# The impact of school provision on pupil attendance: evidence from the early 20th century[1]

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Abstract:

Elementary schooling in North America in the early 20th century underwent major changes with the spread of graded schools with multiple classrooms and teachers to semi-urban and rural areas. Detailed schooling records from British Columbia indicate that pupil attendance responded strongly to the introduction of additional teachers in one-room schools. The attendance impact of grading a school dominated alternatives such as employing more highly qualified teachers, or building additional schools to reduce catchment areas. Changes in the provision of schooling can account for about a quarter of the 30 percentage point increase in attendance rates between 1900 and 1930.

## Introduction

The modern literature on the expansion of schooling in the early 20th century has linked "grass roots" demand to rising enrollment and graduation rates in American high schools. Labour market conditions, parental wealth and aspirations, and social attitudes towards education and learning, were important in bringing about innovations in secondary schools in towns and cities across North America. One of the main ways in which educators attempted to improve schooling outcomes was gradually implemented for elementary school pupils in the countryside and on the fringes of small towns. At the beginning of the twentieth century pupils in these areas, particularly in areas of relatively recent settlement, typically attended one-room, one-teacher schools. Teachers and school inspectors reported that conditions for learning in "common" one-room schools were often dreadful, and advocated a shift towards "graded" schools with multiple teachers and classrooms in which children were divided by age and academic ability. Moves to consolidate small rural schools began in the United States in the mid-nineteenth century. By the second decade of the twentieth century, the consolidation movement had spread to the provinces of Western Canada, where consolidated school districts were created. The transportation of rural pupils at public expense to district high schools is often stressed, but in many cases, district elementary schools were an important parallel development.

Grading and consolidation increased the share of children taught in graded elementary schools. Average class size across a state or province typically fell as these organizational changes were introduced. Did the expansion of the network of graded schools raise educational outcomes? This paper uses early 20th century administrative data from public primary schools in British Columbia, Canada, to answer this question. The *Annual Reports of Education* (*ARE*) for British Columbia recorded daily attendance, potential annual attendance (the product of enrollment and the length of the school year) and a variety of other

characteristics for every public school in the province. The *ARE* offer a unique insight into how pupil outcomes respond to changes in how schooling is provided over the course of several decades.

We focus on explaining attendance patterns in this period. Attendance is best thought of as an intermediate input in the production of education. Children with irregular school attendance would likely acquire less human capital for any given years of schooling, and even for children who did attend regularly, simply sharing a classroom and teacher with children who came to school only occasionally probably slowed their academic progress. Children in schools with the lowest attendance rates were less likely to reach to reach the top grades of the elementary schools, to attempt the high school entrance exam, or to enroll in high school even if they passed the entrance exam.[2] Attendance is an outcome that teachers and education administrators cared about. At the beginning of the 20th century, the average attendance rate in BC elementary schools about 64 percent. In their comments on the state of education in the province, British Columbia school inspectors spent considerable time discussing the perceived causes of low attendance in some schools, and how schools could better use their resources in order to raise attendance. By 1930, British Columbia's schooling arrangements had been transformed, and average attendance rates had risen to close to 90 percent.

In what follows, we first explore to what extent type of school, class size, and other school characteristics explain the varying attendance outcomes seen early in the 20th century. Several studies have linked historical school attendance to pupil and parent characteristics in census data.[3] Our paper is the first to provide a comprehensive assessment of how the characteristics of schools mattered for attendance outcomes in the early 20th century. We

[2] For most years, we know the number of pupils in each school who passed the high school entrance exam. However, many of the smallest schools rarely presented candidates, and we cannot work out the attendance rates of the pupils who actually took the exams.

[3] Galenson, "Educational opportunity"; MacKinnon and Minns, "Canadian school attendance"; Moehling, "Family structure."

then use these results to estimate the contribution of grading and consolidation to the rise of attendance between 1900 and 1930.

**Schooling in North America in the early 20th century**

By the beginning of the 20th century, almost all children aged from 7 to 12 were at least enrolled in school. For the enrolled population, school attendance in both Canada and the US rose throughout the early twentieth century. Canadian census estimates suggest a greater increase in the proportion of children at school than do administrative records compiled at the school level (Table 1); both show a substantial rise occurred between 1911 and 1931.[4] In the United States, the trend is broadly similar, with attendance rates rising from 71 percent in 1911 to 87 percent in 1931[5]. The aggregate figures, however, conceal substantial variation both between and within provinces and states. Canadian figures for 1921 reveal a 25 percent gap in attendance rates between British Columbia and Prince Edward Island, even though the proportion of school aged population enrolled was about the same.

Our calculations from British Columbia's *ARE* show that a considerable number of schools had very poor attendance records.[6] In 1900, a quarter of British Columbia primary schools had attendance rates below 52 percent. By 1920 attendance had improved at almost all schools, but attendance rates in the bottom quarter were below 70 percent – in other words, the typical pupil at these schools still missed almost one day in three. For the United States, the *Biennial Survey of Education 1916-1918* (*BSE*) shows similar dispersion in attendance. State level attendance rates in 1917-18 vary from below 65 percent, primarily in

[4] The school-level records indicate 130 – 215,000 more pupils at school than the census counts. When pupils changed school, they were likely counted a second time in the administrative records. It may also be that parents answered "No" to the question about school attendance for many of the pupils with the weakest attendance.
[5] See Carter et al., *Historical Statistics*, Table Bc 94-96; Goldin, "Education."
[6] We calculate attendance rates from the *ARE* records by dividing the total number of days attended by the number of potential pupil days (the number of pupils multiplied by days in session).

the South and southern Midwest, to over 83 percent in Illinois and close to 90 percent in Ohio. We do not have as detailed school attendance data as for British Columbia, but several states had large differences in attendance rates between cities and rural areas. For example, Delaware and Connecticut had rural attendance rates more than 20 percent below urban attendance rates. In other states, such as Maine, Michigan, and Texas, rural attendance rates were actually higher than in urban areas. States in the Pacific Northwest show a similar split – Oregon had 74 percent attendance in city schools, compared in 87 percent in rural schools. In Washington, city schools had 77 percent attendance rates, and rural schools 72 percent attendance.

What factors can account for the uneven rise in school attendance across North America? Part of the explanation must lie largely outside the control of educators. Other scholars have stressed the increased demand for schooling, particularly at the secondary level, over the period. Goldin argues that technical change in the early 20th century favoured educated labour, and that the returns to education were particularly high in a geographically mobile society, such as the United States or Canada.[7] New schools (and in particular, secondary schools) in the United States took root quickly in wealthier states with high wages but relatively little industry, and high levels of social cohesion.[8] Schooling was also made more accessible to children in rural areas by improvements in transportation, primarily in the form of expanded road networks and the arrival of motor-powered transportation. The combination of more roads, school buses, increased population density, and an increasing number of schools, meant that many children had shorter travel times to school in 1930 than would have been the case in 1900. Better public health measures and lower child mortality rates meant that more school-aged children would have been healthy enough to go to school more days of the year, and their parents would have had less reason to keep them away from

[7] Goldin, "The human capital century."
[8] Goldin, "The human capital century"; Goldin and Katz, "Education and income."

a potential source of infectious disease.[9]

Educators wishing to increase the amount of schooling received by children had three margins to work on: get children to start school at a younger age, keep adolescents in school longer, or encourage more regular attendance by pupils of all ages. The evidence suggests that educators were interested in working on all three margins. Schooling laws, for example, in many cases were changed (at least in theory), to bind children to full-time formal education for a period that exceeded the age range in which enrollment was already common.[10] These laws, when combined with truancy officers and other enforcement mechanisms, also targeted regular attendance at ages where all virtually all children were enrolled, but many did not attend on a regular basis.

