

# A Forecast of Enrollment in Muncie Community Schools: 2006-2030

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## Key Points

- From the 2005-2006 school year, MCS enrollment has declined from 7,567 to 5,883 students, reflecting population declines for the city since the 1960's.<sup>1</sup>
- The largest declines occurred in the 2014-15 school year, presumably due to the consolidation of Southside and Muncie Central High Schools. This appears to be a transient consequence.
- Changes to state laws regarding charter, voucher and cross-border enrollment did not play a statistically meaningful role in MCS enrollment changes.
- Combining three major forecasting methods (cohort, structural and stochastic models) we project continued declines in enrollment through 2030.
- The rate of decline appears to be slowing dramatically, with total losses from the 2016-17 to the 2029-30 school year numbering 473 students. These estimates mirror population projections for Muncie performed by this Center and Indiana University.
- Though formal estimates beyond 2030 are not part of this analysis, our projections are for positive population growth beyond 2030 for the Muncie region.

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<sup>1</sup> Note, for convenience, we sometimes abbreviate the year, referring to the spring semester (so, when referring to 2006 that really means the 2005-6 academic year). Also, we use the Indiana Department of Education data, which varies from each ADM count for all schools, since these annual data include administrative changes, and averages of two counts for several years. The differences between schools reported data and IDOE are not sufficiently large to change this forecast.

## **1. Introduction**

This analysis outlines the recent history and forecast of Muncie Community Schools through 2030. We use data from the U.S. Census, the Indiana Department of Education as well as forecast analysis of the region provide by the Center for Business and Economic Research. The purpose of this work is to aid in facilities, operation and staffing planning through the coming decade.

## **2. Enrollment History and Forecast**

Since 2006, the first year IDOE data are available, the number of students in the Muncie Community Schools has been steadily declining. The current enrollment is 5,883, which is down 1,684 students from the 2006 level of 7,567. This is a loss of more than one in five students over a decade. Over the same time period, enrollment nationally in public schools rose by 1.5 percent, while in Indiana, enrollment in public schools grew by 0.97 percent. Overall, school enrollment in Delaware County grew by roughly 1.5 percent over this time period. The simple fact is that few school corporations in the United States will have experienced this level of declining enrollment over this period.

Annual population change ranged from a low of 0.7 percent decline to a high of 6.2 percent decline, averaging 2.4 percent loss each year. This trend was especially sharp in 2014 and 2015, which we attribute heavily to the merger of Muncie Southside and Muncie Central High Schools.

In order to better analyze the history and project enrollment in schools, we crafted an empirical model for enrollment change. This model accounted for enrollment in each grade based upon enrollment in earlier grades (a cohort element), variables in time for school consolidation and the voucher/private school and funding changes imposed by the legislature, the one to three year lagged error variable and a variance measure. The number of cohort years and the lag length on the error term were determined for each year based on available data and through an algorithm that minimized estimated errors in the data.<sup>2</sup>

The results of this model suggest a strong cohort effect, which is unsurprising, and a consistent decline in enrollment as described above. Despite the much anecdotal evidence to the contrary, there is no empirical evidence that changes in Charter School authorization, private school vouchers or cross-border enrollment changes had any effect on enrollment in Muncie Community Schools. Indeed, in the years after this implementation, decline in enrollments slowed, with the exception of the consolidation

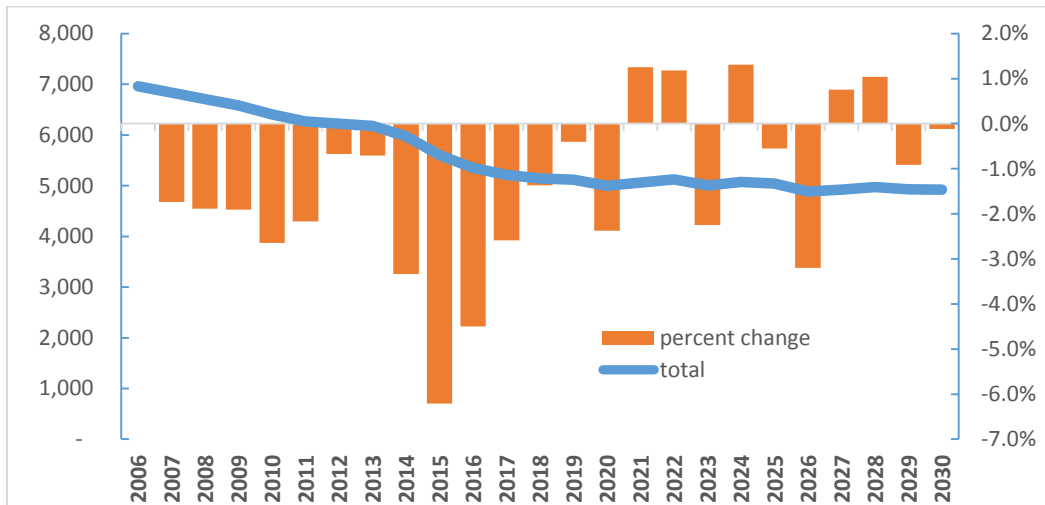
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<sup>2</sup> Formally, this is an autoregressive integrated moving average model with time varying error term, a consolidation dummy and regulatory presence variable, with the ARIMA(p,d,q) lag lengths determined by the minimization of the Akaike Information Criterion. Optimization of the log-likelihood function was made using the Berndt, Hall, Hall and Hausman hill climbing algorithm.

