When is Small Too Small?

Efficiency, Equity & the Organization of Vermont Public Schools

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Executive Summary

In January, 2015, graduate students from Penn State University released a report on Vermont schools, seemingly in an effort to head off proposed changes to state school finance polices that might increase pressure on very small schools to consolidate. Among other policy recommendations, the report suggested that the current small schools grant be increased, not decreased, and also restructured, so as to help sustain small schools. The report also suggested that any lowering of the "excess spending threshold" include exemptions for very small schools so as not to put unnecessary budgetary pressure on those schools.

The Penn State report, however, presents a skewed characterization of the literature on a) school size, and b) consolidation, to support their conclusions. Further, the report fails to appropriately relate data on actual Vermont schools to that literature. As such, the policy recommendations of the report are misguided, at best.

Preliminary analyses presented herein show that:

1. Vermont's very small school districts suffer from a combination of:
    a. higher spending than necessary;
    b. higher taxes than necessary;
    c. and less comprehensive academic programs than could be provided at scale.
2. Exorbitant costs are most evident in tiny elementary schools and districts
3. Program breadth and depth may be significantly compromised in the state's very small high schools

In addition, Vermont remains consistently among the highest spending states in the nation when it comes to elementary and secondary education, and spends a greater share of its economic capacity on schools than any other state.

In contrast with recommendations of the Penn State report, consolidation options should not be taken off the table in Vermont, and the state should scrutinize small school subsidies and spending cap exemptions which reduce incentives to more efficiently organize schools. The best empirical literature does suggest that consolidation of very small schools as exist in Vermont can lead to long run cost savings, improve equity in access to curricular and co-curricular opportunities. Further, district reorganization in the cases mentioned herein may lead to greater property tax equity.

Introduction

In January, 2015, graduate students from Penn State University released a report on Vermont schools, seemingly in an effort to head off proposed changes to state school finance polices that might increase pressure on very small schools to consolidate. The report's central conclusion was as follows:

> A century of research strongly suggests neither district consolidation nor the elimination of the Small Schools Grant will produce needed reforms. In sum, a balanced and capacity---building strategy, rather than consolidation, offers the greatest potential to accomplish necessary economic and educational reforms. (p. 10)[1]

Among other policy recommendations, the report suggested that the current small schools grant be increased, not decreased, and also restructured, so as to help sustain small schools (see p. 9). The report also suggested that any lowering of the "excess spending threshold" include exemptions for very small schools so as not to put unnecessary budgetary pressure on those schools.[2]

The report, however, presents a selective and imbalanced characterization of the literature on a) school size, and b) consolidation, to support their conclusions. Further, the report fails to appropriately relate data on actual Vermont schools to that literature. As such, the policy recommendations of the report are misguided, at best.

In this policy brief, I begin by reviewing relevant empirically rigorous literature on school size, consolidation and costs. Next, I consider the position of the State of Vermont among New England states in terms of education spending and the share of state capacity spent on k-12 schooling, based on data from the most recent five years of our award winning[3] national report card on state school finance systems: *Is School Funding Fair?*[4] Put simply, is Vermont putting up disproportionate effort to maintain its current system? Next, I review long term trends in enrollments and numbers of schools in Vermont. Next, I evaluate the relationship between school and district level spending, tax rates and school and district enrollment size and organization. I conclude with analyses of specific zones within the state where consolidations might significantly reduce costs, expand program access and improve equity of opportunities across children.

Research on School & District Size & Consolidation

I begin with a brief review of the most relevant literature pertaining to the questions at hand. First and foremost, when discussing "small schools," the benefits of "small schools" and issues pertaining to consolidation it is critically important to define what is meant by "small," and, for that matter to differentiate smallness by grade levels and ranges served. In the most comprehensive review of literature on economies of scale in education, Andrews Duncombe and Yinger (2002) concluded:

[1] http://www.ed.psu.edu/crec/policy-brief

[2] The report explains: Lowering the threshold therefore places greater burden on small, rural towns, perpetuating the inequities that Act 60/68 was designed to prevent. Therefore any reduction in the excess spending threshold must include small school exemptions to minimize size--- based inequities. (p. 8)

[3] 2013 – AERA Division L Policy Report Award for Baker, B. D., Sciarra, D. G., & Farrie, D. (2010). Is School Funding Fair?: A National Report Card. Education Law Center.

[4] Available at: http://schoolfundingfairness.org/

> The best of the cost function studies suggest that sizeable potential cost savings in instructional and administrative costs may exist by moving from a very small district (500 or fewer pupils) to a district with ca 2000–4000 pupils. The findings from production function studies of schools are less consistent, but there is some evidence that moderately sized elementary schools (300–500 students) and high schools (600–900 students) may optimally balance economies of size with the potential negative effects of large schools.[5]

That is, district level per pupil costs tend to level off as district enrollments approach 2,000 pupils. Districts enrolling over 2,000 pupils are able to produce comparable outcomes to smaller districts at much lower per pupil costs. The authors also note that this finding is consistent with literature on student outcomes in schools of varied sizes, which finds that high schools of around 600 to 900 pupils seem to be optimal in terms of production of student outcomes. Lee and Smith (1997) note:

> Results suggest that the ideal high school, defined in terms of effectiveness (i.e., learning), enrolls between 600 and 900 students. In schools smaller than this, students learn less; those in large high schools (especially over 2,100) learn considerably less.[6]

In many states and metropolitan areas around the country, a school district enrolling 2,000 pupils is small and a high school with fewer than 900 pupils in grades 9 to 12 is small. Thus, we often see these studies used as a basis for arguing that smaller is better. In Vermont, however, these would be among the largest schools and districts in the state.

Building on this work, Duncombe and Yinger estimate models of the potential cost savings of consolidating very small school districts in rural upstate New York. They find:

> We find economies of size in operating spending: all else equal**, doubling enrollment cuts operating costs per pupil by 61.7 percent for a 300-pupil district and by 49.6 percent for a 1,500-pupil district.** Consolidation also involves large adjustment costs, however. These adjustment costs, which are particularly large for capital spending, lower net cost savings to 31.5 percent and 14.4 percent for a 300-pupil and a 1,500-pupil district, respectively. Overall, consolidation makes fiscal sense, particularly for very small districts, but states should avoid subsidizing unwarranted capital projects.[7]

[5] Andrews, M., Duncombe, W., & Yinger, J. (2002). Revisiting economies of size in American education: are we any closer to a consensus?. Economics of Education Review, 21(3), 245-262.

