11	11	5
Reading, Pa.	92	88	72	37	23	.....	.....	.....	.....	.....
Richmond	84	75	61	42	.....	.....	32	17	10	2
St. Louis	82	60	37	28	18	.....	12	5	4	2
Salem	83	73	63	63	39	39	30	28	14	17
Salt Lake	90	81	68	51	42	.....	18	10	6	5
Somerville	89	84	78	70	59	43	28	23	17	16
Spokane	76	66	55	35	27	.....	21	12	10	6
Springfield, Mass.	97	74	71	66	46	34	31	24	15	8
Washington	82	74	57	48	41	.....	25	14	7	5
Waterbury	80	78	59	52	31	23	17	12	5	7
Wheeling	67	66	44	30	20	.....	11	7	4	3
Williamsport	92	71	63	54	38	30	25	17	7	6
Wilmington	94	85	78	53	35	.....	31	9	8	.....
Worcester	84	83	83	61	60	42	31	21	16	14
York	82	63	45	31	24	.....	16	11	8	7

TABLE 16.—*School grade populations; reproduced from the 1898 Report of the U. S. Commissioner of Education.*

	Data reported.	Date.	Elementary school grade.									High school grade.			
			Kinder-garten.	1.	2.	3.	4.	5.	6.	7.	8.	9.	1.	2.	3.	4.
San Francisco, Cal.	Number belonging	June, 1898		5,520	4,445	4,420	4,148	4,256	3,339	2,815	2,046	1,369				
Denver, Colo.	Total enrollment	1897-98	1,981	2,458	1,445	1,265	1,586	1,295	1,186	772	662					
Wilmington, Del.	Number belonging	Feb., 1898		1,802	1,444	1,241	1,170	984	827	554	426		316	165	75	
Chicago, Ill.	Average daily membership	1896-97		38,943	32,948	29,623	24,656	22,121	15,606	10,846	7,422		3,266	2,141	1,453	987
Washington, D. C.	Total enrollment	1897-98		8,949	6,472	5,761	5,426	4,743	4,021	3,163	2,892					
Louisville, Ky.	Average number belonging	1895-96														
Baltimore, Md.	Number on roll	Dec., 1895		18,134	11,127	8,992	7,427	5,566	3,834	2,338	1,365		1,023	672	423	243
Boston, Mass.	Number belonging	Jan. 31, 1898	3,925	12,927	8,919	7,410	7,815	7,053	6,752	5,747	4,433	3,492	2,044	1,212	824	370
Cambridge, Mass.	do	Dec., 1897	583	2,363	1,681	1,499	1,169	1,133	1,020	830	686	524	423	262	185	182
Lowell, Mass.	do	Sept., 1897	454	2,046	1,312	1,165	1,017	1,072	934	760	644	469	300	221	198	59
Worcester, Mass.	Total enrollment	1897-98	563	2,727	2,340	2,175	2,021	1,990	1,933	1,543	1,392	1,152	770	560	405	534
Minneapolis, Minn.	do	1896-97		9,026	4,[illegible]	4,370	3,425	3,112	2,274	1,787	1,227		1,007	544	466	358
Kansas City, Mo.	do	1896-97		4,941	3,[illegible]	2,760	2,892	2,205	1,925	1,690						
St. Louis, Mo.	Number belonging	End of first quarter, 1897-98.	6,109	13,624	12,245	11,104	7,596	3,940	3,063	1,985	1,377		601	410	290	190
Omaha, Nebr.	Total enrollment	1897-98	2,351	2,597	2,075	2,120	2,052	1,802	1,621	1,339	934		681	407	154	107
Jersey City, N. J.	Number belonging	Nov. 30, 1896		5,496	3,470	3,408	2,817	2,182	1,474	1,050	740		569	303	128	92
Newark, N. J.	Average enrollment	1896-97	913	5,731	4,363	4,015	3,082	2,325	1,678	1,304	900		195	88	85	77
Trenton, N. J.	Number belonging	Nov. 30, 1897		2,324	1,041	1,065	985	706	561	296		1,643				
Buffalo, N. Y.	Total enrollment	First term, 1896-97.		12,662	6,834	5,871	5,373	4,421	3,718	2,900	2,116					
Cincinnati, Ohio	do	1897-98		9,806	6,970	6,634	5,799	4,534	4,001	2,701	1,701		1,106	503	399	325
Cleveland, Ohio	do	1897-98	890	11,373	8,074	7,851	7,267	5,875	4,637	3,478	2,373		1,292	878	569	500
Philadelphia, Pa.	Number belonging	Dec. 31, 1897	7,210	35,203	24,989	22,659	16,790	12,898	8,929	5,627	4,129					
Richmond, Va.	Total enrollment	1896-97		2,140	1,881	1,882	1,630	1,593	1,095	828			570	404	249	
Milwaukee, Wis.	Average enrollment	1896-97	3,230	7,359	4,272	3,744	3,214	2,846	2,226	1,737	1,183					

