ARCS NEWS

Advancing Rural Computer Science

Announcements

Greetings and welcome to our April newsletter all about Computing Systems!

We've had an amazing turnout of 89 participants for our ARCS Learning Bytes Spring sessions! Several instructors with CodeVA provided training on a variety of fundamental CS content and skills including: Cyber-security, Cryptography, & Ciphers; Getting Started with Scratch, Getting Started with Twine, AI Basics, Physical Computing, and Networks & Internet Unplugged.

We are also sharing a wealth of free resources this month for all our ARCS participants so that you can make the most out of using your classroom resources to integrate computer science instruction with your students. Visit our **TCEP YouTube Channel** to view our KITS trainings with classroom robotics.

Click **this link** for a bundle of free engaging lessons to use with RVR+, BOLT+, and BOLT!
We hope you enjoy your spring! As always, we welcome your comments, questions, and ideas.

The ARCS team

Concept Corner

It is amazing how much computing power and storage capacity our modern computing devices have. It is even more amazing that how fast this has happened. The first modern computer, ENIAC, was built using vacuum tubes in 1945. It occupied a large room, weighed 27 tons, used a huge amount of power and had a teeny fraction of storage capacity and computing power of your smartphone! Tremendous increase in speed and storage capacity as well as miniaturization of devices was made possible by invention of the transistor in 1947 and the continuous improvement in technology of packing larger and larger number of transistors on a single silicon chip.

In 1965, Gordon Moore, co-founder of INTEL, predicted that the density of transistors that we pack on our computer chips will continue to double every 18 months. This is often referred to as Moore's Law and held true until very recently. With the current technology, it is possible to pack 100 million transistors in 1 square mm of chip space. Individual transistors have size that is about $100,000^{th}$ part of the width of a human hair! However, it is unlikely that this can continue in future as we are coming up against limits due to laws of physics. This has led to a different approach for building more powerful computing systems e.g., quantum computers. **These resources** give a nice perspective on where we have been and where we might be headed.

Pedagogy Pointers
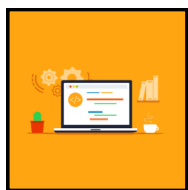
Before learning computer skills, children should have a general understanding of what a computer is and how it functions. Videos are an engaging strategy to teach students about basic computer components and to show them how hardware and software work together to do various tasks including sending, receiving, processing and storing information. Try this *__Make it Easy Education__ video about Computer Fundamentals* for 3rd to 5th graders. For younger learners, this **Socratica Kids video** geared toward K-2nd graders not only introduces students to the components of a computing system, but also provides information about algorithms, coding languages, and careers in this field! [these resources are aligned with the new VDOE CS Standards of Learning: K.CSY.1; 1.CSY.1; 2.CSY.1; 3.CSY.1; 4.CSY.1; and 5.CSY.1].

Unplugged coding activities using simple crafts are engaging and simple ways to teach computer science skills. This month, try this code.org lesson to introduce **binary code by making bracelets** with your students. Teach the entire 15-minute lesson or select the resources provided to create your own tailored learning activity!

Computer Science in the Commonwealth

The Virginia Board of Education approved the **2024 Computer Science *Standards of Learning*** at the June 21, 2024, business meeting. The 2024 Computer Science *Standards of Learning* must be fully implemented by the 2025-2026 school year.

Virginia's Computer Science standards aim to raise our aspirations for computational instruction to enable students to engage and 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. Computer Science is one of Virginia's largest and fastest growing industries, and computer programmers are needed within every field, including healthcare, transportation, and banking. Irrespective of a Virginian's post-secondary occupation, all students will benefit from learning computer science concepts and practices that support better understanding of the technologies underpinning the world around them, improve their logical reasoning and problem-solving skills, and increase their creativity and collaboration across all educational disciplines.

Engaging All Learners
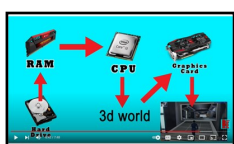
Computing systems can vary widely in size and scope, from handheld devices like smart phones to multi-billion dollar mechanisms like the Mars Perseverance Rover, which recently celebrated its fourth anniversary on the surface of the red planet. Perseverance's historic landing and mission, along with the emerging reality of visiting Mars one day, has sparked renewed national interest in aerospace engineering and technologies and once again launched conversations about the importance of diversity in these and other STEM fields. **Click here** to read the story of Christina Hernandez, a NASA Jet Propulsion Laboratory engineer who discusses how her Latina culture helped shape her work ethic and how she overcame childhood and diversity issues to ultimately play a key role in the Mars 2020 project. Learn more about the **Perseverance Mars Rover here** , and **click here** to access NASA's STEM-CS resources page, which includes hands-on activities such as "Code a Mars Landing" and "Code a Mars Sample Collection Video Game." Students and teachers can also view and follow the location of **Perseverance** here.