[6] Lee, V. E., & Smith, J. B. (1997). High school size: Which works best and for whom?. Educational Evaluation and Policy Analysis, 19(3), 205-227.

[7] Duncombe, W., & Yinger, J. (2007). Does school district consolidation cut costs?. Education Finance & Policy, 2(4), 341-375.

In other words, substantial cost savings can be achieved by consolidating districts as small as 300 pupils into districts with around 1,500 pupils. Smaller cost reductions, if any, are achieved for consolidations above those levels. Again, the authors are referring to consolidations of very small districts, smaller than exist in many states, but dominant across the Vermont landscape. Much of the elevated cost of very small districts is not in centralized and overhead costs, but in the staffing ratios at the classroom level, such that cost savings are only maximized when individual schools can be reorganized and consolidated as well as overhead costs. Combining schools comes with up front capital investment, which should be approached strategically.

In many states, a school district enrolling 2,000 pupils or a high school with fewer than 900 pupils is small. In Vermont, however, these would be among the largest in the state.

The previous studies speak primarily to issues of maximizing achievement gains on test scores and/or minimizing the cost of producing those gains. Certainly there is more to school size than efficiently producing test score gains – including access to programs, services and curricular options. A multitude of studies find that curricular options – in particular advanced course offerings and electives – are severely curtailed in very small high schools.[8] In this case, the boundary of small tends to be set around 400 pupils at the high school level. High schools enrolling far fewer than 400 pupils tend to have fewer elective options and fewer advanced course offerings available. Notably, in very large high schools, more options may be available, but participation rates in those options may decline. A multitude of research studies indicates the importance of access to and participation in these opportunities.

The opportunity to participate in important milestone courses such as algebra or geometry as well as more advanced and enriched academic coursework is associated with college acceptance, matriculation and ultimately personal financial success after college. For example, Rose and Betts note: "Our results suggest that a curriculum that includes algebra and geometry is systematically related to higher earnings for graduates a decade after graduation."[9] Betts and Rose further explain that: "…the math curriculum can explain nearly one-quarter of the gap between students with parental income in the lowest and middle

[8] Brent, B. O., Roellke, C. F., & Monk, D. H. (1997). Understanding teacher resource allocation in New York state secondary schools: A case study approach. *Journal of Education Finance*, 207-233.
Baker, B. D. (2003). State policy influences on the internal allocation of school district resources: Evidence from the common core of data. *Journal of Education Finance*, 1-24.
Monk, D. H., Brent, B. O., & Roellke, C. F. (1997). Teacher resource use within New York state secondary schools. *Paul D. Planchon, Associate Commissioner*, 37.
Baker, B. D. (2001). Measuring the outcomes of state policies for gifted education: An equity analysis of Texas school districts. *Gifted Child Quarterly*, *45*(1), 4-15.
Monk, D. H., & Haller, E. J. (1993). Predictors of high school academic course offerings: The role of school size. *American Educational Research Journal*, *30*(1), 3-21.
Haller, E. J., Monk, D. H., Bear, A. S., Griffith, J., & Moss, P. (1990). School size and program comprehensiveness: Evidence from high school and beyond. *Educational evaluation and policy analysis*, *12*(2), 109-120.
Monk, D. H. (1987). Secondary school size and curriculum comprehensiveness. *Economics of Education Review*, *6*(2), 137-150.

[9] Heather Rose and Julian R. Betts, "The Effect of High School Courses on Earnings," *Review of Economics and Statistics* 86, no. 2 (Month, 2004): 497–513, p. 510.

groups. This latter finding is important because it suggests a tool—namely the math curriculum—for increasing the degree of equity in students' earnings opportunities later in life."[10] Others point to the importance of early access to algebra specifically (as a pathway to higher mathematical attainment by graduation) in order to put students on a trajectory to succeed in non-remedial, credit bearing math courses during their freshman and sophomore years in college.[11]

Access to non-academic offerings also matters. Killgore explains the importance of high school students' academic and non-academic qualifications for acceptance to selective colleges. With regard to non-academic merit, Killgore explains "Nonacademic merit becomes important to admissions officers at elite colleges because it offers them additional criteria to distinguish the best from among their large pool of applicants who are highly qualified in academic terms."[12] Again, participation rates in non-academic alternatives, like advanced academic alternatives may decline in large high schools, where large means enrollment greater than 900. But these opportunities tend to be generally less available in high schools enrolling fewer than 400 pupils, and many Vermont high schools fall well below this threshold.

Vermont in Regional Context

These first few figures compare Vermont to other New England states in terms of a) adjusted state and local revenue per pupil, corrected for economies of scale related costs, child poverty rates and regional labor cost, and b) total effort put toward financing elementary and secondary education. These figures are based on data from the forthcoming 2015 edition of *Is School Funding Fair?*[13] They are included here to illustrate how Vermont's per pupil spending and burden of supporting that spending compare to other nearby states, even after correcting for the small size and population sparsity of Vermont districts, as explained in the funding fairness report technical appendix.[14]

Vermont's share of economic capacity spent on public schools is highest in the nation.

Figure 1 shows that up through 2009, Vermont had been the highest in state and local revenue per pupil among New England states. Connecticut surpasses Vermont in 2011, but Vermont remains high. More strikingly, however, Vermont remains much higher than other New England states (and all states nationally) on the report's measure of educational effort. That is, Vermont spends the largest share of its fiscal capacity,

[10] Heather Rose and Julian R. Betts, "The Effect of High School Courses on Earnings," *Review of Economics and Statistics* 86, no. 2 (Month, 2004): 497–513, p. 510.

[11] Adam Gamoran and Eileen C Hannigan, "Algebra for Everyone? Benefits of College-Preparatory Mathematics for Students With Diverse Abilities in Early Secondary School," *Educational Evaluation and Policy Analysis* 22, no. 3 (Fall, 2000): 241-254.

Mark C. Long, Patrice Iatarola, and Dylan Conger, "Explaining Gaps in Readiness for College-Level Math: The Role of High School Courses" *Education Finance and Policy* 4, no. 1 (Winter 2009): 1-33.

