THE OHIO SENATE	# FINANCE COMMITTEE
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Proponent Testimony – HB 33

Chris Orban

April 14, 2023

Members of the Senate Finance committee—my name is Chris Orban and I write to express my support for the creation of the Ohio Computer Science Council (OCSC) and the Office of Computer Science Education (OCSE), which are described in HB33, and to suggest a broadening of the scope of those bodies.

Specifically I will try to convince you that (1) the goal of computer science (CS) education in Ohio should be to engage as many students as we can with CS skills, not simply to increase the number CS teachers and CS classes, (2) math teachers (and teachers of non-CS classes generally) are more important to the future of computer science in Ohio than most people realize.

I also worry that a very successful **Ohio Department of Education program to train math teachers with CS skills may not be able to tap into the millions of dollars of computer science education funding** that the 2022 State Plan for Computer Science proposes.

To introduce myself, I have been a faculty member at The Ohio State University since 2014 and I have worked in a number of capacities with the Ohio Department of Education (ODE). My training is in computational physics and so my expertise has been useful in contributing to ODE committees and working groups on science, computer science and math education. In 2017-2018, I made important contributions to updating the astronomy section of the Ohio Science Standards.

In January 2020, I began serving on the discrete math "writing team" at ODE in an effort to design a new high school course that includes connections to computer science. I proposed some minor changes to the Ohio Learning Standards for Computer Science that were integrated into the 2022 revisions to that document. I have also worked closely with Metro Early College High School which is the STEM magnet high school connected to Ohio State University.

While I work and teach at Ohio State University, it is important for me to note that I am writing today in my capacity as an individual with knowledge of CS education. None of my testimony should be attributed to Ohio State University, or the Ohio Department of Higher Education. I also do not represent the Ohio Council for Teachers of Mathematics, although I am a member of that group.

There are some key things that I believe legislators need to better understand about computer science in Ohio:

1. Despite state investment, only 3.6% of Ohio high school students took a CS course last year

According to the 2022 State Plan on Computer Science, only 3.6% of Ohio high school students took a CS course last year and there are only about 1,100 computer science teachers in Ohio.

Even to get 30% of Ohio high school students to take a CS course before graduating would require twice as many CS teachers as we have.

2. Increasing the number of Computer Science teachers has been a slow process

In 2013 only about 10% of Ohio public high schools had a computer science teacher. Ten years later, the percentage in Ohio is 48% according to data gathered by code.org. At this rate it may take another decade or more until every public high school has a computer science teacher on staff. But even if every high school has a CS teacher, this will still not be enough teachers to allow most high school students in Ohio to take a CS class before graduating.

3. The Ohio Learning Standards for Computer Science Standards do not just apply to computer science classes

The Ohio Learning Standards for Computer Science describe CS concepts that the education system should try to cover from Kindergarten through 12th grade. There are even specific recommendations for each grade. And there is explicit direction that CS should be integrated into non-CS classes: *"The K-8 standards integrate computer science into instruction across subject areas including mathematics, science, history, English language arts, fine arts, world language and career and technology courses. The high school computer science standards provide both foundational and advanced opportunities districts can use to design as separate courses or, when appropriate, integrate into other disciplines."* Ohio Learning Standards for Computer Science Page 6

4. The importance of the ODE-led discrete math and data science initiative

There is a great deal of potential for ODE's new high school **discrete math** and **data science** classes to bring computer science skills to Ohio students. **Every high school student has a math teacher** and these courses are being designed so that **math teachers even without CS credentials can teach these courses** after completing ODE led training sessions. In the 2023-2024 school year there will be approximately 50 classrooms in Ohio teaching either discrete math or data science with many more schools joining as the project grows. **If just 1 in 10 high school math teachers in Ohio were trained to teach discrete math or data science, the number of students being introduced to CS skills would roughly double.** The origin of this effort goes back to the Kasich administration which expressed interest in making high school mathematics more connected to workforce needs.

In summary, the future of CS in Ohio has as much to do with how we encourage teachers of non-CS classes to embrace CS as it does with efforts to increase the number of CS teachers.

