

# **Gifted Education in Orange County Schools**

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**Abstract**

Underachievement is defined as a discrepancy between a student's ability and performance. Underachievement in gifted children, namely those one to two years above grade level, is especially concerning. Gifted children of high potential require additional nurturing and motivation to fulfill this potential, a task for parents, teachers, and school administrators alike. In Orange County Schools, a public school district in Orange County, North Carolina, these stakeholders care about the achievement of students in the Academically and Intellectually Gifted (AIG) program. This study explores test score growth among Orange County Schools' AIG students in the fifth through eighth grade in order to assess underachievement for this group. By examining the quantitative and qualitative factors contributing to gifted student learning, it finds that test score growth does not accurately reflect gifted student achievement, and instead suggests that other measurements be used to assess Orange County Schools' gifted program.

**Introduction**

Gifted students are defined here as those who “learn well beyond the expected level of one's age peers” (Orange County Board of Education, 2010). If high potential children aren't engaged in school from an early age, they often lose interest and have difficulty meeting challenges later in life (Clever, 2008). Studies suggest that 10-50% of all gifted students can be classified as underachieving (Hoffman, Wasson, & Christianson, 1985; Richert, 1991). The term underachievement describes the discrepancy between a child's performance in school and his or her actual ability (Rimm, 1998). Underachievement may take the form of lower class grades, lower test scores, or a general lack of engagement with school material (Reiss, 2000). One potential metric of underachievement is a lack of growth from year to year.

The North Carolina Department of Public Instruction calculates a test score growth index for each student in grades three through eight using a baseline and the student's previous standardized test scores. Data from the Orange County Schools' Department of Testing and Accountability show that 34% of students in grades five through eight identified as gifted in math and 35% of those gifted in reading showed negative growth in the 2010-2011 school year using this metric.<sup>1</sup> Approximately 54% of the students in the sample were identified as gifted in both reading and math, though they were counted separately in the data analysis. There was little difference between the elementary and middle schools in regards to the impact of various factors on performance. Out of the measures analyzed, only the percentage of students showing negative growth in reading was significant, though this may be due to the small sample size.<sup>2</sup> Teachers and administrators alike expressed concern over this trend of negative growth and sought additional information about the assessment of negative growth and its causes.

Orange County Schools can be used as a case study in addressing an overarching question: *What factors impact gifted student learning?* This review applies the relevant literature regarding both gifted underachievement and effective instructional methods for gifted education to Orange County Schools by incorporating both quantitative data analysis and qualitative evaluation from teacher interviews. A total of eleven sub-questions are examined in order to investigate the trend of negative growth and to inform the district's upcoming review of its academically and intellectually gifted (AIG) program.

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<sup>1</sup> Data set provided by Orange County Schools in January 2012 for the purposes of this research.

<sup>2</sup> A t-test yielded a correlation of 0.0191 for the percentage of students showing negative growth in reading between elementary and middle schools, 0.1682 for the percentage of students showing negative growth in math, 0.0882 for average growth score in reading, and 0.2827 for average growth score in math. Of these, only the percentage of students showing negative growth in reading is significant.

## Background on Academically and Intellectually Gifted Students in Orange County

### *Orange County Schools and the AIG Program*

Orange County includes two school districts: Orange County Schools and Chapel Hill – Carrboro City Schools. Orange County Schools is the 50<sup>th</sup> largest of the 115 school districts in North Carolina, with a total population of 50,086 including 8,644 children between the ages of 5 and 17. About 18% of these children come from families in poverty, compared to a mean of 26% for the state (U.S. Census Bureau, 2010). Orange County Schools has seven elementary schools and three middle schools, serving a total of 99 and 334 AIG students, respectively. All students take the state-mandated End-of-Grade (EOG) exams in both math and reading in grades 3-8. Orange County Schools generally exceeds the state average for percent of students performing at or above their grade level.<sup>3</sup> In reading, students in the district exceeded the state average at all grade levels. In math, students in the district exceeded the state average in the fifth and seventh grades, and narrowly fell behind the state average in the sixth and eighth grades (see Table 1).

<b>5th Grade</b>	<b>Reading</b>	<b>Math</b>
District	73.6	84.3
State	70.7	82.4
Difference	2.9	1.9
<b>6th Grade</b>	<b>Reading</b>	<b>Math</b>
District	77.2	80.6
State	75.1	80.7
Difference	2.1	-0.1
<b>7th Grade</b>	<b>Reading</b>	<b>Math</b>
District	73.1	85.6
State	67.8	81.1
Difference	5.3	4.5
<b>8th Grade</b>	<b>Reading</b>	<b>Math</b>
District	73.8	83
State	69.8	84.4
Difference	4	-1.4

*Table 1.* District and State Proficiency Levels. This table shows the difference in proficiency levels between Orange County Schools and the North Carolina state average in reading and math on the 2010-2011 EOG exam. Values show the percent of students at or above grade level.

<sup>3</sup> As calculated by the author based on North Carolina Public Schools Testing and Accountability Results, found at <http://accrpt.ncpublicschools.org/app/2011/disag/>

The AIG programs within Orange County Schools vary substantially, both in size and in specific program offerings. Each school employs a full-time AIG specialist who works with students and teachers to customize the AIG program. According to Orange County Schools' 2010-2013 AIG strategic plan, schools use some combination of grouping, acceleration, and collaborative teaching in elementary and middle school programs. Grouping involves teaching groups of students based on their demonstrated knowledge of a particular subject, and can occur through either a pull-out model or a push-in model. Pull-out models take students out of their regular classes for advanced instruction, whereas push-in models engage students within their regular classroom. Acceleration involves addressing the curriculum at a faster pace, often involving coursework above the student's grade level. Collaborative teaching brings the AIG specialist and the regular classroom teacher together to meet the needs of high achieving students regardless of formal AIG identification. In middle school, AIG-identified students are enrolled in advanced math and language arts courses with the AIG specialist and other AIG students. Differentiated instruction in the general classroom and AIG-specific instruction provided by gifted specialists are each drawn from the North Carolina Standard Course of Study, and as compared to normal instruction, both involve "greater depth and sophistication to provide a challenging, rigorous learning experience" (Orange County Board of Education, 2010).

In 1996, North Carolina reexamined its policies concerning the education of academically and intellectually gifted children. Article 9B of the North Carolina General Statute provides a state definition for AIG students (see Reference 1) and requires local education agencies (LEA) to develop specific AIG plans for local schools. The current mandate for K-12 gifted education charges schools with meeting the needs of students who require "educational services beyond those ordinarily provided by the regular education program" (Orange County LEA, 2011). The

first standard, student identification, requires procedures that are clear, equitable, and comprehensive. The practice employs multiple criteria for student identification, including student aptitude, achievement, and potential to achieve (Orange County LEA, 2011).

#### State Definition of AIG Students, Article 9B (N.C.G.S. § 115C-150.5)

Academically or intellectually gifted students perform or show the potential to perform at substantially high levels of accomplishment when compared with others of their age, experience, or environment. Academically or intellectually gifted students exhibit high performance capability in intellectual areas, specific academic fields, or in both the intellectual areas and specific academic fields. Academically or intellectually gifted students require differentiated educational services beyond those ordinarily provided by the regular educational program. Outstanding abilities are present in students from all cultural groups, across all economic strata, and in all areas of human endeavor.

*Reference 1.* Article 9B of the North Carolina General Statute. North Carolina Department of Public Instruction. (2009). North Carolina Academically or Intellectually Gifted Program Standards. Public Schools of North Carolina State Board of Education. Raleigh, NC. Page 1.

Building off the 2008 state assessment as well as a district assessment of the AIG program, Orange County Schools uses a multi-pronged approach in identifying its AIG students. Students may be identified at any age, and the process includes input from teachers, parents, and administrators. Students must achieve at the 95<sup>th</sup> percentile or higher on the North Carolina EOG exam, show a probable rating of giftedness on the GATES<sup>4</sup> assessment, and be recommended for gifted services by the school's needs determination team. The team takes classroom grades as well as teacher and parent recommendations into account when placing students, and uses a non-verbal test to reach underserved populations and alternative learners (Orange County Schools, 2012). Orange County Schools' LEA does not mention the AIG program in its 2010-2011

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<sup>4</sup> The Gifted and Talented Evaluation Scale (GATES) is a tool used by teachers, parents and others to evaluate the giftedness of a child by rating the presence of evidence-based, norm-referenced characteristics. More information can be found here: <http://www.prufrock.com/GATES-Complete-Kit-P87.aspx>

improvement plan. However, an outline of the School Board's strategic goals for the AIG program emphasizes reaching traditionally underserved populations through a comprehensive, bi-annual AIG talent search (Orange County LEA, 2011; Orange County Board of Education, 2010). Based on conversations with teachers, it is unclear whether schools have consistently conducted this search.

#### *Definition of Performance in the Orange County AIG Context*

The North Carolina Department of Public Instruction (DPI) calculates Academic Change as part of its school and teacher accountability model (North Carolina Department of Public Instruction Accountability Services, 2011). This test score growth index computes the growth of each individual student from one year to the next by subtracting the student's current scale score from his or her previous scale scores. Scale scores are computed by comparing the student's raw score on the state-wide standardized grade-level achievement exam, End-of-Grade (EOG), to a baseline set in the exam's first year of use. Students who score above the baseline in one year are expected to score above the baseline in consecutive years. In doing so, they receive a growth score of zero. Students who do not perform as well on the EOG exam as previous years, relative to the grade level average in the standard-setting year, receive a negative growth score. DPI uses growth score data to assess school and teacher performance, not individual student performance, though schools and teachers have access to individual student scores. See Appendix A for a sample growth score calculation provided by DPI.

Due to the variety of factors that may lead to a gifted student's low performance in the classroom, Orange County Schools includes underachievement in the list of characteristics to be taken into account when identifying students for consideration in the AIG program (Orange

County Board of Education, 2010). According to the Orange County LEA 3-year strategic plan for its AIG program, “Nurturing services are intended to make special efforts to recognize and support students at all grade levels who demonstrate high intellectual potential to develop skills for advanced study but do not exceed expected grade level achievement” (Orange County Board of Education, 2010). Teacher efforts to reach students without AIG identification who demonstrate subject area mastery further support this endeavor.