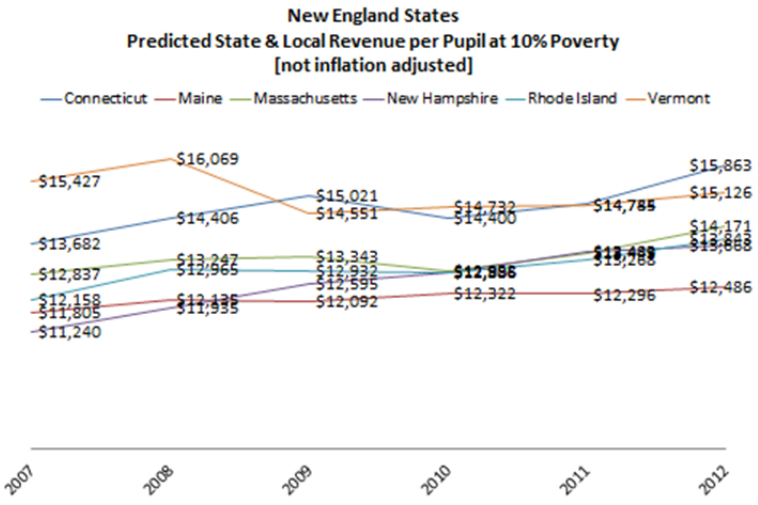
[12] Leslie Killgore, "Merit and Competition in Selective College Admissions," *The Review of Higher Education* 32, no. 4 (Summer 2009): 469–488, p. 471.

[13] Baker, B. D., Sciarra, D. G., & Farrie, D. (2010). Is School Funding Fair? A National Report Card. *Education Law Center*.

[14] http://schoolfundingfairness.org/SFF_Data_and_Methods.pdf

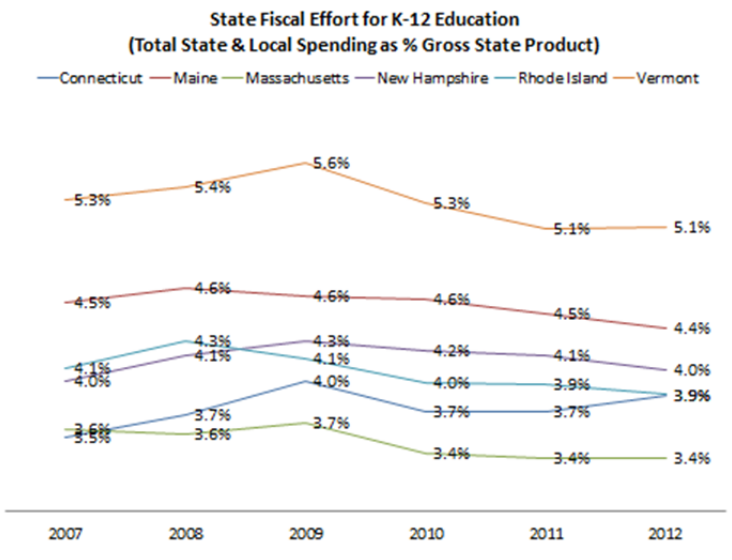
among states, on supporting elementary and secondary schooling. All states declined on this measure in the recent recession.[15]

Figure 1



Data source: www.schoolfundingfairness.org [Winter 2015 update]

Figure 2



[15] Baker, B. D. (2014). Evaluating the recession's impact on state school finance systems. *education policy analysis archives*, *22*, 91.

District and School Size in Vermont

Figure 3 shows the long term trends in numbers of schools by grade level in Vermont using the National Center for Education Statistics Public School Universe Survey data. Over time, numbers of elementary schools have declined, from over 180 to around 150. But while elementary schools have declined in numbers, possibly being combined into elementary-middle schools in some cases (note the small uptick), numbers of high schools remain unchanged.

Figure 3

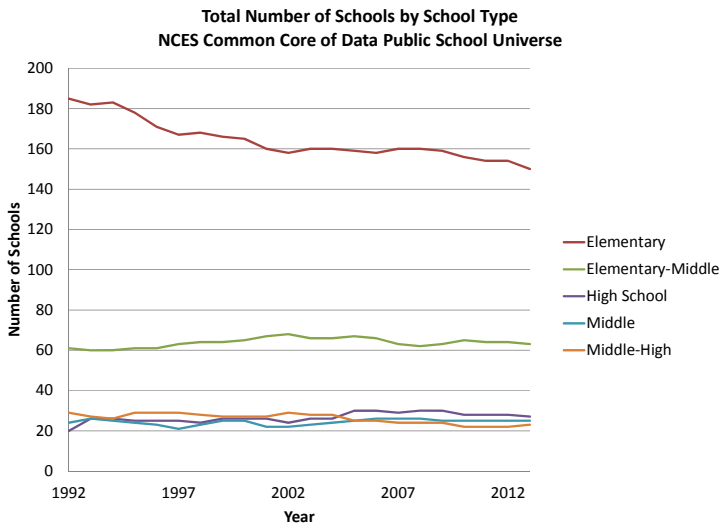


Figure 4

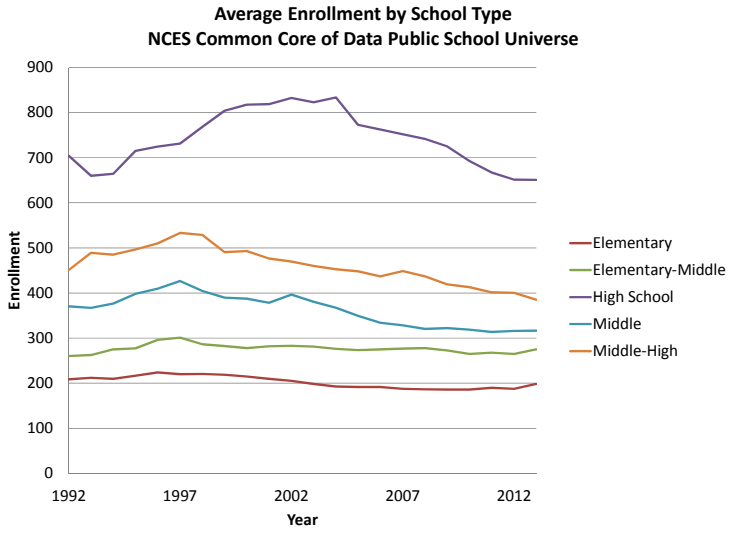


Figure 4 shows the average enrollments by school grade range over time. High school average enrollments reached their (most recent) maximum in the early 2000s, at just over 800 pupils, declining to an average of around 650 by 2013. That is, the average enrollment size remains within the range for

effective, efficient high schools large enough to offer a diverse array of courses and extracurricular opportunities. But there remains substantial variation around that average, and the average represented in Figure 4 is weighted by enrollment.