1899—90—4

PART V. ELIMINATION BY AGE.

§ 15. *The Original Data of Age Populations.*

Table 17 gives such data as I have been able to gather concerning the number of pupils of each year-age in the public schools of 25 cities.

Table 18 gives the facts of Table 17 for ages of 10 and over in percentages on the number of 7, 8, and 9 year olds divided by 3, which is practically the same as the number of 8-year-olds, a single set of such percentages being calculated from all the records together for any city.

TABLE 17.—*Showing for 25 cities the distribution by age of pupils in the public day schools (elementary and secondary.)*

	Age.													
	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.
Baltimore, Md.:														
1897	6,040	6,953	7,573	7,610	7,537	7,113	6,817	5,486	3,876	2,406	1,230	642	299	90
1898	6,115	7,325	7,369	7,788	7,757	7,099	6,889	5,471	3,751	2,392	1,274	602	289	96
1901	6,495	7,132	7,710	7,793	8,086	7,371	6,755	5,519	3,810	2,284	1,109	556	264	122
Boston, Mass.:														
1894	5,694	6,139	6,503	6,224	6,298	5,825	5,992	5,808	4,707	3,308	2,053	1,121	571	* 200
1896	5,818	6,398	6,520	6,665	6,432	6,100	6,045	5,744	4,787	3,383	2,052	1,113	628	* 236
1897	6,086	6,569	6,692	6,807	6,733	6,178	6,244	5,890	4,909	3,563	2,261	1,221	621	* 248
1903	8,407	8,233	8,170	7,916	8,035	7,669	7,601	7,068	5,568	3,636	2,352	1,378	687	* 284
Cleveland, Ohio:														
1895	6,808	5,530	5,630	5,258	5,333	4,743	4,562	3,920	2,980	1,648	976	635	.....	.....
1896	6,755	5,957	5,953	5,443	5,493	4,725	4,882	4,260	3,092	1,717	980	580	.....	.....
1897	7,366	6,277	6,096	5,670	5,509	4,865	5,081	4,819	3,157	1,646	1,002	650	.....	.....
1898	8,105	6,421	6,325	5,860	5,543	5,149	5,178	4,937	3,428	1,864	1,068	645	.....	.....
1900	8,154	7,067	6,878	6,242	5,982	5,251	5,440	4,935	3,732	2,006	1,093	674	.....	.....
1901	8,753	7,096	6,961	6,618	6,191	5,599	5,561	4,794	3,740	1,988	1,058	607	.....	.....
1902	8,634	7,030	7,208	6,723	6,639	5,763	5,693	4,973	3,497	1,946	1,086	635	.....	.....
1904	8,949	7,572	7,694	7,229	7,238	6,555	6,705	6,011	3,839	2,037	1,065	768	.....	.....
Chicago, Ill.:														
1900	39,716	32,423	29,805	28,256	27,091	25,024	24,062	20,171	14,655	9,579	6,129	.....	.....	.....
1901	41,753	32,096	30,606	28,763	27,756	25,629	24,342	20,974	14,928	9,463	5,832	.....	.....	.....
Columbus, Ohio:														
1899	2,048	1,856	1,850	1,777	1,800	1,593	1,693	1,609	1,354	1,084	631	365	173	59
1902	2,044	1,974	2,108	2,052	2,004	1,830	1,857	1,721	1,473	977	720	465	228	91
Dayton, Ohio:														
1900	1,526	1,334	1,350	1,326	1,298	1,212	1,188	1,166	802	556	310	249	171	105
1901	1,451	1,320	1,383	1,344	1,316	1,239	1,202	1,128	938	503	336	222	145	111
Denver, Colo.:														
1897	1,358	1,094	1,147	1,094	1,095	1,029	1,056	993	960	743	525	369	245	125
1898	1,204	1,202	1,052	1,070	1,150	1,096	1,069	1,013	887	735	563	357	233	126
1899	1,350	1,296	1,345	1,229	1,259	1,114	1,106	894	862	703	526	347	222	107
1900	1,265	1,286	1,359	1,310	1,275	1,172	1,168	1,067	920	755	551	363	217	117
1901	1,142	1,339	1,372	1,463	1,359	1,296	1,271	1,118	962	788	578	362	215	87
Fitchburg, Mass.:														
1901	391	399	413	410	341	350	341	376	208	172	118	59	25	4
Grand Rapids, Mich.:														
1899	1,366	1,534	1,502	1,474	1,462	1,364	1,287	1,313	1,225	1,077	714	357	236	116
1901	1,372	1,548	1,567	1,545	1,536	1,424	1,381	1,301	1,153	1,059	691	328	226	113
1903	1,332	1,543	1,392	1,441	1,520	1,433	1,427	1,462	1,245	1,062	576	297	188	113
1904	1,310	1,414	1,497	1,357	1,533	1,422	1,452	1,356	1,344	1,062	614	315	240	92
Jersey City, N. J.:														
1897	2,703	3,021	3,083	3,036	3,124	2,843	2,896	2,576	1,900	1,161	427	180	57	10
1898	2,555	3,348	3,265	3,138	3,195	2,914	2,893	2,580	1,881	1,179	455	151	79	37
1899	3,509	3,971	3,965	3,529	3,482	3,335	3,244	2,556	1,753	1,064	430	141	72	33