### *Review of the Growth Data for AIG Students in Orange County Schools*

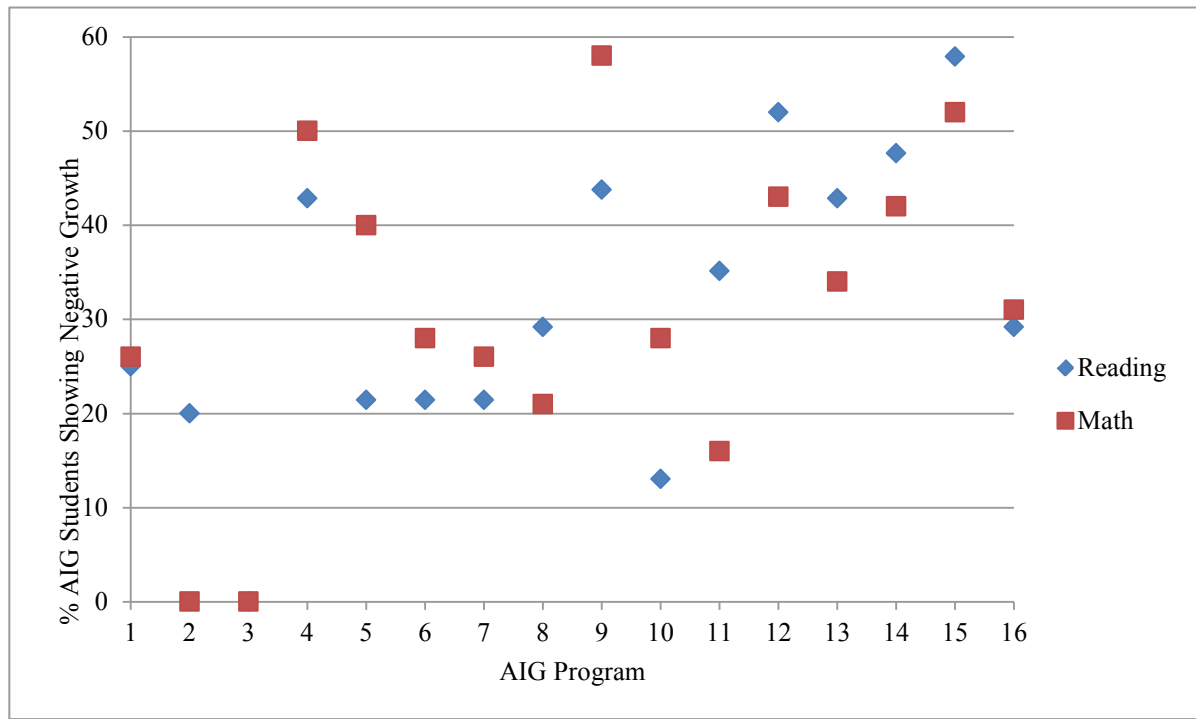
Orange County Schools’ measure of achievement in this case is the North Carolina EOG exam, with expected academic change calculated by the DPI. Regression to the mean, the tendency for high achieving students to trend towards the average as they reach their potential over time, is taken into account in DPI’s growth projection formula for North Carolina (North Carolina Department of Public Instruction Accountability Services, 2011). However, this trend fails to explain the negative growth for students in all grade levels in the sample. Looking at the 2010-2011 school year, 21% of fifth grade students studied showed negative growth in reading, while 24% showed negative growth in math. 39% of middle school students studied showed negative growth in reading, while 36% showed negative growth in math.<sup>5</sup> There was no major difference between students identified in only one subject area versus those identified for both, and the only noteworthy variance between grade levels was a dip in seventh grade math, a trend verified anecdotally by teachers and administrators in Orange County Schools. While in some schools over 50% of AIG students showed negative growth in their area of identification, the average growth scores for the students in all but two of the programs were positive (see Figures

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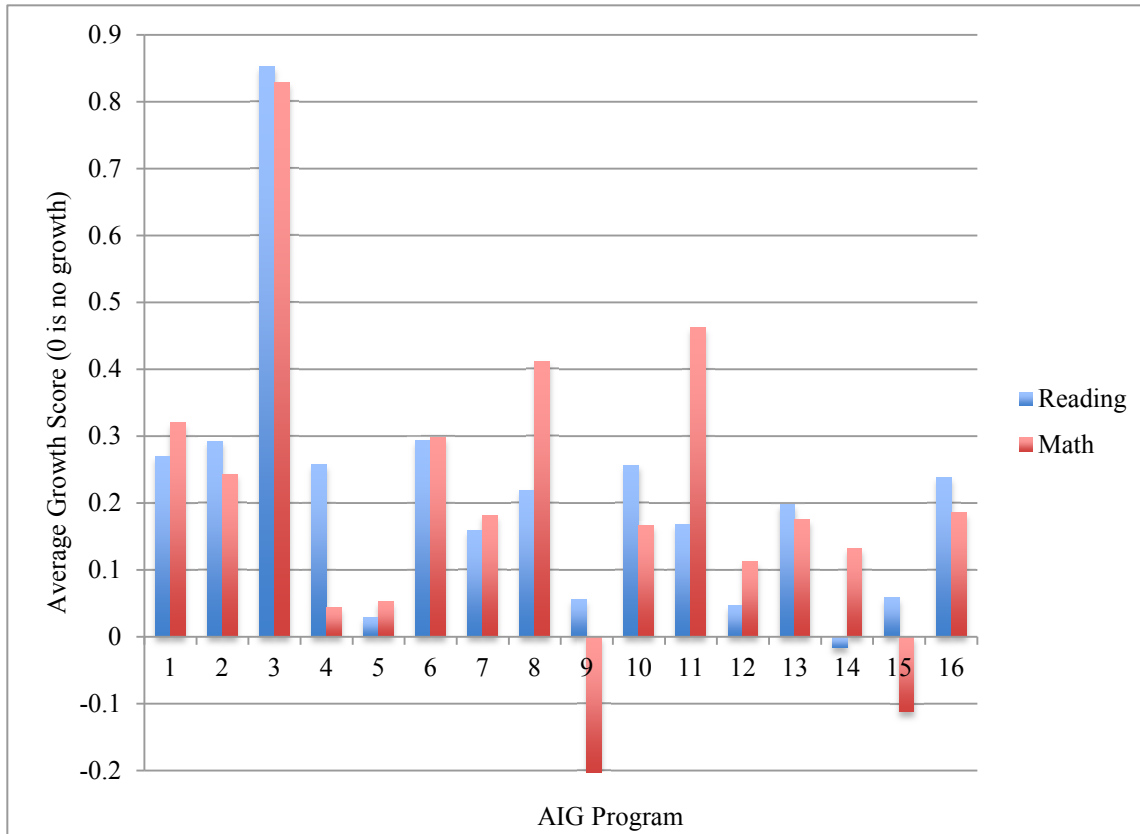
<sup>5</sup> All data analysis is the author’s own based on the information provided by Orange County Schools Testing and Accountability Services.



A and B). This would indicate that in general, the students in the sample showing negative growth were closer to a score of zero than the students showing positive growth.



*Figure A.* Percentage of AIG Students in Orange County Schools Showing Negative Growth. This figure shows the percentage of students with negative growth scores on the 2010-2011 EOG exam in their area of AIG identification. The 16 programs studied include grades 5-8 for the 10 schools in the sample (names are hidden for confidentiality). Programs 1-7 are elementary schools, and programs 8-16 are middle schools. Negative growth is defined as below 0.



*Figure B.* Average Growth Scores of Orange County Schools AIG Students. This figure shows the average growth score on the 2010-2011 EOG exam for students identified as gifted in reading, math, or both in Orange County Schools. The sixteen data points show the average growth scores across the programs in the sample, including grades 5-8 for 10 schools (names are hidden for confidentiality). Programs 1-7 are elementary schools, and programs 8-16 are middle schools.

To place this data in context, it is necessary to examine the school-level achievement for the same period. While non-AIG student growth scores were not available, school-wide performance on the EOG is publically reported. The North Carolina Department of Public Instruction publishes report cards for each district and public school within the state detailing students' levels of proficiency as assessed by the EOG. Distinctions are awarded to individual schools based on the percentage of students scoring at or above grade level on the exam and the expected learning (or growth) achieved in one year. During the 2010-2011 school year, no elementary or middle schools in Orange County Schools were deemed Schools of Excellence,

defined as having 90% of students at grade level and making expected growth. Nearly 30% of the district's elementary schools and 33% of the district's middle schools were deemed Schools of Distinction, defined as having 80-89% of students at grade level and making expected growth (North Carolina Public Schools, 2011). This places Orange County Schools in the middle of its neighboring school districts, Chapel Hill-Carrboro City Schools and Durham Public Schools, which respectively had 100% and 0% of elementary and middle schools deemed Schools of Distinction or higher during the 2010-2011 school year.

### **Methodology**

The following analysis is based on the Orange County Schools AIG growth data on the 2010-2011 EOG exam as reported by the Orange County Schools Division of Testing and Accountability in Spring 2012. Orange County Schools includes one high school, three middle schools, and seven elementary schools. This evaluation was based on the elementary and middle schools' test score data for AIG students in the fifth through eighth grade. The sample includes 16 programs at 10 different schools, comprising a total of 422 AIG students. The program sizes by grade level range from less than 10 students to more than 50 students, separated by reading and math identification.

A total of eleven questions are analyzed in order to address the central question: *What factors impact gifted student learning?* Online resources from the Duke Library website, LexisNexus research database, US Department of Education ERIC clearinghouse, and relevant print sources informed the literature review. Data for the quantitative analysis came from the Orange County Schools AIG student test score growth, provided by district administrators, and

was matched with available grade, school, and district-level data from the NC Report Cards.<sup>6</sup> AIG instructors in Orange County Schools consented to participate in the research and answered a series of questions regarding their experience with the AIG program at their school. Nine current teachers, two former teachers, and one teacher specialist chose to participate, with interviews occurring in person and on site at each school. See Appendix B for the teacher questionnaire and Appendix C for the participant consent form.

### **Analysis: What factors impact gifted student learning?**

#### *How does school size impact AIG student growth?*

While school size has the potential to affect student achievement based on cost efficiency in per-pupil expenditures, studies relating school size to student achievement produce conflicting results with relatively small correlations (Slate, 2005). Slate and Jones (2005) review the literature on school size and student achievement:

Ramirez (1992) conducted a review of the literature relating school size to student achievement and concluded that little difference in achievement was present between large and small schools. Cotton (1996) reviewed 31 studies of the relationship between school size and achievement and found them about evenly divided between studies favoring small schools and studies showing no differences in achievement based on school size. None of the studies reviewed by Cotton yielded results in favor of large schools. Greenwald, et al. (1996) conducted a meta-analysis of 60 studies and found that student achievement was negatively related to school size. That is, achievement was better in small schools. A 1999 analysis of academic achievement in Texas high schools also found a lower academic achievement in larger schools.

Based on this information, two scenarios seem plausible regarding school size and AIG growth in Orange County Schools: Either larger schools have access to more resources for AIG students, and therefore demonstrate higher rates of positive AIG student growth, or smaller

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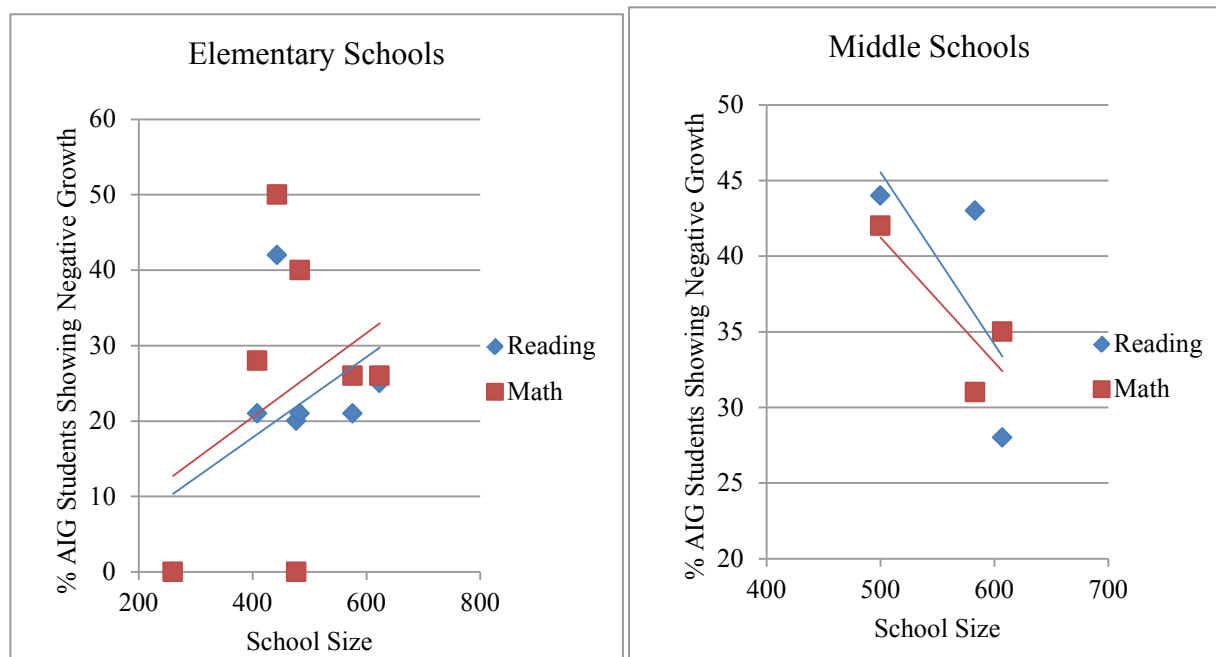
<sup>6</sup> Website: <http://www.ncreportcards.org/src/>

schools are able to pay more attention to AIG students and provide individualized instruction, and demonstrate higher rates of positive AIG student growth. The data was mixed on the relationship between school size and test score growth for AIG students (see Appendix D for the correlations between various factors and achievement). At the elementary school level, school size was strongly negatively correlated with average AIG test score growth in math, meaning that larger schools also showed lower average growth scores in this area.<sup>7</sup> School size was also strongly positively correlated with the percentage of students showing negative growth in reading, corroborating this claim. At the middle school level, however, school size was negatively correlated with the percentage of students showing negative growth in reading. This means that for the middle school sample, larger schools had a lower percentage of students showing negative growth (see Figure C).