District Revenues and Enrollment Size

Figure 5 shows the relationship between district state and local revenue per pupil and enrollment size, by district type, using data from the U.S. Census Fiscal Survey of local governments for 2011-12. One can see in the figure that there exist a handful of very small school districts requiring substantially greater per pupil revenue than their larger counterparts. Less like patterns in some other states, there also exist many very small schools that have much lower revenue per pupil. Such low revenue, and spending at such small scale would typically require sacrificing substantially course offerings and specialized staffing, as well as combining grade levels in elementary schools.

Figure 5

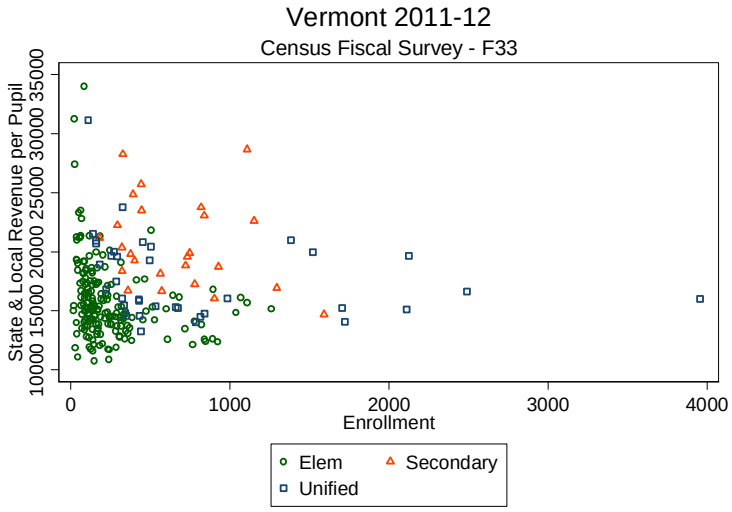
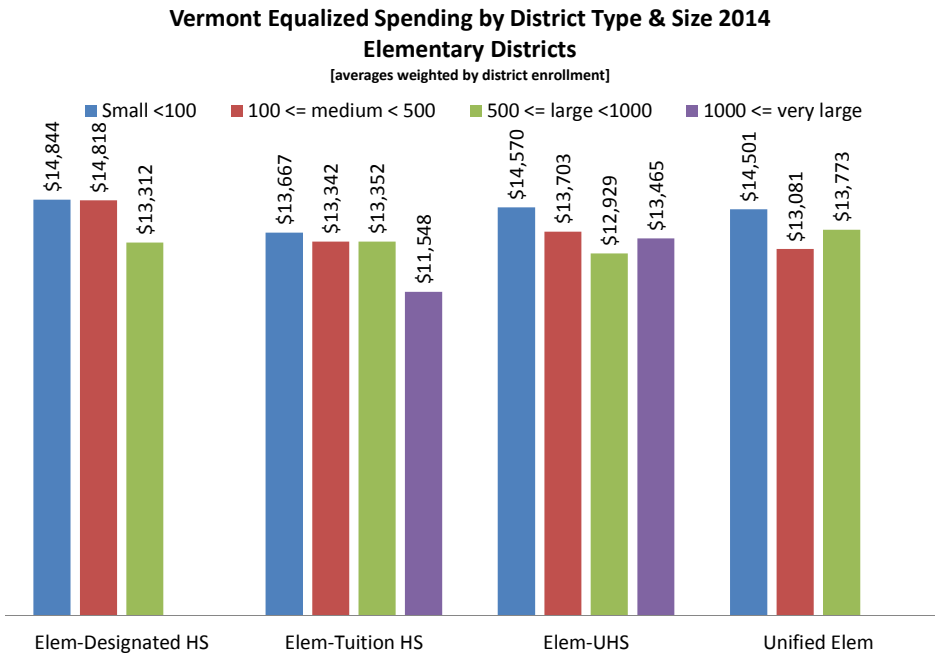


Figure 6 uses data from the Vermont Department of Education to compare per pupil spending levels by district classifications used by the state. Within elementary district types, smaller districts tend to be spending, on average, weighted by enrollment, about $1,000 per pupil more. These differentials are somewhat smaller than found in other studies of economies of scale in education,[16] and may indicate that program breadth and depth and related school services or more severely constrained. A second issue is that in Vermont, these comparisons are being made between very, very small districts, and merely small ones. As such, per pupil costs for all districts and schools are somewhat elevated. Vermont is among the few states with very small numbers of children attending fully organized (k-12) scale efficient (>2,000 pupils) districts.

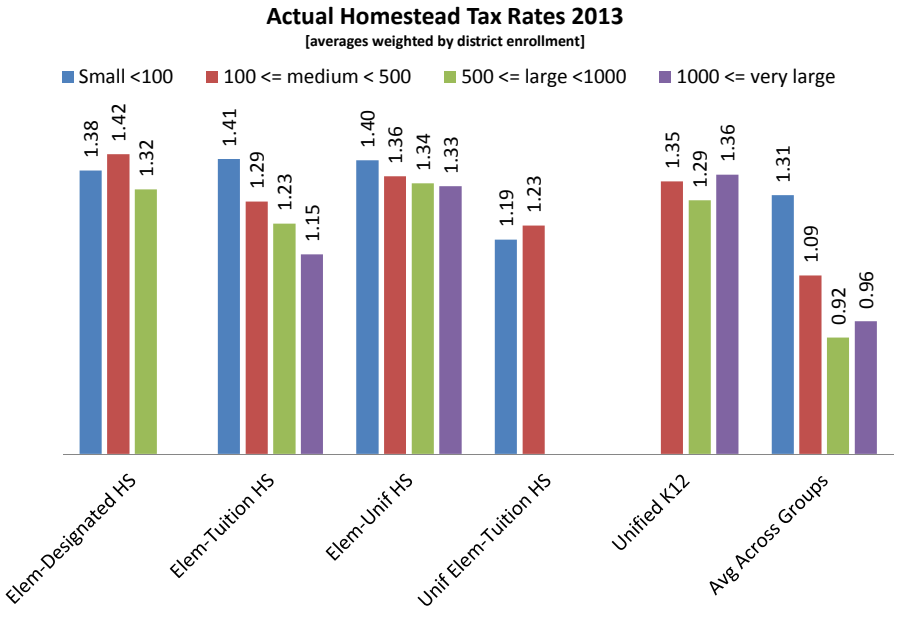
[16] Baker, B. D. (2005). The emerging shape of educational adequacy: From theoretical assumptions to empirical evidence. *Journal of Education Finance*, 259-287.

