Securing the Future of Maryland: Computer Science Education for All

ANNUAL REPORT 2018-2019

Maryland Center for Computing Education

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INTRODUCTION

The Maryland Center for Computing Education (MCCE) was formally established in statute and funded with the enactment of *Securing the Future: Computer Science Education for All* on July 1, 2018. The purpose of this first-year annual report is twofold. First, the report provides a descriptive analysis for how MCCE is in compliance with the legislation. Second, the report offers a detailed account for how MCCE is using state funds to assist each of the 25 Maryland Local School Systems (LSSs) and the Institutions of Higher Education (IHEs) to strengthen the computing knowledge and skills of the public teacher workforce in Maryland.

> **"By passing HB 281, the General Assembly has taken a critical step to make Maryland the Silicon Valley of the East. We must ensure that all of our children, no matter what their zip code, can fully participate in the 21st-century economy. Our students should just not be consumers of technology—they should be the creators of it."**
> **Delegate Aruna Miller, 2018**

Implementation Plan Overview

§4-111.4 Education Article, Annotated Code of Maryland
Beginning in the 2021-2022 school year, each county board shall require each public high school in the county to offer at least one computer science course.

The MCCE Advisory Committee has defined high school as a diploma granting Maryland public high school. The metrics toward compliance is to monitor that all diploma granting Maryland public high schools offer at least one high quality computer science course each year beginning in the 2021-2022 school year. We are currently verifying data with each LSS to account for each diploma granting Maryland public high schools.

The computer science course shall be of high quality and meet or exceed the curriculum standards and requirements established by the State Board.

The MCCE Advisory Committee has formed a working group to make recommendations on what qualifies as a high quality computer science high school course which meets or

exceeds the Maryland's K-12 Computer Science Standards. The standards were approved by the Maryland State Board of Education on September 25, 2018. MCCE will report annual progress made by each LSS beginning in the 2019-20 school year. Once this is defined and approved by the MCCE Advisory Committee, it will be reported in the next MCCE Annual Report.

> **"For nearly three years, our administration has worked tirelessly to build an unrivaled ecosystem of innovation and economic growth in Maryland. We want to make sure that Marylanders have the tools and the skills they need to compete for 21st century jobs. Maryland simply must continue to lead the way, and closing this skills gap begins with a focus on education. We must spark the interest of students—particularly girls—beginning at an even younger age, and we must inspire high school and college students to pursue careers in computer science."**
> **Governor Hogan, 2018**

The county board shall make efforts to:

1. Incorporate instruction in computer science in each public elementary and middle school in the county and;

2. Increase the enrollment in middle and high school computer science courses of:

> *I. Female*
>
> *II. Students with disabilities*
>
> *III. Students of ethnic, racial, and other demographic groups that are underrepresented in. the field of computer science as identified by the U.S. Equal Employment Opportunity Commission.*

MCCE is working with each Local School System (LSS) to increase the number of teachers who are trained to teach computational thinking and computer science at the elementary, middle, and high school levels. Using nationally recognized processes for developing computer science pathways, the MCCE supports LSSs to provide enough trained teachers to scale and sustain a rigorous statewide computing education program that reaches every student and aligns with Maryland's K-12 CS standards. The MCCE is in the process with every LSS to build local capacity, vet and develop local facilitators, provide curriculum

resources, create regional partnerships, and share resources in a format that is customized by each LSS.

Student enrollment numbers will be monitored for each student subgroup in partnership with the Maryland Longitudinal Data System Center (MLDSC). The data is currently being analyzed and will be publicly displayed online after approval from MLDSC and MCCE.

MCCE Annual Milestones

The MCCE was first established at the University System of Maryland (USM) on July 1, 2018. Since then, the MCCE leadership has hired a program director and a research director who have led efforts to fulfill the mission of the MCCE to increase computing education in Maryland public school classrooms. Below are the major milestones that have occurred throughout the first year. Each of these milestones will be discussed further in the additional sections of this report.

