



Public Schools of North Carolina
State Board of Education
Department of Public Instruction

Report to the North Carolina General Assembly

Advanced Courses in Mathematics

SL 2020-3 (SB 704), sec. 2.8 (a-b)

GS 115C-81.36 (a1-c)

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Report to the North Carolina General Assembly on Advanced Courses in Mathematics, per G.S. 115C-81.36.(c), as amended by S.L. 2020-3, Sec. 2.8

G.S. 115C-81.36 directs that, when practicable, local boards of education shall offer advanced learning opportunities in mathematics in grades three through five, and advanced courses in mathematics in all grades six and higher. For the purposes of this legislation, advanced learning opportunities are those services and curricular modifications in mathematics for academically or intellectually gifted students approved as part of the local plan, as required by G.S. 115C-150.7

Due to the COVID pandemic, S.L. 2020-3, Section 2.8, revised the reporting requirements for 2020 to the number and demographics of students who were (i) enrolled in advanced mathematics courses, including high school level mathematics courses in eighth grade, or (ii) given other advanced learning opportunities for the 2020-2021 school year. The report shall include information on the type and format of advanced mathematics courses or advanced learning opportunities provided and shall also include any feedback provided by local boards of education on the implementation of G.S. 115C-81.36.

In accordance with this legislation, NCDPI extracted enrollment data for advanced courses from the NC Student Information System (SIS) for all Local Education Agencies (LEAs) and 127 charter schools (n=243), and then developed and distributed a survey to gather information from LEAs about the type and format of advanced mathematics learning opportunities offered to students in grades 3 and higher.

The data tables below respond to the legislated requirements and reflect survey data from 114 of the 115 LEAs, as well as seven charter schools who chose to participate in the data collection process (n=121). See Appendix 1 for a sample of the survey used.

At the end of the report, NCDPI provides conclusion statements drawn from the data and a synopsis of the additional information regarding the impact of COVID-19 on the availability of advanced learning opportunities, courses in mathematics and other information LEAs shared about the implementation of the legislation via the survey.

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DATA TABLES

Table 1: GRADES 3-8

Summary of Advanced Learning Opportunities Available in Fall 2020, as reported in the survey (n=121)

Grade span	Type and Format of Advanced Learning Opportunities Available in LEAs/Charters	Percentage of LEAs/Charters who offer this opportunity to students
<i>Grades 3-5</i>	<p>Note: Respondents may be offering multiple types of these advanced learning opportunities for students.</p> <p>Students are intentionally grouped within heterogeneous regular classroom settings to maximize differentiation of curriculum and instruction. Differentiation may include the following:</p> <ul style="list-style-type: none"> • enrichment and extension of grade level standards; • an opportunity for above grade level tasks within units of study; • compacted content; • tiered lessons; • computer adaptive instruction; • various online learning platforms with courses designed for enrichment and/or accelerated content; • choice boards, menus, and playlists; and • independent studies with contracts. 	57%
<i>Grades 3-5</i>	<p>Students participate in small group AIG and/or Talent Development services led by AIG Personnel for instruction. During this designated time, AIG and advanced learners experience the following:</p> <ul style="list-style-type: none"> • problem-based learning opportunities; • specific talent development programming experiences; • advanced content using research-based higher level thinking resources and activities designed to support gifted students in remote and/or blended learning environments; • project-based learning opportunities, with embedded research and real world problem solving activities; and • a variety of STEM and STEAM activities. 	46%