The average percentage of students showing negative growth in both reading and math was higher for schools above the combined median size of 491.5 for both elementary and middle compared to those below the median size. From teacher interviews, AIG specialists at smaller schools seemed to have a broader reach across various grade levels within the school compared to specialists at larger schools, as well as more time to provide professional development and support to other teachers. Teachers surveyed agreed that both of these factors were of critical importance to improving gifted services.

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<sup>7</sup> Strong correlation defined as an r value of  $|0.4|$  or greater.



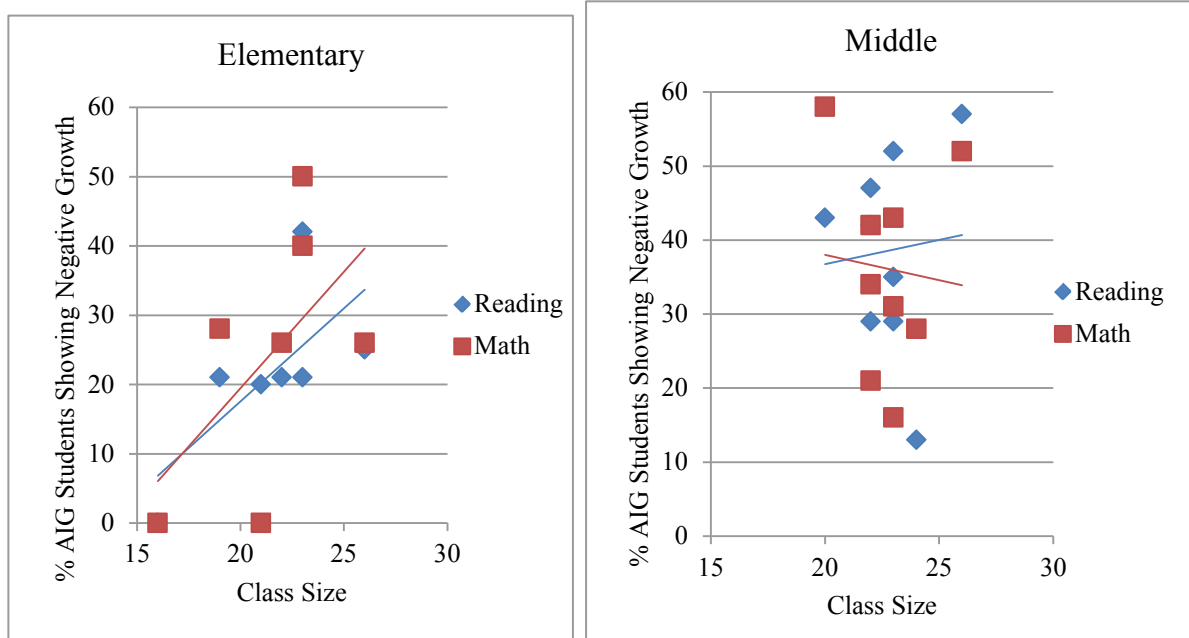
*Figure C. Negative Growth as a Function of School Size.* This figure shows the percentage of AIG students in Orange County Schools with negative growth scores on the 2010-2011 EOG exam in their area of AIG identification as compared to the number of students enrolled in their school during the 2010-2011 academic year. Elementary and middle schools are separated due to the strong correlation between these factors. Trendlines are shown for both reading (blue) and math (red).

*How does class size impact AIG student growth?*

It is often assumed that smaller class sizes are more conducive to student achievement (Cho, Glewwe, & Whitley, 2012). A landmark study in Tennessee shows that reduced class size has a positive impact on student achievement, especially for minority and low-income students due to increased attention (Krueger, 2001). Since gifted students also benefit from greater attention, smaller class sizes and smaller program sizes might lead to higher levels of positive AIG growth. While the literature surrounding this topic does not include specific studies on class size and gifted student achievement, conflicting evidence exists regarding the effectiveness of reducing class size in increasing overall student achievement (Southworth, 2010). Gains are

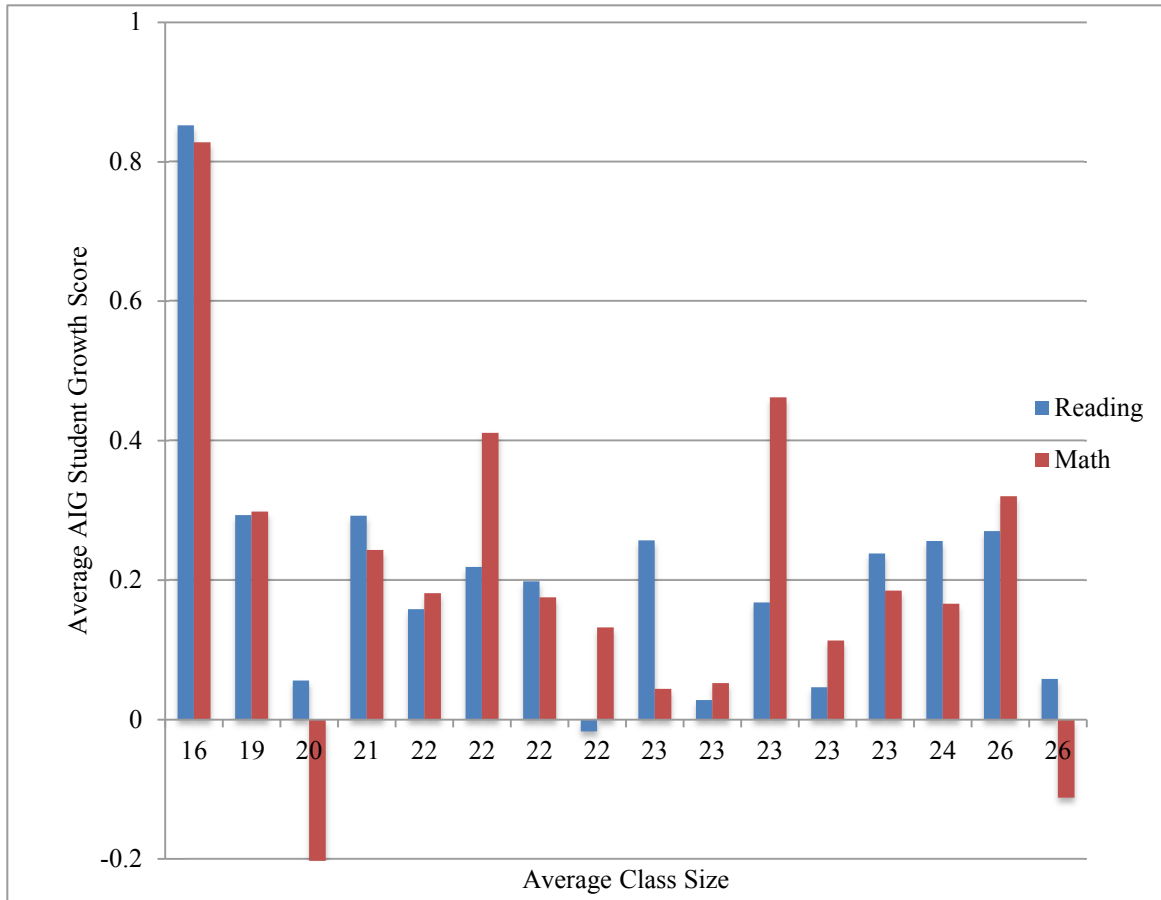
usually very small, and are not likely to persist over time or lead to “sizable increases in student learning” (Cho, Glewwe, & Whitley, 2012).

The median class size for this sample was 22.5. There was no discernable difference between the growth rates of AIG students in Orange County Schools with class sizes below the median and students at schools with class sizes above the median. As seen in Figure D, the percentage of students showing negative growth on the EOG exam varied between programs with similar average class sizes, and high percentages of negative growth were found both above and below the median class size. Overall, the variation in performance among classes of similar size was greater than the variation between classes of different sizes, indicating that this variable was likely not the sole determining factor of performance. See Figure E for the plot of class size versus average AIG growth scores. In data analysis, large class size was strongly negatively correlated with average math scores in elementary schools, with an  $r$  value of  $-0.7073$ , and strongly positively correlated with the percentage of students showing negative growth in both reading ( $r = 0.7040$ ) and math ( $r = 0.5744$ ) at the elementary school level. This suggests that reduced class sizes may be more beneficial to elementary school AIG students than middle school AIG students.



*Figure D.* Negative Growth as a Function of Class Size. This figure shows the percentage of AIG students in Orange County Schools with negative growth scores on the 2010-2011 EOG exam in their area of AIG identification as compared to the average class size of their grade that year. For the elementary schools, the percentage of AIG reading students showing negative growth in School X's fifth grade is shown against School X's average fifth grade class size in 2010-2011. For the middle schools, each data point represents either the math or reading program for each grade level at each school. For example, the percentage of AIG reading students showing negative growth in School Y's sixth grade is shown against School Y's average sixth grade class size in 2010-2011. Trendlines are indicated for both reading (blue) and math (red).