Changes in the provision of schooling were identified as instruments to increase the effectiveness of the education provided. In British Columbia, one-room, one teacher common schools generally divided pupils into up to three "classes" based on age and academic skill, but the same teacher was responsible for the instruction (and simultaneous monitoring) of all pupil groups. It is not difficult to imagine the challenges facing single teachers in large common schools, both in terms of maintaining discipline, and simultaneously teaching pupils at different levels of academic development. Some parents may have perceived common schools, and in particular common schools with large numbers of pupils, as having rowdy classrooms that did not provide sufficient academic stimulation to make attendance worthwhile. Shifting away from one-room, one-teacher common schools to larger graded schools with multiple classrooms enabled teachers to divide the school population into separate grades based on age and ability. Inspectors promoting school district consolidation in British Columbia favoured transporting upper grade pupils to new central

[9] Outbreaks of disease are occasionally cited as reasons for especially poor attendance or the temporary closure of schools in British Columbia.
[10] Oreopoulos, "The compelling effects."

(graded) schools, and keeping existing one-room schools open for lower grade pupils.[11] The expansion of the graded school network, and the increase in the number of teachers and schools more generally, resulted in smaller class sizes in 1930 than in 1900. If smaller classes meant that children received more time and attention from their teacher, we would expect attendance to respond to changes in class size over this period. This was the expectation of those writing about consolidation at the time. The *BSE* reviews developments outside of the US, and it notes the following in relation on school consolidation in Western Canada:

> "The most conspicuous feature of education in the western Provinces is the consolidation of rural schools at convenient centers … The advantages incident to the consolidation of schools have from the first been thoroughly appreciated in Manitoba; more and better teachers, modern and hygienic buildings, possibilities of the beautifying of school grounds, largely increased enrollment, and in many places the attendance of practically all children of compulsory school age, instead of the deadening disadvantages of a number of inaccessible single-room schools." (*BSE*, Volume III, p. 159)

For British Columbia, the *ARE* data allow us to document changes in the provision of schooling between 1900 and 1930. We have digitized records from 1900/01, 1905/06, 1910/11, 1914/15, 1920/21 and 1930/31.[12] At the beginning of the century, the province had only 5 public high schools. While there were only 54 graded elementary schools with multiple teachers and classrooms, and 266 common one-room schools (Table 2), the graded schools in operation taught over 60 percent of all elementary pupils – virtually all pupils in the cities of Vancouver, Victoria, New Westminster, and Nanaimo, and just under 40 percent in smaller population centres around the province. By 1930, there had been a large increase in the number of schools of all types in the province. The number of graded schools increased six fold over 30 years, and the share of elementary pupils enrolled in such schools

[11] *ARE* 1926, R12; *ARE* 1928; V28.
[12] We chose the academic year 1914-1915 due to the poor condition of the 1915-16 copy of the BC Sessional Papers in the British Library of Political and Economic Science.

had risen over 20 percentage points, and almost 40 percentage points in rural areas and small towns. By 1930, graded schools were common in rural municipal school districts, and a large handful were in operation in more remote areas not attached to a rural municipality.

The largest classes were always found in the graded schools. In 1900-01, there were over 50 pupils per teacher in these schools. One-room schools had much lower pupil-teacher ratios on average, but about 25 percent of these schools had one teacher responsible for 60 or more students. Average class size in both types of elementary school was cut in half over the period. By 1930, no common schools had more than 30 pupils enrolled. Reductions in class size were at least somewhat influenced by provincial government policy. In 1906, the revised Public School Act decreed that classes of more than sixty were unacceptably large; by 1922 they were setting the break at forty.[13] These class size thresholds appear to have mattered in determining when one-room schools hired an additional teacher and became a graded school.

Were developments in British Columbia representative of wider North American picture? We do not have truly comparable data to hand for other jurisdictions, but some evidence on the provision of schooling in the United States can be drawn from the *BSE*. Figure 20 of the *BSE* reports the share of rural school buildings having only one room in 1917-18. These data show considerable heterogeneity in the extent to which graded schools were present in rural America. On average, 76 percent of rural American schools had only one room, but there were notable outliers; in Utah (23 percent one-room), Rhode Island (37) percent, Texas (42) percent, and New Jersey (50 percent) graded schools accounted for at least half of rural schools. At the other end of the spectrum, over 90 percent of rural schools in Iowa, Connecticut, Massachusetts, Montana, South Dakota, and Minnesota were one-room schools. In British Columbia, 64 percent of all schools had only one room in 1920, and 72 percent of all schools outside of the cities of Vancouver, Victoria, and Nanaimo and New

[13] Johnson, *A History of Public Education*, p. 96.

Westminster. This would place British Columbia near the middle of the table of American States. It is difficult to get a sense whether change in BC was rapid or sluggish relative to other parts of North America. The literature on school consolidation suggests that the Canadian provinces that were most active in creating graded rural schools prior to 1920 were simply copying developments observed in the United States in earlier years.

The nature of school finance in British Columbia may have facilitated fairly rapid change. Public education in the province was initially highly centralized, with costs gradually downloaded to cities, and then to rural municipalities. Until the 1920s, the provincial government paid at least a third of school costs.[14] Thus there was considerable scope in BC for the structure of provincial grants to influence how the schools were structured, probably much more so than was typical across North America. By the time of the First World War, British Columbia's school inspectors were ardent supporters of school district consolidation, and were highly critical of ratepayers in jurisdictions who successfully opposed attempts to introduce consolidated schools.[15]

If the expectations of the provincial school inspectors were correct, the expansion of graded schooling ought to have a substantial impact on attendance rates. Figure 1 traces changes in attendance, the share of graded pupils, and class size in British Columbia's elementary schools. We focus our analysis on the rural and small urban areas where attendance rates were lowest in 1900, restricting the population of schools for this figure and the empirical work that follows to schools outside the cities of Nanaimo, New Westminster, Vancouver, and Victoria. The attendance rate is calculated by dividing the total number of days attended by all elementary students by the potential number of days attended. The denominator in this calculation is the sum of enrollment multiplied by the number of days the

[14] Canada – Dominion Bureau of Statistics, *Annual Survey*, p.103. In the early 1900s, the proportion was close to 2/3

[15] *ARE* 1920, p. C23.

school was in session.[16] The share of graded pupils is equal to the fraction of children in the school system that were enrolled in graded schools. Class size is computed for each school by dividing total enrollment by the number of classes within the school. We then use the unweighted average across all schools in Figure 1. The most striking pattern in the figure is how well changes in attendance rates track the share of graded pupils. The figure also illustrates the sharp fall in class size between 1900 and 1930. The combination of falling class size and rising attendance rates meant that the number of average number of pupils present per class was largely unchanged over the period.