Johnstown, Pa.:														
1903	685	565	718	666	693	648	563	578	408	282	124	60	41	27
Kansas City, Kans.:														
1901	3,118	2,886	2,817	2,884	3,046	2,904	2,834	2,527	2,143	1,566	1,096	730	369	138
Kansas City, Mo.														
1900	2,637	2,747	2,938	2,864	2,799	2,507	2,547	2,421	1,972	1,682	1,109	696	415	249
1901	2,945	2,766	2,867	2,906	3,023	2,757	2,648	2,338	2,075	1,567	1,065	687	369	205
Little Rock, Ark. (white):														
1895	353	286	284	326	283	301	279	262	249	174	105	50	33	7
1896	322	299	323	304	334	308	300	262	220	175	118	51	17	7
Los Angeles, Cal.														
1899	1,815	1,902	1,941	1,742	1,975	1,719	1,639	1,452	1,443	1,005	661	390	226	152
1900	1,912	1,851	2,125	2,005	2,110	1,911	1,848	1,606	1,340	1,023	671	414	197	201
1901	2,086	2,287	2,341	2,270	2,323	2,178	2,189	1,855	1,502	1,075	680	412	226	200
Louisville, Ky. (white):														
1895	2,387	2,434	2,252	2,360	2,217	1,871	2,055	1,802	1,257	1,039	511	265	145	53
1896	2,540	2,549	2,449	2,441	2,301	2,038	2,055	1,775	1,374	992	420	348	189	84
Minneapolis, Minn.:														
1899	4,639	3,727	3,663	3,244	3,229	3,010	2,926	2,601	2,233	1,599	1,149	737	433	194
1900	4,891	3,953	3,871	3,651	3,680	3,368	3,193	2,870	2,435	1,840	1,128	625	403	182
1902	4,640	4,104	3,961	3,891	3,909	3,622	3,625	3,241	2,719	1,902	1,233	772	420	153
1904	4,836	4,113	3,997	4,111	3,996	3,813	3,925	3,601	3,137	2,271	1,428	842	453	224
Newark, N. J.:														
1901	4,306	4,490	4,478	4,329	4,092	3,662	3,495	2,597	1,618	846	505	243	108	52
1902	4,608	4,466	4,276	4,141	4,082	3,637	3,382	2,603	1,522	784	436	210	134	55
1903	4,873	4,413	4,589	4,343	4,266	3,775	3,740	2,673	1,564	831	426	232	107	90
New Orleans, La. (white):														
1901	2,566	2,025	3,079	3,107	2,897	2,693	2,513	2,171	a 1,554	a 992	a 408	a 255	a 100	a 70
1902	2,440	2,970	3,005	6,091	3,151	2,685	2,638	2,091	a 1,574	a 720	a 412	a 244	a 110	a 70
Omaha, Nebr.:														
1898	1,825	1,799	1,814	1,651	1,599	1,420	1,557	1,387	1,133	812	517	277	129	54
1899	1,988	2,000	1,987	1,807	1,716	1,509	1,461	1,369	1,053	767	485	266	115	50
Springfield, Mass.:														
1899	879	924	883	841	821	785	733	767	662	530	377	228	123	51
1900	792	917	887	873	829	802	833	738	668	470	343	215	135	51
1901	856	1,003	995	885	903	828	816	779	746	643	396	256	128	70
1902	873	1,039	1,026	923	903	922	884	836	789	548	338	214	126	77
1903	924	1,007	1,128	1,023	906	936	914	963	762	627	407	234	134	81
St. Joseph, Mo.:														
1891	868	747	821	771	866	707	727	594	485	305				
1892	843	859	833	844	783	796	667	580	432	287				
St. Paul, Minn.:														
1898	2,481	2,119	2,265	2,076	1,881	1,584	1,596	1,330	1,166	769	564	289	166	73
Toledo, Ohio:														
1894	1,881	1,602	1,587	1,551	1,539	1,284	1,288	1,073	903	560	295	164	60	23
1899	2,696	2,223	2,157	2,962	1,893	1,718	1,784	1,650	1,464	953	570	271	105	47
Troy, N. Y.:														
1891	657	701	713	736	811	678	796	554	496	254	118	107	66	28
1895	540	597	673	671	720	627	679	597	481	268	173	101	54	30
1896	893	698	675	1,257	720	691	731	595	435	266	151	70	48	41

