

A Vision for K–12 Computer Science

The K–12 Computer Science Framework represents a vision in which all students engage in the concepts and practices of computer science. Beginning in the earliest grades and continuing through 12th grade, students will develop a foundation of computer science knowledge and learn new approaches to problem solving that harness the power of computational thinking to become both users and creators of computing technology. 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.

The Power of Computer Science

The power of computers stems from their ability to represent our physical reality as a virtual world, and their capacity to follow instructions with which to manipulate that world. Ideas, images, and information can be translated into bits of data and processed by computers to create apps, animations, or autonomous cars. The variety of instructions that a computer can follow makes it an engine of innovation that is limited only by our imagination. Remarkably, computers can even follow instructions about instructions in the form of programming languages.

Computers are fast, reliable, and powerful machines that allow us to digitally construct, analyze, and communicate our human experience. A computer is an engine of innovation that is limited only by our imagination. More than just a tool, computers are a readily accessible medium for creative and personal expression. In our digital age, computers are both the paint and the paintbrush. Computer science education creates the artists.

Schools have latched on to the promise that computers offer: to deliver instruction, serve as a productivity tool, and connect to an ever-increasing source of information. This belief that

303 computers can improve education is apparent in the number of one-to-one device initiatives seen
317 in our nation’s school districts. Despite the availability of computers in schools, the most
333 significant aspect of computing has been held back from most of our students: learning how to
339 create with computers (i.e., computer science).

351 Literacy provides a relevant context for understanding the need for computer science
369 education. From a young age, students are taught how to read so that they can be influenced by
386 what has been written, but also to write so that they can express ideas and influence others.
401 Although computing is a powerful medium like literacy, most students are taught only how to
418 use (i.e., read) the works of computing provided to them, rather than to create (i.e., write) works
433 for themselves. Together, the “authors” who have worked in the computing medium over the last
445 few decades have transformed our society. Learning computer science empowers students to
461 become authors themselves and create their own poems and stories in the form of programs and
474 software. Instead of being passive consumers of computing technologies, they can become active
488 producers and creators. In our digital age, you can either “program or be programmed”
(Rushkoff, 2011, p. 1).