



NORTH CAROLINA
State Board of Education
Department of Public Instruction

Report to the North Carolina General Assembly

Impact of the Coding and Mobile App
Development Program

SL 2017-57(SB 257)

Date Due: September 15
DPI Chronological Schedule, 2022-2023

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REPORTING REQUIREMENT

This document reports the impact of the Coding and Mobile App Development Program to the General Assembly pursuant to Session Law 2017-57 (SB 257), which called for the following:

SECTION 7.23.(d) Reporting Requirements. – By August 1 of each year of the Program, grant recipients shall submit a report to the Department of Public Instruction, beginning with an initial report by August 1, 2018, for the preceding year in which grant funds were expended that provides at least the following information on the partnership initiative:

- 1) The use of grant funds.
- 2) The number of students by grade level participating in the partnership initiative.
- 3) The number of students who subsequently participated in work-based opportunities, internships, or apprenticeship programs and a description of the types of opportunities for those students.
- 4) Student outcome data regarding job attainment and postsecondary opportunities as a result of the partnership initiative.
- 5) Any other information the Superintendent of Public Instruction deems necessary.

By September 15 of each year of the Program, the Department shall report to the Joint Legislative Education Oversight Committee and the Fiscal Research Division, beginning with an initial report by September 15, 2018, on grant recipients and implementation of the program, including the information required to be reported to the Department pursuant to this subsection and any legislative recommendations for modifications or expansion of the Program.

COMPUTER SCIENCE, IT, AND TECHNOLOGY EDUCATION

The Office of Career and Technical Education (CTE) at the North Carolina Department of Public Instruction serves as lead for the Coding and Mobile App Development Program that is delivered through the Computer Sciences Standards and Computer Science, IT, and Technology (CSITT) Education. Computer Science is a content area focused on the understanding and creation of information and technological systems to be a digital age learner. As part of the Computer Science pathway of study, students can experience:

- Computing Systems and Applications
- Networks and the Internet
- Data Analytics
- Programming and Algorithms
- Impacts of Technology
- STEM
- Information Processing
- Design Thinking
- Engineering and Advanced Manufacturing
- Artificial Intelligence and Robotics
- Cybersecurity and Privacy

Students experience Computer Science, IT, and Technology Education through the NC Computer Science K-12 Standards administered at the elementary level through the North Carolina Standard of Study and through individual Computer Science, IT, and Technology Education courses on the middle grades and high school level.

IMPACT OF THE CODING AND MOBILE APP DEVELOPMENT PROGRAM

The Coding and Mobile App Development Grant Program finished its sixth year of engaging and impactful programs for North Carolina. The grant program afforded the opportunity for more than 21,641 students and their educators, administrators, and other staff to experience coding or mobile app development as well as exposure to Computer Science, IT, and Technology related work in business and industry. These experiences included classroom integration activities, work-based learning opportunities, professional development experiences, and others. The twelve Public School Units (PSU) grant recipients were awarded grant funds to implement activities to add new or expand coding and Computer Science courses or supporting activities for elementary, middle, or high school students.

<i>Participating Public School Units Grant Recipients</i>	<i>Grant Amount</i>
Alexander County Schools	\$77,467.00
Beaufort County Schools	\$77,467.00
Burke County Schools	\$77,467.00
Cabarrus County Schools	\$77,469.00
Caldwell County Schools	\$77,467.00
Catawba County Schools	\$75,000.00
Charlotte-Mecklenburg Schools	\$26,196.00
Edgecombe County Schools	\$77,467.00
Lee County Schools	\$40,000.00
Lexington City Schools	\$25,800.00
McDowell County Schools	\$75,000.00
Northeast Academy for Aerospace & Advanced Technology	\$53,200.00

Ten PSU grant recipients provided a report by August 1, 2023 on the grant initiative activities completed, with Edgecombe County Schools not submitting a report. Charlotte-Mecklenburg Schools declined the grant in May 2023 as transition in district leadership prevented grant implementation. As a result, data reported excludes information from Charlotte-Mecklenburg Schools or Edgecombe County Schools.

It is important to note that coding and Computer Science curriculum is significantly expanding with increasing demand for students to be digital literate upon graduation. Students from a miscellany of demographics readily exposed to the curriculum as an increasing number of educators and administrators are receiving professional development and training to help expand course offerings. This expansion of curriculum and technology with the younger generations has the potential to positively impact the economy in the state of North Carolina as more students are being exposed to and developing the skills necessary to meet workforce demands. PSU grant recipients have overwhelmingly expressed their desire to continue along this path of Computer Science expansion and exposure to move into the future.