Milestones	Year 1 (July, 2018- June, 2019)												
	J	J	A	S	O	N	D	J	F	M	A	M	J
Law Enacted	■												
CS K-12 Standards approved by the State Board of Education				■									
MCCE Directors Hired					■								
Advisory Committee Meetings							■					■	
Steering Committee Meetings						■				■			
SCRIPT planning meetings			■	■	■	■		■	■		■		
Professional School Counselor PD						■							
Elementary PD			■		■			■		■			■
Middle School PD								■	■	■	■		■
High School PD													■
2019 Maryland Computing Education Summit											■		
IHE Grants (Solicitation, Awards)									■	■			
IHE Grantee Workshop													■
LSS Phase I Grants (Solicitation, Awards, Reports)								■	■	■	■	■	■
External Grants Submitted						■		■	■		■	■	■

STAKEHOLDER REPRESENTATION

§12-118 Education Article, Annotated Code of Maryland

(1) There is a Maryland Center for Computing Education in the University System of Maryland.

(2) The purpose of the Center is to expand access to high-quality computer science education in grades prekindergarten through 12 by strengthening the skills of educators and increasing the number of computer science teachers in elementary and secondary education.

(3) In carrying out the powers and duties granted under this section, the Center shall work in consultation and collaboration with institutions of higher education in the State, including:

> *(I) Historically black colleges and universities;*
>
> *(II) Other public senior higher education institutions;*
>
> *(III) Independent institutions of higher education; and*
>
> *(IV) Community colleges.*

MCCE has two stakeholder groups, the MCCE Steering Committee and the MCCE Advisory Committee. Both groups provide valuable feedback and critical insights into the state of computing education in Maryland. The MCCE relies on the regular meetings and subcommittee workgroups to help set priorities.

MCCE Steering Committee

The larger MCCE Steering Committee, which began meeting 5 years ago, has representation from government, K-12 LSSs including classroom teachers and administrators, non-profits, industry, community colleges, and public, private, and historically black four-year colleges and universities. (See Appendix A for the full membership.)

The MCCE Steering Committee had two meetings this year. They met on November 5, 2018 and provided feedback for both MCCE grant programs (LSS and teacher pre-service grants), the annual summit, and how to incorporate cybersecurity initiatives in high schools, two-year, and four-year IHEs which align with the cybersecurity standards in the Maryland's K-12

Computer Science Standards. This feedback helped to shape the grant solicitations, summit sessions, and cybersecurity initiatives.

The next meeting occurred on March 6, 2019. During this meeting, the MCCE Steering committee provided feedback on middle school computational thinking *Every Student Succeeds Act* (ESSA) State Plan compliance, high school units of study (CS electives, CS as a mathematics course, and Career Technology Education Pathways), and how to build regional partnerships between LSSs, between LSSs and IHEs, and between IHEs.

MCCE Advisory Committee

The MCCE Advisory Committee is co-chaired Dr. Nancy Shapiro, Associate Vice Chancellor for Education and Outreach Special Assistant to the Chancellor for P-20 Education at the University System of Maryland and Dr. Carol Williamson, Chief Academic Officer, Deputy State Superintendent, Office of Teaching and Learning ag the Maryland State Department of Education (MSDE). The committee includes the following members:

- Dr. Daniel D. Curry, Superintendent, Calvert County Public Schools and President, Public School Superintendents' Association of Maryland (PSSAM),
- Jennifer Frank, Vice President of Academic Affairs, Maryland Independent College and University Association (MICUA),
- Robin Hrivnatz, Senior Manager, Education Strategy at Microsoft, Microsoft,
- Dr. Lethia Jackson, Chair and Professor Department of Technology and Security, Bowie State University,
- Jack McLaughlin, Dean and Professor, School of Technology, Art, & Design, Community College of Baltimore College,
- Dr. Jan Plane, University of Maryland College Park and MCCE Steering Committee Chair,
- Jennifer Smith, President, Computer Science Teachers' Association, Maryland Chapter and high school CS teacher, and
- Pat Yongpradit, Chief Academic Officer, Code.org.

The first MCCE Advisory Committee occurred on December 17, 2018. The committee met the MCCE staff and discussed the definition of a high school, grant programs, annual summit session topics, and agreed to meet at least twice during the academic school year. The

committee defined high school as diploma granting high schools. This provides a measurable goal to have each of these high schools offer a high-quality CS course by the 2021-2022 school year.

The second meeting of the MCCE Advisory Committee occurred on May 29, 2019. The committee discussed teacher certification issues. In particular, the committee discussed the Praxis II CS exam and how a CS degree does not necessarily lead to successfully passing of this exam. The Advisory committee intends to explore what types of undergraduate classes align better to this exam and assist in the preparation for high school CS teachers. Micro-credentialing is another option that was discussed and will be further investigated as a possible CS endorsement path.