Figure 6



Data source: http://education.vermont.gov/data/per-pupil-spending

Figure 7



Data Source: http://education.vermont.gov/documents/EDU-Data_School_Comparison_Data_for_Cost_Effectiveness_FY2014.xls

The smaller than usual spending differentials for very small districts may in part be a function of lacking local fiscal capacity to support sufficient breadth and depth of programs and services in those schools. Figure 7 summarizes the actual homestead tax rates in these districts, revealing that the higher spending is coming with a higher homestead tax. Among elementary districts that tuition their secondary students, the rate is much higher for small than for very large (small in many other states) districts. The case is similar for elementary districts sending to a unified high school.

Very small Vermont school districts face both elevated costs & elevated homestead tax rates.

School Level Staffing Expenditure and Enrollments

As noted previously, the major driver of elevated annual operating costs in small school districts is not administrative overhead or maintenance of capital stock, but rather the staffing ratios that must be maintained in order to provide a basic set of educational programs. Small districts with small schools require very low pupil to staff ratios and thus have much higher staffing costs per pupil. Larger districts with small schools have only marginally lower per pupil costs.

However, when within district school size causes inefficiency, local boards of education have authority, albeit constrained by local politics, to reorganize attendance zones to more efficiently distribute students – optimizing school enrollments. In Vermont, many very small schools are themselves, stand-alone very small districts, placing the burden of reorganization on state policymakers, with more limited tools and more complicated political calculus. But the organizational efficiency task remains similar.

Figure 8 shows the relationship between school level total staffing salary expense per pupil and school enrollments for Vermont schools serving elementary grades. Figure 9 shows the same for schools serving secondary grades. Vertical red lines identify optimal size ranges based on findings of studies mentioned at the outset of this brief. Clearly, there are many lower grades schools below the optimal size range, and among them, a handful of relatively high staffing expense schools.

Figure 8

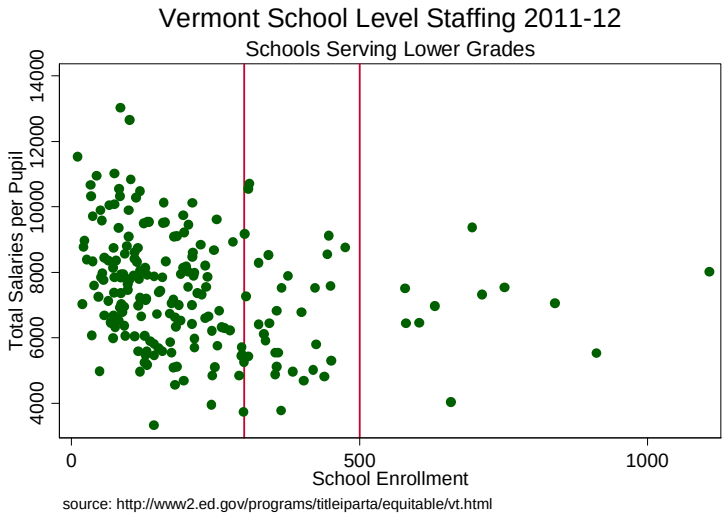
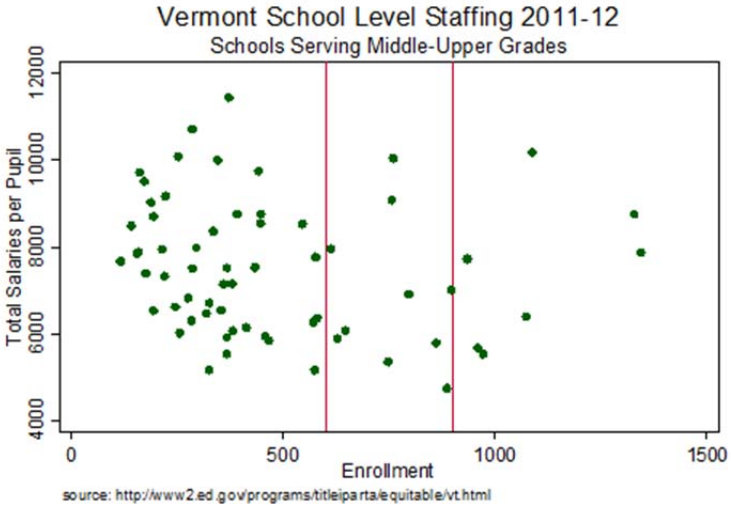


Figure 9 shows per pupil staffing expenses of schools serving secondary grades. Similarly, many of these schools fall well below the "optimal" ranges discussed previously and some of those operate at relatively high staffing cost per pupil.

Figure 9

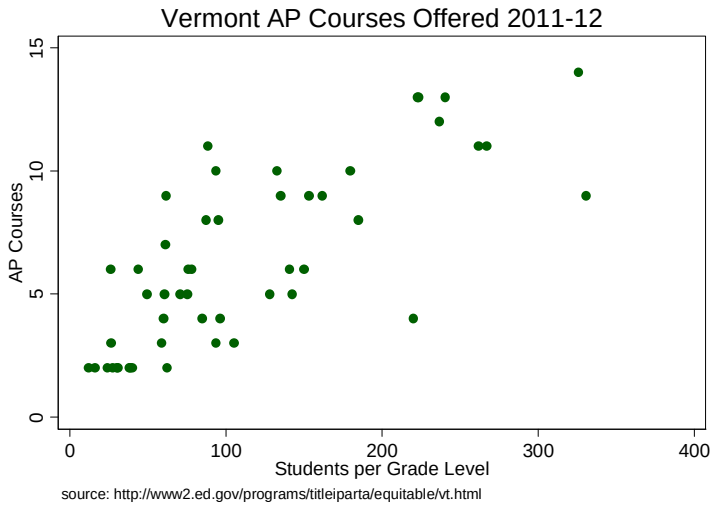


Curricular Options in Small High Schools

The recently released (December 2014) U.S. Department of Education Office of Civil Rights data collection includes numerous measures of course offerings, athletic offerings and participation rates for schools across the country, including those in Vermont. Here I present only one snapshot of data on advanced course offerings with respect to high school size. Figure 10 presents the numbers of Advanced Placement courses offered in Vermont high schools with respect to the average enrollment per grade level. Numbers of AP offerings increase almost linearly with average enrollments per grade level, but for two lower outliers among larger schools. Only Vermont's largest high schools are large enough that participation rates might decrease appreciably despite large numbers of offerings. In very small high schools, where few or no AP courses even exist, there can be no participation, or participation may be limited to a single course option. Data appear similar for athletics opportunities, with no significant declining participation rates in the largest high schools.

