# Vision

*“Computers play an increasingly larger role in all fields of science; they're helping us explore outer-space and our solar system. Whether you want to become a doctor or an astronaut, it would help to learn the basics of computer programming.”*

Leland Melvin

Astronaut, NASA Education Administrator

***The abilities to effectively use and create technology to solve complex problems are the new and essential literacy skills of the twenty-first century.***

# Overview

The Digital Literacy and Computer Science (DLCS) skills and knowledge articulate critical learning outcomes for Kindergarten through Grade 12 to help prepare students for success in world. The standards represent the core elements of digital literacy and computer science and are intended to drive coherent, rigorous instruction which results in the mastery and application of digital literacy and computer science knowledge, reasoning, and skills.

The purpose of this document is to introduce educators to the DLCS Framework by providing a general overview of the key skills and knowledge in Grade 9 to Grade 12.

# DLCS Skills and Knowledge

The concepts and skills in grades 9–12 build on K–8 experiences and progress to more technical and sophisticated applications. Students continue to refine their skills in differentiating problems or sub-problems that are best solved by computing systems or digital tools and those best solved by humans. Students work independently and collaboratively to achieve the high school standards. Students further develop their computational thinking problem solving skills, which facilitate the selection and use of technology. The high school standards provide opportunities for students to gain proficiency and incorporate substantive expectations of the College Board’s *Computer Science Principles*, the widely recognized benchmark for post–secondary preparation. The high school standards specify the skills that all students should study in order to be college and career ready.

Grade 9 to 12 standards integrate all seven practices. Standards in this grade span ask students to demonstrate the ability to:

Computing and Society (CAS)

* Understand safety and security concepts, security and recovery strategies, and how to deal with cyberbullying and peer pressure.
* Analyze the impact and intent of new technology laws.
* Interpret license agreements and permissions.
* Examine the impact of technology, assistive technology, technology proficiencies, and cybercrime in people’s lives, commerce, and society.

Digital Tools and Collaboration (DTC)

* Select and use ‘best’ digital tools or resources to create an artifact or solve a problem.
* Communicate and publish online.
* Advance research skills including advance searches, digital source evaluation, and synthesis of information.

Computing Systems (CS)

* Select and use ‘best’ computing devices to accomplish a real-world task.
* Understand how computing device components work.
* Use troubleshooting strategies to solve routine hardware and software problems.
* Decompose tasks/problems into sub-problems to plan solutions.
* Understand how networks communicate, their vulnerabilities and issues that may impact their functionality.
* Evaluate the benefits of using a service with respect to function and quality.

Computational Thinking (CT)

* Create a new representation through generalization and decomposition.
* Write and debug algorithms in a structured language (pseudocode).
* Understand how different data representation effects storage and quality.
* Create, modify, and manipulate data structures, data sets, and data visualizations.
* Use an iterative design process to create an artifact or solve a problem.
* Create models and simulations to formulate, test, analyze, and refine a hypothesis.

Throughout high school, students should develop increasingly sophisticated skills relevant to their goals for college and career. By the completion of high school, students should have the opportunity to use more specialized computing systems and digital tools, and develop an appreciation for the capabilities and capacities of technology in civic, college, and career contexts. Students should be knowledgeable about the role technology plays in various fields of work, enabling them to better plan for their careers in the twenty-first century.

**Resources**

DLCS Resources – <http://www.doe.mass.edu/stem/dlcs/>

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