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March 5, 2019

Robert Sanchez, Co-Chair
Douglas McCrory, Co-Chair
Education Committee
Legislative Office Building, Room 3100
300 Capital Avenue
Hartford, CT 06106

Regarding S.B. No. 957 (RAISED) AN ACT CONCERNING THE INCLUSION OF COMPUTER SCIENCE INSTRUCTION IN THE PUBLIC SCHOOL CURRICULUM, PROGRAMS OF TEACHER PREPARATION AND IN-SERVICE TRAINING PROGRAMS FOR TEACHERS

Dear Mr. Sanchez and Mr. McCrory,

Thank you for your efforts to make computer science education a reality for Connecticut students. Offering Computer Science for all students, grades K-12, will strengthen Connecticut's future workforce, improve standardized test scores, and encourage all students (including under-represented minorities such as women) to pursue in-demand careers in STEM fields right here in Connecticut. I an excited to learn that CT is joining the ranks of other states that recognize and promote Computer Science as an important STEM subject. I'm sharing my testimony in the hope that you will revise this act to include even more support for the adoption of Computer Science in Connecticut schools.

I've been teaching computer integration at Newtown Middle School since 2015. I serve on our district's Educational Technology Committee, volunteer as a Connecticut Computer Education Association (CECA) board member, participate in our state's Computer Science Advisory Council, and serve on the Consortium of School Networking (CoSN)'s Emerging Technologies Committee. In addition, I regularly present at regional educational technology conferences such as the CTCSTA Summit and CASL/CECA's Annual Conference. After school, I volunteer my time to teach students computer programming through various clubs and activities. As a former English teacher, I'm often asked why I dedicate so much time to helping students learn computer science. My response is often brief and personal: Learning Computer Science has taught me that I can innovate, create, learn, and impact others. I want to help students to realize that they can do these things, too.

As outlined in the *Connecticut K-12 Computer Science Initiative* (See Appendix A), expanding access to high-quality computer science education in grades kindergarten through 12th grade can be accomplished if we accomplish several tasks. I'd like to focus on those related to curriculum and instruction:

1. Strengthening the skills of educators and increasing the number of computer science teachers in **both** elementary and secondary education.
2. Continue developing a state strategic plan for expanding computer science education in elementary, middle and high schools.
3. Teaching computer science to **all students, grades K-12**:
    a. At the elementary level, this would include: introduction to computational thinking, as well as basic computer science concepts.
    b. At the middle school level, this would include exploratory computer science.
    c. At the high school level, this would include at least one computer science course.
4. Allowing district-approved computer science courses at the high school-level to fulfill one unit of the nine credits in science, technology, engineering and mathematics credits required for high school graduation.

There are enough educators, community members, and industry leaders interested in helping us meet or exceed the standards and curriculum requirements established by the Connecticut State Board of Education. Building rigorous and engaging STEM-based education that includes computer science from grades K-8 is crucial to developing a comprehensive program. Connecticut's State Board of Education's *Position Statement on Computer Science Education for All Students K-12* states that the integration of computer science into the K-12 curriculum should be purposeful and systematic, designed to motivate and prepare students to compete in a diverse and globally-driven workforce where science, engineering and mathematics play a vital role" (see Appendix B). In addition, current research suggests that investing Computer Science in grades K-5 has "been shown to be one of the best means for closing early achievement and development gaps, which subsequently aids the economic and social well being of the broader community" (see Appendix C for a summary of Computer Science in Early Childhood Education research and review written by the *K12 Computer Science Framework*). As written, S.B. No. 957 does not provide the scaffolding needed to implement the framework for a successful integration of computer science into K-12 education. I urge you to take pause, and develop a more comprehensive version of a Computer Science bill such as the one outlined in the Connecticut K-12 Computer Science Initiative (See Appendix A).

There are myriad ways districts can implement Computer Science education into its curriculum-- to learn more consider reviewing the State Department of Education's Connecticut Computer Science Implementation Guidelines (Appendix D). The implementation models on page 10 offer pathways to offer students broad and deep exposure to computer science and offer various suggestions for implementation. These suggestions, however, will not come to fruition without a more robust act from the state. The adoption of ISTE and CSTA standards in June of 2018 was a solid beginning. However, the standards are based on a progression of learning that include detailed and measurable student performance expectations. As written, S.B. No. 957 does not help districts meet these expectations. In order to make change, we need to adopt more specific guidelines, such as those proposed in the *Components of High-Quality Computer Science Education: Guidelines for Policy Makers* (see Appendix B). The Connecticut K-12 Computer Science Initiative offers specific and thorough strategies to meet those guidelines (see *Connecticut Computer Science Implementation Guidelines*, Appendix D).

By itself, Computer Science is a valuable tool for helping students cultivate problem-solving skills. Yet the connections between other subjects, Common Core, NGSS, and other standards are substantial. In

its 2016 *Redefining Learning in a Technology-Driven World report,* ISTE (International Society for Technology Education) stresses the valuable contribution that computational thinking makes to student development: “CT [Computational Thinking] combines logic and deep knowledge of the fundamentals of how computers ‘think.’ Thus, it is an important, contemporary literacy for all students, not just those who are likely to become software engineers. Even if students do not pursue computing in their careers, they will need to be familiar with the vocabulary and processes to effectively communicate with colleagues on technical issues and to be knowledgeable themselves about how computer works and affects their lives” (see Appendix E).

As a middle school computer integration teacher, I know first-hand how life changing computer science can be. Every day, I have the privilege to work with young people just beginning to explore what they’d like to learn-- and possibly pursue-- as a career. Not every student is going to become a software engineer, data scientist, or IT staff specialist. But Computer Science courses provide them with an environment conducive to learning skills like perseverance, teamwork, problem solving, innovation, and creativity. The K12 Computer Science framework encapsulates this sentiment in the *Vision for K-12 Computer Science* section of their framework: “By applying computer science as a tool for learning and expression in a variety of disciplines and interests, students will actively participate in a world that is increasingly influenced by technology” (see Appendix F). Building a foundational knowledge of computer science, which begins in kindergarten and continues throughout high school, equips students with the skills they need to thrive in a society that is increasingly reliant on technology.

As a student, I struggled in my math and science courses. It wasn’t until I began to teach Computer Science that I discovered that I was capable of understanding these subjects. Providing an alternate way of learning through computational thinking has sparked confidence, creativity, and passion of innovation in many of my students as well. With Artificial Intelligence, Machine Learning, Deep Learning, and Cybersecurity already impacting the lives of most American citizens, it’s more important than ever to teach students how to think logically and critically about how they can leverage technology to help themselves, and others, thrive.

Thank you,

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