More exploration of these data is needed.

Figure 10



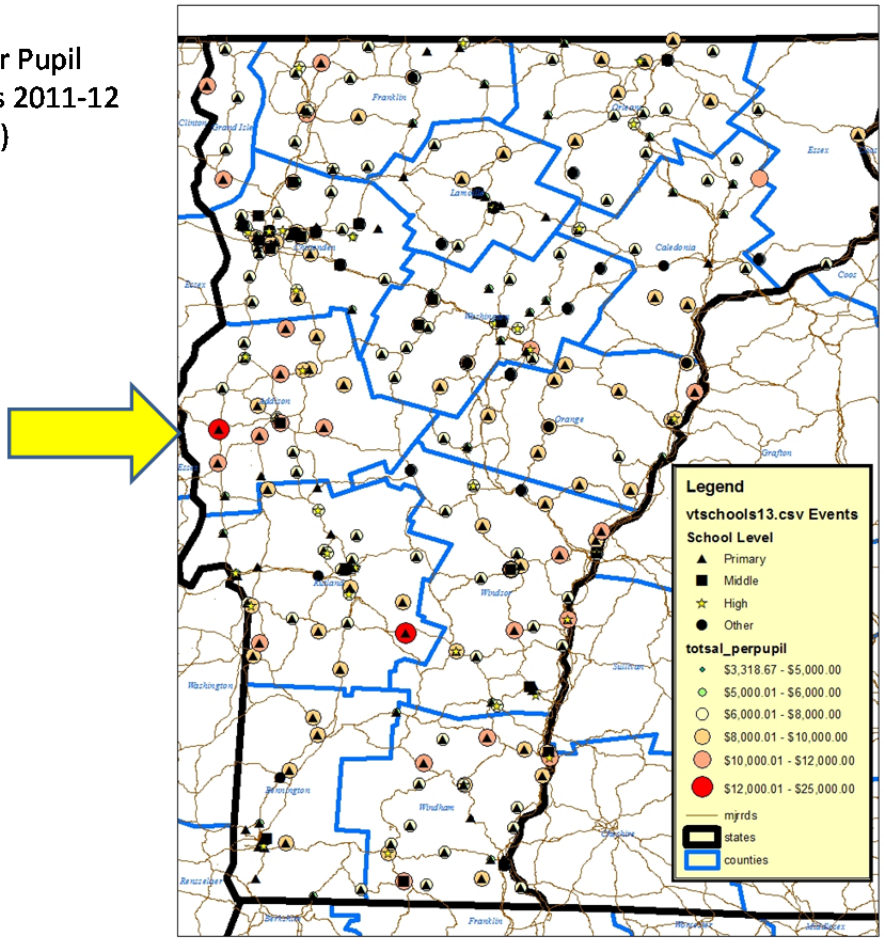
Consolidations for Consideration

As noted at the outset of this brief, consolidation becomes most relevant where schools are very small and might be feasibly combined. Consolidation savings are produced by the merging of individual schools, more so than by shared administrative overhead services. Certainly, for some Vermont school districts geography poses constraints on student bus travel, especially in the winter months. I focus in this section on two specific areas of the state where these constraints are less significant. Figure 11 presents a statewide view of data on staffing costs per pupil, with markers indicating grade levels of schools. Major roads are also indicated.

The yellow arrow in Figure 11 points toward the very small and relatively high expense elementary districts of Addison County. These districts tend to be less than 10 miles from one another, center to center, are placed along relatively major state highways with no significant geographic barriers between them. The sizes and red coloring of the circles in this zone indicates that these are some of the highest per pupil staffing cost schools in the state, despite the apparent feasibility of consolidating them. Immediately to the south is another zone worth exploring, but for different reasons. Western Rutland County is home to numerous very tiny high schools, again, often less than 10 miles from center to center.

Figure 11

Statewide per Pupil Staffing Costs 2011-12 (School Level)



Elementary/Middle Schools of Western Addison County

Small schools in Addison County remain significantly dependent on the state's small schools subsidy.[17] But continuing to subsidize schools of such inefficiently small size which are geographically feasible to consolidate does not make sense. Figure 12 shows the per pupil staffing expenses of the small schools in the county. Indeed, there are some very small schools that appear to be operating a t relatively low expense, including Orwell and Whiting Village, but these schools are unlikely to be able to offer rich programs at such small scale and low spending. Other small schools spend far more per pupil including Bridport, Ripton and Shoreham, among which, only Ripton sits east of Route 7.

Figure 12

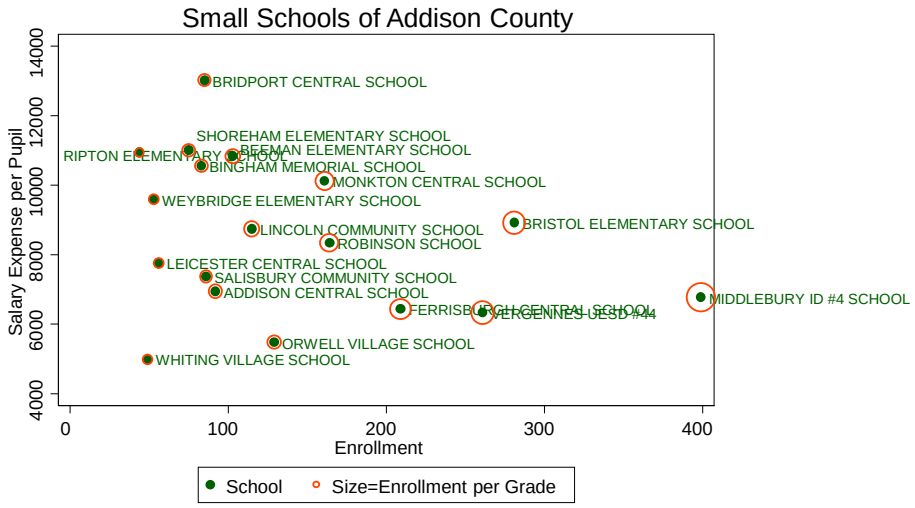


Figure 13 maps school sizes by location in Addison County and Figure 14 maps per pupil staffing costs by location. These figures make clear that some consideration should be given to potential reorganization and consolidation of districts along and around Route 22. Indeed, new construction may be a necessary short run cost, but combining these schools/districts each enrolling fewer than 100 pupils would improve long run operational efficiency substantially and increase programming options for all in the new attendance zone.

