ARCS NEWS

Advancing Rural Computer Science

Brought to you by The Center for Educational Partnerships at Old Dominion University

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Announcements

Greetings, and welcome to our October newsletter!

We hope you enjoyed your summer! We understand that the beginning of any school year is a busy and challenging time, and we thank you for your commitment to ARCS this year. This newsletter is one way that we keep in touch with all of you and offer timely CS-related resources for elementary educators. The ARCS team includes faculty members and education specialists at The Center for Educational Partnerships, many of whom have worked as educators and administrators in Virginia's public schools. We are dedicated to supporting you and look forward to the learning journey we are embarking on together. If you would like to find out more about TCEP, please visit **www.odu.edu/tcep/**

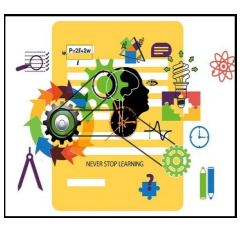
Our topic this month is an **Introduction to Computer Science and Computational Thinking!** What do your students think of when they hear "Computer Science?" In today's technology-saturated world, computer science skills are required in many professions and in our personal lives as well. This issue will share more about this topic and how weaving computer science into teaching K-5 learners helps prepare them for the future.

If you have any questions about ARCS or CS integration, or have any innovative ideas you would like to share with us, please don't hesitate to reach out to us via email at **TCEP@odu.edu**.

Sincerely,

The ARCS Team

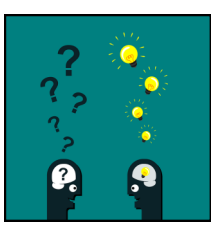
Concept Corner



What is computer science? Computers are tools that help us solve computational problems. The broad area of Computing refers to its many different aspects including those pertaining to design of computer hardware, computer software, computer networks and ethics of computing. At the heart of Computer science (CS) though is design of efficient computational methods (also called algorithms), frameworks and data structures to solve important computational problems. The goal is to design algorithms that are correct, run fast and use as little memory as possible. These algorithms are then implemented as computer programs.

Computer scientists are also typically responsible for creating software with good coding practices. Together with the advent of cheap and powerful computing devices, efficient algorithms have enabled development of computer programs (often reflected as Apps on your cellphones) that can solve very large computational problems very quickly. Examples include, the Search Engines like Google Chrome or Microsoft Edge and Apps like Apple Maps or Waze that help you search for routes when you are driving. As increasingly powerful computing hardware becomes available, computer scientists continuously devise efficient methods to utilize them to solve bigger computational problems which would previously be considered infeasible to solve.

Pedagogy Pointers



Code.org provides a variety of free lesson plans, including a specific one designed for elementary students that introduces computational thinking. This unplugged lesson doesn't require the use of computers and comes with resources such as materials, a teacher guide, and a video. The website also features numerous activities that can be incorporated into lessons aligned with many of the VDOE Computer Science Standards of Learning (SOLs).

code.org computational thinking lesson

For cross-curricular computational thinking, **ctlessons.org** offers a wealth of ideas for integrating computational thinking into various subjects. Free lessons are available for all four core content areas: math, science, social studies, and language arts. While some content may be too advanced for younger elementary students, many of the materials can be adapted for lessons focusing on Computer Science SOLs related to Algorithms and Programming.

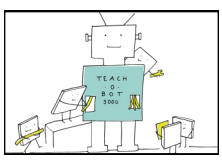
Computer Science in the Commonwealth

As technology is constantly evolving and becoming an integral part of our daily lives, computer science has become an essential academic domain for all students. Computer science fosters critical thinking, problem-solving, and nurtures creativity. Computer science is a dynamic and multidisciplinary field that encompasses a wide range of topics, from theoretical abstractions to practical applications, contributing to advancements in technology and shaping the digital landscape. As the foundation for all computing, computer science is defined as, "the study of computers and algorithmic processes, including their principles, their hardware and software designs, their applications, and their impact on society" **(Tucker et. al, 2003, p. 6).**

Virginia's Computer Science standards aim to raise our aspirations for computational instruction and to enable students to engage; as well as; thrive in a digital world. Beginning in the earliest grades and continuing through 12th grade, students must 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.

In June 2024, the **Virginia Board of Education approved the 2024 Computer Science Standards of Learning,** which are to be fully implemented by the 2025-2026 school year. Instructional guidance and resources will be developed by the VDOE and educational partners to support the transition from the 2017 computer science standards to the newly approved 2024 computer science standards.

Engaging All Learners



This month, our newsletter is focused on computational thinking, a problem-solving process initiated through steps or stages that can be automated for completion by a computing device. However, computational thinking activities can also be "unplugged," making them appropriate for use in solving problems in areas like social studies and literacy in addition to math and science fields. Digital Promise is a non-profit agency whose mission is to promote learning for all students through innovation in education. Digital Promise is committed to expanding opportunities for underserved and underrepresented students to gain experiences in computing, and many of their resources are designed with a diversity, equity and inclusion lens. A great example is their report titled "**Computational Thinking for an Inclusive World: A Resource for Educators to Learn and Lead, Quick Start and Discussion Guide**" a valuable source of information and activities designed to support student engagement in computational thinking.

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