

Appendix F

Importance of Enrollment

Enrollment in Wyoming public schools drives the costs of instruction, support, operations and new construction. Analysis of Wyoming public school enrollment data reveals some interesting observations.

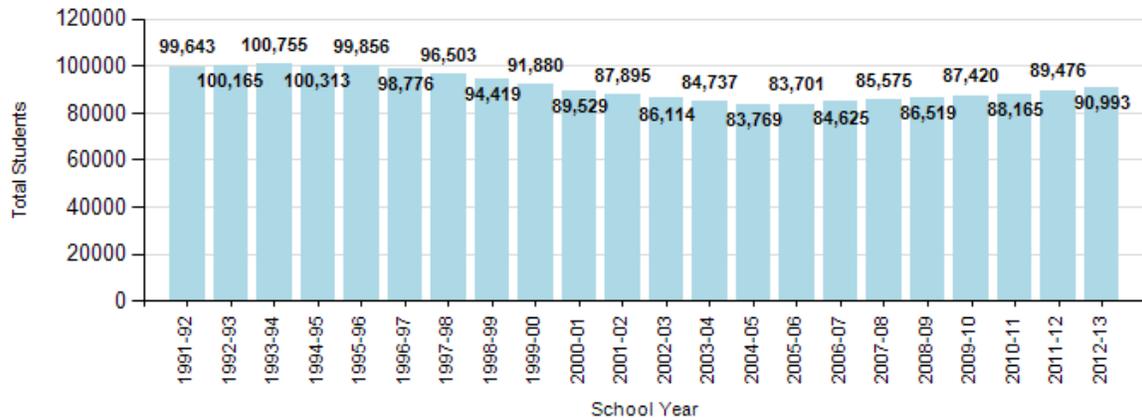


Figure I: Wyoming public school enrollment since 1992. *Source: WDE Stat Series 2*

The above data shows that Wyoming experienced a contraction in the number of students from the mid 1990's to the mid 2000's followed by a growth in students over the last half decade. Some sources of forecasting enrollments expect that enrollment will continue to climb. It is worthwhile to note that the data for this analysis is from the WDE Stat Series 2 and that it is snapshot data representing the enrollments on October 1 of each year. It is essential to look deeper into the data to understand what will affect enrollment in the near and far future for Wyoming.

| District Name | Date | Enrollment | | | | | | | | | | | | Total | |
|------------------|-----------|------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| | | KG | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | | 12 |
| State of Wyoming | 10/1/2003 | 6,224 | 6,039 | 5,977 | 5,836 | 6,165 | 6,424 | 6,689 | 6,960 | 7,100 | 7,217 | 7,051 | 6,604 | 6,451 | 84,737 |
| | 10/1/2004 | 6,263 | 6,206 | 5,981 | 6,040 | 5,851 | 6,218 | 6,489 | 6,787 | 6,905 | 7,219 | 7,063 | 6,475 | 6,272 | 83,769 |
| | 10/1/2005 | 6,381 | 6,255 | 6,184 | 6,053 | 6,104 | 5,955 | 6,329 | 6,634 | 6,799 | 7,443 | 7,078 | 6,444 | 6,042 | 83,701 |
| | 10/1/2006 | 6,576 | 6,422 | 6,346 | 6,373 | 6,188 | 6,271 | 6,132 | 6,535 | 6,676 | 7,168 | 7,396 | 6,395 | 6,147 | 84,625 |
| | 10/1/2007 | 6,891 | 6,565 | 6,512 | 6,485 | 6,488 | 6,394 | 6,415 | 6,321 | 6,665 | 7,069 | 7,160 | 6,398 | 6,212 | 85,575 |
| | 10/1/2008 | 7,215 | 6,770 | 6,678 | 6,659 | 6,604 | 6,694 | 6,547 | 6,522 | 6,433 | 6,978 | 6,993 | 6,333 | 6,093 | 86,519 |
| | 10/1/2009 | 7,422 | 7,068 | 6,774 | 6,691 | 6,685 | 6,696 | 6,761 | 6,591 | 6,586 | 6,724 | 6,979 | 6,302 | 6,141 | 87,420 |
| | 10/1/2010 | 7,611 | 7,124 | 7,061 | 6,799 | 6,689 | 6,708 | 6,759 | 6,766 | 6,632 | 6,777 | 6,645 | 6,386 | 6,208 | 88,165 |
| | 10/3/2011 | 7,873 | 7,441 | 7,104 | 7,115 | 6,787 | 6,746 | 6,825 | 6,831 | 6,784 | 6,934 | 6,633 | 6,231 | 6,172 | 89,476 |
| | 10/1/2012 | 8,131 | 7,628 | 7,394 | 7,116 | 7,127 | 6,790 | 6,811 | 6,879 | 6,874 | 7,122 | 6,738 | 6,337 | 6,046 | 90,993 |