<i>Grades 3-5</i>	Students are encouraged to participate in various local, regional, and statewide math competitions and/or are provided specific challenge opportunities, which often incorporate STEM activities and project-based learning exercises.	23%
<i>Grades 3-5</i>	Students are placed into an advanced class/course where instructional pacing is accelerated and teachers incorporate more depth and complexity, including project-based and other above grade level learning experiences (example: compacted 5-6 curriculum).	7%
<i>Grades 3-5</i>	Students are flexibly grouped within and across the grade levels to maximize school-wide enrichment/remediation time, allowing for increased access and opportunities to enrichment, extension, and acceleration experiences.	6%
<i>Grades 3-5</i>	Respondents indicated that advanced learning opportunities are offered to students; however, did not provide specific examples of the types of opportunities.	13%
<i>Grades 6-8</i>	<p>Students are placed into an advanced class/course where instructional pacing is accelerated and teachers incorporate more depth and complexity, including project-based and other above grade level learning experiences (example: compacted 5-6 curriculum).</p> <p>Based on SIS data with the integration of survey data collected. Refer to Table 3 for student enrollment and course offerings in Grades 6-8.</p>	Grade 6: 51% Grade 7: 52% Grade 8: 98%
<i>Grades 6-8</i>	<p>Students are intentionally grouped within heterogeneous regular classroom settings to maximize differentiation of curriculum and instruction. Differentiation may include the following:</p> <ul style="list-style-type: none"> • enrichment and extension of grade level standards; • an opportunity for above grade level tasks within units of study; • compacted content; • tiered lessons; • computer adaptive instruction; 	Grade 6: 47% Grade 7: 40% Grade 8: 30%

	<ul style="list-style-type: none"> • various online learning platforms with courses designed for enrichment and/or accelerated content; • choice boards, menus, and playlists; and • independent studies with contracts. 	
<i>Grades 6-8</i>	Students are given opportunities to compete in a variety of local, regional, and statewide math related contests.	Grade 6: 19% Grade 7: 19% Grade 8: 17%
<i>Grades 6-8</i>	Students access additional online learning opportunities, to support enrichment experiences (i.e., locally developed options via an online learning platform or utilizing commercial resources) or acceleration options through various computer adaptive lessons to support access to above grade level content.	Grade 6: 16% Grade 7: 19% Grade 8: 15%
<i>Grades 6-8</i>	<p>Students participate in small group AIG and/or Talent Development services led by AIG Personnel for instruction. During this designated time, AIG and advanced learners experience the following:</p> <ul style="list-style-type: none"> • problem-based learning opportunities; • specific talent development programming experiences; • advanced content using research-based higher level thinking resources and activities designed to support gifted students in remote and/or blended learning environments; • project-based learning opportunities, with embedded research and real world problem solving activities; and • a variety of STEM and STEAM activities. 	Grade 6: 14% Grade 7: 17% Grade 8: 14%
<i>Grades 6-8</i>	Students participate in special electives and/or clubs within the school environment to further promote student interests and continued achievement in mathematics.	Grade 6: 8% Grade 7: 11% Grade 8: 10%
<i>Grades 6-8</i>	Students are flexibly grouped within and across the grade levels to maximize school-wide enrichment/remediation time, allowing for increased access and opportunities to enrichment, extension,	Grade 6: 7% Grade 7: 7% Grade 8: 6%

	and acceleration experiences.	
<i>Grades 6-8</i>	Students participate in mathematics experiences/ camps and other special learning opportunities, often hosted by university or external partner organizations.	Grade 6-8: 2%
<i>Grades 6-8</i>	Respondents did not provide specific examples of the types of either the advanced learning opportunities or advanced courses available.	Grade 6: 4% Grade 7: 3% Grade 8: 2%

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Summary of Demographic information for Advanced Learning Opportunities

Table 2: GRADES 3-5

Number and percentages of students who participate in advanced learning opportunities (ALOs) by gender and race/ethnicity in Fall 2020, as reported in the survey (n=121)

	# of students participating in ALOs	Total # of students in Grades 3-5
Total Number of Students	40,455	307,651
	# of students participating in ALOs	% of students participating of the total subgroup population
Gender		
Female	19,313	13%
Male	21,142	13%
Race/Ethnicity		
American Indian or Alaska Native	254	7%
Asian	3,365	27%
Black or African American	5,995	8%

Race/Ethnicity	# of students participating in ALOs	% of students participating of the total subgroup population
Hispanic or Latino	5,040	8%
Native Hawaiian/Other Pacific Islander	74	16%
Two or More	2,019	13%
White	23,708	18%

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Table 3: GRADES 6-8

Number and percentages of students who participate in advanced learning opportunities (ALOs) by gender and race/ethnicity in Fall 2020, as reported in the survey (n=121)