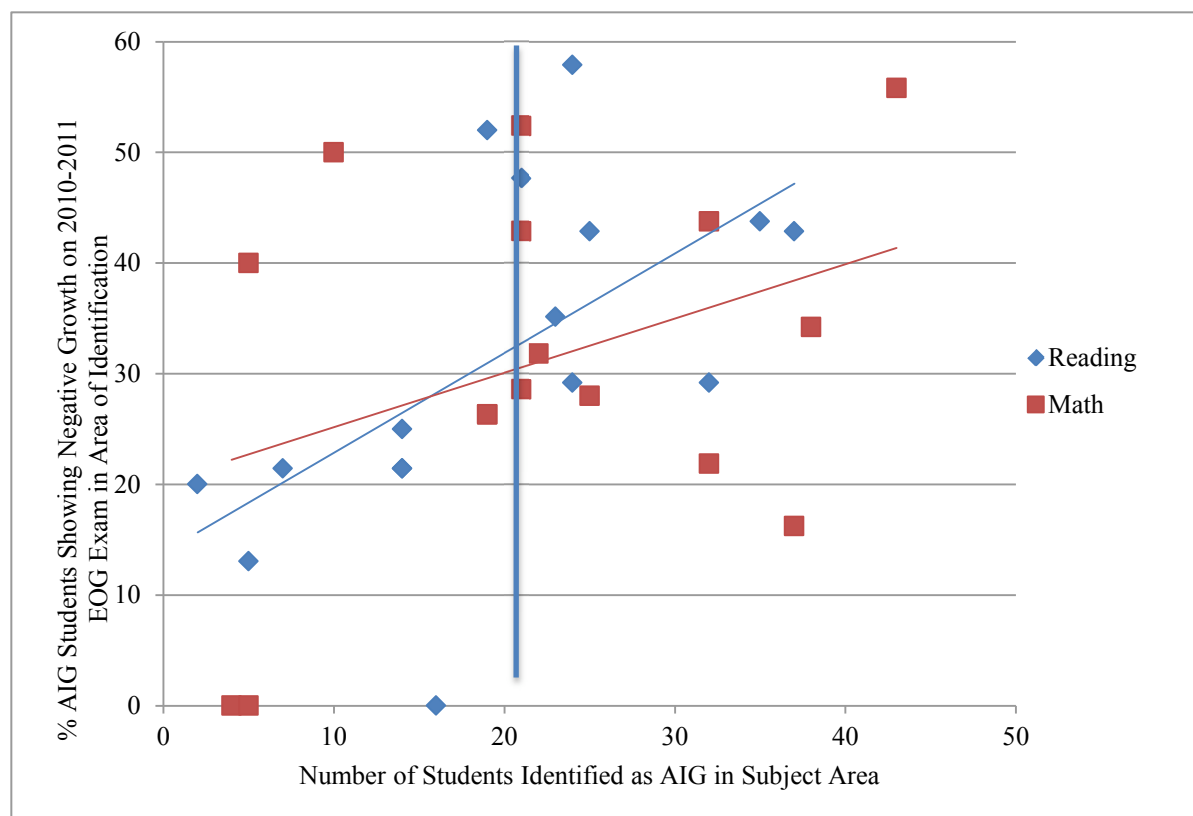
*Figure E. Average AIG Growth by Class Size.* This figure shows the average test score growth of AIG students in Orange County Schools on the 2010-2011 EOG exam in their area of AIG identification as compared to the average class size of their grade that year. Cohorts from each program in the sample, namely grades 3-8 across 10 schools, are included.

Teachers generally stated that smaller class sizes tend to be better for gifted students. Since AIG specialists are only able to work with high achieving students for a portion of the school day, it is imperative that all classroom teachers have the resources and support to cater to the needs of gifted students. Smaller class sizes give teachers more time to do so. Additionally, gifted students are often called upon to help struggling students in larger classes when the teachers require assistance to reach everyone. This may have the effect of creating social divides among students in the class, as well as removing the opportunity for gifted students to experience enriched material themselves. Lastly, in larger classes the most disruptive students often garner

the most teacher attention. Often these students are the ones who struggle with the material, rather than those who are either on target or above. Therefore, teachers in this study advocate for reduced class sizes in order to support the needs of teachers and gifted students alike.

*How does program size impact AIG student growth?*

In general, program size had a similar impact on AIG student achievement as did class size. For both reading and math, there was a small positive correlation between program size and the percentage of students showing negative growth (see Figure F). This indicates that larger program sizes in the sample generally had larger percentages of students showing negative growth. Additionally, all but one of the programs below the median size of 20 for reading had less than one third of their students showing negative growth; in contrast, 75% of programs above the median size had more than one third of AIG students showing negative growth. Teachers in Orange County Schools commented that smaller programs tend to facilitate growth for students due to additional attention from the AIG specialist on staff. However, larger programs are able to both bring more funding and differentiation within AIG than do smaller programs. It should be noted that none of the correlations for program size were strong, differentiating it from the other factors (see Appendix D).



*Figure F. Negative Growth as a Function of AIG Program Size.* This figure shows the percentage of Orange County Schools AIG students with negative growth scores on the 2010-2011 EOG exam in their area of AIG identification as compared to the number of students in their AIG program. AIG programs are defined as cohorts of students identified as gifted in a given subject area at a certain school. AIG programs in this sample include grades 5-8 across 10 schools. The median program size, 20, is displayed with a vertical line. The trendlines indicate the trends in the data for both reading (blue) and math (red). Since none of the correlations between program size and achievement were strong, for either reading or math, the elementary and middle school data are shown together.

*How does overall school performance impact AIG student growth?*

In order to analyze individual student growth levels, achievement must be placed in context. As mentioned in the background on Orange County Schools, growth scores are not available for non-AIG identified students. Therefore, school-wide performance on the EOG exam was used as a proxy for achievement. While not a perfect comparison, this measurement gave a sense of AIG students' achievement within their school environment. Overall, the data

showed a link between school quality and AIG student growth. The two elementary schools of distinction in the sample showed the two highest overall growth rates for both reading and math, excluding the smallest programs with 0% negative growth rates. The one middle school of distinction in the sample had the highest overall math growth rate and second highest for reading. These schools of distinction also had the largest number of students in their AIG programs. This correlation could potentially be related to parental choice in schools, as parents interested in gifted programs for their children have the option to self-select into a school with a well-known gifted program by moving to that school's neighborhood. The schools with the lowest number of students in the AIG program tended to have lower overall growth rates, with the exception of elementary programs with less than ten AIG students.

As seen in Figure G, there was a small correlation between school-wide achievement in Orange County Schools and AIG student growth. When the outliers were removed, the trend lines revealed a positive association between school EOG achievement and AIG growth for both reading and math (see Figure H). This could mean that higher levels of school performance encourage higher AIG growth, or rather are indicative of an environment conducive to high student performance. Teachers did not comment on school-wide performance except to note that in most cases, AIG-identified students on average out-perform their peers on the EOG exam. This is related both to the fact that the EOG is used to identify students for the gifted program in Orange County Schools, and that gifted students are often able to easily master grade-level material.

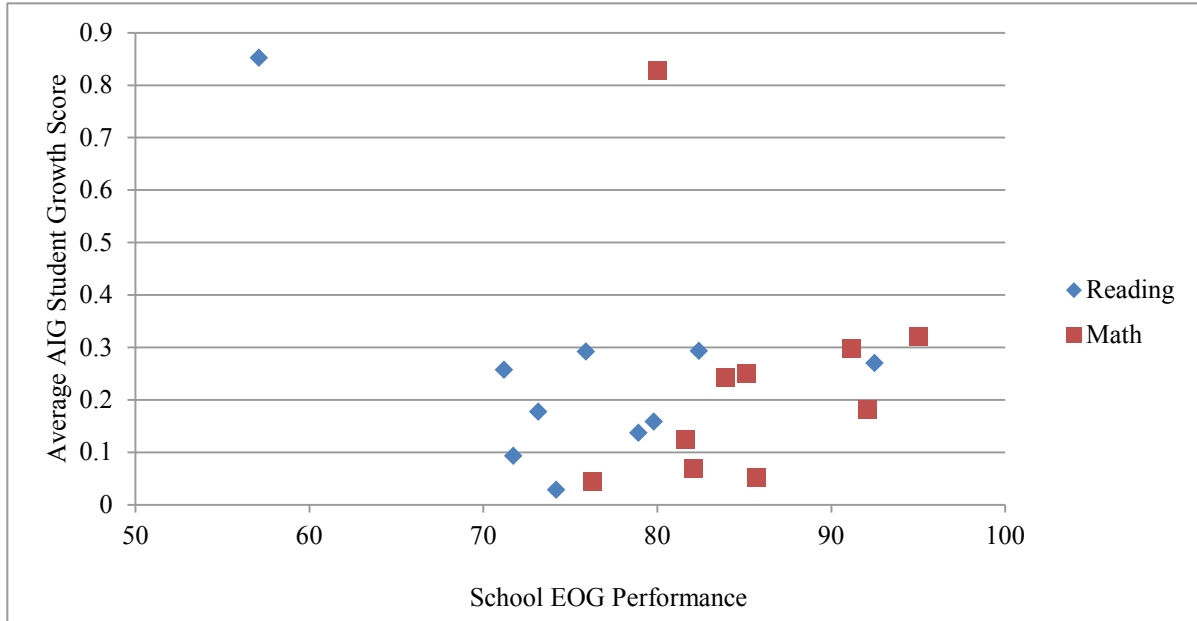


Figure G. Average AIG Growth versus School-Wide Achievement. This figure shows the average growth score on the 2010-2011 EOG exam for students identified as gifted in reading, math, or both in Orange County Schools as compared to the percentage of students at their school performing at or above grade level on the 2010-2011 EOG exam.

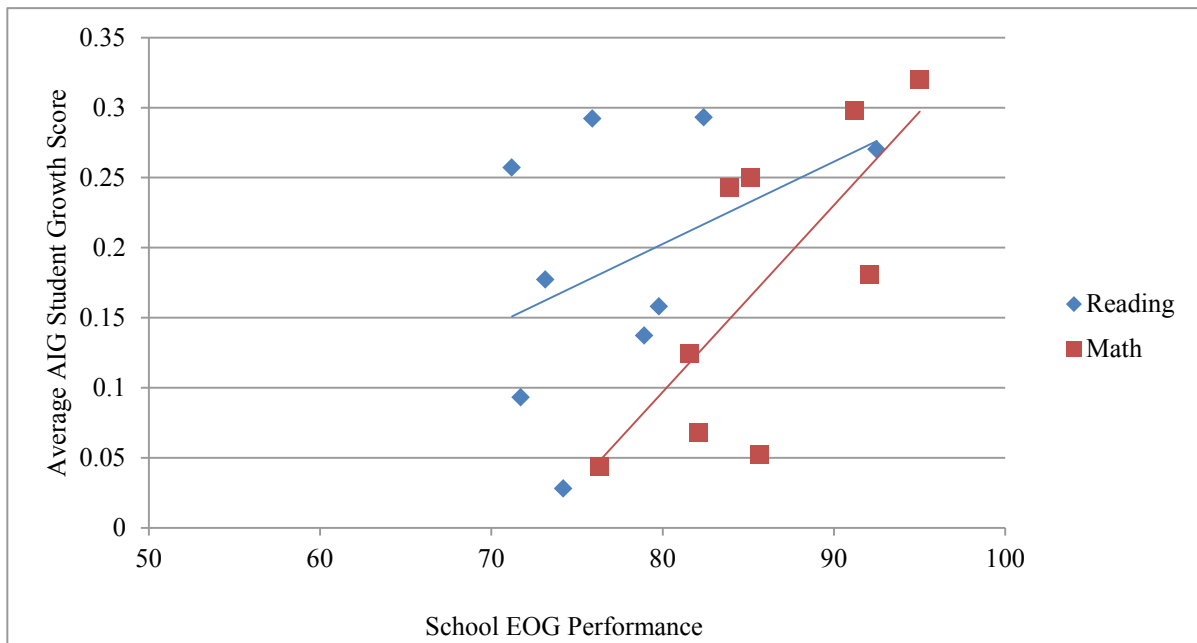


Figure H. Trends in Average AIG Growth versus School-Wide Achievement. Removing two outliers from Figure G, this figure shows the trend lines for the comparison between average AIG growth scores and school EOG performance, defined as the percentage of students performing at or above grade level on the 2010-2011 EOG exam.