Figure II: Ten Year data, Wyoming public school enrollment by grade. *Source: WDE Stat Series 2*

The above chart shows the enrollments by grade in the state of Wyoming. It is read in two different ways. By reading the chart in each column, the reader can discern the changes in enrollment for each grade. By reading diagonally from top left to bottom right one can discern the changes in each cohort of Wyoming students by grade. For example, the kindergarten

cohort in 2003, becomes the first grade in 2004 and it has attrition of 18 students. Attrition? Yes, attrition happens as students move from kindergarten to first grade in nearly every year in the above chart. Another example in the change in the size of Wyoming cohorts happens between 8th and 9th grade. The 2003 8th grade enrollment grows 119 students to the 2004 9th grade. Growth occurs for every cohort over this ten year period as each moves from 8th to 9th grade. Yes, in the last decade there is significant and consistent growth in enrollment as students move from 8th grade to 9th grade in every year. This is followed by a trend of attrition in 10th, 11th and 12th grades. The below chart shows the change in students by cohort and by grade.

| Date | KG | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | Total |
|-----------|----|-------|------|-----|------|-----|-----|-----|------|-----|-------|-------|-------|-------|
| 10/1/2003 | | | | | | | | | | | | | | |
| 10/1/2004 | | (18) | (58) | 63 | 15 | 53 | 65 | 98 | (55) | 119 | (154) | (576) | (332) | (968) |
| 10/1/2005 | | (8) | (22) | 72 | 64 | 104 | 111 | 145 | 12 | 538 | (141) | (619) | (433) | (68) |
| 10/1/2006 | | 41 | 91 | 189 | 135 | 167 | 177 | 206 | 42 | 369 | (47) | (683) | (297) | 924 |
| 10/1/2007 | | (11) | 90 | 139 | 115 | 206 | 144 | 189 | 130 | 393 | (8) | (998) | (183) | 950 |
| 10/1/2008 | | (121) | 113 | 147 | 119 | 206 | 153 | 107 | 112 | 313 | (76) | (827) | (305) | 944 |
| 10/1/2009 | | (147) | 4 | 13 | 26 | 92 | 67 | 44 | 64 | 291 | 1 | (691) | (192) | 901 |
| 10/1/2010 | | (298) | (7) | 25 | (2) | 23 | 63 | 5 | 41 | 191 | (79) | (593) | (94) | 745 |
| 10/3/2011 | | (170) | (20) | 54 | (12) | 57 | 117 | 72 | 18 | 302 | (144) | (414) | (214) | 1,311 |
| 10/1/2012 | | (245) | (47) | 12 | 12 | 3 | 65 | 54 | 43 | 338 | (196) | (296) | (185) | 1,517 |

Figure III: Cohort changes in size as a function of grade. *Source: Calculated by OSPI from WDE stat Series 2*

This chart exemplifies that there is attrition in grades 1, 10, 11 and 12 (negative values in orange and red fill). Grade 9 has growth and the state overall total has growth for the most part in the past decade. Each year's change is best explained by understanding that students both enter and leave the cohort. Students can be held back or can be advanced out of a cohort. Students can drop out or drop into a cohort through mobility into and out of the state and this is most easily explained by the relative jobs availability in Wyoming compared to the nation. And, cohort size is affected by movement of students into and out of public schools from private schools, parochial schools and home school students. The total change in enrollment for Wyoming public schools shows growth despite the attrition in the grades noted above, because there are simply more kindergarten students entering public school than graduates leaving public school.

Another stark observation that occurs in the above chart is the change in values in cells below the October 1, 2008 row of data. Attrition in first grade takes a step change upward. Changes in grades two through eight are dramatically reduced. This is probably due to economic changes throughout the nation and in Wyoming. This requires some more research, but it appears that with a drop in the number of jobs, children are more frequently being home schooled starting in first grade and not returning until ninth grade.