impact. These variables were uniformly beneath any acceptable level of statistical significance.

Our forecast model projects that over the next fifteen years, enrollment will continue to decline, but the rate of decline will slow dramatically. Over this time, the annual decline will drop to beneath one percent on average. We project MCS to see enrollment in 2030 of roughly 5,410 students a decline of 473 from the current (2015-2016) number.

**Figure 1, History and Forecast of MCS enrollment (2006-2030)**



This forecast is consistent with the predicted decrease in population. According to a December 2015 forecast by this center, the east central region of Indiana, including Muncie, is predicted to continue experiencing population decline through 2030. Census data also reports that school age population is predicted to decrease, but at a slower rate than the past 10 years.

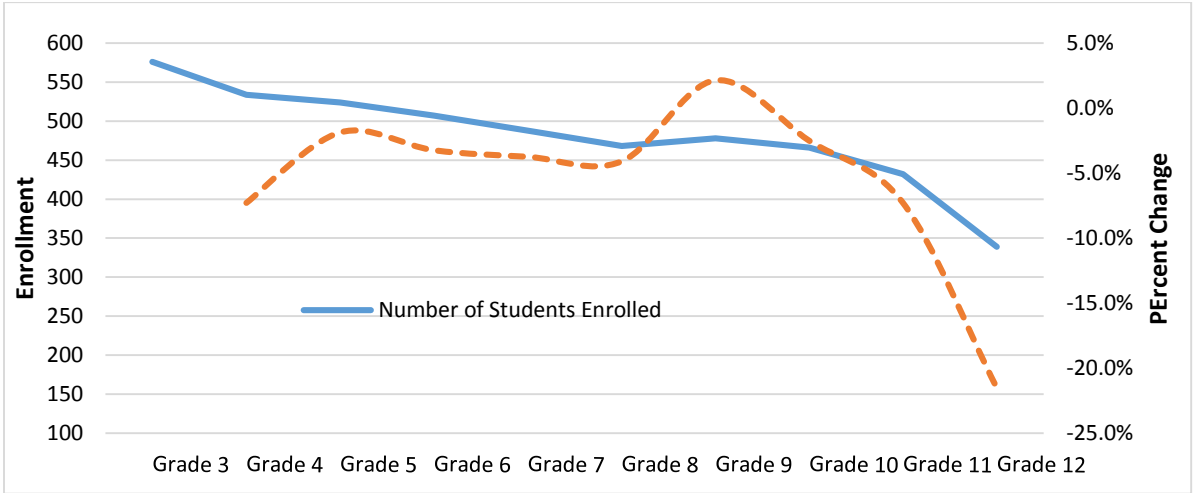
Within Delaware County, the Yorktown and Delta School Corporations are the only two regions with growing population, so all of the regional student growth in Delaware County noted above will occur there over the next decade and a half.

### 3. Cohort Analysis

An examination of individual cohort permits us to examine which grades and years the change students going to Muncie Community Schools is significant. The cohort of students graduating in the 2014-2015 school year, declined at a fairly consistent rate from grade 3 to grade 8. At grade 9 there was an increase of students, most likely due to children from private grammar schools switching to public high school. The decline in the number of students attending from grade 11 to grade 12 was significant because