*How do the demographics of the school, specifically economic disadvantage, impact AIG student growth?*

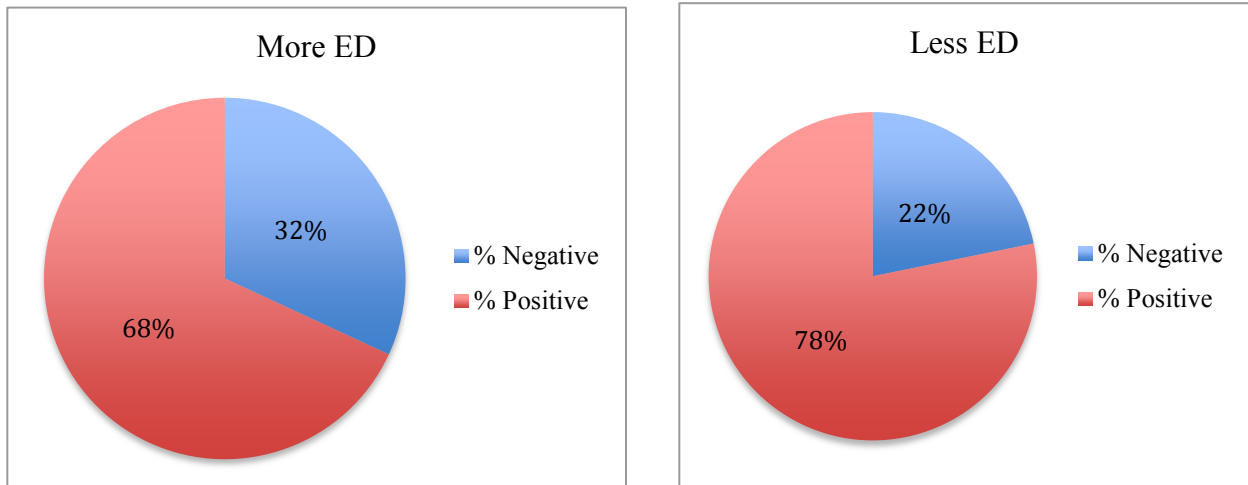
Student demographics in terms of economic disadvantage can have a great impact on the learning environment of a school. In a 2010 study of student achievement in North Carolina, the authors found that the “racial and poverty composition of schools affect student achievement after factoring in student, family, and other school influences” (Southworth, 2010). Another study showed that 44% of low-income students who enter first grade in the top 10% do not maintain their status through fifth grade (Wyner, Bridgeland, & Dilulio, 2007). Poverty concentrations in schools, defined here as the number of students identified as economically disadvantaged, impact teacher inputs, resources, and peer achievement. Teachers in low-income schools are often newer, have fewer credentials such as subject matter scores and teaching exam scores, and are generally less effective (Clotfelter, Ladd, & Vigdor, 2005). For these reasons, they may offer less challenging curriculum and have lower expectations of students than teachers in middle-class schools (Southworth, 2010).

The National Center for Education Statistics found in a 2007 analysis that middle-class children attending schools with high levels of poverty had, on average, lower achievement levels than low-income children in middle-class schools (North Carolina Center for Education Statistics, 2007). Peer spillover effects can reduce the importance of individual poverty level when low-income students go to school with student from middle-class backgrounds. These peers are more likely to be academically oriented, respond to pressure to succeed, and have access to human and social capital not otherwise available to low-income students (Godwin, 2002). This capital includes natural abilities, learned skills, and relationships with others that can

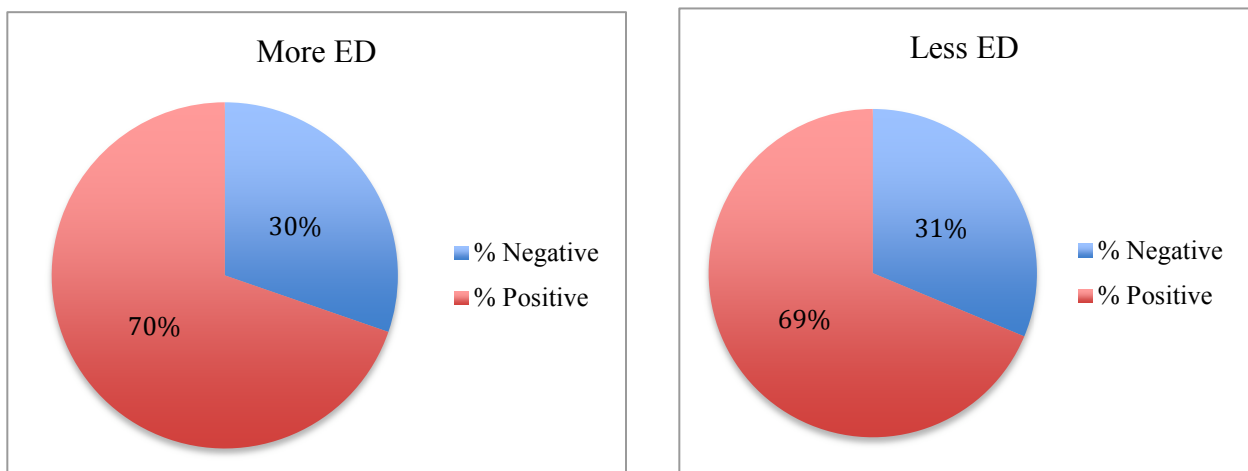
be beneficial later in life in regards to information gathering, financial asset building, and job acquisition (Burt, 1993).

Schools in the district with more students of economic disadvantage, as defined in Figure I, had a higher percentage of AIG students showing negative growth than did schools with less students of economic disadvantage (ED). However, this trend only held constant for reading, and the difference is negligible for math. Teacher turnover, another indicator of unsatisfactory school conditions, did not appear to be impacted by the number of economically disadvantaged students in Orange County Schools (see Figure J).

## Reading

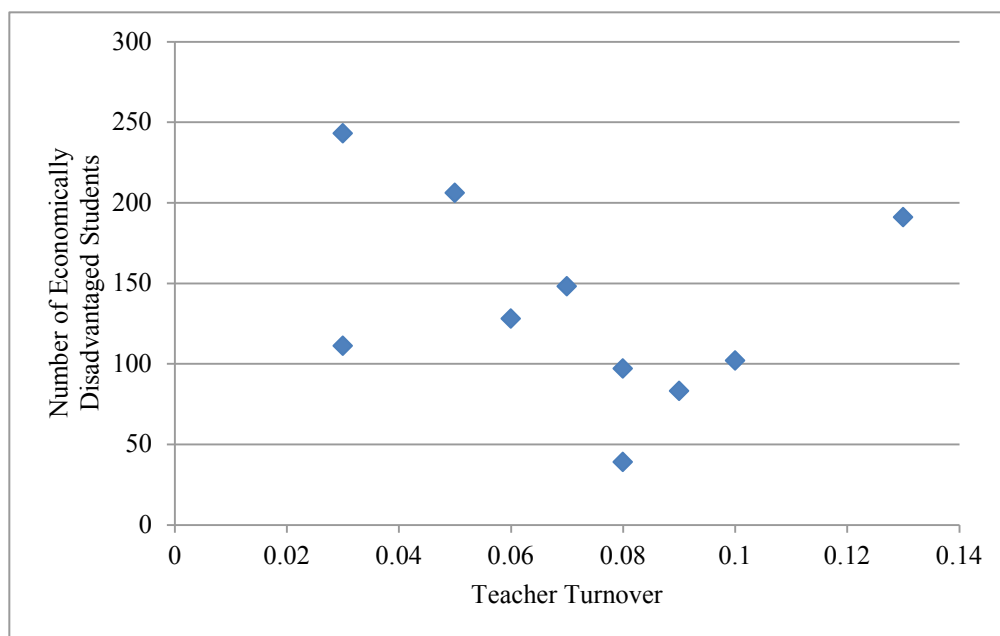


## Math



*Figure I. Economic Disadvantage in Orange County Schools.* These figures show the percentage of AIG students with negative growth scores in their area of identification as compared to the relative proportion of students of economic disadvantage in their school. The number of students identified as economically disadvantaged by the state of North Carolina who took the 2010-2011 EOG exam was divided by the total number of students in the school to arrive at a proportion. The median percentage of economically disadvantaged students within the sample of 10 schools was 27.3%. “More ED” consists of the schools with more than the median percentage of economically disadvantaged students within the sample. “Less ED” consists of the schools with less than the median percentage of economically disadvantaged students within the sample.





*Figure J. Impact of Economic Disadvantage on Teacher Turnover.* This figure compares the number of economically disadvantaged students taking the 2010-2011 EOG exam in each school with the 2010-2011 teacher turnover rate in that school. A higher rate indicates more teachers leaving the school that year.

Teachers noted in interviews that the mix of students greatly impacts school-wide achievement, with students from disadvantaged backgrounds often facing additional challenges at home that inhibit their ability to focus and perform well in school. Additionally, schools with a higher mix of wealthier students are likely to experience a different culture of achievement, especially due to parental pressures. Almost all of those interviewed emphasized the need to increase efforts to include students from traditionally underrepresented groups in gifted programming. One teacher noted that five percent of any population should be gifted, and yet less than five percent of many groups (including racial minorities, English language learners, and students in poverty) are represented in Orange County Schools' gifted program. It is important that these students be identified so that they can receive appropriate services and be placed on the right track for middle and high school courses. These students also benefit from the more

advanced peer group and teacher expectations that come with AIG identification, possibly even more so than do students from professional backgrounds with an emphasis on academic achievement. Potential methods to raise the diversity of Orange County Schools' gifted program include more holistic identification practices, increased gifted programming in younger grades, and a continued emphasis on inclusive push-in models that reach students who are not formally identified as AIG.

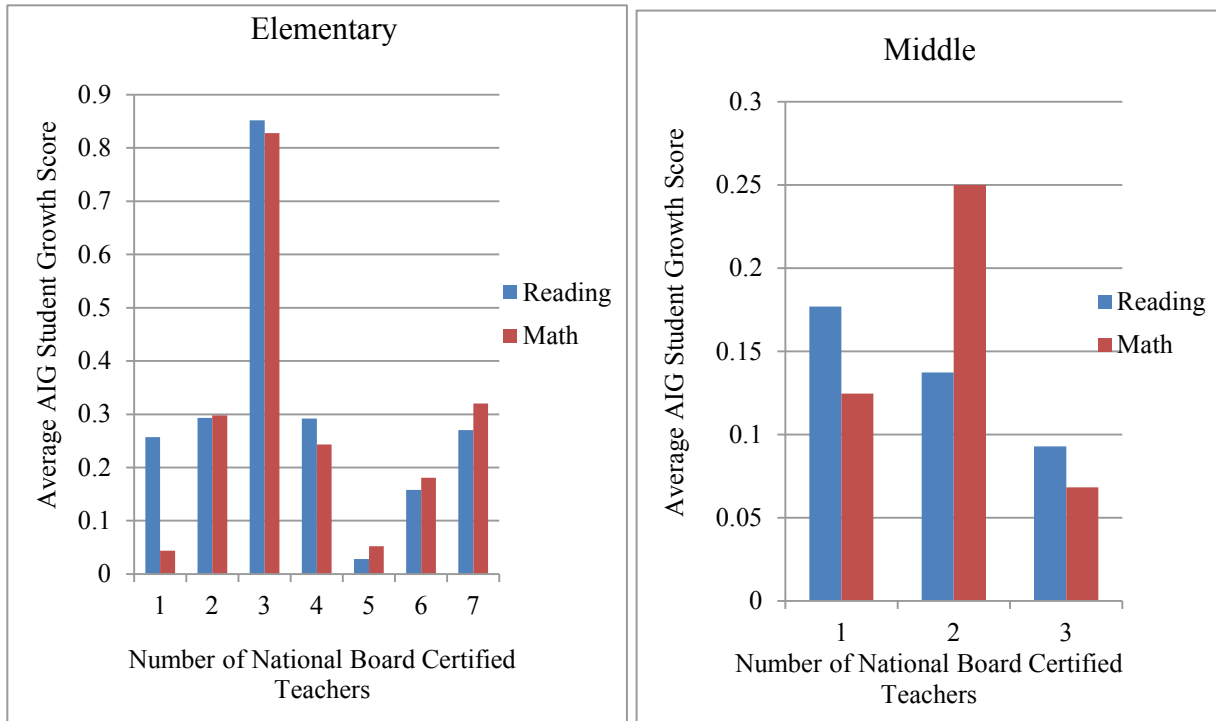
*How does teacher quality impact AIG student growth?*

While the definition of teacher quality is a highly debated concept, there is no doubt that quality teachers have a strong impact on students' learning and achievement (Southworth, 2010). In fact, one analysis shows that the quality of teachers is "more predictive of academic achievement than class size, the poverty level of the student, or teacher salaries" (Darling-Hammond, as cited in Southworth, 2010). In regards to gifted education, the teacher-student relationship may significantly influence achievement (Baker, 1998).