| Date | KG | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | Total |
|-----------|----|-------|-------|------|-------|------|------|------|-------|------|-------|--------|-------|--------|
| 10/1/2003 | | | | | | | | | | | | | | |
| 10/1/2004 | | -0.3% | -1.0% | 1.1% | 0.3% | 0.9% | 1.0% | 1.5% | -0.8% | 1.7% | -2.1% | -8.2% | -5.0% | -1.14% |
| 10/1/2005 | | -0.1% | -0.4% | 1.2% | 1.1% | 1.8% | 1.8% | 2.2% | 0.2% | 7.8% | -2.0% | -8.8% | -6.7% | -0.08% |
| 10/1/2006 | | 0.6% | 1.5% | 3.1% | 2.2% | 2.7% | 3.0% | 3.3% | 0.6% | 5.4% | -0.6% | -9.6% | -4.6% | 1.10% |
| 10/1/2007 | | -0.2% | 1.4% | 2.2% | 1.8% | 3.3% | 2.3% | 3.1% | 2.0% | 5.9% | -0.1% | -13.5% | -2.9% | 1.12% |
| 10/1/2008 | | -1.8% | 1.7% | 2.3% | 1.8% | 3.2% | 2.4% | 1.7% | 1.8% | 4.7% | -1.1% | -11.6% | -4.8% | 1.10% |
| 10/1/2009 | | -2.0% | 0.1% | 0.2% | 0.4% | 1.4% | 1.0% | 0.7% | 1.0% | 4.5% | 0.0% | -9.9% | -3.0% | 1.04% |
| 10/1/2010 | | -4.0% | -0.1% | 0.4% | 0.0% | 0.3% | 0.9% | 0.1% | 0.6% | 2.9% | -1.2% | -8.5% | -1.5% | 0.85% |
| 10/3/2011 | | -2.2% | -0.3% | 0.8% | -0.2% | 0.9% | 1.7% | 1.1% | 0.3% | 4.6% | -2.1% | -6.2% | -3.4% | 1.49% |
| 10/1/2012 | | -3.1% | -0.6% | 0.2% | 0.2% | 0.0% | 1.0% | 0.8% | 0.6% | 5.0% | -2.8% | -4.5% | -3.0% | 1.70% |

Figure IV: Percentage change in cohort size, base is previous year. *Source: Calculated by OSPI From WDE stat Series 2*

The above chart indicates the change in cohort enrollments as a percentage of the size of the cohort (over previous year). Again, the areas that are red and orange in grades 1,10,11 and 12 show attrition and grade 9 shows growth. Attrition and growth in these cohorts are predictable and present some opportunities to make instructional changes to affect student learning as well as policy changes that can lower costs within the state’s educational system.

Instructional and policy implications:

The first question that is immediately apparent is why does 9th grade show an increased growth in every cohort for the last decade? There is more research to perform in this area, but the preliminary inquiries show that parochial, private and home schooled students are entering the public education system about 9th grade. Imagine this transition to public school and the difficulties encountered by these students. This transition should be further researched to know how these children perform on state and district measures as well as their propensity to stay in school until graduation. When those questions are answered, then districts can implement solutions that can impact the populations that are likely to drop out or provide instructional interventions that improve performance of students at risk. Graduation rates are the measure most affected by the jump in 9th grade cohort size. Graduation rates are based on cohorts starting in ninth grade. The average 4.7% increase in enrollment for the last decade builds up the base of the graduation rate calculation. It may be that interventions or actions taken by the district through partnerships with parents, private and parochial schools would make transition into ninth grade more palatable to students and increase success in high school. OSPI will work with districts to explore the reasons behind growth in ninth grade enrollments as well as to follow the data on those students entering public schools to address the issues presented above.

Policy issues surrounding the analysis of statewide enrollment are primarily in the area of forecasting and planning for instruction and construction costs. School Facilities Department currently uses linear regression to forecast enrollments for capacity decisions in schools and

districts. This is a flawed method because the data violates the assumptions of linear regression. The assumption in using that method is that data points are independent, but this is clearly not true in studying grade by grade enrollments. The number of 5th grade students in any district or state next year is heavily dependent on the number of 4th grade students this year, period. There are exceptions due to mobility into and out of a region, but for the most part, children already in the system represent the biggest part of children in the system in coming years.

The largest factors in forecasting a district or the state's enrollment in public schools is mobility and kindergarten enrollment.

Mobility is predicted by predicting economic conditions within the state or within a district. Families are likely to be mobile based on the prospects of employment. Kindergarten enrollment is best predicted by understanding the communities pre-K population as related to factors such as birth rates and mobility of young families into and out of a district or the state.