Unfortunately not everyone connected to CS education in Ohio appreciates the importance of integrating CS into non-CS classes. My fear is that the OCSC and OCSE will make this same mistake. This fear is founded on something that happened with the State Committee on Computer Science which last year was tasked with writing the State Plan for Computer Science. Although it was later corrected, the public draft of the State Plan for Computer Science did not contain a single reference to discrete math or data science. This happened, I believe, because there were no math educators on the committee and because these courses are labeled as "math" even though they contain significant CS content.

Another situation where labels act as a barrier, is that, according to conversations I have had with ODE staff, there are already significant funds set aside for CS education, but the discrete

math and data science initiative (which is also called Strengthening Ohio's High School Math Pathways) were not permitted to access any of those funds. In fact, my understanding is that ODE has had trouble spending these funds because they are labeled only for "CS" and are restricted to things like paying back teachers who spend money to become credentialed to teach CS (and not as many teachers are taking advantage of this as anticipated). At this moment there are funds that could be used to integrate CS into any number of math, science or other courses but the "CS" label on these funds prevents this from happening. Instead, the **discrete math and data science initiative has been primarily funded by federal covid relief dollars through the ESSER program which is expiring**.

Recommendations:

Continue funding the discrete math and data science initiatives by directing part of the proposed $18 M per year for computer science education to these efforts

The 2022 State Plan for Computer Science proposes to spend 1% of the state's education budget on computer science education. In the HB33 hearing in the house the industry led Computer Science Advocacy Coalition called for $18 M per year of funding for CS education. Currently discrete math and data science are supported at $1 M per year total. There is nothing in writing anywhere in HB33 that clarifies that efforts to integrate CS into math and other subjects are eligible for CS education dollars. There is nothing in HB33 that specifically mentions that the Strengthening Ohio's High School Math Pathways initiative has any connection to computer science.

Change the name of the "Ohio Computer Science Council" to the "Ohio Computer Science Integration Council" and make it clear that the Office of CS education will also encourage efforts to integrate CS into non CS classes

The text of the bill should be explicit that the council's role and the office of CS education's role are to oversee CS education as it relates to the Ohio Learning Standards for CS which describe the need to "integrate computer science into instruction across subject areas".

Require that one of the 11 members of the OCSC represent math education

I have spoken to my colleagues in the Ohio Council for Teachers of Mathematics which represents math teachers and they strongly support the idea of having a qualified math educator on the committee. The role of this person would be to give the committee updates on efforts to integrate CS into high school math classes. (Currently these courses are discrete math and data science but that list could expand in the future.) As I mentioned, a few years from now there could be more high school students gaining CS skills from math classes than from CS classes. THere should be an explicit directive that the council should encourage and monitor these efforts.

Require that the OCSC has a standing committee on integrating CS into non-CS subjects, and that the Office of CS education has a person who will focus on this important area

As I mentioned earlier this would be in the spirit of the Ohio Learning Standards for Computer Science which has a broad scope. This committee would encourage efforts to integrate CS into non-CS subjects and monitor ongoing efforts like discrete math and data science which are part of the Strengthening Ohio's Math Pathways initiative.

Make explicit that CS funding can be spent on efforts to integrate CS into non-CS classes in general

As a professor I apply for many grants and when I propose something that is slightly outside what the grant program is designed to fund, I am almost guaranteed not to win the funds. The more explicit the legislation can be to direct the council and the Office of CS education to make funds available to support efforts to implement Ohio CS standards into K-8 and non-CS classes the better. It needs to be crystal clear, for example, that efforts to connect data science concepts with social studies, efforts to use coding to generate art in art classes, and efforts to integrate CS into middle and high school math and science classes, etc., are well within the scope of funding. (This wider scope will also help to address any criticism that state spending on computer science is at the expense of other subjects.) The council will be directed by the legislation as defining the goals, priorities and deliverables of the grant program, so please make the legislation's language as strategic as it can be so as not to discourage all the valuable CS-related activities I have mentioned that are not necessarily categorized as "CS" as the legislation is currently written. These are worthy efforts in and of themselves and my experience is that science and math teachers who have a positive experience integrating CS into their classes will later consider becoming credentialed to teach CS.

Thank you for the opportunity to provide feedback on the proposed Ohio Computer Science Council and Office of Computer Science Education. I would very much like to further discuss this with you, and/or your staff. Please do not hesitate to contact me if I can be of additional assistance. My cell is 614-557-9387.

Regards,

Chris Orban