a Approximate.

TABLE 18.—*Showing for 25 cities the per cents which the 10-year-olds, 11-year-olds, etc., in school, are of the number of 8-year-olds, approximately, by giving the per cents which they are of the sum of the 7, 8, and 9 year olds divided by 3.*

[Calculated from the data of Table 17.]

	Years reported.	Age.									
		10.	11.	12.	13.	14.	15.	16.	17.	18.	19.
Baltimore	1897, 1898, 1901	104.0	96.4	91.3	73.3	50.9	31.6	16.1	8.0	3.8	1.0
Boston	1894, 1896, 1897, 1903	99.6	93.4	93.6	88.8	72.4	50.3	31.6	17.5	9.1	a3.3
Cleveland	1895, 1896, 1897, 1898, 1900, 1901, 1902, 1904.	93.3	82.3	83.4	73.4	54.0	29.3	16.4	10.1		
Chicago	1900, 1901	90.4	83.5	79.8	67.9	65.3	31.4	19.7			
Columbus, Ohio	1899, 1902	98.3	88.5	91.7	86.1	73.1	51.2	35.0	21.4	10.4	3.9
Dayton	1900, 1901	97.2	91.2	88.9	85.3	64.7	39.4	25.2	17.6	11.8	8.1
Denver	1897, 1898, 1899, 1900, 1901.	98.7	91.8	90.4	81.8	73.8	59.9	44.1	28.9	18.2	9.0
Fitchburg	1901	84.4	86.7	84.4	93.1	51.5	42.6	29.2	14.6	6.2	1.0
Grand Rapids	1899, 1901, 1903, 1904.	102.0	95.6	94.2	93.2	85.3	71.9	42.7	21.5	14.6	7.3
Jersey City	1897, 1898, 1899	97.0	90.0	89.1	76.2	55.0	33.7	13.0	4.5	2.1	0.8
Johnstown	1903	107.0	99.7	86.6	88.9	62.8	40.3	19.1	9.2	6.3	2.3
Kansas City, Kans.	1900, 1901	106.4	101.5	99.1	88.4	74.9	54.8	38.4	25.5	12.8	4.8
Kansas City, Mo.	1900, 1901	102.1	92.4	91.1	83.5	71.0	57.0	38.3	24.1	13.6	5.3
Little Rock	1895, 1896	101.6	100.0	95.4	86.3	77.3	57.5	36.7	16.6	8.2	2.3
Los Angeles	1899, 1900, 1901	101.4	91.9	89.8	77.7	67.9	49.1	31.8	19.2	10.1	8.9
Louisville	1896, 1898	93.5	80.9	85.3	74.1	53.6	42.1	19.3	12.7	6.9	2.8
Minneapolis	1898, 1900, 1902, 1904.	98.8	91.8	91.0	81.8	70.0	50.6	39.5	19.8	11.3	5.0
Newark	1901, 1902, 1903	94.0	83.8	80.4	59.7	35.7	18.7	10.4	5.2	2.8	1.6
New Orleans	1901, 1902	99.3	88.3	84.6	70.0	a51.3	a23.2	a13.4	a8.2	a3.4	a2.3
Omaha	1898, 1899	89.8	79.7	81.8	74.7	59.2	42.8	27.2	14.7	6.6	2.8
Springfield, Mass	1899, 1900, 1901, 1902, 1903.	91.0	88.9	87.0	85.0	76.3	58.5	39.0	24.1	14.5	6.9
St. Joseph	1891, 1892	11.5	92.5	87.1	72.3	56.4	38.8				
St. Paul	1893	87.4	73.7	74.2	61.9	54.3	35.8	26.2	10.3	7.7	3.4
Toledo	1894, 1899	85.3	74.6	76.3	67.6	58.8	37.6	21.5	10.8	4.1	1.7
Troy	1891, 1895, 1896	12.0	92.5	100.0	79.0	63.9	35.7	20.1	12.6	7.6	4.8
Medians		98.7	91.2	88.9	79.0	63.9	42.6	26.7	15.0	7.8	3.4

a Approximate.

§ 16. *The Reliability of Age Data from a Few Years as Representative of the General Tendencies of Cities.*