	# of students participating in ALOs	Total # of students in Grades 6-8
Total Number of Students	55,995	332,388
	# of students participating in ALOs	% of students participating of the total subgroup population
Gender		
Female	27,416	17%
Male	28,579	17%
Ethnicity		
American Indian or Alaska Native	468	12%
Asian	4,275	35%
Black or African American	6,984	8%
Hispanic or Latino	7,491	11%
Native Hawaiian/Other Pacific Islander	59	13%
Two or More	2,393	15%
White	34,325	23%

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Summary of Enrollment Data for Advanced Mathematics Courses

Table 4: GRADES 6-12

Number of students enrolled in advanced math courses in Fall 2020 as reported in the Student Information System (n=243)

Advanced Mathematics Courses	Total Enrolled Students As of 12/01/2020
6th grade Advanced Math	21,537
Advanced Local Option Grade 6	4,568
7th grade Advanced Math	22,063
Advanced Local Option Grade 7	4,242
NC Math 1 for middle school students	35,600
Advanced Local Option Grade 8	3,397
NC Math 1 Honors	13,096
NC Math 2 for middle school students	3,686
NC Math 2 Honors	46,492
NC Math 3 for middle school students	301
NC Math 3 Honors	47,855
Discrete Mathematics Honors	3,171
Pre-Calculus Honors	27,459
NC Math 4 Honors	13,168
AP Calculus AB	9,003
AP Calculus BC	4,152
AP Computer Science	1,741
AP Statistics	9,674
CCP MAT 143 Quantitative Literacy	1,320
CCP MAT 152 Statistical Methods I	2,779
CCP MAT 171 Precalculus Algebra	6,448
CCP MAT 172 Precalculus Trigonometry	2,178
CCP MAT 263 Brief Calculus	86
CCP MAT 271 Calculus I	995

Advanced Mathematics Courses	Total Enrolled Students As of 12/01/2020
CCP MAT 272 Calculus II	264
CCP MAT 273 Calculus III	127
CCP MAT 280 Linear Algebra	19
CCP MAT 285 Differential Equations	15
CCP MAT 141 Mathematical Concepts	<10
CCP MAT 167 Discrete Mathematics	<10
IB Computer Science HL	25
IB Mathematical Studies SL	26
IB Mathematics SL	73
IB Math: Analysis and Approaches SL	979
IB Math: Analysis and Approaches HL	227
IB Math: Applications & Interpret SL	1,065
IB Math: Applications & Interpret HL	57
University Math Course	934
Univ 300/Higher Math Course	133
CIE Math Probability & Statistics AS	47
CIE Math Probability & Statistics A	22
State Total	289,027

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Table 5: GRADES 6-12

Number and percentages of students enrolled in advanced mathematics courses by gender and race/ethnicity in Fall 2020 as reported in the Student Information System (n=243)

	# of students participating in ALOs	Total # of students
Total Number of Students	289,027	821,816
	# of students participating in ALOs	% of students participating of the total subgroup population
Gender		
Female	152,969	38%
Male	136,058	32%
Ethnicity		
American Indian or Alaska Native	1,710	19%
Asian	22,130	77%
Black or African American	46,942	23%
Hispanic or Latino	41,814	27%
Native Hawaiian/Other Pacific Islander	315	29%
Two or More	11,744	31%
White	164,372	43%

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SUMMARY OF FINDINGS:

Across grades 3-8 in NC public schools, a variety of advanced learning opportunities are available to enrich, extend, and accelerate the mathematics standards for students according to learning needs. Specific resources and strategies are adapted based on student needs. Most respondents emphasized students having access to advanced curriculum and resources designed to challenge thinking, incorporate above grade level content, inquiry or problem based learning, and provide opportunities for student choice and voice. Another similarity across the grade bands was the emphasis on co-teaching to support regular classroom teachers as part of the differentiation process through the intentional co-planning of learning experiences and collaborating in the delivery of instruction. In addition, across grades 3-8, districts and charter schools alike rely on local, regional, and statewide math competitions and challenges to provide advanced learning opportunities to students.