Highlight of Initiatives of PSU Grant Recipients

PSU grant recipients completed innovative initiatives to build local capacity and Computer Science, IT, and Technology pathways as part of the K-12 Computer Science Standards. The following is a highlight of the initiatives completed by PSU grant recipients:

- Build educator capacity and leadership in integrating the NC Computer Science Standards
- Expose elementary and middle school students to Computer Science, computational thinking, and robotics
- Promote the Computer Science, IT, and Technology CTE pathways at the high school level
- Develop interdistrict staff training on Computer Science concepts and technology tool integration
- Build Computer Science integration capacity in English Language Arts, Mathematics, Science, and Social Studies course of study
- Build connections between elementary and secondary schools through intentional programming
- Provide cybersecurity credential attainment opportunities for students
- Facilitate professional development for educators on Computer Science and coding
- Host multiple PSU regional collaboration on Computer Science integration

USE OF GRANT FUNDS

The grant funds were used to purchase equipment, curricular materials, and cover the costs associated with educator professional development activities to build capacity in coding, Computer Science, robotics, and mobile application development initiatives. Students across the state were exposed to various topics and concepts related to coding, Computer Science, and robotics. The exposure expanded beyond the classroom and included interactions with business and industry members, participation in community coding activities, increased course offerings, and additional skill building activities which can increase employability. The sections below provide more details on the specific use of funds among the PSU grant recipients.

Professional Development Activities

The professional development activities varied in nature and content, but all with the common goal of expanding educator and administrator capacity to deliver Computer Science concepts to students within their PSU. As a result of multiple hours of training, learning and exposure, students have the benefit of being instructed by educators who have participated in the following experiences:

- The Friday Institute Computer Science professional developments sessions
- Computer Science Discoveries curriculum training
- Computer Science Fundamentals curriculum training
- Industry immersion experiences at local Computer Science related businesses
- Interdistrict training on the integration of the NC Computer Science Standards
- Multiple PSU regional Computer Science integration best practices sharing sessions
- VEX Go training
- Design thinking coaching and training
- North Carolina Technology in Education Society (NCTIES) Conference sessions
- ACTE Career Tech Vision sessions

Computer Science Integration Activities

PSU grant recipients focused on building educator capacity on integrating the North Carolina Computer Science Standards into educational experiences for students through in classroom experiences or outside of school activities. Besides Computer Science courses, integration activities were implemented in the K–12 English Language Arts, Mathematics, Science, and Social Studies course of studies. The primary concepts of focus for integration were coding and programming, cybersecurity, artificial intelligence, computational thinking and problem-solving, data analysis, computer systems, and using various software and hardware. The following is a summary of the intentional integration activities implemented by PSU grant recipients:

- Provided stipends to educators to create integrative lesson plans and activities
- Purchased books on coding and Computer Sciences for school media centers
- Provided transportation for work-based learning opportunities for students
- Provided transportation for students to attend Computer Science and robotic competitions
- Facilitated business and industry field trips for students

Educators and students accessed computer labs, equipment, and software as integral and enhanced components of the grant program. The following is a summary of the equipment and curricular materials purchased or used:

- Finch 2.0 Robots
- Hello World Digital Curriculum
- Humingbird Robots
- Makey Makey classroom packs
- Sphero Bolt power packs and mats
- Sphero Indi class packs
- VEX Robots

STUDENT PARTICIPATION DATA

Students at the various PSU grant recipient sites were exposed to Coding and Computer Science concepts in a variety of ways. Representation in this grant cycle comprised of a diversity of backgrounds and capabilities; adding to the affluence of program experience and impact throughout the state of North Carolina. The tables below include demographics specifically related to sex, ethnicity, and grade for participating students. The following information is self-reported by grantees. Please note, the tables are not correlated.

Student Participation Demographics

The table below summarizes the total student participation in grantee initiatives by sex, race/ethnicity, and grade level. Total student participation for the 2022–2023 grant cycle was 21,641.

Characteristic	Participation Total	%	Mode
Sex			Male
Female	9,504	43.9	
Male	10,677	49.4	
Other	1,460	6.7	
Race/Ethnicity			White
American Indian/Alaskan Native	20	<0.01	
Asian	1,244	5.7	
Black/African American	2,379	11.0	
Hispanic/Latino	3,689	17.0	
Native Hawaiian/Pacific Islander	69	<0.01	
White	11,173	51.6	
Other	1,295	6.0	
Not Reported	1,772	8.2	
Grade Level			Grade 8
Kindergarten	965	4.4	
1	1,094	5.0	
2	1,194	5.6	
3	1,113	5.1	
7	1,148	5.3	
5	1,124	5.2	
6	4,066	18.8	
7	4,007	18.6	
8	4,401	20.3	
9	649	3.0	
10	687	3.2	
11	659	3.0	
12	534	2.5	

Student Participant Enrollment and Engagement Before and After Grant

The table below summarizes the student participation before and after the grant initiative through enrollment in Computer Science courses, enrollment in courses that added Computer Science content, attendance of after school Computer Science activities, and engagement in industry partner activities.