The general tendency of a city as shown in a long series of years is of course only approximately represented by the figures of Table 18, calculated from only a few years' statistics.

The closeness of the approximation can be calculated by well known formulæ based on the theory of probability. I have to this end calculated the percentages of 10, 11, 12, etc., year olds on $\frac{7+8+9}{3}$ year olds for each year's record from Springfield (five years), Minneapolis (four years), Cleveland (eight years), and Dayton (two years), and from these individual year percentages have calculated the probable closeness of the approximation for a record from one year only, for a record from two years, etc. The chances are even that the results obtained for 10-year-olds will not diverge from the true per cents by more than—

1.7 per cent of the per cent obtained, one year's records being used.
1.2 per cent of the per cent obtained, two years' records being used.
1.0 per cent of the per cent obtained, three years' records being used.
.8 per cent of the per cent obtained, four years' records being used.
.8 per cent of the per cent obtained, five years' records being used.

For other ages the corresponding figures are obtained by dividing a given constant, computed for each age, by the square root of the number of years' records used. The value of the constant for each age is as follows:

	Value of constant.		Value of constant.
11-year-olds	1.9	15-year-olds	4.8
12-year-olds	2.6	16-year-olds	5.3
13-year-olds	3.5	17-year-olds	5.7
14-year-olds	4.1		

To get the figures such that the chances are 99 to 1 against greater divergence, multiply the figures for even chances by $3\frac{1}{2}$.

For example, the obtained result from Denver for 16-year-olds is 44.1, calculated from five years' records. The chances are even that the true per cent for Denver 16-year-olds will not diverge from 44.1 by more than $\frac{5.3}{\sqrt{5}}$ per cent of 44.1, or 1.1. That is, the chances are even that the true per cent will lie between 43 and 45.2.

The chances are even that the medians calculated from these 25 cities will not diverge from the medians of the entire group of cities from which these are a random sampling by more than the following per cents for the different ages:

	Per cent.		Per cent.
10-year-olds	0.85	15-year-olds	1.8
11-year-olds	.9	16-year-olds	1.8
12-year-olds	.75	17-year-olds	1.1
13-year-olds	1.35	18-year-olds	.55
14-year-olds	1.8	19-year-olds	.3

§ 17. The Process of Estimating Actual Elimination from the Facts of School Age-Populations.