Specifically in grades 3-5, a variety of data sources are used to determine student needs for advanced learning opportunities. Examples of data sources include classroom performance, teacher observations, school/district benchmarks and formative assessments. A variety of research-based instructional resources are also being used to emphasize critical thinking skills and provide appropriately challenging curriculum and instruction.

In grades 3-5, respondents noted the most common way to provide advanced learning opportunities was through utilizing intentional grouping strategies, in conjunction with differentiation in the classroom. This was followed closely by the use of specific AIG and other Talent Development services, with the support of AIG personnel. In the elementary grades, only a small percentage of respondents provided advanced courses (7%).

As students progress into middle school in grades 6-7, respondents note the most common way to meet the needs of advanced learners was through providing advanced course offerings. Currently, 50% of respondents include advanced coursework at grade 6 and 52% include advanced coursework at grade 7. These advanced courses are designed to ensure students receive compacted curriculum and instruction to ensure understanding of all standards leading to preparedness for NC Math 1 in grade 8.

In grade 8, districts begin shifting the approach of serving gifted and advanced learners from a variety of advanced mathematics learning opportunities to advanced mathematics courses:

- 97% of districts offer NC Math 1 at 8th grade;
- 24% of districts offer high school math courses at middle school beyond NC Math 1;

- 21% of districts report that advanced math courses, most frequently NC Math 1, are the primary source for advanced math opportunities; and
- 10% of districts offer a local Advanced 8th grade math course prior to enrollment in NC Math 1.

Following advanced course options, middle school respondents reported using differentiated instruction within the regular classroom setting to provide services, making note of professional development of the assigned teacher. Efforts focused on teachers having either AIG licensure, AIG specific coursework, or general success with AIG students, as evidenced by student achievement and/or EVAAS data.

In grades 9-12, districts and charters are offering various advanced mathematics courses to meet student needs, interests, and post-secondary plans:

- schools are offering a variety of Honors, University, Career and College Promise, Advanced Placement, International Baccalaureate, and Cambridge mathematics courses;
- students are enrolled in 33 different advanced mathematics high school courses this year;
- 55% of students enrolled in advanced mathematics courses are female.

One additional note, in progressing along the grades 3-12 continuum, there is an increase in the diversity of students; beginning with participation in advanced learning opportunities through enrollment in advanced courses. For example, in the Hispanic population, while 8% of all Hispanic students participate in advanced learning opportunities in grades 3-5, the percentage increases to 11% by middle school, and culminates with 27% of Hispanic students enrolled in advanced courses in grades 6-12. This increase is seen as a trend among almost all subgroups.

This report and data will help inform the NCDPI's Advanced Learning and Gifted Education's future professional development focusing on the multi-year initiative, "Call to Action for Realizing Equity and Excellence".

Impact of COVID-19:

When asked "*Are the above opportunities typically offered each school year or unique due to COVID-19?*", there were a variety of responses representing the full spectrum of ideas. Many districts expressed concerns that COVID-19 had interrupted many opportunities for enrichment outside of the school, including competitions and some enrichment field trips and other activities. These districts also shared that many of the usual enrichment offerings were either greatly modified or not available due to schedule constraints and concerns around limiting student movement and contact to reduce the spread of COVID-19.

Equally prevalent however, respondents expressed excitement about finding new and innovative strategies using a variety of platforms and/or learning management systems that worked well during COVID and in working to ensure these strategies continue even when students return to face to face instruction. Many of these districts have switched the usual methods of service delivery to an online format, have begun adding new online enrichment options, and have found creative ways to offer hands-on options for students, like “STEM box challenges.” In addition, many respondents expressed appreciation for a variety of new online resources developed by NCDPI and partner organizations to support the needs of gifted and advanced learners throughout this period of extended remote instruction.

Many of the comments also centered around implementation of the legislation, related to specific COVID-19 factors. These concerns included:

- COVID-19 shifted district capacity to determine appropriate placement for students, as some student data utilized in the past was unavailable;
- Wide range of student learning needs at the beginning of this school term and the need to identify and fill learning gaps for all students while moving them forward;
- The availability to offer a variety of advanced classes in mathematics may be impacted due to fewer students enrolled.