The next discussion led to the development of a workgroup to define high-quality high school CS course. The MCCE Advisory Committee provided guidance on the members assigned to the workgroup. This workgroup will report back their recommendations to the advisory committee. This is a critical component in order to offer guidance to the LSSs as to which courses are consider high-quality.

MCCE LEADERSHIP AND STAFF

The MCCE leadership includes a variety of education and computing expertise which strengthens the collaborative processes required to move computing education forward in Maryland. The collaborative processes occur within and between the levels of education as well as with our industry, government, and non-profit partnerships. Below are the MCCE leader and their roles.

Leadership **Dr. Nancy Shapiro (USM)** **Dr. Carol Williamson (MSDE)** **Dewayne Morgan (USM)** **Advisory Committee**	**Guidance** Dr. Jan Plane (UMD) Steering Committee
Budget, equitable distribution, financial distribution, implementation plan, grant processes	Assess statewide needs, recommend next steps, engage stakeholders
Implementation **Dianne O'Grady-Cunniff, Director**	**Research** **Dr. Megean Garvin, Director of Research and Assessment**
District meetings, professional development, teacher support, resource appraisement, national connections	Data, reports, publications, grant writing, assessment, monitor statewide policy changes

MCCE hired two critical positions, Director and Director of Research and Assessment. Both positions were filled by the fall of 2018. The remaining two positions are currently being hired. One position will be the first computer science specialist at the Maryland State Department of Education. This full-time position is being funded by MCCE and will be a contractual position at MSDE. The second position will be a full-time administrative assistance at MCCE. Both searches are currently occurring and will be filled in July, 2019.

MCCE GOALS AND METRICS

§12-118 Education Article, Annotated Code of Maryland

The Plan shall identify:

> ***(I)*** *Specific actions, resources, metrics, and benchmarks to create a long-term sustainable pipeline of computer science teachers.*

The MCCE Steering Committee created goals and metrics for computing education in Maryland in 2017. They were then further updated and approved by the steering committee in 2018. These goals are also reflected in the *Securing the Future: Computer Science Education for All* Act. The ultimate goal is to have CS recognized as a content discipline in K-12 Maryland Public School classrooms with significant reduction in gaps of student subgroups who have access to and participate in CS classes.

	2021-2026 5-10 Years	**2027-2030 11-14 Years**	**2031 Final 15 Year Goals**
Student Access and Participation	CS course offerings, including AP, taught by trained teachers in every high school. Gaps have been reduced by 50% from baseline. CT integrated from preK-8th grade.	Rigorous computing courses and content offered in every P-12 school.	CS is offered to every student throughout their P-12 education. Gaps have been reduced by 90% from baseline.
Professional Training	At least three undergraduate and three graduate programs offering CS certification.	Training universally available. All P-12 pre-service programs require a CS course.	All full-time secondary CS teachers are certified in CS. Offerings are continually updated.
Curriculum and Standards	P-12 CS curriculum in every school system aligned with state CS standards.	Graduation requirements include CS. All P-12 CS standards implemented in all schools.	Review board established and in effect to continually update P-12 standards.

MCCE is on track to meet or exceed the milestones established by these goals. Working with our partners and aligning the resources across the state, computing education will be available to all Maryland public school students in every LSS. The eight IHEs who are piloting how to incorporate computing education into pre-service programs increase the likelihood of having at least three approved CS teacher programs in Maryland in the next two years.

MCCE GRANTS

§12-118 Education Article, Annotated Code of Maryland

(3) (I) The Center shall administer a grant program to support professional development in computer science education.

(II) The grant program shall:

> *1. Be administered through an open and competitive process;*
>
> *2. Prioritize applications from county boards of education and institutions of higher education ; and*
>
> *3. Prioritize applications that focus on serving:*
>
>> *A. Areas with high poverty;*
>>
>> *B. Rural areas; or*
>>
>> *C. Areas with large minority or diverse student populations including female students, students with disabilities, and students of ethnic, racial, or other demographic groups that are underrepresented in the field of computer science as identified by the U.S. Equal Employment Opportunity Commission.*

The MCCE administers two grant programs. The first grant process provides pilot study research for IHEs to update pre-service teacher education programs to include CS. The second grant process provides a series of grants to LSSs in order for each of the 25 Maryland public LSSs to reach full compliance with this law.