Some studies show that teacher experience is the most important factor affecting teacher effectiveness, while others cite level of education or certification status (Clotfelter, Ladd, & Vigdor, 2005; Godwin, 2002). Research shows that compared to other teacher qualifications, National Board Certification is one of the best measures of effectiveness (Goldhaber, 2008). Figure K uses this measure to analyze the correlation between teacher quality and AIG student performance in Orange County Schools. It is difficult to draw conclusions from this analysis, as two schools out of the seven in the elementary school sample and one school out of three in the middle school sample skewed the results. In the elementary school sample, one school with fewer than the median number of National Board Certified teachers had more than double the average growth scores, while another school with more than the median number of National

Board Certified teachers had less than half of the average growth scores. This led to an overall negative correlation between the two factors. In the middle school sample, the one school with the highest number of National Board Certified teachers had the lowest average growth scores. This led to an overall positive correlation between teacher qualification and the percentage of students showing negative growth. While it is important to look at the data, most likely these results are not indicative of a trend.

Another factor to consider is that gifted students meet with teachers who are not AIG specialists for the majority of their classes, and some teachers are better with gifted students than others. In interviews, AIG specialists noted that within schools, it is generally well known who is “good with” gifted students and who is not. Those teachers who differentiate well, are interested in meeting the needs of high achieving students, and develop the skills to meet these needs are likely to produce better results for the gifted students in their classes than teachers who do not exhibit these qualities. Based on this insight, higher quality teachers in both general classrooms and AIG programs could potentially produce students with higher growth scores.



*Figure K. Average AIG Growth by Teacher Quality.* This figure shows the average growth score on the 2010-2011 EOG exam for students identified as gifted in reading, math, or both in Orange County Schools as compared to the number of National Board Certified teachers in their school as reported in the NC Report Cards for the 2010-2011 school year. Elementary and middle school data are shown separately due to the strong correlation between these factors.

*How do AIG identification practices impact AIG student growth?*

In Orange County Schools, students are considered for the AIG program based on a variety of factors. All schools in the district use the same methods of identification, which include both objective and subjective standards. In third grade, all students take the CogAT<sup>8</sup> exam. Those scoring in the 99<sup>th</sup> percentile are automatically identified as gifted, and those scoring in the 95<sup>th</sup> percentile may be identified with a teacher recommendation. After third grade, students scoring in the 95<sup>th</sup> percentile on the North Carolina EOG exam may be identified with a teacher recommendation, regardless of the student's CogAT score. Alternative non-verbal tests

<sup>8</sup> The Cognitive Abilities Test (CogAT) is an aptitude test commonly used as part of gifted student identification. The primary goal is to assess students' reasoning abilities. For more information, see <http://www.riverpub.com/products/cogAt/details.html>

are given to students when necessary, or when requested by a parent or teacher. These non-verbal tests aim to capture alternative learners who think outside the box but may not achieve qualifying scores on standardized tests such as the EOG. To qualify for the AIG program in middle school, students must score in the 95<sup>th</sup> percentile on either an achievement (EOG) or aptitude (CogAT) test and have either a classroom grade of “A” in the subject of desired identification or a qualifying GATES score. The majority of AIG students in Orange County Schools are identified as gifted in elementary school, and the district neither retests students nor differentiates service delivery based on qualifying scores or methods of identification.

Many teachers surveyed in Orange County Schools recommended changes in the AIG identification process. The most consistent feedback was that giftedness involves above-grade level thinking skills, which cannot be accurately assessed by a standardized grade-level exam such as the EOG. Therefore, teachers advocated for the replacement of the EOG with more appropriate measures of giftedness. Suggestions included: Iowa Test of Basic Skills (ITBS), used by Wake County; IQ tests, formerly used by Orange County Schools; portfolio assessment and teacher recommendations, currently used in some but not all cases; and evaluations throughout the year. In neighboring Durham County, AIG students are identified by either the Woodcock Johnson III Achievement Battery or the ITBS, in addition to an aptitude assessment (Durham Public Schools, 2010). These methods provide a more holistic and accurate assessment of true giftedness, rather than relying on a one-time snapshot from one test day as with Orange County Schools’ current method.

Teachers expressed concern that some students qualify for the AIG program via a testing fluke caused by either getting lucky, guessing correctly, or having an extraordinary teacher that particular year. These students often struggle in the AIG program and would be better served in a

different set of courses suited to their skill level. Furthermore, even high achieving students are not always truly gifted. Academic excellence might be a result of hard work, a nurturing environment, or high levels of preparation, rather than the higher-order thinking that characterizes gifted students. Teachers thought it crucial to differentiate between academic high achievers and gifted students with a consistent, appropriate, and adequate identification process.

*How do AIG-specific instructional methods impact AIG student growth?*

Ability grouping is a central component of gifted student instruction. Ability grouping can be broken into three distinct methods: cluster grouping within a general classroom, special classroom grouping, and tracking. Cluster grouping enables students of similar abilities to interact within a heterogeneous classroom environment. The key component of a cluster grouping strategy is that it must be accompanied by differentiated curriculum, which is adapted to the needs and abilities of each group. Research shows that clusters are only effective in improving academic achievement for gifted students if the curriculum is sufficiently extended beyond the material offered to all students, though cluster grouping can benefit students of all abilities if an appropriate curriculum is provided (Toth, 1999). Several examples of successful cluster grouping models involve separating students by identified ability, allowing for flexibility in identification throughout the year, and placing groups of similar ability together in a heterogeneous classroom. Teachers working in this model are able to more easily focus on students with special needs when they are grouped, as opposed to being scattered throughout the classrooms (Toth, 1999). Cluster grouping is an effective intervention when resources are not available to support a full-time gifted program (Rogers, 1991). Gentry and Owen conducted a scientific study analyzing the impact of cluster grouping, finding that students at all achievement

levels benefited from differentiated instruction and content accompanied by cluster grouping (Gentry, 1999). Cluster grouping places together several high-ability students within a mixed-ability classroom, providing differentiated curriculum and instruction to these students (Gentry, 1999). It is important to remember that ability grouping on its own does little to promote gains in achievement: Gains are only seen when the groups experience differentiated content and pace of learning (Kulik, 1992).

The Orange County school system relies heavily on cluster grouping to serve its gifted students throughout the school day. Teachers emphasized the importance of including high-achieving students who lack formal AIG identification in gifted programming, adding that AIG-identified students will not always be high-achieving in all areas at all times. Therefore, flexible grouping models that allow all students demonstrating mastery to participate in extended and enriched curriculum will be crucial for Orange County Schools moving forward. These models serve the additional purpose of reaching students from underrepresented populations who for various reasons are not formally identified as gifted. All schools included in the study used cluster grouping either in the form of AIG co-teaching, push-in models, or differentiated instruction. These models make AIG specialists more of a resource for the entire school, rather than for a select group of students.

Special grouping creates an entire class for students of similar ability for a specific academic subject. All schools in the district employ a full-time AIG specialist who teaches such classes as necessary, though it is important to consider that not all schools will have this capability. Students may be identified with different abilities for different subjects, and served accordingly. Teachers serving only students identified as gifted can apply certain techniques that might not be effective in a general ability classroom, such as enrichment groups and off-campus

opportunities (Delisle, 1999). Special grouping has the advantage of freeing the instructor to apply an accelerated approach to the entire classroom, creating a competitive “peer effect” among the students (Bui, 2012). This effect can be especially substantial for underachievers, who step out of underachievement when placed with cognitive like peers (Rimm, 1998). However, this competition may cause negative effects for students who suffer a reduction in their “self-concept,” or perception of oneself relative to one’s peers. It is possible that the drop in ranking relative to one’s peers offsets the expected positive impact of more rigorous courses, more effective teachers, and higher-achieving peers in gifted programs (Bui, 2012). It follows that reductions in student growth may occur when placed in a higher achieving environment.

In Orange County Schools, special classrooms are used occasionally at the elementary school level and consistently at the middle school level. Some schools pull students out to special classrooms if they are part of the AIG program, whereas others include students who “compact out” based on pre-assessment. Elementary schools often use pull-out models for AIG students in reading, and compacting models for all high achieving students in math. This is partly due to the fact that it is generally easier to pre-test in math than in reading. All three middle schools employ an accelerated sixth grade English language class for AIG students identified in reading, taught by the AIG specialist. Math courses are also special grouped based on ability, though these may or may not correlate directly with AIG identification. AIG instructors collaborate with science and social studies teachers to provide accelerated curriculum for AIG students within those courses, though separate classes are not available.

Tracking is full-time ability grouping for regular instruction, placing students of different abilities in separate classrooms for the majority of their academic classes (Toth, 1999). While studies show that tracking has no discernible impact on the academic achievement of average



and low ability students, the gains for gifted students are substantial (Toth, 1999). While some contend the equity of tracking due to potential bias in teacher and student selection, research contends that achievement gains are likely due to the interaction of “greater degrees of learning potential, teachers who are interested in their students and their subject, and the willingness of gifted students to learn while in a classroom with other interested, high ability learners” (Toth, 1999). Across all forms of ability grouping, what is clear is that the grouping itself does not cause academic gains; but rather the ability of the teacher to meet the students’ needs through differentiation does (Toth, 1999). Tracking theoretically should maintain students’ growth over time by continuing to challenge the student academically and place students of similar ability together to challenge each other.

In Orange County Schools, tracking is used at the middle school level to place students in a series of courses that matches their abilities. Tracking is particularly prominent in math, enabling students to enroll in high school level courses during middle school. Teachers interviewed expressed concern that some students who qualify for difficult tracks based on department requirements may experience difficulty in those courses and be unable to catch up once placed in the accelerated group. Unlike grouping, which provides flexibility on a day-to-day or unit-by-unit basis, tracking assumes that students who qualify at a certain level will continue to achieve at that level with even more challenging curriculum. Taking high school level courses in middle school presents additional hurdles for students, who must adapt to a different schedule as well as transportation challenges. Middle schools in Orange County Schools use year-long schedules, whereas the high school uses a semester-long schedule. This means that middle schoolers attempting to take classes at the high school must condense their

learning into a shorter period without the processing time to which they are accustomed, on top of an already rigorous curriculum.