Other comments specifically about the implementation of the legislation:

One concern noted by LEAs in the survey was teacher turnover. Districts highlighted the difficulties of maintaining high quality instruction with high levels of rigor necessary to provide advanced mathematics opportunities and courses if teacher turnover in their districts is higher than normal.

Many districts feel the legislation opens avenues to share data with internal and external stakeholders. The data provided is representative of what is happening in the core curriculum and instruction, and gives insights into what students need based on how they are performing. Sharing the data with stakeholders makes room for conversations around supporting the needs of students by providing opportunities when the data is clear.

Districts specifically credited this legislation with helping to support district efforts to ensure talent development is a priority, especially with the lens of equity and excellence.

- *“We feel like the legislation has helped “find” students who qualify for advanced mathematics and especially for 8th grade NC Math 1.”*
- *“Legislating that Level 5 students are recognized and given opportunities has promoted better options for our underrepresented populations and ensured that (they) are provided opportunities in unique ways.”*

Appendix 1: Survey instrument used to collect advanced learning opportunities for students in grades 3-8.

For the purposes of the legislation, advanced learning opportunities are those services and curricular modifications in mathematics for Academically or Intellectually Gifted students approved as part of the local AIG plan, as required by G.S. 115C-150.7. Advanced learning opportunities may also include a variety of talent development activities, as well as, other enrichment, extension, or acceleration experiences to support the student's growth and development in mathematics.

1. Are advanced learning opportunities in mathematics available for grades 3-5?
 - a. If yes, who delivers the advanced mathematics learning opportunities?
 - b. Describe the advanced learning opportunities provided for students in grades 3-5.
2. Provide the following demographic information for those students in grades 3-5 receiving advanced learning opportunities:
 - What is the total number of students in grades 3-5 throughout the district receiving advanced learning opportunities in mathematics?
 - How many of these students are male?
 - How many of these students are female?
 - How many of these students identify as (AM) American Indian or Alaska Native?
 - How many of these students identify as (AS) Asian?
 - How many of these students identify as (BL) Black or African American?
 - How many of these students identify as (H) Hispanic or Latino?
 - How many of these students identify as (PI) Native Hawaiian/Other Pacific Islander?
 - How many of these students identify as (WH) White?
 - How many of these students identify as (M) Two or More races?

Background: While many districts do not yet offer advanced courses in grades 6 and 7, the district provides advanced learning opportunities in these grades. For the purposes of this report, advanced learning opportunities may include a variety of talent development activities, as well as other enrichment, extension, or acceleration experiences to support the student's growth and development in mathematics.

3. Are advanced learning opportunities in math available for grade 6? If yes, please describe the format of the advanced learning opportunities for grade 6.
4. Are advanced learning opportunities in math available for grade 7? If yes, please describe the format of the advanced learning opportunities for grade 7.

Background: Consider the advanced learning opportunities that may be offered, in addition to the high school mathematics course(s) offered in grade 8.

5. Other than advanced math courses, does the district provide advanced learning opportunities in math for grade 8? If yes, please describe the format of advanced learning opportunities available for grade 8.

6. Provide the following demographic information for those students in grades 6-8 receiving advanced learning opportunities in mathematics:

- What is the total number of students in grades 6-8 throughout the district receiving advanced learning opportunities in mathematics?
- How many of these students are male?
- How many of these students are female?
- How many of these students identify as (AM) American Indian or Alaska Native?
- How many of these students identify as (AS) Asian?
- How many of these students identify as (BL) Black or African American?
- How many of these students identify as (H) Hispanic or Latino?
- How many of these students identify as (PI) Native Hawaiian/Other Pacific Islander?
- How many of these students identify as (WH) White?
- How many of these students identify as (M) Two or More races?

7. Are the above opportunities typically offered each school year or unique due to COVID-19?

8. Do you wish to share any additional information about the implementation of the legislation?

Contact NCDPI Advanced Learning and Gifted Education with questions or concerns at sneha.shahcoltrane@dpi.nc.gov.