The figures of Tables 17 and 18 obtained from the contemporaneous age-populations need to be viewed in the light of the fact that in these cities the number of children 10 or 11 or 12 etc. years old is not the same as the number of 8-year-olds. Just what the ratios are in each city is not known, nor are the ratios for the cities as a group known more than approximately. An accurate census by year ages is needed for this. By the natural birth-rate minus death-rate increase there are in the entire country, for every 1,324 from 5 to 9, 1,175 from 10 to 14, and 1,057 from 15 to 19 (Abstract of 12th Census, p. 12); that is, 88.7 and 79.8 per cent, respectively. In the cities as a group this condition holds approximately for the 10 to 14 group, but not at all for the 15 to 19 group, the 1890 and the 1900 censuses giving for the corresponding per cents approximately 91 and 96. (See Table 19.) These differences are due to a very slight degree probably to differences between the urban and the general birth rate, and to a large degree to

the fact that inter-migration of city and country children gives the cities more boys and girls from 10 to 14, and many more from 15 to 19, than it removes. Individual cities vary very widely from the general tendency of the group, some cities having as many children 10 to 14 as 5 to 9, and others only 80 per cent as many. The variation in the ratio which the number at 15 to 19 bears to the number 5 to 9 is still more variable. I shall not in general try to estimate the number of children at each year age in each city, but shall do so only for each age group as a whole.

Table 19 gives the per cent which the 10 to 14 year olds are of the 5 to 9 year olds in each of these same cities by the census of 1900, and also of 1890, and the per cent which the 15 to 19 year olds are of the 5 to 9 year olds by the census of 1890. The per cents are calculated from data in Table 83 of the Abstract of the Twelfth Census, 1900, pages 109–111.

TABLE 19.—*Per cents which the general populations 10 to 14 years old and 15 to 19 years old were of the population 5 to 9 years old in 1890 in certain cities; also the per cents which the population 10 to 14 years old were of the 5 to 9 years old in 1900.*

	1890.		1900.		1890.		1900.
	10–14 / 5–9	15–19 / 5–9	10–14 / 5–9		10–14 / 5–9	15–19 / 5–9	10–14 / 5–9
Baltimore, Md	91.5	96.0	95.7	New Haven, Conn	95.9	[b]109.0	87.7
Boston, Mass	99.1	108.6	86.5	New Orleans, La	97.3	95.9	94.1
Cambridge, Mass	98.5	[a]112.8	87.9	New York, N. Y	93.3	106.0	85.0
Cleveland, Ohio	91.1	89.5	86.4	Omaha, Nebr	77.9	80.7	89.8
Chicago, Ill	83.9	86.2	85.6	Paterson, N. J	97.0	97.8	89.1
Columbus, Ohio	100.1	109.2	98.0	Somerville, Mass	91.9	95.3	83.7
Dayton, Ohio	93.6	100.0	.....	Springfield, Mass	94.2	108.8	86.0
Denver, Colo	84.5	97.4	88.1	St. Joseph, Mo	98.0	106.2	85.6
Fitchburg, Mass	.....	.....	87.0	St. Louis, Mo	94.3	99.3	93.8
Grand Rapids, Mich	90.0	91.3	89.1	St. Paul, Minn	80.0	87.8	85.7
Jersey City, N. J	96.5	98.6	84.3	Toledo, Ohio	86.1	88.2	88.6
Johnstown, Pa	.....	.....	80.4	Trenton, N. J	93.3	98.0	89.3
Kansas City, Kans	83.3	84.3	87.1	Troy, N. Y	102.7	113.8	100.0
Kansas City, Mo	90.4	106.0	96.5	Washington, D. C	106.0	113.0	95.8
Little Rock, Ark	97.4	101.0	95.4	Waterbury, Conn	90.1	105.0	85.0
Los Angeles, Cal	99.7	95.2	94.0	Wilmington, Del	98.3	101.5	92.3
Louisville, Ky	102.5	110.8	96.1	Worcester, Mass	95.0	103.7	84.9
Malden, Mass	.....	.....	88.6				
Minneapolis, Minn	78.9	90.3	86.6	Medians	94	99	88
Newark, N. J	90.7	93.4	85.4				

[a] This 112.8 should probably be reduced to, say, 104 because of the special influence of Harvard College.
[b] This 109 should probably be reduced to, say, 100 because of the special influence of Yale College.