**School and teacher characteristics**

The picture presented in Figure 1 supports the views of inspectors that schooling outcomes were strongly related to how schooling was provided. If grading schools and reducing class size was directly related to attendance outcomes, these correlations should be also be present in school-level data. The data we have collected from the *ARE* allow us to explore these relationships. We have collected over 2000 observations of attendance, enrollment, and the number of teachers and classes in each school for five years between 1900 and 1930. From these data, we calculate an attendance rate and average class size for each school in the province, and identify graded versus common schools.[17]

The *ARE* list several additional factors that may play an important role in explaining attendance patterns. Table 3 shows mean values for these characteristics in 1900 and 1930. The data are presented as the mean value of each variable across the population of schools.[18]

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[16] This is equal to $\sum_i^n e_i \cdot d_i$ , where e is enrollment at school I, d the number of days school i was in session, and n the total number of elementary schools.

[17] The attendance rates in any school (*arate*) is equal to the total number of days attended in the school (*a*), divided by total potential attendance. Potential attendance is the product of enrollment (*e*) and the number of days the school was is session (*d*): $arate_i = a_i \big/ (e_i \cdot d_i)$ (enrollment * days in session).

[18] For characteristics where we have teacher-level information, we summarize the school average, or the

Length of the school term was recorded in the *ARE*. Variance in the number of session days was often caused by teacher absenteeism. This reflects economic conditions (teachers leave for better paid occupations, and are difficult to replace on short notice during a boom), and other shocks keeping schools closed (for example, bad weather or an outbreak of an infectious disease). Some schools were opened part way through the year, or added an extra classroom. It is unclear if session days and attendance rates should be related, but schools with shorter terms presumably covered less of the curriculum.[19] Average days in the school year fell over the period. The variance in the days schools were in session is greater for common than graded schools, and greater in the earlier years. Bad weather and other disturbances were more likely to lead to school cancellations in remote one-room schools, although common schools had about the same average number of teaching days as graded schools. Around 1900 it was also probably harder to replace teachers on short notice than was true thirty years later.

Some inference on the dispersion of pupils' age and skill level can be made from the *ARE* listings of the number of students following each "reader". This is the best available approximation for academic grade divisions within the school. Between 1900 and 1920 there were seven different levels of primary school reader, from First Primer to Fifth Reader[20]. In many one-room schools, pupils are widely distributed across all seven readers, with both the most junior grades (First and Second Primer) and the most senior grades (Fourth and Fifth Reader) having twenty to thirty percent of the student population. The education reports also give enrollment by sex of pupil, from which we derive the sex ratio. Attitudes towards

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proportion of teachers in the school who possess the characteristic in question.

[19] If a school opened late because there was no teacher for the first two months of term, attendance may have been abnormally high once the teacher arrived. However, if a school was closed for some weeks because of an epidemic, there may have been very low attendance in the weeks just before and after the closure.

[20] It should be noted that Fifth Reader was used extensively in 1900, but in the other years, few or no pupils were above Fourth Reader. In 1930, a system with 10 grade levels was in place. The first two grades appear to correspond to First and Second Primer, while the top three grades were offered only in Junior High Schools and Superior School classes.

education and out-of-school opportunities may have differed between boys and girls, or between the parents of boys and girls. The sex ratio moved towards parity between 1900 and 1930. Unfortunately, we do not know sex-specific attendance rates.

The *ARE* include considerable detail about the teachers employed. From name and prefix we can determine the gender of almost all teachers. In American schools, male teachers (when present) were often responsible for discipline in the early 20th century.[21] If teacher gender mattered for discipline, attendance patterns may be responsive to the presence of a male teacher in the school. As in the other parts of North America, school teaching in British Columbia was increasingly feminized between 1900 and 1930. Men were much less likely to be found in one-room schools in 1930 than in 1900, and were concentrated as principals or head teachers of graded schools.[22] The *ARE* also list the salaries paid to teachers. If pay attracts and retains better teachers, salaries may be linked to productivity in education. Over time, rural and rural municipal school districts were given increased discretion as to how to pay their teachers, and some districts responded by linking salaries to perceived outcomes.[23] Finally, the *ARE* list the teaching certificates held by every educator in the province. Academic certificates required that holders have a university degree; first and second class certificates required a high school diploma, or a certain amount of secondary education, plus certification obtained through a recognized teacher training institution. Third class and temporary certificates required less training and education, and school inspectors routinely complained about the relatively high proportion of teachers, particularly in common schools, practicing with third-class or temporary teaching certificates.[24]

[21] Perlmann and Margo, *Women's Work*?
[22] Male teachers accounted for a significant share of high school teaching staff throughout the period.
[23] *ARE* 1906, p. A21.
[24] Inspectors were dismissive of the classroom abilities of such teachers: "If to teach successfully a rural school of from twenty to thirty pupils, with its multiplicity of classes and subjects, is a tax on the ability, energy, tact, and generalship of the best Normal trained teacher, where will the young, inexperienced, and untrained teacher

Changes in the standard of teachers, therefore, may have something to do with rising attendance rates. Table 3 shows that graded school teachers were better paid than their counterparts in common schools, with the premium rising over time. A large part of this can be explained by differences in teacher qualifications between graded and common schools, and in gender composition. Women teachers received lower pay than male teachers. Fewer women held academic or first-class certificates, and females also received lower pay for the same level of qualifications.[25] Schools' average pay does not appear to have increased very much, if at all, over the 30 year period. This is partly due to the increasing feminization of teaching; the pay of male teachers in graded schools rose by over 20 percent between 1900 and 1930.

Geography presented educators in British Columbia with particular challenges. The province is rugged, and settlement away from established urban areas was often in mining camps and fishing villages that were poorly connected to the rest of the province by road or rail. We have constructed a set of simple measures to measure the relative isolation of individual schools. First, we computed the (straight-line) distance between each school and the nearest alternative school. From this we create a dummy variable indicating whether a school is at least 5 kilometers from the nearest alternative school. This is a rough proxy of the catchment area of a school; we are not able to map the population distribution of the province against individual schools, but schools that are distant from all other schools will be the closest school for any potential students living within at least a couple of miles walking distance. We also compute the distance between each elementary school and the nearest high school, and from this create an indicator whether a school is more than 5 kilometres from the nearest high school. One reason to attend elementary school regularly was to learn enough to pass the high school entrance exam. If the nearest high school was in the pupil's village or in

appear? They are simply helpless… They are simply 'keeping school'." (*ARE* 1905, p. A22).

[25] Women teachers were likely younger and less experienced than their male counterparts.

a nearby town, they could continue their education without having to board or have their family move closer to where the secondary schools was located.