[17] http://addisonindependent.com/node/28184

Figure 13

Addison County School Enrollment Sizes 2011-12

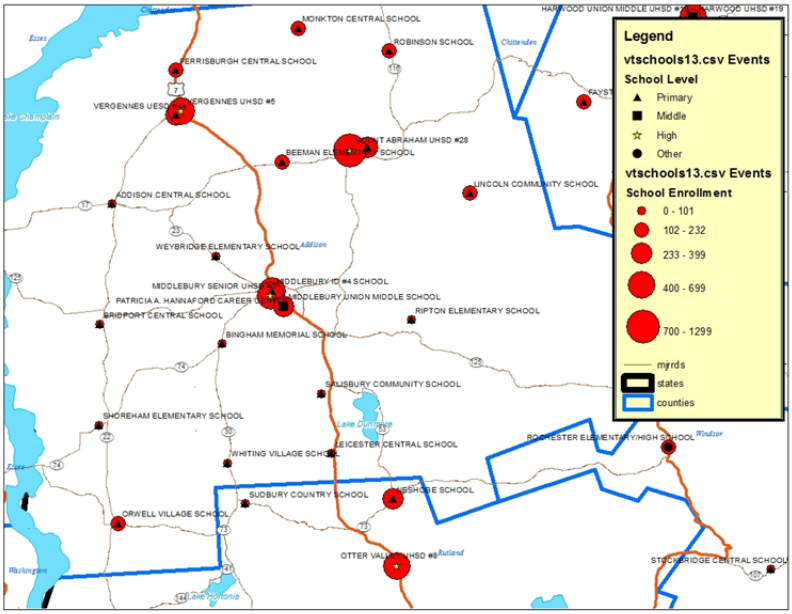
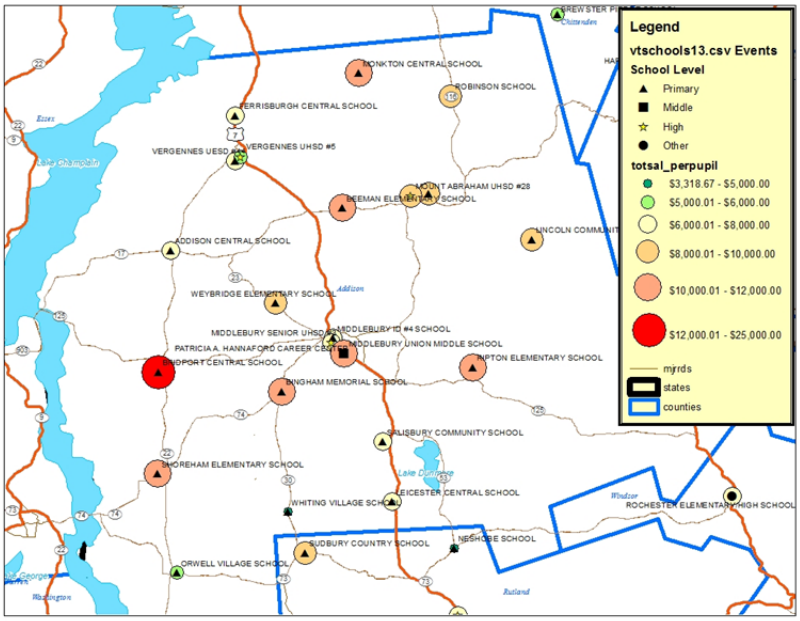


Figure 14

Addison County School Staffing Costs per Pupil 2011-12



High Schools of Western Rutland County

Immediately to the south of the zone discussed above lies a cluster of small high schools. The geography is similar, relatively flat and passable all seasons by Vermont standards, including a major east-west highway, unlike most other parts of the state. Figure 15 shows per pupil staffing expenses and enrollment sizes for the schools of interest. Proctor and Poultney high schools lie at opposite ends of this zone, but are relatively close to other small districts.

As one option, these districts might all be feasibly consolidated into a single Western Rutland County High School district. Alternatively, they might be clustered into a few schools, with one more efficient school near West Rutland and another near Fair Haven/Castleton. The first option, consolidating all schools would require more up front expense, constructing a new high school along Route 4 between Castleton and West Rutland. But this option might present the greatest long run cost savings coupled with expansion of educational options.

Figure 15

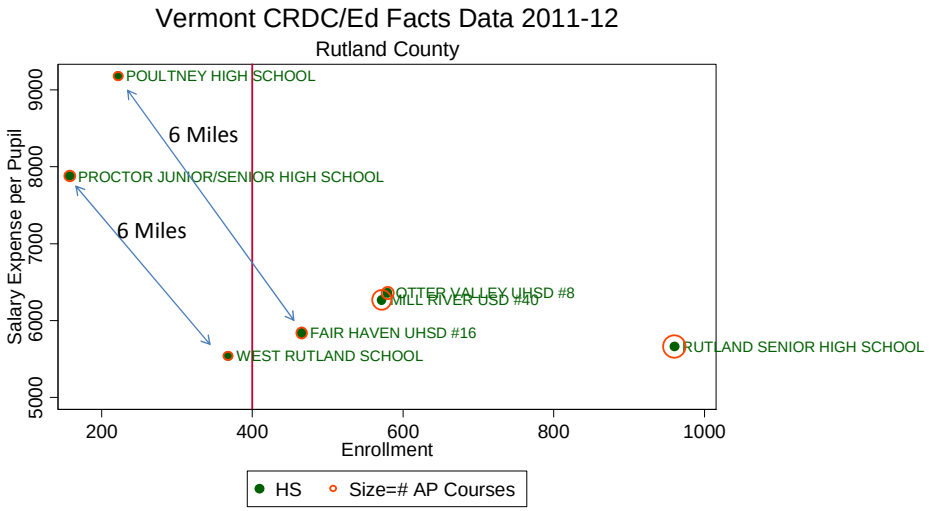


Figure 16 and Figure 17 show the locations of the schools, their enrollment sizes and their current staffing expenses per pupil. In this case, only two of the schools, Proctor and Poultney operate at much higher staffing expense per pupil than the others. The potentially bigger issue among these schools is the depth and breadth of curriculum they are able to offer.

