Issue Brief (December 2016 update): Computer Science Flex Credit

Background and recommendation

In 2014, Code.org advised against allowing computer science to count as a foreign language credit in favor of allowing it to count as a mathematics or science credit. Our position has evolved to support computer science as a flexible credit that satisfies a core credit for high school graduation. This means a computer science course should be considered a *computer science credit* on student transcripts and as it pertains to other areas, such as teacher certification and departmental organization. States should allow these courses to "flex" to satisfy a requirement for a mathematics, science, technology, foreign language, or other core credit.

How to treat computer science

Computer science exhibits all the characteristics of an academic discipline: core concepts that can be used to organize it as a body of knowledge, practices that illustrate the methods of the discipline (i.e., ways of knowing), and an associated medium within which to act (i.e., a computer). As such, it is a distinct subject. In K-12, computer science should have its own set of course codes, appear on student transcripts as "computer science," and have a definitive teacher certification pathway.

We recognize allowing a computer science course to satisfy an existing core credit contributes to confusion about how computer science fits in K-12. We are not arguing that computer science is mathematics or science or foreign language. It is its own discipline. However, we are adopting this position to give states flexibility on exactly how to achieve the goal of allowing a computer science course to count for a core credit for graduation. No states, to date, have a distinct, rigorous graduation requirement for computer science. While some states may adopt a graduation requirement eventually, this position reflects a flexible way to provide core credit for a computer science course.

Concerns

We had two main concerns in advising against allowing computer science as a foreign language credit. First was that educators and policy-makers may view computer science simply as learning a new language. Some consider code to be a "language", yet there are significant differences. Coding does not have the flexibility, history, and cultural connections of natural

languages. Learning a programming language of a few hundred words is fundamentally different than learning a natural language with tens or hundreds of thousands of words. More importantly, an emphasis on just learning the “language” in a computer science course could lead to a course that simply focuses on programming and misses broader computer science concepts.

This misconception remains a concern for course implementation. We advocate for the expansion of *computer science* education, not just coding. In a computer science class, a student learns how the Internet works and methods to analyze big data sets, as well as the societal implications of computing and computers — all topics important to any field, even if the student does not write a line of code. *Coding* is the tool that students use to implement computer science and create software, and is fundamental to rigorous computer science. The combination of learning the concepts of computer science, then applying these skills through coding, is what empowers students.

Our second concern was that allowing computer science to satisfy a foreign language credit may lead to implementation/structural issues in schools. For example, would computer science teachers need to be reorganized into a school’s foreign language department? Or would it require computer science teachers to also get a foreign language certification in order to teach the course? How would this impact college and university requirements that often require one or more years of foreign language?

These issues can be largely mitigated if states and districts first adopt a policy allowing computer science to be a computer science course and credit (i.e., these courses would be a computer science credit on student transcripts, have computer science course codes, and be tied to computer science teacher certification), and then allow this computer science credit to “flex” to satisfy a core mathematics, science, technology, foreign language, or other credit.

Implementation Considerations

States and districts should seek to ensure decisions about how a computer science flex credit can be used will align with coursework required by the state’s public higher education systems. Misalignment between high school graduation and university admissions policies creates challenges that should be addressed through collaboration between state boards and/or departments of education and higher education governing bodies.

In Washington state, Advanced Placement (AP) computer science counts as a math credit for high school graduation, and as a “Senior Year Math-Based Quantitative Course” for admission to the University of Washington. The policy was crafted with input from both the Office of the

Superintendent of Public Instruction and the Washington Student Achievement Council (the governing board that determines admissions requirements for public universities).

Arkansas' Approach to the Computer Science Flex Credit

To address the rapid expansion of high school computer science courses across the state, the Arkansas Department of Education created a "computer science flex credit". A student receiving this credit can substitute it for the 4th math credit requirement or the 3rd science credit requirement (4 math and 3 science credits are required for graduation). Critically, the computer science flex credit is *not a math or science credit*. It substitutes *for* the requirement, mitigating the departmental and teacher certification concerns mentioned above.

Due to levels of local control and other regulatory barriers, this may serve as a model for implementation in many states. Arkansas' approach is exemplary in its navigation of existing constraints to come up with a solution for computer science to satisfy high school graduation requirements.

(For more on Arkansas' computer science plan, see their working strategy document, and for more specifics about the computer science flex credit, see their fact sheet.)