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Testimony House Bill 1398 – Senate Education Committee

Senator Elkin, Chairman

March 15, 2023

Chair Elkin and members of the Senate Education Committee, for the record, my name is Dr. Alyssa Martin. I am the director of the North Dakota Center for Distance Education (CDE). CDE supports HB 1398, viewing this bill as an effort to help North Dakota students remain competitive with the five states that now require computer science to receive a high school diploma and the 27 states that require schools to offer computer science courses. I will briefly highlight CDE's perspective on what advantages this bill will bring to North Dakota students and spend the remainder of my testimony describing the steps CDE has taken and will continue to take to help support this legislation and the intent behind it.

CDE has offered computer science and cybersecurity courses at the high school level for over ten years. Still, our enrollments are low, with just 75 high school completions in 2021-22 and 68 enrollments and 29 completions so far this year. The numbers that we have seen at CDE reflect a national trend. According to the *2021 State of Computer Science Education* report produced by the Code.org Advocacy Coalition, 78% of high school students have access to a foundational computer science course. Still, only 5% of students enroll in these often optional, elective courses.[1] From our perspective at CDE, an organization that values giving North Dakota students educational access and every learning advantage possible, these trends are disheartening, especially once one is aware of the many benefits of computer science education. To summarize only a few:

- A 2019 meta-analysis study found that, when reviewing 440 other studies of K-12 students who learned computer programming, this exposure to this field substantially improved creativity, mathematical skills, metacognition, spatial skills, and reasoning skills.[2]
- A College Board study showed that students who took computer science significantly outperformed their peers on AP exams in calculus and statistics.[3]

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[1] Hendrickson, K., Gauthier, L., Glennon, M., Harrigan, A., Weissman, H., Fletcher, C., & Mak, J. (2021). *2021 state of computer science education: Accelerating action through advocacy.* Code.org. https://www.nga.org/webinars/2021-state-of-computer-science-education-report/

2 Scherer, R., Siddiq, F., & Sánchez Viveros, B. (2019). The cognitive benefits of learning computer programming: A meta-analysis of transfer effects. *Journal of Educational Psychology*, 111(5), 764.

[3] Buckley, J. (2015). *Preliminary results of AP computer science analyses*. The College Board. https://code.org/files/CollegeBoardPreliminaryCSMemo.pdf

- A longitudinal study conducted in two of the largest school districts in the U.S. found that computer science students were more likely to enroll in college than their peers, even after controlling for variables such as socioeconomic status, GPA, race, and gender.[4]
- According to a letter signed by 800 major industry, education, and nonprofit leaders in July 2022, "The USA has over 700,000 open computing jobs but only 80,000 computer science graduates a year." The letter also emphasizes, "Graduates no longer need to leave their state to pursue careers in tech. Even the smallest town can become a tech hub; the key is education"—an important consideration for a rural state like North Dakota, which has and continues to take extensive measures to retain our students after high school and college graduation.[5]

Knowing the value of computer science education, how can a state ensure that students participate? Clearly, participation in computer science courses increases exponentially when states require it as part of high school graduation requirements, which is why Code.org has recommended such a legislative change as part of its "Nine Polices to Make Computer Science Fundamental." There are both direct and indirect benefits to such a requirement. According to Code.org, "after South Carolina implemented its graduation requirement for computer science, graduation rates increased as a whole and for every racial and ethnic group tracked by the state."[6] In addition to recommending that a computer science graduation requirement be codified into law, Code.org recommends offering computer science across the K-12 curriculum, citing studies on how early exposure to this content erases students' fears and stereotypes about participating in computer science courses and helps build a pipeline within the field.

Because of the myriad of positive outcomes associated with computer science education, CDE, like many other state virtual schools, has proactively been offering cybersecurity and computer science coursework, recognizing that for small schools especially, finding qualified teachers, developing curriculum, and finding time within the school schedule to provide these courses can pose a challenge. We do not believe, however, that a lack of local resources should be a reason for denying students the benefit of exposure to computer science education. Throughout its history, CDE has served as an educational support service to ND K-12 schools, especially rural schools, helping provide instruction delivered by a state-licensed teacher in core, elective, and CTE areas when a district needs to fill a gap caused by a teacher shortage, experiences curricular cuts due to low enrollments, or faces the inability to offer certain content due to size or budgeting constraints. Likewise, CDE aims to support K-12 schools with the new requirements in HB 1398 through the following steps.

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[4] Brown, E. A., & Brown, R. S. (2020). *The effect of advanced placement computer science course taking on college enrollment*. West Coast Analytics.
http://www.westcoastanalytics.com/uploads/6/9/6/7/69675515/longitudinal_study_-_combined_report_final_3_10_20__jgq_.pdf

[5] Roberts, S., Osorio-Glennon, M., Weissman, H., Fletcher, C., Dunton, S., Baskin, J., & Mak, J. (2022). *2022 State of computer science education: Understanding our national imperative*. Code.org.
https://advocacy.code.org/stateofcs

[6] Roberts, S., Osorio-Glennon, M., Weissman, H., Fletcher, C., Dunton, S., Baskin, J., & Mak, J. (2022). 2022 State of computer science education: Understanding our national imperative. Code.org.
https://advocacy.code.org/stateofcs

- CDE already offers an elementary scratch coding course and is currently piloting additional elementary curricula to provide young learners with various options for learning the basics of cybersecurity and computer science.
- CDE offers a full year of coding at the middle school level and is working with curriculum vendors to identify additional opportunities to expand its offerings at this level.
- At the high school level, CDE offers two full years of coding courses and one year of cybersecurity coursework. It is actively engaged with Edutech and partners from North Dakota's postsecondary institutions and industry to further expand technology curricular pathways to secondary learners, with the aim of them acquiring post-secondary credit and potentially post-secondary credentials in the form of certificates.
- CDE has identified a plan to scale its current offerings to meet the demand for the courses covered by this bill. DPI will support these efforts by earmarking $600,000 in federal Elementary and Secondary School Emergency Relief (ESSER) funds to help cover the cost of CDE scaling up its computer science and cybersecurity courses. CDE will expand its adjunct pool to ensure qualified, licensed teachers teach these courses. We have worked with ESPB to identify all current teachers within the state who are qualified to teach computer science and cybersecurity to prepare a distribution list, notifying them of CDE's efforts to hire teachers with computer science credentials. We have had great success in the past recruiting in-state teachers to work as adjuncts for CDE while they maintain their day jobs in local schools.

Because of the value of computer science education, the need to remain competitive with other states already requiring it, and the feasibility of local schools implementing this law with CDE as a partner, CDE recommends a do pass on HB 1398.