IHE Pre-service Teacher Education Program Grants

The IHE Pre-service Teacher Education Program grants address the need for long-term solutions to prepare pre-service teachers at all levels of K-12 instruction to enter Maryland public school classrooms with computer science knowledge and skills. Each pre-service teacher education program needs to incorporate the Maryland's K-12 CS Standards and CS pedagogy with an emphasis on equity, inclusion and diversity. The grant requires faculty from CS and education to collaborate, IHEs to collaborate with LSSs, and for grant teams from across the institutions to collaborate and learn from each other. The grantees determined which level (primary, secondary or both) that they would begin with for the pilot study. The overall total funding per the fiscal note for this effort $500,000. Therefore, initial funding per IHE to apply for was set at two levels $20,000 and $50,000. Each IHE determined which level to pursue and submitted a request for funding to MCCE. MCCE sent the solicitation to all

IHEs in Maryland. For the first phase, there were eight IHEs which applied and were awarded grants. (See the map below.) There are three additional IHEs who are committed to apply in the next phase.
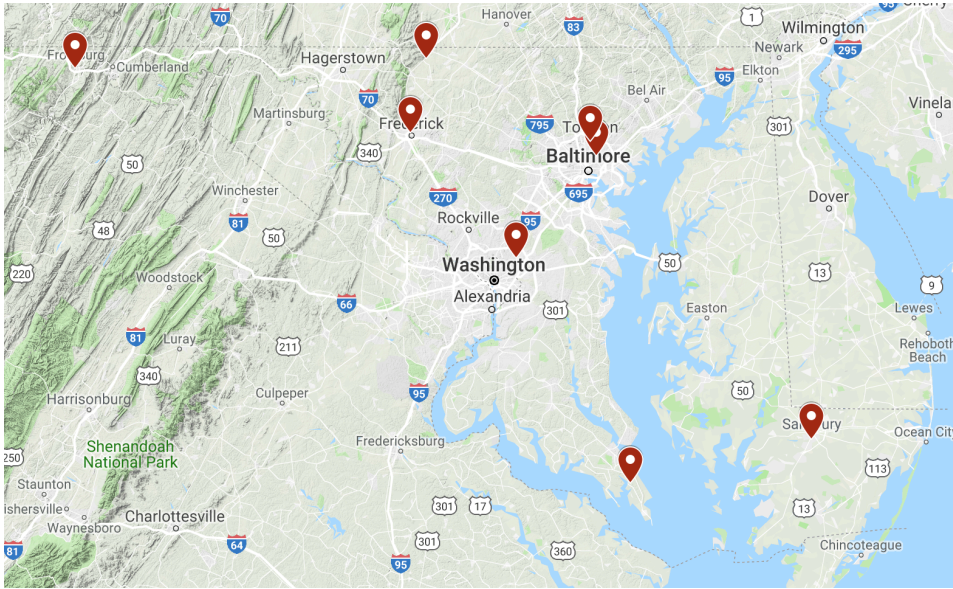
MCCE scheduled an initial grantee session at the 2019 Maryland Computing Education Summit and a two-day workshop at Towson University on June 10 and 11, 2019. The IHEs provided MCCE with important information and discussed issues in order to assist all of the IHEs as each engages in program and institutional reforms. (See Appendix B for the IHE Pre-service Grants.)

LSS Phase I Grants

AS CS builds into a K-12 content discipline, the infrastructure and support at each level (classroom, school, central office, and state) must also grow. MCCE is poised to assist in the growth process at all levels. MCCE offered regional meetings consisting of multiple LSSs and individual LSS team planning meetings to clarify computer science and computational thinking, recommend appropriate resources, share best practices, develop district CS visions, and answer questions. These meetings leveraged expertise and provided the first step toward developing regional collaborations between LSSs and between LSSs and IHEs. Only two of the 25 LSSs (Baltimore County and Anne Arundel County) have designated a CS specific central office administrator. The remaining LSSs have central office administrators who designate only a portion of their time to CS. Likewise, CS trained teachers feel isolated as they are often the only CS teacher in their building. MCCE is poised to assist each LSS as they grow their CS K-12 programs.