We do not know the population of small villages and settlements in the province. We have constructed a proxy for market size using records from the Report of the Postmaster General printed in the *Sessional Papers of Canada*. The Postmaster's Report contains an annual list of all post offices in Canada, and the revenue collected by each post office. We attach local post office revenue to any schools that are within one-tenth of a degree of latitude and longitude of a post office.[26] We use information on the presence of post offices and their annual revenue as a proxy for market size. Table 3 presents the share of schools that did not have a local post office, and median postal revenues (in constant 1901 dollars) for schools that did have a local post office. In the regression work that follows, we use three dummy variables to pick out variation in market size: no local post office, local post office with over $1000 of annual revenue, and local post office with over $5000 of annual revenue.

**Explaining Attendance Rates**

To determine whether grading, class size, and other school characteristics affected attendance at the school level, we estimate OLS models of attendance rates. Column (1) of Table 4 lists the results of an attendance regression for all primary school observations (outside major population centres) for which we have complete information, including the location of the school. In columns (2) and (3), we limit the analysis to schools that we observe in all six years. The explanatory variables include school and teacher characteristics potentially relevant to parental or student attendance decisions, and a series of variables related to school location.

Teacher pay and attendance are positively correlated in columns (2) and (3) of Table

[26] In practice, this means that a school is allocated the market size of the largest post-office within 9 kilometers of the school.

4. We do not propose to make a strong causal interpretation of this result. Better pay may be a proxy for unobserved teacher qualities, and it is also likely that attendance was a determinant of teacher salaries. The 1906 School Act gave municipal school boards authority over salaries, and the school inspectors claim that outcomes were a leading consideration in setting pay for returning teachers.[27] Other teacher characteristics appear to have only a modest impact on attendance. In particular, we do not find a meaningful relationship between teacher qualifications and attendance. Table 4 reports small, insignificant coefficients on the presence of a teacher with at least a second-class certificate. Alternative regressions generated similar insignificant coefficients for other qualification categories. The presence of a male teacher in the school has a modest positive relationship with attendance rates.

Student sex ratios are negatively related to attendance rates. This may indicate that boys and girls have different age-attendance profiles, but we are unable to verify that with the British Columbia data. The length of the school year has at best a weak statistical relationship with attendance rates. The regressions offer partial confirmation of the views of the school inspectors regarding distance to school and attendance. Schools with larger catchment areas (which we infer from distance to any alternative school) also had somewhat lower attendance rates, with the coefficient on distance to primary school negative and significant in column (1).[28] We find little evidence of a relationship between attendance and distance to the nearest high school

The variables for post office revenue suggest there was some relationship between economic activity and school attendance. In the full population of schools (col. 1), attendance rates were higher if there was an active post office in the area, but lower in the

[27] However, results from annual cross-sections give no suggestion that the pay/attendance correlation is stronger after 1905 or 1910 than before.

[28] The coefficients on distance to other primary schools are roughly similar if we exclude the high school distance variable – in other words, distance to a high school is not absorbing the effect of distance to another primary school.

largest towns with large post offices collecting over 5000 dollars worth of revenue. When we look only at schools open in all years (col. 2 and col. 3), none of the post office coefficients are statistically significant.

After controlling for a range of teacher and school characteristics, school structure remains strongly correlated with attendance. Column (1) suggests that graded schools had about 8 percent higher attendance than common schools with similar characteristics. It is possible that schools in areas with high attendance, perhaps due to unobserved characteristics among the local population, were more likely to receive funding for an additional teacher. Columns (2) and (3) are a first attempt to deal with this possibility, by examining the sub-sample of schools for which we have data for all six years. The coefficient on graded schools is more or less equal in column (2) and (1). This coefficient declines somewhat when school fixed effects are introduced (col. 3), but it remains relatively large and statistically significant. Class size is also strongly correlated with attendance. Reducing class size by ten (one standard deviation of common school class size in 1920) is associated with 2 to 3 percent higher attendance rates in all three columns of Table 4. It is unlikely that this coefficient suffers a downward bias (meaning that the true effect is smaller in magnitude than what is reported) due to reverse causality or unobserved heterogeneity. Unmeasured factors causing schools to have higher attendance rates, such as unobservable teacher quality, or the characteristics of parents in the local community, would also be expected to lead to greater enrollment. The number of students enrolled in a school appears to have been a trigger for the employment of additional teachers to reduce class size, but we have found no evidence that school administrators used attendance outcomes as a trigger for teacher hiring.[29]

[29] We have never found a comment in the Inspectors' reports suggesting that because attendance was improving, a teacher could not handle as many pupils in a class.

**Graded schools, common schools, and reader distribution**

Graded schools had higher attendance rates, even when we control as wells as we can for the quality of teachers, size of classes, and distance to the nearest school. The results above, however, do not reveal which pupils were most affected by grading. If graded schools offered more focused training to older pupils, we might expect to see better attendance rates at schools with more pupils in upper readers. Alternatively, graded schools may have been especially attractive to the parents of young children. Small children may have suffered more bullying, or simply been ignored by the teacher, in classes with children of all ages. It is also unclear from Table 4 to what extent the "graded school effect" is due to the addition of a second teacher, or is evident only for large graded schools with fine age-grade divisions.

To explore the link between grading, age and reader distribution, and attendance, Table 5 presents results from attendance regressions similar in form to Table 4, but with the addition of two variables measuring the share of pupils in junior reader categories (first and second primer) and in senior reader categories (fourth and fifth reader). We also know the number of divisions in each graded school, and the Table 5 regressions include a set of dummy variables for the number of divisions within the school.

The first column of Table 5 shows estimates for the full sample of primary schools from 1900 to 1930. The coefficient on junior reader share indicates that attendance rates were significantly lower in schools with larger shares of primary reader pupils. Raising the share of junior pupils from 30 to 50 percent (which is about equal to going one standard above from the mean) would be predicted to reduce attendance rates by about two percentage points. The graded coefficient remains positive, significant, and substantial at .070. However, the division variables show that schools with more than 5 classes had significantly higher attendance rates than simple 2 division graded schools.

Columns (2) and (3) of Table 6 break the regression in column (1) into graded and

common school subsamples. Of particular interest here is the difference in the junior share coefficient between these two groups. A higher share of junior readers led to lower attendance in common schools, but had little systematic impact in graded schools. A plausible interpretation of this pattern is that graded schools were more attractive to parents of young pupils. If junior pupils were the most neglected in traditional one room schools, it stands to reason that schools with set class divisions and multiple teachers would be particularly attractive to parents of pupils who had just entered formal education. The division dummies for graded schools in column 3 reinforce the finding that large graded schools had higher attendance rates than small schools with 5 or fewer divisions.

The magnitude of the class size coefficient is similar in separate regressions for graded and common schools. This indicates that there were two viable mechanisms for school boards to raise attendance in crowded one-room schools. One was to add a second teacher in the over-subscribed one-room school, which would benefit both from grading and reduced class sizes. The alternative was to employ additional teachers in nearby schools – either by building new one-room schools, or grading other schools.

