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Testimony on House Bill 170

Ohio House of Representatives Committee on Education and Career Readiness
Representative Andrew Brenner, Chair

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Chair Brenner, Ranking member Fedor, and other members of the Education and Career Readiness Committee, my name is Nigamanth Sridhar and I am a professor of Electrical Engineering and Computer Science at Cleveland State University, where I have taught courses and conducted research in the field of computer science for the past thirteen years. Prior to that, I received a doctoral degree in computer science from The Ohio State University.

Thank you for allowing me to appear before you today to give a higher education perspective from Cleveland State on some of the aspects of House Bill 170. I hope to amplify the direct positive impact that House Bill 170 will have on Ohio's future citizenry, and to share with you some of the work that we have been doing in Cleveland that will be further advanced when House Bill 170 becomes law.

Computer Science is increasingly becoming a necessary knowledge skill for future high school graduates. Even among students who choose not to enter a college program majoring in Computer Science, a basic understanding of the digital world that we live in is necessary for future success. Nationally, there is increasing recognition of the importance of CS in K-12 schools, and in the last year, there have been a number of initiatives at local, county, state, as well as national policy that support the introduction of computer science in K-12 curricula. For example, Chicago Public Schools has begun a CS4ALL initiative, which will require computer science as a high school graduation requirement for all students in Chicago. Similarly, New York City has announced an initiative by which every student in a NYC public school will have access to computer science in their school.

My testimony today stresses mostly on the level of *access* to CS courses and content for Ohio high school students. There are indeed a number of programs across the state that provide computer science training and instruction by way of after-school clubs and summer camps. This, however, is not anywhere close to sufficient, given that these clubs and camps are not accessible to a lion's share of the population of students in most school districts. We envision CS courses being taught at *every* school in the state, thereby enabling every student in the state to have *equal* access to this very important knowledge area which will be vital for their future growth, and for their entry into the knowledge workforce and ecosystem.

Computer Science Curriculum. Over the last decade, a significant amount of federal as well as private investment emphasis has been placed on designing and developing curriculum for computer science in K-12. Of particular note are two year-long high school courses: *Exploring Computer Science (ECS)* and *Computer Science Principles (CSP).*

Both these courses are rigorous, college-preparatory courses designed to be offered at the high school level. The courses have both been designed with access and broad participation as primary design considerations. As such, the course content as well as pedagogical methods are intended to reach a variety of student populations. The research on both courses has, in fact, borne this to be true — the number of women and minority students enrolling in computer science courses has increased sharply.

Computer Science Principles was designed as a joint effort between the National Science Foundation and the College Board as an Advanced Placement class. The choice to make the course an AP course was motivated by the appeal of national reach and scale. While the College Board is the leader in designing the curriculum framework, the actual design of the curriculum itself has been led by about a dozen prominent projects in the CS education research community across the country. Across the country, the National Science Foundation "CS10K" initiative has been effective in scaling the course nationally. Since 2011, nearly 1000 teachers nationwide have been trained, and are teaching CSP in their schools. Cleveland State University is the leader on one of these projects. We have design and curated our own curriculum that addresses the CSP curriculum framework, and we have also brought close alignment with College Credit Plus. Since 2014, our project has trained 55 teachers in Ohio, most of whom are teaching the AP course in their schools. The CS Principles course is being offered as a CCP course in about 20 schools across the state. We believe that this seed will play a strong role in scaling the CS Principles course in Ohio over the next several years. This week is a particularly exciting week for those of us in the community — the first AP CS Principles test is being administered this Friday, May 5, and nearly 30,000 students across the country are taking the test!

Exploring Computer Science was originally designed to be used with the Los Angeles Unified School District (LAUSD), and since 2008, the course has grown significantly both within that district as well as nationally. The National Science Foundation, by way of its CS10K initiative, has supported the scaling and replication of the ECS course in a number of states in the country. At this point, the plan that I will describe later in this testimony of work in Cleveland is the most well developed one in Ohio for scaling across a district.

Teacher Professional Development.   Based on our experience with our NSF-funded initiative, we have learned a lot about introducing computer science in high schools. We now have a strong understanding of curriculum issues surrounding introducing computer science into the high school curriculum, even though we may not have solutions to all the issues. Our team at CSU stands ready to direct this understanding to scaling computer science courses to as many high schools across the state as we can, and doing so in a purposeful and sustainable manner.

A strong asset is what we have learned from our NSF project on how to provide effective training and professional development to teachers. We have developed an intensive professional development program that works closely with teachers over the course of eight weeks during the summer (1 week face-to-face, 6 weeks online, and 1 week face-to-face), followed by year-round support to the teachers while they teach the CS class in their classroom. Our training program is effective even for teachers who have no prior background in teaching computer science courses. Teachers who go through our rigorous professional development program receive graduate course credit from CSU, and are placed on the path to receiving "highly qualified teacher" status in the field of computer science.

CS for All in Cleveland Metropolitan School District.   Our team at Cleveland State University in working alongside the Cleveland Metropolitan School District on a "CS for All" program. This program is primarily focused on equity — ensuring that *every* student in the district has the opportunity to acquire knowledge and skills in this field that is fundamentally re-defining how we live in society. Our training programs and expertise ensures that our team is extremely well-positioned to ensure that the district has a robust group of teachers who are trained and ready to deliver top-quality computer science instruction.

In the summer of 2016, we worked with a dozen teachers, and as a result of that training, seven high schools in CMSD offered computer science courses. This number is doubling this year, and nearly half of all high schools in the

district will offer one or more computer science course. Our work is purposeful and sustainable: at the same time when we are training new teachers, we are also building capacity within the district in the form of master teachers who can provide thought leadership inside the district.

We have also reached out and worked closely with industry partners. The Regional IT Engagement board in Northeast Ohio, which is a consortium of several dozen companies and their IT organizations, is a central partner in our plans and provides consistent guidance on matters related to curriculum. We have recently entered into a partnership with the Microsoft TEALS program, which places volunteer software engineers inside classrooms to help teachers deliver the course content. This is a particularly exciting partnership, which directly contributes to ensuring that our teachers continue to grow throughout the school year, and also providing the opportunity for our students to directly interact with productive members of the knowledge economy.

The elements of House Bill 170, specifically ones that pertain to (a) computer science as a subject area that can be used to satisfy graduation requirements, (b) teacher credentialing and certification requirements, and (c) technology support to school district, will together put Ohio on a strong forward march toward preparing a future population that is strongly positioned to compete and win in the largely digital economy that is unfolding before us.

Chairman Brenner and members of the committee, thank you for the opportunity to share with you the perspective on behalf of higher education on the importance of computer science in K-12. I would welcome any questions you might have for me.