DID YOU KNOW?

Computer Science Education at South Allegheny

Garrett V., first grade, is programming his cat to kick a soccer ball in a Scratch Jr. story.

Computer science is NOT just about learning technology. It is about logic, problem solving, and creativity.

Computer science is foundational knowledge necessary for all students. Technology affects every field of employment and all 21st century students should have the opportunity to learn about algorithms, how to make apps, and how the internet works.

What is STEM?

STEM (Science, Technology, Engineering, and Mathematics) is a term that many people have heard but are not quite familiar with what that means or what it looks like in a classroom setting. These curricular areas are taught in an interdisciplinary and applied approach. Rather than teach the four disciplines as separate and discrete subjects, STEM integrates them into a cohesive learning environment based on real-world applications. According to a report by the website STEMconnector.org, by 2018, projections estimate the need for 8.65 million workers in STEM-related jobs.

What is coding?

Coding is the computer language used to develop apps, websites and software. Without it, we'd have none of the major technology we've come to rely on such as Facebook, our smartphones, the browser we choose to view our favorite blogs or even the blogs themselves. It all runs on code.

Coding allows our students to explore how technology & computers work and how they are shaping the world. When students are learning to code, they are using a programming language that directs the computer to complete certain tasks. Coding can be used in a variety of ways including creating computer software, apps, and websites.

Do you know what *our youngest learners are doing?*

Kindergarten and First Grade students are using Bee Bot Robots to learn about directional points and basic sequencing.

After learning about sequence in other coding programs, the **Second Graders** program Dash Robots to make music by playing on a xylophone.

In **Third Grade**, students create an animal's habitat by dressing up the Dash Robot and making a maze. Then they code the 'animal' to go through the habitat maze.

After learning about conditionals and loops in other coding programs, **Fourth Grade** students will code a robot to shoot a basketball through a hoop.

Students also learn about these skills by creating games in Scratch.

Fifth Grade students learn about advanced loops and variables by coding different types of games using Scratch, Sphero Robots, and Bloxels.

In the newly updated **Digital Literacy** curriculum, elementary students are becoming familiar with and will be able to create:

Google Slides
Google Docs
Google Sheets

Students also learn how to use search engines, complete STEM activities, **digital citizenship** lessons, and how to use word processing systems.
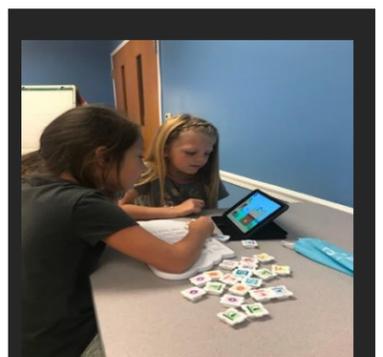
Second grade students collaborating to complete an activity in Puzzlets.

Fourth grade students testing the catapult they designed.

🔔 Classrooms that focus on the skills necessary for the future include opportunities for student driven problem solving, real world application of skills, small group instruction, collaboration, communication, and a classroom environment that allows for failure in a safe way.

Do you know what our *middle school students* **are able to do?**

Currently **Coding** is offered as a nine weeks exploratory course to **7th & 8th students** who are using code.org, Google's CSFirst, and Scratch programming to create stories, art, animations, and interactive presentations.

All students in **8th grade** also have a course in Technology Education. This class is an **introduction to engineering and design**. Students learn about different fields of engineering, and the engineering design process that engineers use to solve everyday problems. Students are exposed to **industry grade design software** which can take a design from computer to 3D printer.

This class is the **T** and the **E** in **STEM**!

Career aspirations often begin in middle school. Exposure to STEM careers during this time triggers students to **seriously consider jobs** in engineering, technology, manufacturing, biology, etc.

STEM class is an environment where students **explore, collaborate** on projects, find and use evidence, and use their **critical thinking skills** to solve **real-world problems**. Students are given hands-on learning experiences to gain skills and traits that will make them **career ready** in the future. STEM is offered as a nine weeks exploratory course for all middle school students.

By taking what students have already learned in elementary school, and **deepening the curriculum** in middle school, students will have **obtained 9 years of computer science/ STEM exposure by the time they are 14**.

Students in **7th grade** STEM design and create an apparatus that is used to clean the ocean after studying the human impact on these ecosystems. Students study marine ecosystems, the Pacific trash vortex, and human responsibility to help restore the ocean's delicate ecosystems then explain how their device can both clean up trash and cause the least disruption to organisms.