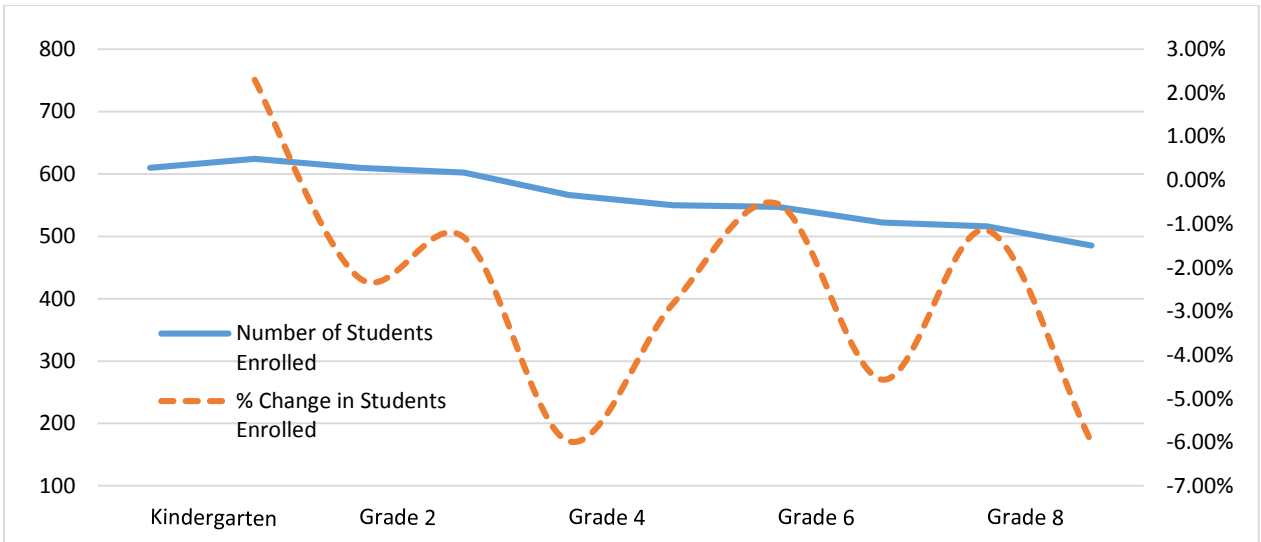
students apparently opted to leave school or change schools at the time of the high school merger.

**Figure 2, Class of 2015 Cohort Analysis**



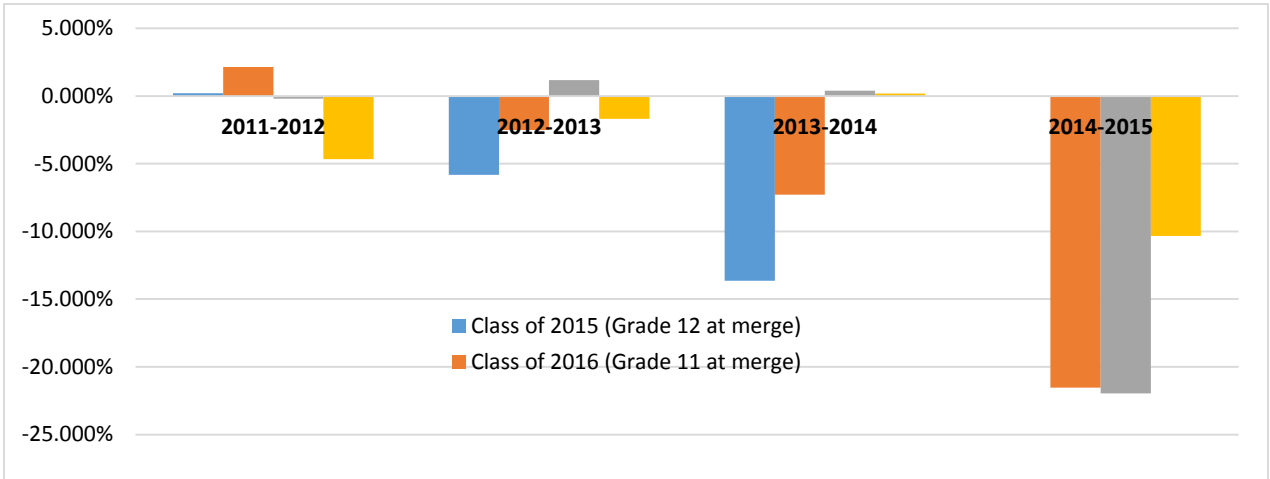
A similar trend can be seen in the cohort graduating in the 2018-2019 school year. The only increase in students for this cohort occurred between kindergarten and first grade, when parents decided to start their children in school. The largest decrease was from grade 8 to grade 9, the 2014 to the 2015 school year.

