Why Computational Thinking? The Rationale

Computational Thinking: Why is it so important in the workplace?

Computational thinking runs through every aspect and function of a modern business. It has become more crucial in the 21st century workplace where so much is now data-driven - analyzing consumer behavior, the movement in financial markets and the performance of public services, like health or policing, are just a few job roles that require individuals to be able to think through problems in a way that a computer could understand.

Computational thinking skills are beneficial to careers in virtually every sector, including consumer products, business and financial markets, energy, travel and tourism, or public services such as healthcare, education and law and order. Workplaces need employees to take an active role in thinking problems through and creating solutions.

Source: The British Computer Society; Excerpts from *The Benefits of Computational Thinking* https://www.bcs.org/content/ConWebDoc/55416

Carnegie Mellon's Center for Computational Thinking

says that computational thinking is, "a way of solving problems, designing systems, and understanding human behavior that draws on concepts fundamental to computer science," and that "to flourish in today's world, computational thinking has to be a fundamental part of the way people think and understand the world."

Source: robottc.net; Excerpt from *What is Computational Thinking and Why Should You Care?* http://www.robotc.net/blog/2015/09/30/computational-thinking/

Computational Thinking is Research Based and Tested

...world leaders such as Barack Obama, and educational philosophers such as Ken Robinson identified Computational Thinking as an essential skill that opens our students' minds to using data, technology, resources and people in a manner which shifts us from technology consumers to creators.

Companies such as Google, Apple and Microsoft actively recruit and train staff in Computational Thinking as an essential skill and competitive advantage in their marketplace.

Source: EdGalaxy.com; Excerpt from *Five reasons why computational thinking is an essential tool for teachers and students.* http://www.edgalaxy.com/journal/2016/5/25/five-reasons-why-computational-thinking-is-an-essential-tool-for-teachers-and-students

Computational thinking makes it possible for transplant surgeons to realize that more lives can be saved by optimizing the exchange of organs among pools of donors and recipients. It enables new drug designs to be analyzed so that they are less likely to create drug-resistant strains of diseases. Artists, when given the tools to think and express themselves computationally, can create totally new modes of human experience. Users of the Internet, when empowered with computational thinking, can demystify privacy technologies and surf the web safely.

Source: Center for Computational Thinking, Carnegie Mellon https://www.cs.cmu.edu/~CompThink/

To flourish in today's world, everyone needs computational thinking.

Source: Center for Computational Thinking, Carnegie Mellon https://www.cs.cmu.edu/~CompThink/

We feel that computational thinking is a core skill for all students.

If we can make these explicit connections for students, they will see how the devices and apps that they use everyday are powered by algorithms and programs. They will learn the importance of data in making decisions. They will learn skills that will prepare them for a workforce that will be doing vastly different tasks than the workforce of today. We owe it to all students to give them every possible opportunity to be productive and successful members of society.

Source: Huffingtonpost.com Excerpt from *Education for 2017: Learning Computational Thinking is the Key to Jobs* https://www.huffingtonpost.com/entry/to-all-students-learning-computational-thinking-will_us_57a15f7ee4b004301c522b7c January 2017.

Just like young students initially learn to read so that they can later read to learn, they also need to learn to think computationally at an early age so they might later use it to learn complex concepts, represent solutions as computational steps, and solve problems using computational models and methods. It is no longer sufficient to wait until students are in college to introduce them to CT concepts.

Source: The Center for Innovative Research in Cyber Learning; *Computational Thinking* http://circlcenter.org/computational-thinking/

There is growing recognition in the education systems around the globe that being able to problem-solve computationally—that is, to think logically and algorithmically, and use computational tools for creating artifacts including models and data visualizations—is rapidly becoming a prerequisite competency for all fields.

Source: EdSurge; Excerpt from *The 5th 'C' of 21st Century Skills? Try Computational Thinking (Not Coding)* https://www.edsurge.com/news/2018-02-25-the-5th-c-of-21st-century-skills-try-computational-thinking-not-coding

CT is essential to the development of computer applications, but it can also be used to support problem solving across all disciplines, including math, science, and the humanities. Students who learn CT across the curriculum can begin to see a relationship between subjects as well as between school and life outside of the classroom.

Source: Google for Education; Excerpt from *CT Overview* https://edu.google.com/resources/programs/exploring-computational-thinking/#!ct-overview, accessed June 2018