**The Transition from One-Room to Graded Schools**

Tables 4 and 5 demonstrate that graded schools had higher attendance rates than otherwise similar common schools, but they do not prove that grading raised attendance. It is plausible that variations in labour market conditions that attract different types of settlers, or offer different employment possibilities to teenagers, explain the presence of the positive and significant graded coefficient. Given the changing nature of British Columbia's economy between 1900 and 1930, the school fixed effects included in columns (2) and (3) of Table 4 may not be adequate controls for unobserved local conditions.

We trace groups of schools over time by combining the school data used above with

supplementary annual observations for schools adding a second teacher. This allows us to show what happened when common schools expanded into small graded schools, and how this compared with schools that did not expand. Ideally, we would compare places that were much the same in all respects except that some moved from to graded school status, while others remained common schools. In fact, there were differences across the areas where common schools remained, areas where schools were always graded, and areas where a transition took place. We are unable to quantify many potential differences – in particular, we do not know much about the economic and demographic characteristics of residents in school catchment areas. In Table 6, outcomes at schools receiving second teachers are contrasted with several comparison groups to give a sense of how attendance was changing over time for several types of school. We do this for 2 intervals: 1906 to 1910, and 1914 to 1920.[30]

Panel 1 of Table 6 summarises attendance and class size outcomes in common schools that added a second teacher between 1906 and 1910 or 1914 and 1920. When common schools became graded schools, class size dropped and attendance rates rose. By contrast, schools that remain ungraded had sluggish growth in attendance (Table 6, Panel 2). Common schools that were initially large, which we define as enrolment of at least 30, saw modest increases in attendance, especially if class size fell over the interval (Panel 3). Schools that were graded at both the beginning and end of each interval (Panel 4) had high attendance, but relatively little growth in attendance – in 1910 and 1920, newly graded schools had attendance rates similar to schools that had been graded for at least 5 years. Finally, small graded schools with only 2 teachers (Panel 5), had higher attendance rates than common schools in 1905 and 1914, and similar, if not somewhat lower, attendance rates in 1910 and 1920 than those receiving second teachers over either interval.

[30] We have repeated this analysis for other intervals, with broadly similar results.

How rapidly did attendance respond to the addition of a second teacher? Figure 2 shows annual average class size and the average attendance rate by year for schools that changed from being one teacher to two teacher schools at some time between 1906 and 1910. The marker "year" on the X-axis can be any year from 1906 to 1910 – it is the year when the change took place.[31] Almost all the schools that experienced this transition had operated for four years before the change, and continued to operate for at least another four years. Class size and attendance rates have been averaged for all schools that can be traced.[32]

Schools adding a teacher experienced a sharp drop in average class size the year when the second teacher was hired. Rising enrolment generally triggered the hiring of the second teacher. Typically, class size rebounded somewhat in the two or three years following the hiring of the second teacher – a second teacher was probably hired in areas where enrolment had risen and was expected to continue to rise. If adding a second teacher caused a school to function better, we would expect any impact of quality on enrolment to have taken some time to become apparent. What is most striking in Figure 2 is the sharp increase in average attendance rates in the year when the second teacher was hired. The first year effect on attendance rates was not fully maintained, but average attendance rates in the next four years were clearly higher than the average for the four previous years. Figure 2 suggests that teachers were added in response to enrollment changes, not increases in attendance rates, and that attendance responded in short order to the grading of a common school.

The immediate impact of adding a second teacher extends into the 1920s. We have examined annual attendance outcomes for the set of schools that receive second teachers between 1920 and 1925 (Figure 3). Figures 2 and 3 are remarkably similar. The addition of a second teacher appears to have brought about an immediate response in attendance rates in both decades, even though class sizes were a good deal smaller, and attendance rates higher

[31] We collected additional annual data for this subset of schools to generate this figure.
[32] We have made similar calculations for the interval between 1900 and 1905, and the results are much the same.

in common schools that were graded in the early 1920s.

A two-teacher school was often in a new or expanded building. Improvements to facilities were easily observed by parents, and expectations of an improved physical environment, more than improved pedagogy associated with age grading, may have generated attendance improvements in schools adding a second teacher. Up to 1910, building expenses for public schools can be identified in the Public Works Report of the Sessional Papers of British Columbia, and we have tracked major expenditures of $1000 or more for all schools considered in Figure 2.[33] Between 1905 and 1910, just over 60 percent of schools receiving a second teacher also had a major building expense that roughly coincides with the arrival of the second teacher.[34] Schools that added a teacher with contemporaneous building expenditures saw an 18 percentage point increase in attendance rates (from 59 to 77 percent), versus a 16 percent increase (from 59 to 75) for the schools that added teachers without any accompanying physical expansion. The number of schools we can compare in this way is small, and schools may have been able to finance minor building work that was not reported in the Public Works accounts. Wherever we can trace capital expenditure, however, we find little evidence that schools that built new facilities to house additional classrooms had better attendance outcomes than those that just added a teacher.

**How important was changing school provision?**

Attendance rates in BC elementary schools increased by 30 percentage points between 1900 and 1930; how much of this can be explained by changes in how schooling was provided? We have performed a simple back of the envelope calculation to provide a rough

[33] From about 1910 onward, most school construction expenses are reported by municipal district, rather than by individual school. The municipal districts of Burnaby and Point Grey, for example, receive large grants regularly after 1910, but it is not possible from the Sessional Papers to determine at which schools (and it what form) spending took place.

[34] We consider building expenses to coincide if expenditure was recorded within a year of the arrival of the second teacher (i.e. 1902 to 1904 for a school adding a second teacher in 1903).

estimate of the long-run importance of these changes. This calculation was performed by multiplying the estimated attendance impact of grading and class size (Table 4, Column (1)) by the changes in the graded share and average class size between 1900 and 1930. Table 7 lists the results of this exercise. The forty percent increase in the share of graded pupils is predicted to increase attendance rates by about 3 percentage points; cutting average class size from 39 to 21 to raise attendance rates by 5 percentage points. Combining these figures, roughly a quarter of the total rise in attendance can be accounted for as a function of changes in school provision. Clearly, changes in parental income and expectations, as well as other factors that could not be controlled by school board, such as population density and transport networks, were important drivers of advances in schooling in early 20th century North America. Our calculations do confirm that the school inspectors were right: changes in how schooling was provided made an observable contribution to the transition to regular elementary school attendance.

Our findings suggest that allocating additional resources to the employment of a second teacher could have a substantial payoff through increased pupil attendance. Increasing attendance rates from 62 to 70 percent for a group of pupils who attend school from the age of 6 to 12 raises the amount of time the average pupil is actually in school by about 4 months.[35] If the return to a year of primary schooling was in the order of 4 percent,[36] this implies that raising attendance rates raises future pupil earnings by about 1.3 percent. For a graded school with 2 teachers and 80 pupils, the net present value of a 1.3 percent permanent increase in pupil earnings is considerable when compared to the $60 to $100 monthly salary paid to the additional teacher.