Different communities will have different conditions that give them indicators as to the population of kindergarten students. An example of forecasting used in Laramie County School District #1 is provided. The district used a 5 year average of births multiplied by 86% to predict numbers of incoming kindergarten children. As can be seen in the chart, there has been a growth in enrollment in LCSD1 forecasts based on birth rates until 2013. After 2013, the birth rates drop. This is most likely due to the effects of the 2008 recession and the drop in birthrates nationwide. Enrollments in kindergarten will continue to fall in the coming years as seen by the graph. However, district enrollment is likely to continue to increase as the current students progress towards graduation. LCSD1 cohorts in 10th, 11th and 12th grades are much smaller than the cohorts 2nd, 3rd and 4th grades. This type of chart often is described as a snake eating rabbit. The process moves from the head to tail and you can see the bubble of growth early in the decade moving through the system.

This brings up interesting effects on the costs of public education. The current kindergarten through 5th grade students in LCSD1 are a bubble passing through the system. They are currently presenting problems for the district in meeting the class size ratios legislated by law in grades k-3. This problem will naturally move to higher grades in years to come. Additionally, the cost of instruction for primary children is lower than for children in secondary. The impact to the state for the current enrollment profile in LCSD1 is more construction costs now as the district tries to reconfigure for these changes in enrollment. And, more costs for instruction in the next three years and beyond as these children reach secondary school age. Will the district need to expand school facilities in the districts secondary schools? Perhaps the district will require more capacity in secondary schools. Should planning and design for the recently approved configuration changes be based on the current bubble passing through the system?

**Birth Chart for Laramie County - 1995 through 2011
(2012/2013 School Year)**

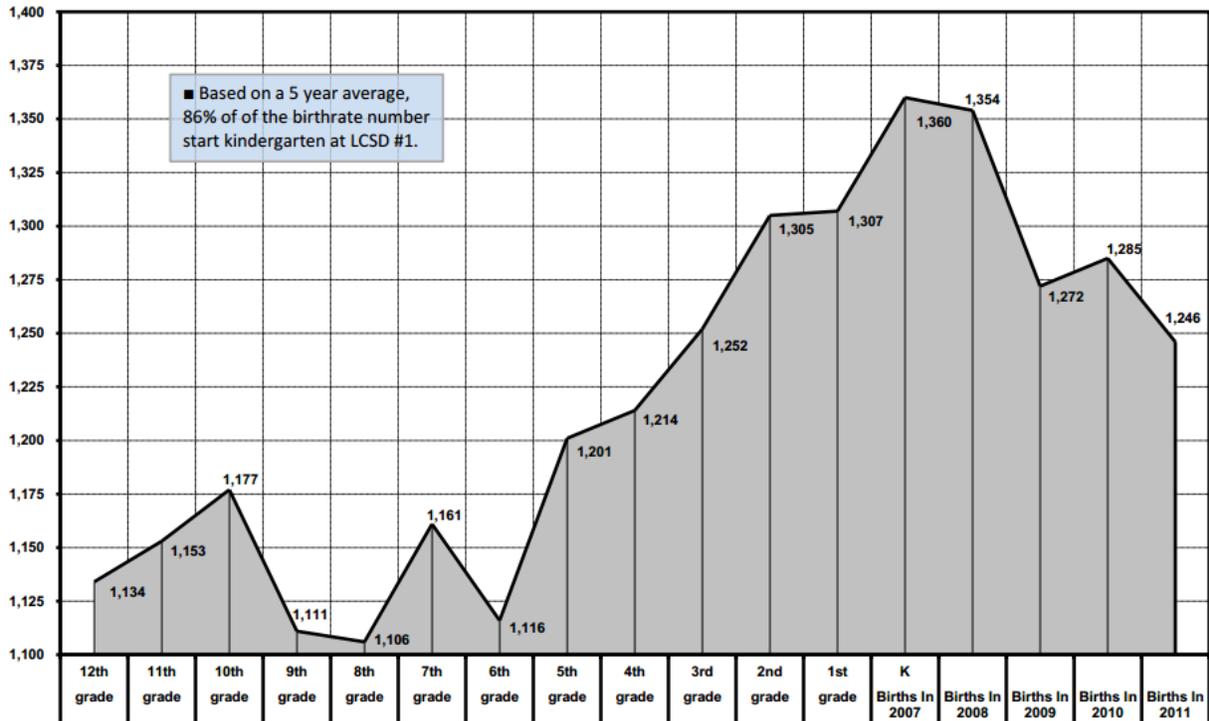


Figure V: Laramie County School District #1 forecasts of entering cohort sizes based on birth rates. Source: LCSD1

The right side of the chart above presents some concerns. Birth rates since 2008 have declined dramatically. Yet, these changes will unlikely be captured in regression forecasting models used by School Facilities Department or the WDE. OSPI recommends that alternative methods of forecasting the size of incoming kindergarten students be developed with the Department of Economic Analysis and data from Vital Records so that proper planning of school foundation monies on instruction and construction can be done.