Students in **6th grade** STEM design and build an outdoor home for a rescued lost puppy to keep it cool during a record setting heat wave until his owner is found. Students study materials to determine which will best protect the puppy from the effects of thermal energy from the sun.

How are we preparing our *high school students* **for their future after SASD?**

This isn't your typical woodshop class anymore!
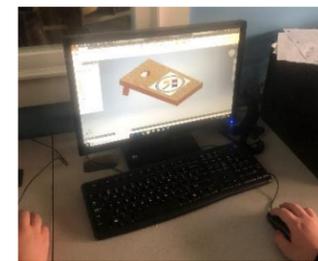
Wood Product Design

This course students learn and use the 3D Inventor design software. Students design 2 x 4 wooden furniture, which can be later built in the wood shop to their design specifications. Students also learn safe practices while working in the shop and with the tools they will need to use.

Computer Science Principles

This is the first year SAHS is offering courses in **Computer Science Principles** through the math department.
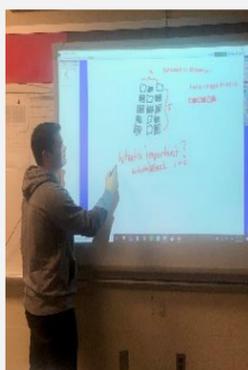
Two new courses are being offered this year at South Allegheny. **Computer Science Principles and AP Computer Science Principles**. Computer Science Principles introduces students to the foundational concepts of computer science and challenges them to explore how computing and technology can impact the world. More than a traditional introduction to programming, it is a **rigorous, engaging, and approachable** course that explores many of the foundational ideas of computing so all students understand how these concepts are transforming the world we live in. These courses can also fulfill a **math or science graduation requirement** for students in the state of Pennsylvania.

ADVERTISING & DESIGN

Students can earn credits in Advertising and Design through courses offered at SAHS. Students work with indoor/outdoor vinyl for signage and wall graphics both inside and outside the district. They work with heat vinyl and screen printing for t-shirts. Students use Adobe Photoshop, Adobe Illustrator and Intuous Digital Drawing tablets when they take Graphics 1-4 or Advertising & Design.

The **Video Production/ TV Broadcasting** course provides an opportunity for students to explore **Broadcasting and Video production** in a hands-on setting. Students work in the High School TV studio to produce a variety of videos and TV projects such as **commercials, news stories, interviews, television advertising, public service announcements, and short films**. Topics covered include the basic aspects of the pre-production, production and post-production process including storyboarding, script writing, camera techniques/movements, audio production, non-linear editing, and special effects. Much of the emphasis is on learning the production tools.

It's important for students to understand STEM and computer science because computers and technology are **literally all around us**. Most students understand how to use technology, but don't necessarily know how technology works. In order to continue innovating and creating new technologies, though, we **need to understand how those technologies work**. Making this connection through the integration of a STEAM aligned curriculum K-12 as well as exposure to the principles of CS will allow our students an integrated thought process. The goal will be for students to **see how both sides of the process support each other**.

"Having to complete assignments from Miss Thomson, our reading teacher, justifies our time in the recording studio. She'll say that we have a choice to either, "write, rap, or recite' our responses to an assignment and we all just roll with it based on what we like. A group of four of us go to the recording studio where we can freestyle our response."

-Camaren Terry and Reco Barrett, 8th graders

According to research, a benefit of **multimedia learning** is that it takes advantage of the brain's ability to make connections between verbal and visual representations of content, leading to a deeper understanding, which in turn supports the **transfer of learning** to other situations. All of this is important in today's Global economy, as we are preparing students for a future where higher-level thinking, problem solving and collaborative skills will be required.

Putting the "A" in STEAM
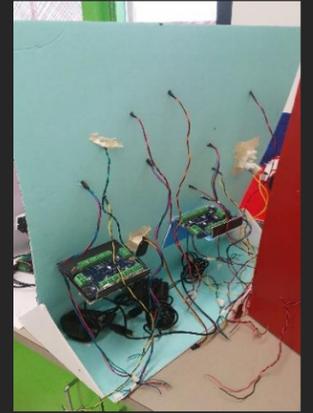
Moving Masterpieces – Coding in Art Classes

STEM education becomes STEAM education when you add in the "arts". Through opportunities in advertising and design, graphic arts, art courses, and music. One opportunity that our students have allows them to explore coding, robotics and art history through the creation of Moving Masterpieces.

This project enables students to choose a painting, recreate it in 3D and add Hummingbird Robotics. The coding that the students design adds movement, lights and sound to the robotics. Each project is a unique design expressing the original art and how the student interprets it.