Enrichment and acceleration are two other methods of AIG-specific instruction. Enrichment may take many forms in gifted education programs, including classroom pull-out, curriculum compacting, and independent study. Pull-out programs remove identified students from the general classroom, providing a specialized environment in which to extend and apply the class lesson in a different way (Toth, 1999). Enrichment activities may encourage students to pursue a personal interest arising from the curriculum. Curriculum compacting involves the elimination of material previously mastered by the student, increasing the challenge level and allowing for a faster pace of learning (Toth, 1999). This method can have a significant reversal effect on underachievement by incentivizing students to complete assignments quickly and to the best of their ability. Once students have demonstrated subject mastery, they are able to extend their knowledge by applying the concept to a project meeting their own interests (Toth, 1999). A study conducted by The National Research Center on the Gifted and Talented concluded that students with a compacted curriculum “significantly outperformed” their counterparts on standardized tests while also gaining better attitudes and higher preferences for the subject matter (Toth, 1999).

Acceleration advances a student to a higher grade either by early admission, grade-skipping, early graduation, or concurrent enrollment in another institution (Toth, 1999). When appropriate, acceleration can be highly beneficial for students who are well above their age-peers. Placing these students in a more challenging environment not only encourages academic engagement, but also provides experience and teaches acceptance of failure. Given the previously mentioned psychological effects of giftedness, teaching students to meet challenges,

including hard work and risk of failure, is a crucial component of gifted education. Gifted education authors have gone so far as to assert that failing to provide a challenging environment teaches children to underachieve by allowing them to succeed without trying (Toth, 1999).

Acceleration provides one option for continuing to push students to meet their potential.

Enrichment and academic acceleration can be beneficial to all students (Phillips, 2008). Continuous progress models accept that students may have different levels of proficiency in various subjects, and allow flexibility for these students to pursue these subjects at different speeds. By meeting individual learning needs as necessary, a student's education is more relevant and meaningful (Phillips, 2008). Teaching methods such as open-ended assignments, opportunities for collaboration, tiered assignments, independent projects, books that extend the curricula, and school-wide enrichment can be beneficial to all students in the classroom (Renzulli, 2008).

Research shows that acceleration, when used with ability grouping, has stronger effects on student learning than enrichment alone (Kettler, 2003). Accelerative opportunities have been shown to enhance learning, motivation, and extracurricular involvement for students learning above their age-peers (VanTassel-Baska, 2005). Gifted students learn and process new information faster than their peers, retain information taught at two to three times the normal pace, and lose content when reviewed more than two or three times (Kettler, 2003).

Differentiated curriculum, sufficiently different from the norm to justify its specialized implementation, challenges gifted students to think in-depth on multiple levels (VanTassel-Baska, 2005). Tailoring classroom activities to student strengths and interests can help reverse academic underachievement and bolster success by acknowledging that students are gifted during all hours of the day, not just during the times set aside for gifted-specific programs (Reiss,

2000). To be successful in this model, teachers should be able to engage in high-level questioning with their students, demonstrate mastery in subject matter examinations, and manage multiple learning objectives and demands at the same time (VanTassel-Baska, 2005).

Overall, AIG specialists in Orange County Schools emphasized the importance of building gifted instruction into general classroom practices. As one teacher stated, “Best practices in gifted education are really best practices for most learning styles.” Enriching and extending the curriculum to provide additional levels of depth can benefit all students, not only the gifted. However, it is especially important to make sure that gifted students’ needs are met through rigorous, challenging curriculum that encourages independent thinking and reasoning. Several teachers emphasized the need to prepare gifted students for the real world by focusing on personal development rather than academic development. Some argue that gifted students need more emphasis on rigor and persevering through challenges rather than pure academic learning, especially in elementary school when they are likely to have already mastered the material. In this way, AIG specialists can take advantage of special classrooms to work on developing skills that gifted and very high achieving students might not develop in other classrooms.

*How do general classroom instructional methods, specifically differentiated instruction, impact AIG student growth?*

Differentiated instruction is an alternative method to gifted-only instruction and is currently used in North Carolina as a method of reaching diverse student populations (North Carolina Department of Public Instruction, 2009). Differentiated instruction uses various instructional methods to meet the needs of all students in the classroom. It is an individual-centered education in which each student influences both his content and pace of learning.

Differentiated instruction relies on an instructor who is familiar with her students and can plan and deliver customized lessons. Teacher quality and classroom support is crucial to the success of this system. Pre-assessment is an essential aspect of differentiated instruction, using different groupings of students to challenge and enhance learning for each student. Pre-assessment helps determine the baseline for a given course material and identify the speed necessary for the student to achieve mastery (Willoughby, 2005). Recognizing that all students do not learn at the same speed, instructors can accelerate or decelerate the standard curriculum based on the pre-assessment (VanTassel-Baska, 2005). Essentially, instructors determine the objectives for the given lesson, activities for students at grade level to achieve the objectives, and activities at various levels above the average for advanced students to achieve the objectives at increasing levels of complexity (Kettler, 2003). For example, all students may learn the basic grade level concept of addition. While the basic students work through the concept with several repetitions, the advanced students apply the concept to above grade-level problems. All students learn the same concept and achieve the grade-level objectives, though not at the expense of the advanced students (Kettler, 2003).

An experiment with differentiated instruction in Topsail, North Carolina yielded a 15.8% increase in student proficiency (Lewis, 2005). Teacher training and administrative support was needed to adjust the curriculum, teaching strategies, and classroom environment to meet the needs of students. Educators modified the content, process, and end product for students, and obtained positive results. Teachers used a combination of the following methods:

- Flexible learning groups: mixing students based on the day's lesson or activity
- Learning centers: stations individualized to the subject at hand
- Independent contracts: agreements between each student and the teacher

- Adjusting questions based on mastery
- Thematic units integrating different disciplines
- Compacting the regular curriculum for students who have achieved mastery
- Independent study for students with special interests
- Tiered assignments: designed at different levels of complexity according to student readiness

Teachers are embracing the new technique of facilitating rather than lecturing, and student achievement is rising across all racial and socioeconomic groups. Students identified as gifted are achieving growth, though at slower rates than other groups (Lewis, 2005).

Orange County Schools has emphasized differentiation as an effective teaching technique in recent years. AIG specialists aid this process by participating in co-teaching and shifting to push-in models of instruction. Co-teaching pairs the AIG specialist with another teacher for a certain class period, enabling instructors to focus on different groups of students. Similarly, AIG push-in brings the AIG specialist into the classroom to work with all students who have demonstrated mastery on the material based on pre-testing. In both co-teaching and push-in models, the AIG specialist provides extended and enriched curriculum for high achieving students while the general teacher works with struggling students to meet their needs. Teachers in the district spoke favorably of these methods, as they reduce the stigma associated with various labels and create a more cohesive classroom environment. Co-teaching and push-in models also allow for increased flexibility to better serve students who may not have qualified for the AIG program, yet have the potential to be identified and are achieving at a high level. Finally, these models keep all students engaged in the same material while at different levels, reducing the disconnect between gifted and general curriculum and maintaining a continuity of

instruction. By doing so, teachers can more easily identify holes in gifted student knowledge and fill those gaps prior to standardized testing.

*What factors outside of school impact AIG student growth?*

Gifted students often exhibit several unique characteristics that put them at risk for underachievement. Gifted students are more likely to receive frequent ability-focused praise, endure high expectations from parents and teachers, and experience pressures associated with being identified as gifted (Snyder, 2012). In addition, gifted students tend to consider academics a primary factor in identity creation. Failure in this area is greatly related to one's conception of personal failure under this paradigm. Therefore, gifted students may disengage from academics in order to protect themselves from the possibility of failure and subsequent loss of self-worth. Academic acceleration or increased challenge may exacerbate the student's incentive to disengage due to the risk of failure (Snyder, 2012). Underachievement is often associated with perfectionism, stress, and a diminished locus of control by which the student does not feel able to control the outcomes of personal efforts (Baker, 1998). Multiple studies suggest that the home environment may influence many of these psychological processes. According to one of these studies, "families of achievers and underachievers exhibit differences on variables important to supporting children's behavior," such as fostering self-confidence and encouraging risk-taking (Baker, 1998). Family structures that instill these qualities in gifted children provide a more solid base upon which the school and AIG program can build.

Underachievement is a function of both the student and the program in which he or she is participating. Often, underachievement is brought upon by an unchallenging academic curriculum that in turn reduces gifted students' academic motivation (Snyder, 2012). Many

gifted students develop intense interests outside of school, leading to boredom and a lack of interest in class. For this reason, it is recommended that gifted programs allow students to investigate these interests through enrichment to enhance student motivation and reverse negative attitudes about school (Reiss, 2000). Inflexible curricular requirements, age-grouping rather than ability-grouping, and lack of acceleration opportunities have also been linked to underachievement (Fehrenbach, 1993). Students must be able to demonstrate what they already know and are able to do, and then proceed to be challenged with curriculum that is “slightly beyond their grasp and requires significant effort to master” (Winebrenner, 2001). When students are able to learn about areas of high interest using complex methods beyond their age-peers, they feel an increased sense of connection with the material and are more likely to find real-world applications (Winebrenner, 2001). Matching the child’s school environment and pedagogical method with his or her learning style is crucial to engaging the student (Baker, 1998).

In addition to the factors mentioned above, teachers in Orange County Schools noted that family background, student interest in school, and involvement outside of school have great impacts on student learning and growth. Middle school students in particular encounter a plethora of new experiences during their middle school years that impact academic achievement. Many physical and psychological changes occurring at this time distract students from school, resulting in stagnated growth. Gifted students are also more likely to take high school level courses during middle school. These classes present additional challenges and encourage students to overlook grade-level material tested on the EOG in favor of credit-rendering material tested in other ways. The seventh grade dip in math achievement (apparent in Figure A) might be attributed to the fact that seventh grade is the first year students participate in school athletic teams and encounter in-depth laboratory science classes. Between athletics and new challenges



in other courses, such as hands-on laboratory work in science, middle school students simply might not have the energy to perform up to their usual standards in subjects such as math and reading. As one teacher noted when interviewed, “Middle schoolers are notorious for being very tunnel-visioned and focused on certain things, and so if that’s their first time in science experiencing hands-on dissection, labs, those sorts of things, then between their athletics and their science, that might be all they’ve got.”

*What metrics should be used to assess AIG student learning?*

As discussed in the section on AIG identification practices, gifted students by definition should perform one to two grade levels above their age peers. Therefore, grade-level assessments are an illogical choice for measuring gifted student learning. Teachers in Orange County Schools unanimously agreed that state-wide standardized test scores are not an accurate measure of AIG student learning and that the DPI-calculated test score growth index is not an accurate measure of AIG student ability and achievement.

With any test, potential errors of measurement include sampling errors, student mood and health on test day, and discontinuity between classroom experience and material on the exam (Reiss 2000). In addition, many gifted students lack the motivation to perform to the best of their abilities on standardized exams for a variety of reasons. Firstly, gifted students are generally confident enough in their own abilities to know that they will achieve a minimum standard. If students have no additional incentive to perform beyond this minimum, many will not (Emerick, 1992). Some teachers also suggested that gifted students tend to feel that standard rules do not apply to them, and will not try their best for this reason. Parents, peers and even teachers may not emphasize the importance of these exams for gifted students, further decreasing motivation.

Many teachers argued that standardized tests in general are an inaccurate portrayal of gifted student achievement. Gifted students tend to think in unconventional ways that are not measured by standardized assessments, and gifted programs further encourage thinking styles more creative and independent than can be displayed on such exams. Reactive assessments that adjust the difficulty of questions beyond grade level based on student answers provide one solution to this problem, as do open-ended assessments that involve reasoning and deeper thinking skills.