Figure 16

Rutland County School Enrollment Sizes 2011-12

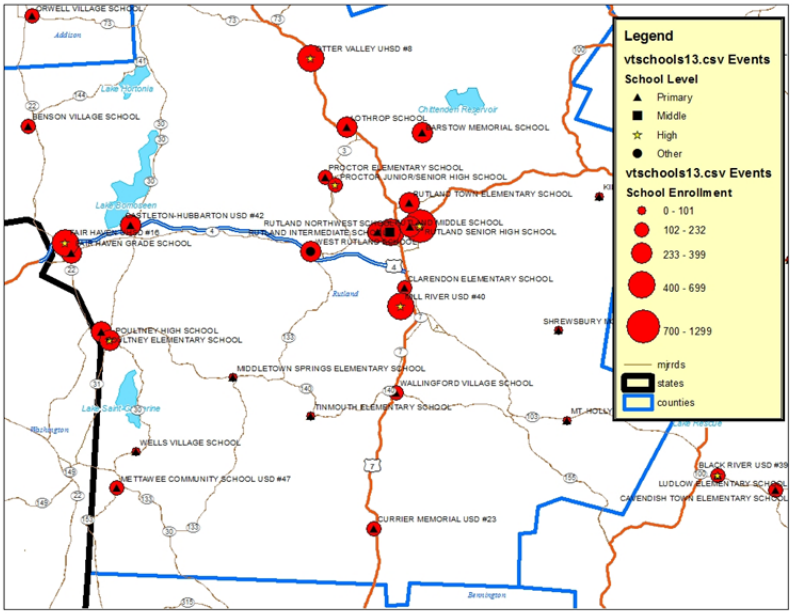
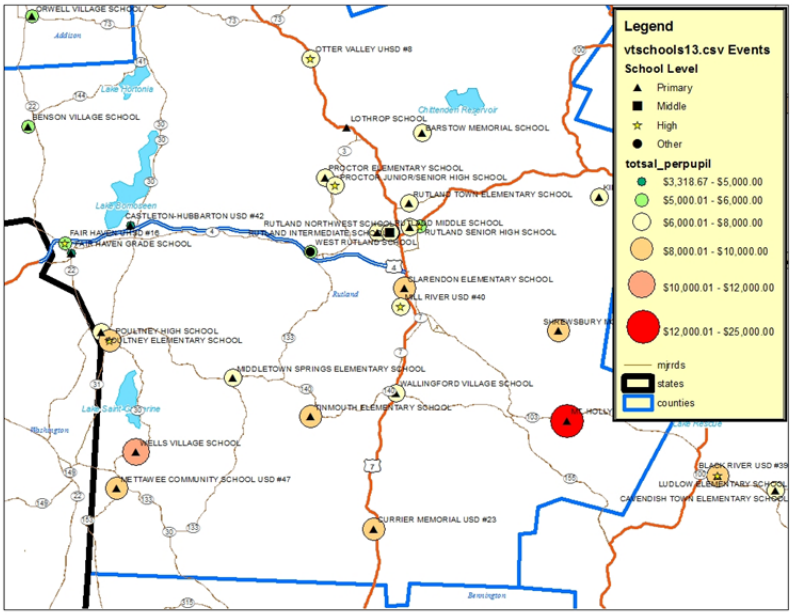


Figure 17

Rutland County School Staffing Costs per Pupil 2011-12



Conclusions & Policy Recommendations

This policy brief presents a preliminary and cursory overview and analysis of school size and consolidation issues for consideration in Vermont. Clearly, much more detailed quantitative and qualitative analyses should follow. Among other things, the state should conduct a thorough audit of the staffing, programs and course offerings available to students across small elementary and secondary schools. The state should explore other possible zones, beyond those mentioned herein, for potential consolidation, and the state should more thoroughly evaluate demographic trends so as to make appropriate capital investments for the future.

In contrast with recommendations of the Penn State report, consolidation options should not be taken off the table in Vermont, and the state should scrutinize small school subsidies and spending cap exemptions which reduce incentives to more efficiently organize schools. The best empirical literature does suggest that consolidation of very small schools as exist in Vermont can lead to long run cost savings, improve equity in access to rich curricular and co-curricular opportunities. Further, district reorganization in the cases mentioned herein may lead to greater property tax equity.

To summarize:

4. Vermont's very small school districts suffer from a combination of:
    a. higher spending than necessary;
    b. higher taxes than necessary;
    c. and less comprehensive academic programs than could be provided at scale.
5. Exorbitant costs are most evident in tiny elementary schools and districts
6. Program breadth and depth may be significantly compromised in the state's very small high schools

Across states, Vermont has among the smallest shares of children attending unified K-12 school districts with enrollments of at least 2,000 pupils. But Vermont, with total enrollment similar to that of Wyoming, is geographically much smaller than other states that have similar shares of children attending scale efficient unified school districts. Further, Vermont remains consistently among the highest spending states in the nation when it comes to elementary and secondary education, and spends a greater share of its economic capacity on schools than any other state.

Connecting the literature on consolidation, costs and school size to Vermont requires defining small. Many schools and districts in Vermont are not merely small, but tiny and possibly unsustainably so. Vermont as a state puts up the highest funding effort of any in the country. It makes little sense for the state to continue subsidizing inefficiently small schools, especially those geographically feasible to consolidate. But, if the state wishes to phase out this subsidy, the state should consider how to assist these districts in financing a capital plan for their merger. Further, given that many of these small districts also face higher local property taxes, it makes little sense to continue to place that burden on local taxpayers by using exemptions to spending limits to sustain inefficiently small schools. Maintaining these schools requires inefficient state expenditure, inequitable local taxation and leads to inequitable programs and services across children attending schools a mere few miles down the road.

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