Building the capacity for LSSs to provide high quality K-12 CS instruction will take time, funding, and teacher professional development. MCCE provided the first phase of grants to LSSs which were designated funds for each LSS to build a CS planning team consisting of at least one central office administrator, a school-based administrator, a teacher at the secondary level, and a teacher at the primary level. Each LSS team determined how to incorporate CS into the existing district structure and identified what, if any, changes need to be made, and develop two to four short-term CS goals (i.e. determine types of CS classes or units, select or create CS curricula, align curricula to the Maryland's K-12 CS Standards, or determine types of teacher professional development). This was the first step which will be a series of steps utilizing the SCRIPT (Strategic CSforALL Resource and Implementation Planning Tool) research-based framework designed for school districts to expand CS to all students. This empowers each LSS to develop a vision for CS throughout each level of their district and to develop measurable goals in five key areas: (1) Leadership, (2) Teacher Capacity and Development, (3) Curriculum and Materials Selection and Refinement, (4) Partners, and (5) Community. Funds were granted to allow LSS teams the time to meet, set goals, and take initial actions towards meeting those goals.

LSSs vary in terms of where they each are in the development process. Awards were sent from MCCE directly to the LSSs in four batches based on the completion of the application and approval of the award. The first batch in February included Baltimore City, Carroll County, Cecil County, Frederick County, Wicomico County, and Worcester County. The second batch in March included the Maryland School for the Blind, Charles County, Dorchester County, Kent County, Queen Anne's County, and Somerset County. The third batch in early May included Allegany County, Anne Arundel County, Baltimore County, Harford County, Montgomery County, Prince George's County, St Mary's County, and Washington County. The fourth and final batch in late May included Calvert County, Caroline County, and Howard County. Garret County, Talbot County, and the Seed School had additional available funding and did not submit phase I grants. However, each of these LSSs are working on their CS visions and goals and are eligible to receive phase II and phase III funds. LSS phase I grant reports including lessons learned, goals met, challenges, and budget expenditures are due to MCCE by June 30, 2019. (See Appendix C for the LSS Phase I Grants.)

PARTNERSHIPS

§12-118 Education Article, Annotated Code of Maryland
The Plan shall identify:
> ***(II)*** *Activities to obtain and sustain public and private partnerships for funding, mentoring, and internships for teachers.*

MCCE has established and maintained partnerships with each of the 25 LSSs, numerous IHEs, non-profits, and industry representatives. In addition to the numerous members of the steering committee and advisory committees, MCCE has partnered with the following:

Four-year IHEs
 Bowie State University
 Chesapeake College
 College of Southern Maryland
 Frostburg State University
 Hood College
 Morgan State University
 Mount St. Mary's University
 Salisbury University
 St Mary's College of Maryland
 Towson University
  Clark Center for Cybersecurity
 University of Maryland, College Park
 Washington College

Two-year IHEs
 Anne Arundel Community College
 Hagerstown Community College
 Montgomery College

Government
 Maryland Governor's Workforce Development Board
 Maryland Longitudinal Data System Center
 National Aeronautics and Space Administration
 National Security Agency

Industry
 Apple, Inc.
 Microsoft Corporation
 Microsoft TEALS

Associations
 Association for the Advancement of Artificial Intelligence
  AI4K12 Working Group
 Computer Science Teachers Association
 Expanding Computing Education Pathways
 International Society for Technology in Education
 National Center for Women in Technology
 National Center for Computer Science Education

Non-Profit Organizations
 Code in the Schools
 Code.org
 College Board
 Digital Harbor Foundation
 Girls Who Code
 Maryland MESA (Mathematics Engineering Science Achievement)
 Maryland Public Libraries

We encourage our partners not only to work with us directly but to also work with the LSSs and IHEs directly. Some the engaging events that have occurred include afterschool clubs and activities, family code nights, teacher professional development workshops, mentoring of teachers, competitions, and contests.

MCCE BUDGET

The overall MCCE budget reflects funds spent from October 1, 2019 until June 30, 2019. Due to the current regulation which limits the number of employees hired at the University System of Maryland (USM), the MCCE needed to partner with the University of Maryland, Baltimore County (UMBC) in order to hire both director positions. The memorandum of understanding (MOU), logistics between this partnership, and hiring process took time to establish the initial positions. Likewise, the MOU with MSDE, transfer of funds, and hiring logistics took several months to resolve issues which has led to the current search for the first CS specialist at MSDE. The final position, which is also in the process of being hired, is a full-time administrative assistant. Both of these positions will be filled in July, 2019. Below is the budget overview including the basic budget categories: administrative operating costs, IHE grants, and LSS grants.