**Figure 3, Class of 2019 Cohort Analysis**



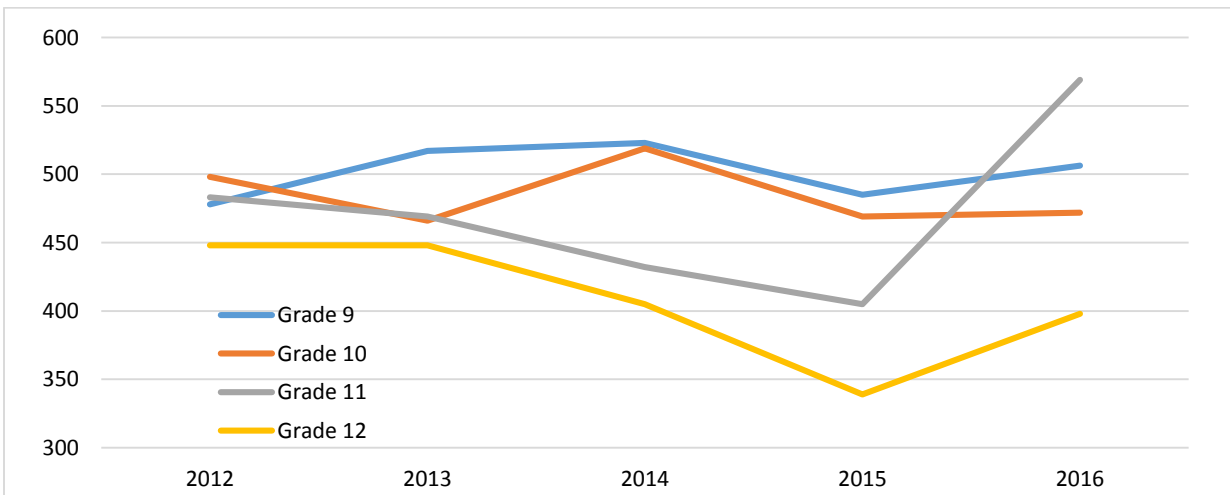
In the school year beginning in 2014, the two Muncie high schools merged to form Muncie Central High School. This caused a large decrease in high school students of all grade levels for both the 2014 and 2015 school years.

**Figure 4, Percent Change in High School Enrollment from Previous Year**



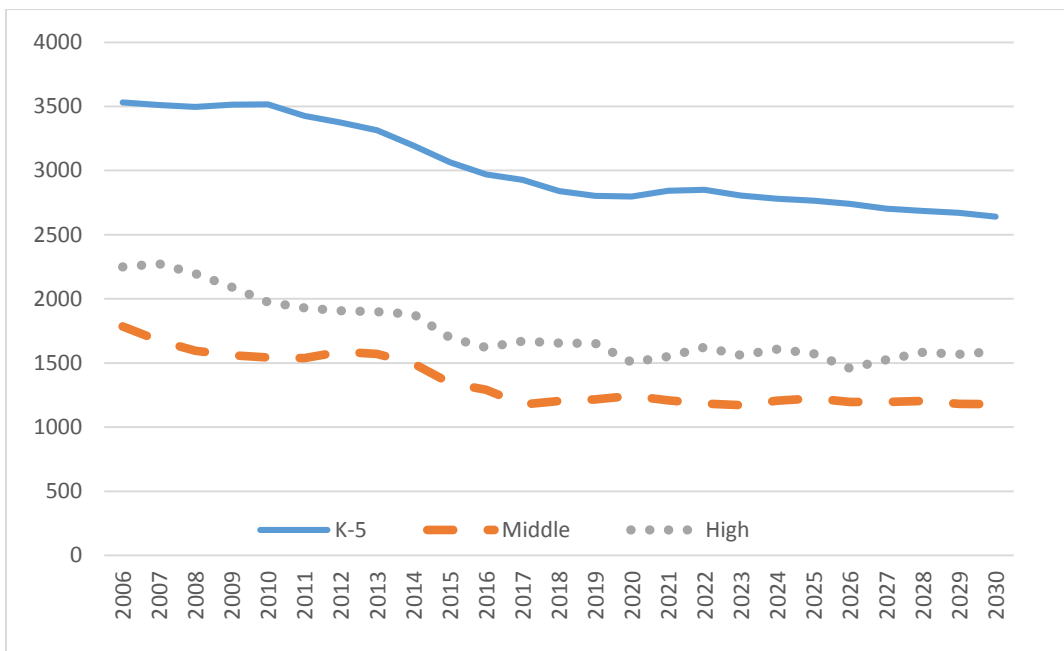
The high school enrollment was fairly constant until the 2014 and 2015 school years, when every grade saw a decrease in students. However, these numbers are expected to rise in the 2016 school year because the decrease was due to the merger of high schools. We believe that the consolidation impact was a transient, one time effect and does not represent a long term impact on MCS enrollment.