[35] This calculation assumes a 9 month school year
[36] Goldin and Katz, "Education and income."

## Conclusions

North American educators stressed the importance of raising and maintaining primary school attendance rates in the late 19th and early 20th century. As in much of the continent, attendance in British Columbia was sporadic well into the twentieth century. Our analysis of British Columbia's public elementary schools suggests that attendance rates responded strongly to the addition of a second teacher, and to reductions in class size. Graded schools had about 8 percent higher attendance rates than similar common schools. More striking is the degree to which attendance rates were highly responsive to the addition of a second teacher, with sharp increases occurring immediately after a common school was transformed into a graded school. Class size was also an important factor in shaping attendance, and our results suggest that reducing class size by ten would raise attendance rates by about 3 percentage points. The attendance impact of these changes outweigh the impact of changes in teacher qualifications, teacher compensation, and geography – the first two of which appear to have had little impact for rural and small town schools. We also find that age grading and division of labour in monitoring appear to raise pupil attendance regardless of whether schools improved their physical infrastructure, and that graded schools were particularly effective in encouraging attendance among the youngest pupils.

Our sources allow us to document only part of the explanation for rising attendance in the early 20th century. Changes in the characteristics of parents, and the aspirations of parents with a given set of characteristics, were surely important in getting children to school regularly. Changes in school provision, however, are likely to have mattered most where attendance was sporadic in the first place. The combination of the consolidation movement and expansion in the number of teachers employed reduced class size and raised the number of graded schools in small towns and rural districts. Our findings suggest that changes in provision mean that "full attendance" rates of 90 percent or more were widespread a decade

earlier than would otherwise have been the case.

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**Table 1: Aggregate School Enrolment and Attendance Rates, 1901-1931**

| | **Enrolment as % of population aged 5-19** | | | | **Attendance as % of Enrolment** | | | |
|---|---|---|---|---|---|---|---|---|
| | 1901 | 1911 | 1921 | 1931 | 1901 | 1911 | 1921 | 1931 |
| Canada | 61.9 | 62.9 | 68.1 | 69.7 | 61.8 | 64.0 | 71.7 | 79.6 |
| PEI | 55.7 | 55.6 | 62.9 | 62.8 | 59.3 | 60.4 | 65.4 | 72.7 |
| NS | 64.5 | 65.3 | 64.8 | 69.2 | 54.5 | 59.5 | 71.5 | 75.7 |
| NB | 58.4 | 59.4 | 56.8 | 63.5 | 56.2 | 62.1 | 67.4 | 79.8 |
| Quebec | 55.2 | 57.2 | 62.2 | 62.5 | 73.8 | 77.5 | 77.5 | 83.0 |
| Ontario | 71.5 | 72.3 | 75.5 | 79.6 | 55.9 | 58.9 | 70.6 | 77.3 |
| Manitoba | 59.0 | 58.6 | 64.3 | 67.0 | 53.1 | 56.3 | 66.8 | 78.6 |
| Saskatchewan | | 52.9 | 73.7 | 71.5 | | 53.0 | 61.3 | 76.7 |
| Alberta | | 60.0 | 71.9 | 70.6 | | 52.8 | 67.7 | 80.9 |
| BC | 61.8 | 60.3 | 62.7 | 62.8 | 64.9 | 65.8 | 79.8 | 87.2 |
| Census reports "at school" | 52.1 | 52.9 | 61.3 | 65.6 | | | | |
| Census reports "at school 7-9 months" | 42.6 | 44.8 | 53.9 | 62.1 | | | | |
| | **Enrolment as % of population aged 5-18** | | | | **Attendance as % of Enrolment** | | | |
| | 1901 | 1911 | 1918 | 1931 | 1901 | 1911 | 1918 | 1931 |
| United States | 78.6 | 80.3 | 82.2 | 91.8 | 69.5 | 72.8 | 74.0 | 84.6 |
| Massachusetts | | | 87.8 | | | | 82.2 | |
| Illinois | | | 85.1 | | | | 83.9 | |
| Iowa | | | 97.4 | | | | 74.6 | |
| Oregon | | | 79.1 | | | | 81.9 | |
| Washington | | | 76.3 | | | | 74.1 | |

Notes and sources: Canadian enrolment estimates for 1901, 1911 and 1921 are from the *Canada Year Book* (*CYB*) 1925, pp. 893-4. Estimates for 1931 are from the *CYB*, 1934-35, pp.1045-6. Estimates are for ordinary day schools, both public and private. Population, 1931 *Census of Canada*, Vol. 1, pp. 388-93. Answers to census questions about school attendance as reported in *CYB* 1925, p. 131 and 1934-35, p. 161. US data for 1918 are from the *Biennial Survey of Education 1916-18*. Enrollment figures are for children between the ages of 5 and 18, and include private schools. Other US figures are calculated on the basis of Carter et. al, (2006), Tables Bc8, Bc95, and Bc96. See Goldin (2006) for further details.

**Table 2: Public schools in British Columbia, 1900-1930**

| | # High schools | # Junior / Superior schools | # Graded schools | # Common schools | % Primary enrollment in Graded School | Attendance rate, graded schools | Attendance rate, common schools |
|---|---|---|---|---|---|---|---|
| All schools | | | | | | | |
| 1900 | 5 | | 54 | 266 | 63 | 67 | 58 |
| 1905 | 13 | | 78 | 298 | 72 | 69 | 61 |
| 1910 | 23 | | 133 | 403 | 77 | 71 | 61 |
| 1914 | 36 | | 243 | 488 | 81 | 82 | 70 |
| 1920 | 53 | | 310 | 619 | 85 | 83 | 74 |
| 1930 | 88 | 47 | 380 | 689 | 88 | 90 | 88 |
| Excluding Nanaimo, New Westminster, Vancouver, and Victoria | | | | | | | |
| 1900 | 1 | | 30 | 265 | 39 | 62 | 58 |
| 1905 | 9 | | 50 | 296 | 51 | 66 | 61 |
| 1910 | 17 | | 84 | 397 | 56 | 69 | 61 |
| 1914 | 28 | | 162 | 483 | 67 | 81 | 70 |
| 1920 | 39 | | 226 | 616 | 73 | 82 | 74 |
| 1930 | 75 | 42 | 296 | 679 | 80 | 90 | 88 |

Notes: See text for source details.