Engagement Category	Before Grant	After Grant
Enrollment in Computer Science Courses	5,128	4,316
Enrollment in Courses that Added Computer Science Content	3,717	3,735
Attendance of After School Computer Science Activities	137	424
Engagement in Industry Partner Activities	476	2,057

*Note. Some PSU grant recipients did not report full enrollment data and totals may not reflect comprehensive enrollment or engagement totals.

PSU grant recipients implemented initiatives through the following middle and high school courses and school-based programming:

- Middle School Level Courses
 - 2008 Math Grade 8
 - CY01 Keyboarding and Basic Word Processing
 - CY13 Apple: Everyone Can Code I - Puzzles
 - CY20 Computer Science Discoveries I
 - CY21 Computer Science Discoveries II
 - CY22 Computer Science Discoveries III
 - CY90 Exploring Computer Science
 - CY95 Exploring Digital Arts I
 - EY10 Exploring Personal Character and Careers
 - EY11 Exploring Careers and Employment

- High School Level Courses
 - 3320 Biology
 - BD10 Multimedia and Webpage Design
 - BF10 Business Essentials
 - B112 CompTIA IT Fundamentals
 - BL53 Develop in Swift Fundamentals
 - BP41 Computer Science I
 - BP42 Computer Science II
 - BW36 CSC134 C++ Programming
 - BW40 CSC251 Advanced JAVA Programming
 - BW47 CTS115 Info SYS Business Concepts
 - ID11 Drone Technology I
 - II11 Cisco Network Engineering Technology I
 - II21 Computer Engineering Technology I
 - II412 Adobe Visual Design I
 - II42 Adobe Visual Design II
 - ME11 Entrepreneurship I
 - TE11 Technology, Engineering, and Design
 - TL18 Robotics I
 - TL19 Robotics II
- School-based Programming
 - CS Fundamentals Modules
 - Google Gravity Club and Games
 - Hour of Code by Code.org
 - Media Center lessons
 - Paxton & Patterson Lab
 - Robotics Clubs
 - STEM Enrichment Time
 - Technology Repair Club

Impacted Educator Data

The table below summarizes the total impact and engagement of educators through initiative activities.

<i>Engagement Category</i>	<i>Number of Educators</i>
Taught Computer Science Related Courses	103
Added Computer Science Content to Courses	227
Hosted Computer Science Related After School Activities	66
Engagement in Industry Partner Activities	176

WORK-BASED LEARNING OPPORTUNITIES

Work-based learning (WBL) is an instructional strategy that enhances classroom learning by intentionally connecting students to the workplace. WBL activities are categorized into four settings: Career Exposure in grades K–4, Career Awareness in grades 5–7, Career Exploration in grades 8–11, and Career Preparation in grade 12 and postsecondary opportunities. PSU grant recipients provided the following WBL activities for students through grant initiatives:

- Career Exposure Activities
 - Implemented robotics clubs
 - Increased participation in elementary robotics competitions
 - Facilitated business and industry guest speakers from local companies to discuss basic Computer Science careers
 - Facilitated Hour of Code projects and presentations
- Career Awareness Activities
 - Facilitated business and industry guest speakers from local companies to provide information about careers pathways
 - Implemented middle school robotics clubs
 - Increased participation in middle school robotics competitions
 - Promoted participation in Technology Student Association and SkillsUSA student association
 - Hosted a 7th grade job and career skills fair
- Career Exploration Activities
 - Facilitated business and industry guest speakers from local companies to demonstrate specific career pathway skills
 - Hosted field trips to at local Computer Science related businesses
 - Facilitated internships opportunities for students at local Computer Science related businesses
 - Developed a mentorship model of high school students mentoring middle and elementary school students
 - Facilitated job shadow opportunities for students at local Computer Science related businesses

STUDENT JOB ATTAINMENT AND POSTSECONDARY OPPORTUNITY OUTCOME DATA

PSU grant recipients did not report any student job attainment or postsecondary opportunity outcome data for this grant cycle. Initiative activities primarily focused on elementary and middle school students and building capacity for educators to deliver high quality Computer Science content across multiple grade levels and academic disciplines.