**Figure 5, High School Enrollment Before and After Consolidation**



In summary, it is clear that Muncie Community Schools have recently faced a severe decline in enrollment coincident with population change in Muncie and overall residential choice of the MCS district. Moreover, the consolidation of Muncie Southside with Muncie Central resulted in a one-time decline in enrollment which we believe has run its course. As is apparent in the data, the number of students has been decreasing at a steady rate in all three levels of schooling. As is also apparent, that decline is expected to continue, but at a slowing pace through 2030. Though it is not part of this formal forecast, both economic and population forecasts suggest a stabilization of population, and by extension school enrollment after 2030.

**Figure 6, Students by School Level (History and Forecast)**



**4. The Use and Misuse of this Forecast**

All economic and demographic projections will be wrong, and this one is no exception. So, it is helpful to understand what this forecast includes, and does not include. It is also useful to compare these projections to other factors which might help establish the direction and magnitude of error in this forecast.

First, we do not include graduation rate or school performance data in these estimates. In Indiana, enrollment declines have been heavily isolated in poorly performing schools, as should be expected. Poor school performance effects the supply of students, since more will drop out of school or seek other educational options. Poor school performance also

reduces the demand for education, as mobile households relocate to corporations with better performing schools, or choose not to locate in poorly performing corporation areas. By many performance measure MCS is improving, especially among elementary aged students. If this continues or accelerates, this forecast should be viewed as pessimistic. If school performance declines, then enrollment declines in MCS will be greater than forecasted here.

This model included no large population changes outside the MCS system. The reason for this is that few of these types of changes have been observed in recent decades anywhere in the United States. The MCS Corporation demographics suggest modest declines through the next decade, with little likelihood of large shocks altering the population of the region.

For planning purposes, this forecast should be carefully compared with actual enrollment data from year to year, understanding that annual forecast errors are likely to be larger than the average of errors over several years. So, high or low enrollment compared to the forecast each year should not be viewed as evidence of a trend. This is especially important since these projections are not used for budgeting purposes by Indiana, but rather as policy and resource allocation decision support for the Muncie Community School Corporation.

## 5. References

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**Appendix Table: MCS Enrollment History and Forecast (2006-15:2016-30)**

	K	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Grade 9	Grade 10	Grade 11	Grade 12
2006	610	624	607	576	563	552	571	603	611	617	587	559	487
2007	625	624	609	582	534	536	554	546	576	610	592	574	499
2008	581	642	610	592	546	524	538	531	527	562	593	577	465
2009	586	588	617	602	578	542	507	527	526	515	529	528	520
2010	629	583	541	612	566	586	527	488	527	516	473	492	494
2011	628	615	542	524	568	550	557	512	468	497	516	442	475
2012	647	605	576	508	510	529	547	531	511	478	498	483	448
2013	604	612	582	563	462	491	526	522	522	517	466	469	448
2014	594	575	549	530	509	437	471	508	516	523	519	432	405
2015	503	559	510	534	465	494	416	445	482	485	469	405	339
2016	532	503	492	498	487	458	442	408	442	457	435	383	346
<b>2017</b>	564	518	422	480	466	479	322	431	424	438	471	393	370
<b>2018</b>	558	548	440	380	452	463	437	325	441	422	456	433	345
<b>2019</b>	552	545	479	397	375	455	437	427	353	439	429	417	369
<b>2020</b>	547	542	475	460	388	385	380	426	437	348	471	387	299
<b>2021</b>	541	534	471	459	436	402	396	376	438	435	393	433	288
<b>2022</b>	535	529	460	436	436	453	397	390	396	436	440	347	401
<b>2023</b>	530	524	455	421	418	457	373	391	407	393	467	399	301
<b>2024</b>	524	523	449	433	407	445	428	370	408	403	425	429	351
<b>2025</b>	518	519	447	427	416	439	414	419	391	405	419	382	365
<b>2026</b>	513	516	442	406	412	452	358	406	431	388	444	376	252
<b>2027</b>	507	510	438	400	395	453	419	357	420	429	421	403	273
<b>2028</b>	501	505	431	414	391	442	412	411	380	417	438	378	350
<b>2029</b>	496	501	426	405	402	442	353	404	425	377	451	397	343
<b>2030</b>	490	498	420	380	395	457	407	353	419	422	413	411	345