We may fairly take the percentages which the numbers of inhabitants of each age from 10 on are to the number of 7, 8, and 9 year olds divided by 3 as:

	Percentage.		Percentage.
10 years old	96	15 years old	90
11 years old	94	16 years old	92
12 years old	92	17 years old	98
13 years old	90	18 years old	102
14 years old	89		

We might then, to get for the group the per cent of the children of each age that are in school, divide through the figures representing

the central tendency of cities in order by 0.96, 0.94, 0.92, etc., that is divide the 98.7 of Table 2 by 0.96, the 91.2 by 0.94, the 88.9 by 0.92, and so on. The figures thus obtained would not, however, be truly significant for the years from 14 on, for the reason that among the 15 to 19 year olds migrating to the city, very many have already been eliminated from school in the country and come to the city specifically to work. We should have in our result a measure not only of the elimination in cities, but of the elimination in cities plus the nature of the selection by cities from other localities. On the other hand, to take ratios based exclusively on the birth rate minus death rate increase, whereby the 15 to 19 year olds are only 79.8 per cent of the 5 to 9 year olds, would be unfair, for the reason that many families move to the city so that older children can have the advantage of the high school, and some of the pupils counted in the city school populations, especially in the late years, come in daily from the surrounding country. Though the great majority of the 15 to 19 increase by immigration come to the cities to work, a small number come specifically to go to school.

On the whole, in order to compare the numbers actually in school with the numbers that would be if every child in the cities who is in school at 8 years of age, kept on in school till he was 19 (except for death), and if no one moved away from or moved into the cities, we may fairly balance the results of death and of immigration on the school age population records after 14, and regard the per cents with which the 98.7, 91.2, 88.9, etc., should be compared as follows:

School expectation if no elimination existed.

	Percentage.		Percentage.
10 years old	96	15 years old	90
11 years old	94	16 years old	90
12 years old	92	17 years old	90
13 years old	90	18 years old	90
14 years old	90		

The percentages retained then rise from 98.7, 91.2, 88.9, etc., and become—

Percentage of $\frac{7+8+9}{3}$ *retained.*

	Percentage.		Percentage.
10 years old	103.0	15 years old	47.0
11 years old	97.0	16 years old	30.0
12 years old	97.0	17 years old	16.5
13 years old	88.0	18 years old	8.6
14 years old	70.0		

The absurdity of the 103 per cent is probably due to the tendency of the children to state their age as 10 if it is 9 or 11, more often than to state it as 9 if it is 8 or 10, or as 11 if it is 10 or 12, and per-

haps to the late entry to the public schools of a few children. We may properly correct for this, making the percentage of $\frac{7+8+9}{3}$ retained as follows:

Corrected percentage of $\frac{7+8+9}{3}$ *retained.*

	Percentage.		Percentage.
10 years old	100.0	15 years old	47.0
11 years old	98.0	16 years old	30.0
12 years old	97.0	17 years old	16.5
13 years old	88.0	18 years old	8.6
14 years old	70.0		

These figures represent then as good an approximation to the retention of children in city public schools, such as those listed, as I can get from the data at hand without elaborate hypotheses for correction. It is certainly not far from the truth to say that of pupils entering these city schools one-tenth leave before 13 years of age, one-fourth before 14, one-half before 15, two-thirds before 16, and five-sixths before 17.

The reader will understand that these figures for cities are much too high for the country at large. Even in Connecticut, a State fortunate in its means of education, the corresponding figures[a] are—

	Percentage.		Percentage.
10 years old	99.5	15 years old	32.0
11 years old	94.0	16 years old	19.0
12 years old	94.0	17 years old	11.0
13 years old	91.0	18 years old	6.0
14 years old	57.0		

§ 18. *The Variability Among Cities with Respect to Elimination by Age.*

The student who is desirous of a strict account of the variability of cities in respect to elimination by age may, by using the data of Tables 17–19 and such other data as he may secure from city reports, correct each city's school population statistics separately and then compare them. I shall do this only for three high and three low ranking cities and without attempt at perfect precision.