**Table 3: Primary School Characteristics 1900-1930**

| | 1900 | | 1930 | |
|---|---|---|---|---|
| | Graded | Common | Graded | Common |
| Mean # of divisions in school | 3.3 (1.7) | 1 (0) | 4.6 (4.1) | 1 (0) |
| Mean Days in session | 188 (26) | 201 (30) | 192 (7) | 189 (19) |
| % with teacher with academic certificate | 10 | 4 | 14 | 2 |
| % with teacher with first class certificate | 68 | 16 | 76 | 38 |
| % with teacher with second class certificate | 21 | 50 | 87 | 58 |
| % with teacher with third class certificate | 0 | 14 | 10 | 1 |
| % of schools with at least one male teacher | 100 | 48 | 65 | 18 |
| Mean School Enrollment | 201 (134) | 36 (23) | 155 (164) | 16 (8) |
| % boys | 52 | 52 | 51 | 51 |
| Average class size | 59 (18) | 36 (23) | 30 (7) | 16 (8) |
| Average monthly salary (1901 $) | 64 (12) | 62 (24) | 69 (10) | 56 (6) |
| % of enrollment in lowest 2 reading books | 39 | 35 | 30 | 31 |
| % of enrollment in top readers | 22 | 24 | 23 | 22 |
| % Primary pupils within 5 miles of any other primary school | 78 | | 93 | |
| % Primary schools within 5 miles of a high school | 71 | | 78 | |
| % of schools with no local post office | 11 | 15 | 14 | 24 |
| Median post office revenue (1901 $) | 1371 | 211 | 1399 | 464 |
| % Attendance | 61 | 58 | 90 | 88 |

Notes: Schools in Nanaimo, New Westminster, Vancouver, and Victoria are excluded. Schools with incomplete information on all variables are excluded. Standard deviations are shown in parentheses. Monthly salaries are weighted by the number of teachers in each school. Salaries and post office revenues are normalized to 1901 dollars using Vancouver price indices in Emery and Levitt, “Cost of living,” and Minns and MacKinnon, “The costs.”

**Table 4: Explaining attendance at British Columbia Schools, 1900 to 1930**

| | (1) | (2) | (3) |
|---|---|---|---|
| | All schools | Schools in op all years | Schools in op all years |
| Log average pay | .005 (0.31) | .059 (2.06) | .103 (2.84) |
| Class size*10 | -.028 (-12.50) | -.025 (-6.53) | -.033 (-7.12) |
| % boys | -.017 (-0.88) | -.024 (-0.55) | -.033 (-0.69) |
| Session days*100 | .010 (1.48) | .013 (0.96) | .010 (0.68) |
| Graded school | .074 (10.03) | .078 (6.45) | .053 (3.41) |
| Male teacher present | .010 (1.97) | .023 (2.42) | .016 (1.59) |
| Teacher with 2nd class or better certificate | .010 (1.64) | -.0003 (-0.03) | .004 (0.37) |
| Distance to nearest high school > 5 kilometers | -.005 (-0.84) | -.002 (-0.15) | .008 (0.52) |
| Distance to nearest primary school > 5 kilometers | -.010 (-2.05) | -.005 (-0.51) | -.006 (-0.39) |
| No local post office | .010 (1.73) | -.017 (-1.30) | -.027 (-1.31) |
| Post office revenue>$1000 | .036 (5.44) | .015 (1.24) | .027 (1.62) |
| Post office revenue>$5000 | -.029 (-3.00) | .014 (0.40) | .003 (0.09) |
| Constant | .644 (9.32) | .417 (3.53) | .232 (1.38) |
| Year dummies | Yes | Yes | Yes |
| School dummies | No | No | Yes |
| N | 2222 | 632 | 632 |
| R2 | .55 | .58 | .70 |

Notes: Schools in Nanaimo, New Westminster, Vancouver, and Victoria are excluded. Schools with incomplete information on all variables are excluded. Standard deviations are shown in parentheses.

**Table 5: Explaining attendance – including graded school size**

| | (1) | (2) | (3) |
|---|---|---|---|
| | All schools | Graded schools | Common schools |
| Log average pay | -.002 (-0.13) | .015 (0.65) | .004 (0.17) |
| Class size*10 | -.027 (-12.00) | -.034 (-8.80) | -.024 (-8.75) |
| % boys | -.010 (-0.55) | -.104 (-2.18) | -.003 (-0.15) |
| Session days*100 | .009 (1.37) | -.029 (-1.77) | -.051 (-4.29) |
| Graded school | .070 (9.07) | --- | --- |
| 3 divisions | -.001 (-0.09) | .005 (0.55) | --- |
| 4 divisions | .006 (0.36) | .013 (1.03) | --- |
| 5 to 9 divisions | .027 (1.95) | .039 (3.28) | --- |
| 10 to 19 divisions | .037 (2.06) | .052 (3.35) | --- |
| 20+ divisions | -.001 (-0.02) | .013 (0.27) | --- |
| Male teacher present | .005 (0.97) | -.002 (-0.29) | .005 (0.83) |
| Teacher with 2nd class or better certificate | .007 (1.15) | .014 (0.57) | .004 (0.52) |
| Distance to nearest high school > 5 kilometers | -.002 (-0.40) | .002 (0.33) | -.008 (-1.01) |
| Distance to nearest primary school > 5 kilometers | -.009 (-1.73) | .003 (0.35) | -.012 (-1.93) |
| No local post office | .010 (1.73) | .011 (1.11) | .010 (1.52) |
| Post office revenue>$1000 | .035 (5.28) | .015 (2.08) | .046 (4.73) |
| Post office revenue>$5000 | -.029 (-3.01 | -.016 (-1.34) | -.048 (-3.59) |
| % junior readers | -.102 (-5.73) | .010 (0.27) | -.134 (-6.60) |
| % senior readers | .013 (0.63) | .001 (0.02) | .021 (0.90) |
| Constant | .701 (10.13) | .819 (7.95) | .804 (9.31) |
| Year dummies | Yes | Yes | Yes |
| N | 2222 | 547 | 1675 |
| R2 | .56 | .62 | .54 |

Notes: Schools in Nanaimo, New Westminster, Vancouver, and Victoria are excluded. Schools with incomplete information on all variables are excluded. Standard deviations are shown in parentheses.

**Table 6: Transitions from One-Room to Graded Schools: Class size and Attendance**

| | **Start = 1905** | **End = 1910** | **Start =1914** | **Start = 1920** |
|---|---|---|---|---|
| | 1. Common at start, graded at end | | | |
| Attendance rate (%) | 60 | 68 | 70 | 82 |
| Average class size | 44 (14) | 39 (9) | 36 (14) | 28 (6) |
| Average # present | 26 (8) | 26 (6) | 24 (8) | 23 (4) |
| N | 17 | | 35 | |
| | 2. Common at start, common at end | | | |
| Attendance rate (%) | 61 | 62 | 70 | 73 |
| Average class size | 25 (12) | 27 (12) | 23 (10) | 22 (10) |
| Average # present | 15 (6) | 16 (7) | 16 (7) | 16 (8) |
| N | 138 | | 268 | |
| | 3. Common at start, common at end, class size 30 or more at start | | | |
| Attendance rate (%) | 58 | 60 | 68 | 76 |
| Average class size | 38 (8) | 36 (11) | 37 (7) | 30 (9) |
| Average # present | 21 (9) | 22 (7) | 22 (5) | 23 (7) |
| N | 45 | | 60 | |
| | 4. Graded at start, graded at end | | | |
| Attendance rate (%) | 66 | 71 | 80 | 81 |
| Average class size | 45 (11) | 43 (16) | 35 (8) | 35 (7) |
| Average # present | 30 (7) | 30 (9) | 28 (6) | 29 (6) |
| N | 25 | | 103 | |
| | 5. Graded at start, graded at end, 3 classes or less | | | |
| Attendance rate (%) | 63 | 65 | 80 | 78 |
| Average class size | 42 (12) | 44 (21) | 30 (6) | 32 (7) |
| Average # present | 26 (5) | 27 (11) | 24 (4) | 25 (5) |
| N | 13 | | 39 | |

Notes: Schools in Nanaimo, New Westminster, Vancouver, and Victoria are excluded. Schools with incomplete information on all variables are excluded. Standard deviations are shown in parentheses.