Budget Overview

Budget Category	October 1, 2018- June 30,2019
Administrative Operating Costs	$194,957.49
MCCE Professional Development Costs	$25,335
IHE Grants	$263,002.63
LSS Grants	$107,681.54
Total	**$590,976.66**

The administrative operating costs include several categories. Salaries and fringe benefits are the most significant operating costs followed by the website design and maintenance, office supplies, and in-state travel. The MCCE professional development costs include state-wide initiatives, such as computing teacher mentoring programs, professional development workshops available to all teachers, regional SCRIPT meetings, and the state summit.

Both the IHE and LSS grants reflect the initial phases for each of these grant programs. The IHE grant is currently capped at $500,000 per the fiscal note; however, a portion of the additional two million might be allocated toward this effort. The Advisory Committee will discuss this option during the 2019-2020 committee meetings. MCCE will also submit additional external grant funding for this important institutional reform effort in order to increase the number of pre-service teachers who graduate with the necessary CS knowledge and skills.

EXTERNAL FUNDING

MCCE has received grant funding from Microsoft Corporation of $25,000 to support teacher certification efforts with a focus on teachers from underrepresented groups and underserved areas. This has allowed MCCE to expand a program to train local facilitators and provide professional development to teachers to become certified in CS.

MCCE has also received a donation of 60 Arduino robots from NICERC (National Integrated Cyber Education Center) valued at $15,000 which have been distributed, along with professional development, supplied by MCCE on their use and curriculum, to high school computer science teachers in Prince George's County public schools.

MCCE is seeking additional external funding to further support the MCCE research agenda. Each grant submission included extensive collaborative efforts which strengthens our partnerships. MCCE is well aware of the competitive nature of these submissions and with time, and additional submissions, hopes to increase the visibility and reputation of MCCE research and implementation. MCCE has submitted four grants to the National Science Foundation (NSF) and one grant to the U.S. Department of Education (ED). (See Appendix D for more information.)

PROFESSIONAL DEVELOPMENT

MCCE is working to inform stakeholders statewide about the concepts and challenges of computing education. The center is working to raise the level of stakeholders' understanding and the quality of computing education from Pre-K-20 including each level from the classroom, school, school district, IHEs, and state. Both short-term goals to prepare the current educator Maryland workforce and long-term goals to prepare future teachers are critical to ensure high-quality computing instruction at all levels.

Professional development occurs in a variety of formats. The formats are selected to meet the needs of the educators. Face-to-face meetings and workshops occur for state level convenings, regional meetings across LSSs and IHEs, and locally to provide time for educators to network and learn together. Online and hybrid (face-to-face and online) formats are also used for meetings, courses, and workshops. These formats accommodate travel and time commitments and enable all Maryland educators to participate. (See Appendix E for the full schedule of professional development that was offered from 2018-2019.)

LOOKING AHEAD

Phase II LSS grants will be awarded in July 2019 and will focus on teacher professional development that align with district visions and short-term computing education goals. (See the MCCE website for more details.) The primary goal of this initial summer professional development is to prepare teachers to teach the required courses that are part of the district plans. The secondary goal is to build local teacher capacity as experts in different areas such as cybersecurity, integration, and CS certification. Each district should not only plan to have teachers trained to offer computer science in every building, but should also plan to bring their team together at the end of the summer to report on lessons learned, curriculum reviewed, and share knowledge gained from other districts. Phase III grants will occur in the fall of 2019 and these will require a more in-depth SCRIPT planning sessions for teams.

IHE Teacher prep phase II will also occur in the fall of 2019. There are already three additional IHEs who are committed to apply for Phase II, and hopefully, additional IHEs will also apply.