The age population percentages for Cleveland,[b] Jersey City, and Newark schools, as given in Table 18, are—

[a] From the 1903 report of the State Board of Education, pp. 184–185, reduced to per cents of the number of 8-year-olds and corrected by the population statistics of the census of 1900.

[b] Baltimore makes a lower record than Cleveland, but as this may be due in large measure to the colored population it seemed better not to include it.

City	Age.								
	10.	11.	12.	13.	14.	15.	16.	17.	18.
	Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
Cleveland	93.3	82.3	83.4	73.4	54.0	29.3	16.4	10.1	.....
Jersey City	97.0	91.0	89.0	76.2	55.0	33.7	13.0	4.5	2.1
Newark	94.0	83.8	80.4	59.7	35.7	18.7	10.4	5.2	2.8
Average[a]	94.8	85.7	84.3	69.8	48.2	27.2	13.3	6.6	4.0
Median	94.0	83.8	83.4	73.4	54.0	29.3	13.0	5.2	2.8

[a]Approximate.

While those for Denver, Grand Rapids, and Springfield are—

City.	Age.								
	10.	11.	12.	13.	14.	15.	16.	17.	18.
Denver	98.7	91.8	90.4	81.8	73.8	59.9	44.1	28.9	18.0
Grand Rapids	102.0	95.6	94.2	93.2	85.3	71.9	42.7	21.5	18.0
Springfield	91.0	88.9	87.0	85.0	76.3	58.5	39.0	24.1	13.6
Average	97.2	92.1	90.5	86.7	78.5	63.4	41.9	24.8	15.4
Median	98.7	91.8	90.4	85.0	76.3	59.9	42.7	14.1	14.6

The question is as to how far these extreme individual differences are due to differences in the rate of growth of the cities, and how far they are due to real differences in the educational character of the cities.

The percentages which the number 10 to 14 and the number 15 to 19 are to the number 5 to 9 for those cities are:

City.	Age.		City.	Age.	
	10–14.	15–19.		10–14.	15–19.
Cleveland	86.5	89.0	Denver	88.4	88.0
Jersey City	84.2	83.0	Grand Rapids	89.1	90.0
Newark	85.4	86.0	Springfield	88.1	90.0
Average	85.4	86.0	Average	87.9	89.3
Median	85.4	86.0	Median	88.4	90.0

It thus appears that the superiority of the record by age populations of the second group of cities is in a slight degree due to the fact that they have more children 10 to 18 to draw from, approximately 4 per cent more. If the age populations of the former group are multiplied each by 1.04, this disadvantage is removed. The difference thus made is very slight.

It is also true that Newark and Cleveland have flourishing private schools, which take from the public schools more old pupils than they return in exchange, and which eliminate a very small percentage of their pupils compared with the public school per cents. Springfield, Grand Rapids, and Denver do not have private schools of anywhere nearly so great influence on school attendance. Moreover, these latter cities probably gain more from the registration of out-of-town

pupils in the high schools than do Jersey City and Newark. A liberal allowance for all these influences and others except the nature of the pupils and of the school systems themselves will be made by multiplying the figures for the former group by—

	Multiplier.		Multiplier.
10 years old	1.04	15 years old	1.08
11 years old	1.04	16 years old	1.10
12 years old	1.05	17 years old	1.18
13 years old	1.05	18 years old	1.20
14 years old	1.06		

We have then the following:

Age.	Average.		Median.	
	Cleveland, etc.	Denver, etc.	Cleveland, etc.	Denver, etc.
10 years	99	97	98	99
11 years	89	92	87	92
12 years	89	91	88	90
13 years	73	87	77	85
14 years	51	79	57	76
15 years	29	63	32	60
16 years	14.5	42.0	14.3	42.7
17 years	7.8	24.8	6.1	24.1
18 years	4.8	15.4	3.4	14.6

The cities in the second list, after this allowance, still keep one and a half times as many to the age of 14, twice as many to 15, three times as many to 16, and three and a half times as many to 17 and 18.

INDEX.