Despite these arguments, teachers generally agreed that students who typically perform well in the classroom tend to perform well on the EOG. Reasons cited include increased engagement in class and interest in the material, as well as greater social adjustment and support from home. The personalities of the children also come into play, as those who hold themselves to very high standards usually perform better than those who only perform well when they deem necessary. Some variation occurs with cultural or language bias, as well as with perfectionist students who unintentionally lower their scores by second-guessing their instincts and changing answers when checking over the exam. Middle school teachers noted that AIG students are often enrolled in advanced coursework that does not match with the content of the grade-level EOG exam. Therefore, students might do well in class but not on the EOG, or vice versa. Some students struggle with the advanced material but continue to retain mastery of grade-level material, whereas others succeed in the advanced coursework at the expense of retaining the basics.

In terms of the specific measure analyzed in this study, test score growth, teachers either felt that it was an inaccurate portrayal of gifted student learning or could not comment due to confusion regarding the calculation. Representatives from the North Carolina Department of

Public Instruction (DPI) agreed that teacher confusion is one reason why the index is not used for individual student evaluation, though it is used for high stakes teacher and school evaluation. Both teachers and representatives from DPI argued that it is extremely difficult, and in fact unexpected, for gifted students to show positive growth on the index. Gifted students are, by definition, in the top five percent or so of the population. Therefore, it is nearly impossible for these students to move more than a few percentage points, if at all. While a score of “0,” or meeting growth, is obviously preferred to showing negative growth, those interviewed felt that as long as gifted students didn’t show multiple years of negative growth the measure was not indicative of underperformance. This is because the index is based on performance relative to the average grade-level performance in the standard-setting year, and students who initially score very highly relative to the baseline are likely to drop in subsequent years. While the index takes this trend into account with its regression to the mean adjustment, gifted students may have a larger regression to the mean than the rest of the population due to their relatively high starting point. Therefore, some amount of negative growth could be expected for this specific group of students.

Most teachers saw trends among those students who met their growth targets and those who did not. Students meeting growth generally were more engaged in class, determined to succeed in school, and supported by teacher and parent relationships. Students not meeting growth either failed to exhibit these qualities or started with such high numbers that growth was nearly impossible. As one teacher noted, students with weaker starting points have an advantage over initially stronger students when aiming to make growth targets. Therefore, recently identified students or those receiving gifted services without formal identification tend to show higher levels of growth. Other teachers asserted that growth scores were “baffling” and did not

correlate at all with classroom performance. These teachers felt that not only was the growth index difficult to interpret, but also failed to accurately represent actual student growth from the beginning to end of the year.

### **Conclusion: Implications for Orange County Schools and Beyond**

This review highlights the achievement of AIG students in Orange County Schools by analyzing test score growth data and interpreting teacher comments. Several points can be of use to both Orange County Schools and other school systems looking to improve gifted education services. Firstly, it is important to note that the binary categories of AIG and non-AIG are not a completely accurate division. Some students are on the brink of being identified but do not cross the threshold, some are identified in one subject but not another, and all students are identified through different means. While much of the information provided in this research is applicable to high potential students regardless of formal identification, schools should note the need to be flexible in service provision. Given this reality, Orange County Schools has shifted its focus away from exclusive pull-out programs to classroom differentiation, co-teaching, and compacting based on pre-assessment rather than identification. These inclusive models extend the reach of gifted services to traditionally underserved populations and create flexible environments for both identified and non-identified students to receive appropriate instruction. Teachers are very supportive of this shift, and the literature surrounding gifted student needs also verifies the importance of adaptable models for different students, classes, and subjects.

The evidence here suggests a revision to Orange County Schools' AIG identification methods to include more holistic, teacher-driven, and non-test based evaluations. Since gifted students have unique qualities that impact standardized test scores, evaluation from teachers and

specialists with more contact with the student can provide better information. Both teachers and representatives from DPI argued that it is extremely difficult, and in fact unexpected, for gifted students to show positive growth using current measures. Those interviewed felt that as long as gifted students didn't show multiple years of negative growth, that statistic was not in fact indicative of underperformance. Therefore, a shift in the definition of performance for both gifted identification and overall student achievement is necessary.

## **Recommendations**

### *For General Classroom Teachers:*

- Differentiate curriculum to meet the needs of gifted students in all subjects, every day, apart from time with AIG specialist
- Increase the use of informal assessment to gauge student learning throughout the unit
- Engage gifted students in schoolwork by connecting the curriculum to their world and interests
- Recognize gifted qualities in students and provide recommendations for placement
- Provide comprehensive and accurate evaluations for all students to ensure appropriate identification

### *For Gifted Specialists:*

- Increase focus on general teacher training for gifted service delivery in all classrooms
- Expand reach into younger grade levels to capture underserved populations before gaps widen
- Differentiate within gifted instruction to meet the needs of the broad spectrum of gifted students, including those identified through alternative means

- Continue to develop push-in and co-teaching methods to create a collaborative environment between AIG and other programs within the school
- Help teachers and parents understand the qualities and needs of the truly gifted
- Provide instruction of sufficient rigor to enable gifted students to push themselves beyond grade level achievement and develop the mental capacities to meet challenges

*For School Administrators:*

- Recognize the limitations of standardized testing, especially in regards to gifted students, and consider reactive testing that goes beyond grade level material for high scorers
- Reduce the emphasis on the test score growth index for high stakes evaluation
- Adjust AIG identification practices to better reflect holistic student qualities
- Remove the EOG from AIG identification
- Reevaluate AIG students periodically for appropriate service placement

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## Appendices

*Appendix A. Sample Growth Score Calculation (from North Carolina Department of Public Instruction, 2010-2011).*

### A Sample Calculation for Determining *Academic Change* for Grades 3-8

For our example, Ramon is a student in grade 5 in the 2010-11 school year. Ramon's test scores are:

	EOG Reading	EOG Math
Grade 5 (2010-11)	353	358
Grade 4 (2009-10)	359	349
Grade 3 (2008-09)	347	343

Steps in the Calculation of Academic Change:

1. **Convert the developmental scale scores to *c-scale* scores:**

- Subtract the state mean for the standard setting year from the developmental scale score
- Divide by the standard deviation for the standard setting year.

Grade Level	Scale score	State mean	Difference	Standard deviation	<b>Actual c-score*</b>
Reading 5	353	350.0	3.0	9.4	<b>.319</b>
Reading 4	359	345.2	13.8	10.1	<b>1.366</b>
Reading 3	347	338.6	8.4	11.9	<b>.706</b>
Math 5	358	353.7	4.3	9.2	<b>.467</b>
Math 4	349	348.9	.1	9.5	<b>.011</b>
Math 3	343	343.2	-.2	9.7	<b>-.021</b>

2. **Compute the ATPAs (average of two previous assessment scores on the *c-scale*), for reading and mathematics, and adjust for regression to the mean to determine what is expected for Ramon at grade 5.**

Grade Level	c-scale	ATPA	Coefficient	<b>Expected c-score</b>
Reading 4	1.366	1.036	0.92	<b>.953</b>
Reading 3	.706			
Math 4	.011	-.01	0.92	<b>-.009</b>
Math 3	-.021			

3. **Subtract the expected c-scale score from the actual c-scale score (see step #1) to determine Ramon's academic change.**

Grade Level	Actual c-score (from Step # 1)	Expected c-score (from Step #2)	Difference = Academic Change	Met Expected Academic Change?
Reading 5	.319	.953	-.634	No
Math 5	.467	-.009	.476	Yes

*Appendix B. Interview Questions for AIG Teachers in Orange County.*

**Interview Questions for AIG Teachers in Orange County**

1. What is the structure of your school's AIG program?
  - a. Which instructional methods are used with AIG students?
  - b. To what extent does differentiated instruction, defined here as using various instructional methods to meet the needs of all students in a mixed-ability classroom, occur in your school's general classrooms?
  - c. How does this affect AIG-specific instruction?
2. How are students selected for the AIG program at your school?
  - a. Would you change this selection process if you could? Why?
3. Do you think state-wide standardized tests are an accurate measure of AIG student learning?
  - a. Would you consider the DPI-calculated test score growth index a reliable measure of AIG student ability and achievement?
  - b. Do you notice any correlation between EOG performance and classroom performance for your gifted students?
4. How do you perceive the test score growth of your AIG students?
  - a. Do you notice any trends?
  - b. Have you found any notable differences between students in your AIG program who are meeting their growth targets and those who are not?
  - c. Are you surprised to hear of the data regarding test score growth for Orange County AIG students?
5. What are some hypotheses you have regarding the reasons for the trend of negative test score growth found in this research?
6. What methods would you suggest to address this trend?
7. Is there anything else you would like to say regarding the AIG program at your school, in Orange County, or otherwise?

*Appendix C. Participant Consent Form for AIG Teachers in Orange County.*

Thank you for choosing to participate in this research project as an educator of gifted students in Orange County Schools. As you know, I am a student at Duke University conducting this research in collaboration with the Orange County Division of Testing and Accountability. This research seeks to identify the school and program-level factors impacting the performance of Orange County's academically and intellectually gifted students on the End of Grade tests.

Given that initial data analysis yielded inconclusive results, the second phase of the research involves teacher interviews to delve deeper into the Orange County AIG program. The interview aims to address the central question: How do academically and intellectually gifted identification practices, instructional methods, and student characteristics in Orange County Schools impact student growth rates on standardized tests?

The interview consists of 7 questions and should take approximately 20 minutes. Feel free to be candid in your responses, as your expertise and knowledge of the students in Orange County is invaluable to our study.

In my report, I will identify the schools where I conducted interviews. Your name will not be used in the report, though you may be identified through your association with a particular school. You may choose to keep some information "off the record," meaning that it will only be used in general discussion and not linked to a specific school.

If you have any questions about the purpose of the study, the use of the interviews, or confidentiality, please ask me now. You may also contact either myself or my faculty advisor via email at [email address removed] or [email address removed].

Signed \_\_\_\_\_

Date \_\_\_\_\_

Appendix D. Chart of Correlations between Quantitative Factors and Gifted Growth (r values).

	<i>AvRe – E</i>	<i>AvMa – E</i>	<i>AvRe – M</i>	<i>AvMa – M</i>	<i>%NRe – E</i>	<i>%NMa – E</i>	<i>%NRe – M</i>	<i>%NMa – M</i>
<i>School size</i>	-0.1559	<b>-0.6262</b>	0.3489	0.2186	<b>0.5148</b>	0.3509	<b>-0.4140</b>	-0.2620
<i>Class size</i>	0.0956	<b>-0.7073</b>	0.1014	0.0058	<b>0.7040</b>	<b>0.5744</b>	0.0760	-0.0810
<i>Program size (R/M)</i>	-0.3692	-0.1915	0.2151	0.0289	0.3299	0.3053	-0.0713	-0.0045
<i>SchoolEOG (R/M)</i>	<b>-0.6407</b>	-0.3602	0.0794	0.3425	-0.2885	0.2253	0.1380	-0.2492
<i>NBC Teachers</i>	<b>-0.7352</b>	-0.1090	-0.3341	0.0226	-0.1844	-0.0253	<b>0.5616</b>	0.0754

Key

AvRe = Average Growth Score on Reading

AvMa = Average Growth Score on Math

%NRe = % AIG Students Showing Negative Growth on Reading

%NMa = % AIG Students Showing Negative Growth on Math

E = Elementary schools

M = Middle schools

R = Reading

M = Math

NBC = National Board Certified

**Bold** = Strong correlation (greater than or equal to the absolute value of 0.4)