APPENDIX A: MCCE STEERING COMMITTEE

Member	Title	Organization
Cassandra Allen	Director, K-12	College Board
Christine Barrow	Dean of STEM	PGCC
Elizabeth Bell	Information Technology Foundation Specialist	Montgomery County Public Schools
Kathy Benson	Retired Elementary Teacher and STEM Integration Consultant	Immersive STEAM
Tiara Booker-Dwyer	Assistant State Superintendent, Division of Career & College Readiness	MSDE
Dwight Carr	JHU - APL STEM Program Manager	Johns Hopkins APL
Linda Cooper	Associate Professor UTeach Co-Director	Towson University
Tara Corona	Continuous Improvement Specialist	MSDE
Michael R. DiGiacomo	Executive Director, Governor's Workforce Development Board (GWDB)	DLLR
Val Emrich	Director of Instructional Technology Instructional Technology, School Library Media, and Mathematics	MSDE
Marquita Friday	Career & Technology Education Lead Specialist	MSDE
Joe Greenawalt	Test developer	ETS
Courtney Hodge	TEALS	Microsoft
Tracy Irish	Clinical Instructor Department of Education	UMBC
Brandon Riesett	Technology Accessibility Specialist	MSDE
Mona Jaffe Rowe	Senior Assistant, Delegate Aruna Miller	District 15, Maryland General Assembly
Ali Keane	Policy Advisor	Office of Maryland Governor Larry Hogan
Diane Ketelhut	Associate Professor Teaching & Learning, Policy & Leadership	UMD
Sharon Kramer	Coordinator, Career and Technology Education	Howard County Public School System
Heather Lageman	Executive Director of Leadership Development	Baltimore County Public Schools
Amanda Lattimore	High School Teacher	Baltimore County Public Schools
Velma Latson	Instructional Technology lecturer	Bowie State
Gretchen LeGrand	Executive Director	Code in the Schools
Raquel Marshall	Program Specialist Office of Education	NASA
Felicia Martin Latief	STEM Supervisor	Prince George's County Public Schools
Richard W. (Bill) MacDonald	High School Teacher	Roland Park Country School
Bria McElroy Barry	Regional Manager, MidAtlantic	Code.org
David McGann	Cloud Migration Offering Leader - Federal CIC Delivery Excellence Leader - Rocket Center Senior Managing Consultant Global Business Services	IBM
Jack McLaughlin	Dean and Professor, School of Technology, Art, & Design	CCBC
Scott Nichols	Career & Technology Education, Education Program Specialist	MSDE
Jan Plane	Steering Committee Chair Principal Lecturer Department of CS	UMD
Jennifer Smith	CS Teacher Digital Harbor High School	Baltimore City Public Schools
Sarah Spross	Assistant State Superintendent, Division of Educator Effectiveness	MSDE
Chuck Trautwein	Technology Resource Teacher	Garrett County Public Schools
Greg Von Lehman	Advisor to the President of UMUC for Cybersecurity & CCEI Board Member	UMUC & CCEI
David Weintrop	Assistant Professor Teaching & Learning, Policy & Leadership College of Education College of Information Studies	UMD

APPENDIX B: IHE PRE-SERVICE GRANTS

IHE	MCCE Grant	Principle Investigators
Frostburg State University	$34,848.00	Michael Flinn
Hood College	$42,947.72	Jennifer Cuddapah
Morgan State University	$19,350.00	Christian Anderson Edward Dillion Simone Gibson
Mount St. Mary's University	$50,000.00	Laura Frazier Stacey Brown-Hobbs
Salisbury University	$49,976.00	Sophie Wang
St Mary's College of Maryland	$19,049.00	Alan Jamieson Lindsay Jamieson
Towson University	$49,980.00	Linda Cooper
University of Maryland, College Park	$39799.69	Jan Plane David Weintrop
Total	**$263,002.69**	

APPENDIX C: LSS PHASE I GRANTS

LSS	Phase I Grant
Allegany	$ 6,612.64
Anne Arundel	$ 3,204.50
Baltimore	$ 5,000.00
Baltimore City	$ 10,000.00
Calvert	$ 313.70
Caroline	$ 225.00
Carroll	$ 7,447.43
Cecil	$ 7,290.00
Charles	$ 5,599.20
Dorchester	$ 4,712.04
Frederick	$ 7,400.00
Garrett	$ -
Harford	$ 7,000.00
Howard	$ 1,180.00
Kent	$ 7,195.50
Montgomery	$ 2,318.12
Prince George's	$ 3,500.00
Queen Anne's	$ 2,425.10
Seed School	$ -
Somerset	$ 4,475.00
St. Mary's	$ 6,000.00
Talbot	$ -
Washington	$ 7,699.04
Wicomico	$ 853.53
Worcester	$ 3,446.74
MD School for the Blind	$ 5,000.00
Total	$107,681.54