Computing jobs are the #1 source of new wages in the United States. There are 500,000 current job openings in every industry, every state, and they are projected to grow at twice the rate of all other jobs.

Check This Out!

https://m.youtube.com/watch?v=LWRPZvxishw

Volleyball Playoff Game Highlight Video

Students who learned from **materials containing both text and graphics** produced 55 percent to 121 percent more accurate solutions to problems, according to David Taylor at the University of Maryland. The use of images, along with words, diminishes the overwhelming nature of text and helps the student to manage the cognitive load, which increases retention. Specifically, **graphics are found to support retention** because important elements are focused on via placement, layout and color. Activation of prior knowledge is engaged quickly with visual analogy, and mental models are created easily as diagrams can enhance understanding of how a concept works. Additionally, learning is made easier because simulations allow students to visualize real-life situations, and motivation is increased as students are able to see the **relevance of skills**.

Engineering and Design

Students learn and use 2D and 3D Industry grade design software. Students will get to design and build prototypes using the engineering design process which shows them that an iterated process of testing and redesigning is a normal process when it comes to product design. This process encourages their ability to discover.

Let's talk *"Big Picture"*

Many of the traits developed through the **Portrait of a Gladiator** creation process contain skills learned and developed through computer science, coding and STEM education opportunities.

Traditional industries are being disrupted by technological advances, and employers and talent need to keep pace. All workers need to continually upskill and become digitally fluent.

Baseline, or 'soft,' skills such as **communications, problem-solving** and customer service continue to grow in importance.

An **increasing number of employers are seeking talent with robust behavioral skills**, and those skills are seen as a prerequisite to be considered for a job.

Baseline skills that are expected to increase in importance over the next decade include:

Project Planning and Development Skills
Troubleshooting
Technical Assistance
Creativity
Performance Analysis
Team Building
Mentoring
**Decision Making**
Planning

With the coming age of automation, many of the available **jobs of today will be replaced by computers and robots**. By training the students about programming and computer science we are training them for the workforce of tomorrow.

In order for our students to be competitive, **they need core academic skills along with the skills provided in computer science and STEM education.**

SOUTH ALLEGHENY PORTRAIT OF A GLADIATOR

PERSONAL RESPONSIBILITY
Demonstrates Integrity
Shows Accountability
Displays Empathy
Self-Evaluates

CREATIVE PROBLEM SOLVER
Prioritizes Effectively
Embraces Innovation
Exhibits Originality
Executes Solutions

FLEXIBILITY / ADAPTABILITY
Demonstrates Resilience
Overcomes Barriers
Adjusts to Change
Accepts Feedback

SA

GLOBAL AWARENESS
Celebrates Diversity
Positivity Impacts Others
Accepts and Respects Others
Demonstrates Civic Responsibility

PURSUIT OF KNOWLEDGE
Exhibits Curiosity
Commits to Lifelong Learning
Utilizes a Variety of Resources
Embraces Academic Challenges

COMMUNICATORS AND COLLABORATORS
Shares Responsibilities
Willing to Compromise
Articulates Thoughts and Ideas
Demonstrates Open Mindedness

Making connections through high expectations, rigorous curriculum, 21st century skills, and engaging spaces for ALL students!
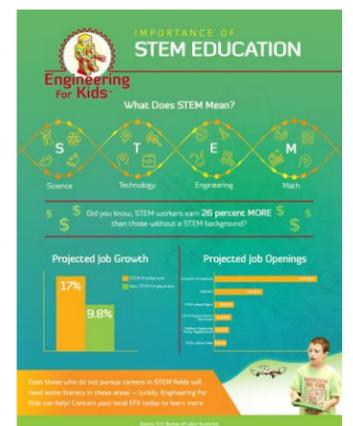
How can parents promote 21st Century Skills?

- ✓ Model good citizenship.
- ✓ Make decisions about responsible digital practices together.
- ✓ Make learning other languages and cultures a priority.
- ✓ Support your child's school.
- ✓ Make connections to afterschool activities.

How can educators promote 21st Century Skills?

- ✓ Encourage students to share thoughts, ideas, questions and solutions in powerful ways.
- ✓ Celebrate achieving shared goals with others, thinking together and harnessing the ideas, skills and expertise of the group.
- ✓ Allow students to look at problems in new ways, make smart decisions connections to other subjects and ideas.
- ✓ Inspire students to generate and test new ideas.
- ✓ Support students who are innovative, inventive and enterprising.