

A Principal's Guide to Addressing Misconceptions about Computer Science

QUESTION How does a school leader talk about computer science in schools?

TOOL DESCRIPTION This tool provides a clear definition of what computer science is (and is not) that a school leader can use when describing computer science in schools to teachers, parents, and others within and outside the school community.

WHY DO YOU NEED TO KNOW THIS? The computer science education field is filled with many terms that attempt to define and explain “computer science” and closely related disciplines. However, educators, parents, community members, students and even professionals working in computer science-related fields often define computing-related terms very differently. As efforts to promote K-12 computer science continue to grow, it is important to build shared understanding and prevent misconceptions about “computer science.”

Current terminology confusion makes it difficult for K-12 leaders to clearly describe to others (district administrators, other school leaders, teachers, students, families, etc.) what computer science is and is not, and why computer science content and skills are important in the 21st century.

HOW DOES THIS TOOL HELP? This tool identifies four common misconceptions that school leaders are likely to encounter when speaking with their stakeholders. It provides both short and long answers that principals can use to respond to and educate their communities. This tool is based on common definitions found in the related **Computer Science Terminology** tool, which provides clear definitions for computer science-related terms.

TOOL CONTENT

Context

Some characterize computer science as “coding” or “programming.” But programming is only one of many dimensions that compose the computer science discipline. [Code.org](#), a nonprofit advocacy organization focused on computer science education, provides a list of specific topics and activities that might be part of a computer science course. These include “algorithmic problem-solving,” “human-computer interaction,” “programming,” “security,” and a variety of [computer science-related skills](#) that can be applied in many careers.

The [Illinois State University Teacher Education in Computer Science website](#) also identifies the considerable variation in the content that falls under the label “computer science” in American schools and findings from a [CSTA-Oracle Academy 2014 US High school CS Survey](#) administered to school leaders illustrate continuing confusion around what computer science is and is not. Administrators described curriculum and courses as “computer science” that professors or professionals working in computer science would not accept.

A Basic Definition of Computer Science

Before moving on to misconceptions, we offer a **basic definition of computer science**:

Computer science is an academic, scientific discipline that includes the study of computers and algorithmic processes (procedures or formulas for solving problems) “including their principles, their hardware and software designs, their applications, and their impact on society” (www.acm.org). The discipline relies on problem solving, design, and logical reasoning, combining human ideas and digital tools in order to create or adapt digital technology, not just use it.

For a more in-depth discussion of computer science terms, see the **Computer Science Terminology** tool.

Common Misconceptions

The section below identifies four common misconceptions people have about what constitutes “computer science.” Each misconception is illustrated with actual statements made by K-12 principals working in schools that currently offer computer science. Then, we provide you with guidance for how to respond to these misconceptions.

MISCONCEPTION Computer science isn’t a discipline like math or science.

example “I never look at computer science as an individual discipline. I look at it from a holistic approach of STEM.”

HOW TO ADDRESS THE MISCONCEPTION

Short answer: Computer science can be integrated into other STEM and non-STEM subject areas, but it is also its own discipline.

Longer explanation: Computer science is an academic, scientific discipline that involves studying, creating or adapting computers, including their hardware and software. While aspects of computer science can be integrated in to many other disciplines, it is also a separate field of study.

MISCONCEPTION Computer science means learning about how to use computers (e.g., use of the keyboard and mouse, special function keys, locating and saving files).

example "...we're looking at computer science as a program that allows students to understand the basics of how to use the computers and different programs that are available."

HOW TO ADDRESS THE MISCONCEPTION

Short answer: Computer science is not about how to use components of computers or how to save files; it's about creating new technologies to solve problems by combining human ideas and digital tools.

Longer explanation: Computer science is not the same as *computer literacy*. Essentially, computer literacy is the ability to navigate and use modern computers. In contrast, computer science is a discipline that involves *creating* or *adapting* technology rather than simply using it.

Further, computer science is not the same as *computer applications*.

Computer applications, like Microsoft Office, Photoshop, AutoCAD, or mobile phone apps are all built from computer code that enables the user to accomplish particular tasks. While being able to use applications is an important skill, it is not "computer science." See the **Computer Science Terminology** Tool for other computer science-related terms.

MISCONCEPTION Computer science is a language like French, Spanish, or Latin.

example "For us, it's learning a new language. No difference than French, Spanish, Mandarin....[It's a] language in which people communicate."

HOW TO ADDRESS THE MISCONCEPTION

Short answer: Computer scientists use programming languages to communicate instructions to computers, but they are not "natural" languages like Italian or Greek. Additionally, programming or "coding" is only one aspect of computer science.

Longer explanation: One aspect of computer science is coding, which uses a "programming language" to tell the computer what to do. However, computer languages are not natural, linguistic languages, are not spoken, and are only used in the context of computer science. Many computer scientists and computer science advocacy organizations argue that computer science is more closely aligned with mathematics and science than languages or any other disciplines.

MISCONCEPTION Computer science is about communicating by using technology.

example "I would describe computer science as the vehicle to establishing a line of communication through technology."

HOW TO ADDRESS THE MISCONCEPTION

Short answer: Communication is not unique to computer science – it is part of every scientific discipline.

Longer explanation: Using technology for communication is certainly an application of computer science, but it is only one aspect of the discipline. Computers and other technologies that are integral to the way that we communicate are *products of* computer science, not computer science itself. Computer Science is also distinct from "Information and Communication Technology (ICT)," a term used to refer to technologies that provide access to information through the Internet, wireless networks, cell phones, and other communication media.