APPENDIX D: SUBMITTED GRANTS

Funder	Proposed Projects	Partners
NSF	**Advancing Informal STEM Learning (AISL) 2018 BECHARM (Baltimore Ecosystem and Computing Hookup with Authentic Research and Mentors)** The project team will have scientists and computing mentors work with students in afterschool programs to gather new environmental data by digitally creating and printing 3-D sensor cases in a citizen science approach and creating data visualizations for the community to understand the over 20 years of Baltimore Ecosystem Study data.	Carrie Institute (Baltimore Ecosystem Study), Digital Harbor Foundation, and Code in the Schools.
NSF	Computer Science for All (CSforAll: RPP) 2019 **SCALE: Sustainable Computational Thinking for All to Create Leaders and Expand Curricula** This project will provide computational thinking professional development to middle school teachers with a scalable model which utilizes district CS high school mentor teachers.	Prince George's County Public Schools.
NSF	EHR-High School Determinants of STEM College and Career Pathways The proposed project will identify determinants in STEM and computing pathways by utilizing the MLDSC data.	UMBC and MLDSC
NSF	C-Accel Pilot - Track B2 (National Talent Ecosystem): **R**ecruiting **E**mployees with **S**imulations to **E**ducate and **T**rain (**RESET**) the Future Workforce. The RCO outlines creating virtual reality (VR) simulations for high school students and adult learners to tour industry workplaces, perform scaffolded workplace simulation tasks, and additional immersive VR will be created to on-board employees for emergency training.	
ED	Education and Innovation Research (EIR) 2019 The proposed project will work to increase computational thinking expertise within rural middle schools in each state.	CodeVA (Virgina) Friday Institute for Education Innovation (North Carolina)

APPENDIX E: PROFESSIONAL DEVELOPMENT

Event	Date/ Location	Participants
Elementary teacher PD , Code.org	August 2018 / Worcester	Various LSSs
SCRIPT planning SE	September 2018 / Worcester	Worcester County Public Schools, Wicomico County Public Schools, Dorchester County Public Schools, Talbot County Public Schools.
SCRIPT planning NE	August 2018 /Washington College	Cecil County Public Schools, Kent County Public Schools, Caroline County public schools, Queen Anne County Public Schools, Harford County Public Schools
SCRIPT planning NW	September 2018 / Hagerstown Community College	Allegany County Public Schools, Washington County Public Schools, Frederick County Public Schools, Montgomery County Public Schools, Carroll County Public Schools
SCRIPT Planning PG	September, November, April 2018-19 PG BOE	Prince Georges County Public Schools
SCRIPT Planning Baltimore City	October / February / April 2018-19 Baltimore City	Baltimore City Public Schools
SCRIPT Planning intensive	January 2019 / San Diego, CA funded by CS for All	Washington County Public Schools, Dorchester County Public Schools
Counselors for Computing Counselor PD	November 2018 / USM Dorsey Station	Various LSSs
Middle School CS PD: circuit playground, Edison robots, Scratch	January, February 2019	Frederick County Public Schools
Elementary CS PD. Unplugged activities for facilitators	October, February, April 2018-19 Waldorf higher education center	Charles County Public Schools
Elementary CS PD, curriculum planning	February 2019	Queen Annes Public Schools
Middle School PD, CS Discoveries	May 2019 / PGCPS	Prince Georges County Public Schools
Computational Thinking in English Language Arts	April 2019 / USM Dorsey Station	Various LSSs
Computational Thinking in English Language Arts	May 2019 / Dorchester CPS	Dorchester County Public Schools
CS Summit	April 2019 / Bowie State University	All invited
IHE grant planning	June 2019 / Hood College	Hood College
IHE grant collaboration	June 2019 / Towson University	Various IHEs
IHE grant collaboration	May 2019 / Frostburg University	Garrett CPS, Allegany CPS, Frostburg University
IHE grant collaboration	June 2019 / Code in the Schools	Baltimore City PS, Morgan State University
IHE grant opportunity, elements of computer science	May 2019 / MICUA	Deans of education at various IHE
Elementary CS PD Code.org	June 2019 / Waldorf Higher Education Center	Various LSSs
Middle school CS PD Scratch and Micro:bit	June 2019 / Waldorf Higher Education Center	Various LSSs
High School CS PD: Arduino robots	June 2019 / PGCPS	Prince Georges County Public Schools
Elementary Coaches program	June 2019 / USM Dorsey Station	Various LSSs

Statewide Summit:
The 2019 Maryland Computing Education Summit was held on April 2, 2019 at Bowie State University. Mr. Wes Bush, the 2019 Langenberg Lecturer, provided the keynote address, *The Critical Partnership Between Higher Education, Students and Business in Building the New Economy.* There were 145 attendees who participated in workshops throughout the day. The focus this year was building capacity to broaden participation in computing through professional development for educators. All of the session materials are available online.