**Table 7: Quantifying the contribution of school provision**

| | Attendance rate | % Graded | Average class size |
|---|---|---|---|
| 1900 values | 59 | 39 | 39 |
| 1930 values | 90 | 80 | 21 |
| Difference | 31 | 41 | 18 |
| Coefficient | | .074 | -.0028 |
| Difference * Coefficient | | 3.0 | 5.0 |
| Contribution to attendance change | | 10% | 16% |

Notes: Coefficients are drawn from Column (1) of Table 4. The product of difference and the class size coefficient is transformed into percentage terms.

**Figure 1: Attendance, grading, and class size, 1900-1930.**

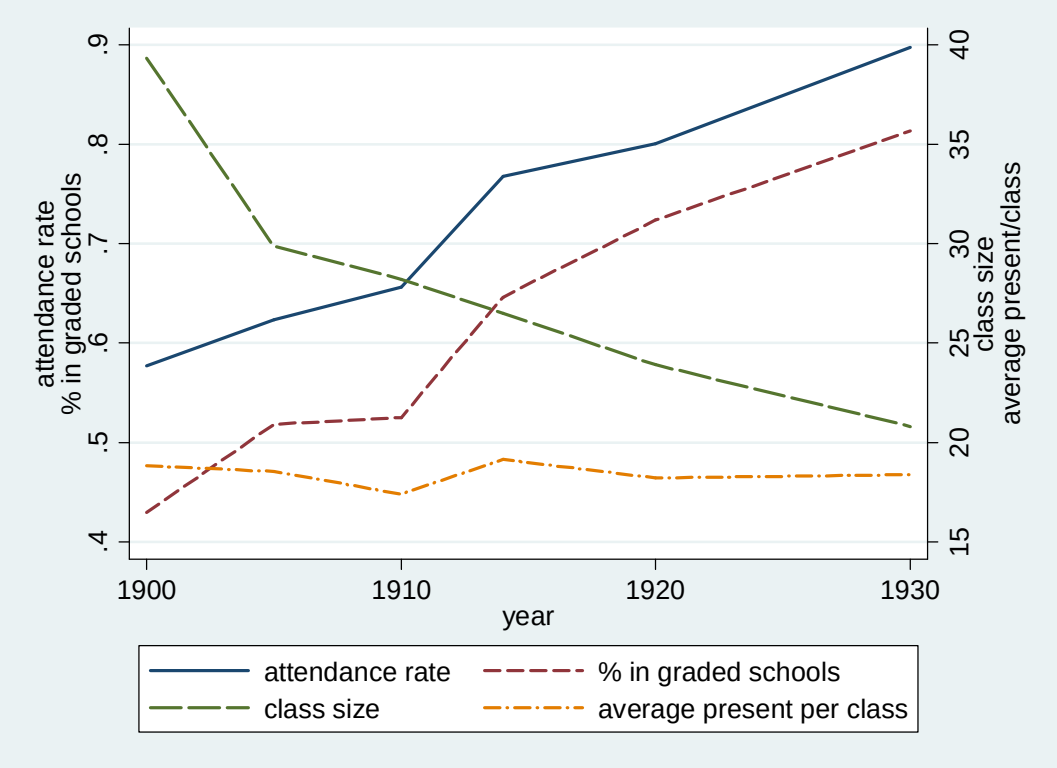

**Figure 2: schools adding second teachers, 1905 to 1910**

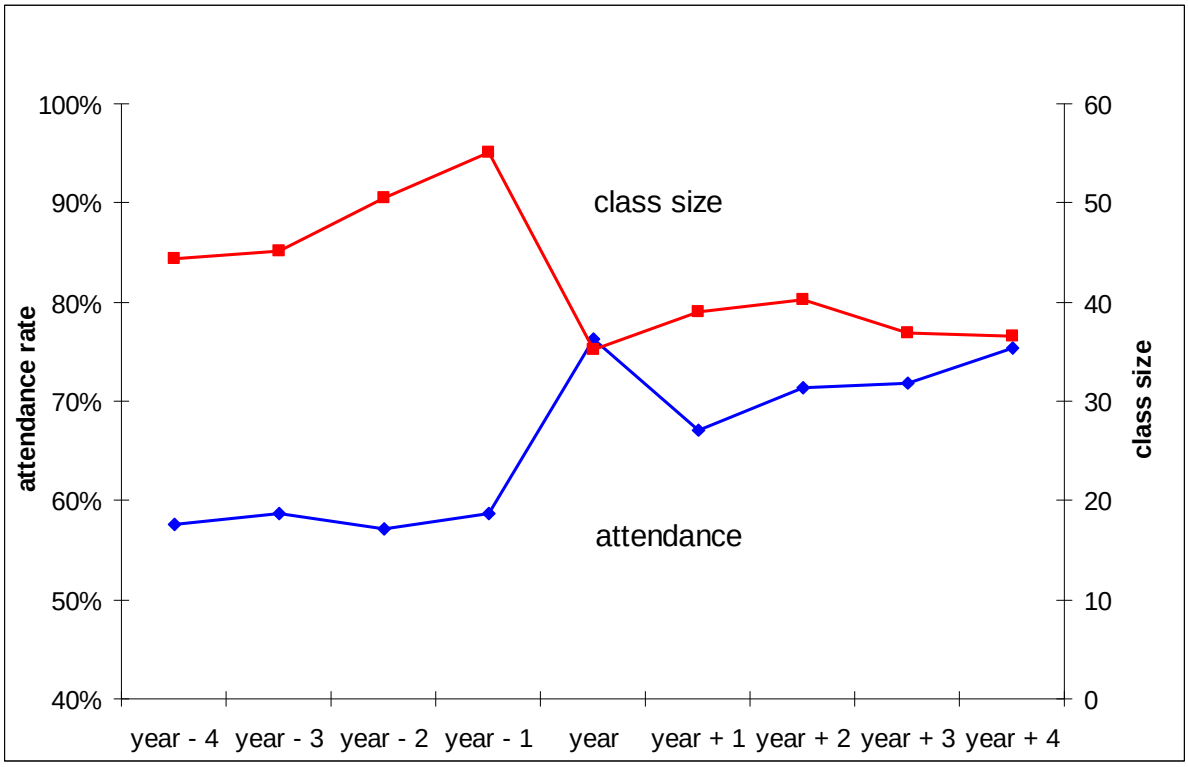


**Figure 3: schools adding second teachers, 1920 to 1925**