Concept Corner

Recent developments and innovations in computer science don’t only impact our lives by solving large problems, making tasks faster, and getting us more connected – they also bring new forms of entertainment. One form of this entertainment that has made one of the largest societal and cultural impacts is gaming. This industry was valued at over $214 billion globally in 2023, with an annual revenue of $365.6 billion! The number of gamers was projected to grow to $3.07 billion globally by the end of 2023. For more gaming statistics click here.

Whether played on a personal computer (PC), PlayStation, Xbox, or Nintendo console, video games have become a driving and intensive pastime for many of us. These games apply multiple concepts in computer science. Every shape, movement, and sound effect is programmed using computer code. Concepts in geometry and mathematics facilitate the appearance of 3D objects and their movement. The program in the game responds to decisions made by players and can take the game down many different paths. In many cases, players face opponents that are controlled by the computer (reasonably called a “computer” opponent). This computer player makes its next move by collecting data on the human player’s actions, analyzing their patterns, and predicting what move the player may do next and acting accordingly to stay competitive. Also, regarding online multiplayer games, a secure network is required to assure that players stay connected with each other and experience fast game response and accurate interaction. In this network, there usually is a central “server” that connects every player’s console and waits for enough players to connect in order to start a game. All of these games require the contribution of hundreds, if not thousands, of developers and experts in various fields, both in computer science and in mathematics.

Pedagogy Points

Free Platform: Gamefroot offers a free version of its game-designing platform that allows students to use basic coding skills to design games that students can play. International curriculum guides and many related educational resources are likely available and can be adapted to Virginia standards. Aligns with CS 2.1-3, 3.1, 4.1, and 5.1-3. For students without much prior coding experience, consider encouraging them to try Bloxels, Gamestar Mechanic (via Code.org’s Minecraft Hour of Tutorials), or Minecraft (via Mojang’s Fan Resources – Education) – this MIT student-friendly video lesson helps students understand how games connect to coding languages like Python and Scratch. Parallels to language arts are drawn throughout the lesson to help students understand how coding is a language. Align with CS K-1, 1.1, 2.3, 3.1, 4.1, 4.2, and 5.1-3.

Computer Science in the Commonwealth

VDOE Computer Science Standards of Learning

In 2017, the Virginia Department of Education adopted Computer Science Standards of Learning (SOL) to identify academic content for essential components of the computer science curriculum at different grade levels. Standards are identified for kindergarten through grade eight and a core set of middle and high school elective courses. Virginia is one of the first states to have K-12 Computer Science Standards of Learning. These standards are intended to promote social and emotional learning among students across K-12, with increases observed for problem solving and critical thinking skills as well as improved academic achievement overall. However, before we introduce strategies such as gaming into our classrooms, we need to ensure that the games are appropriate for all learners. For example, the games you select should be available in multiple languages and should also differentiate support to meet students at various stages of learning.

PDE encourages educators and students to try a new version of a coding game called “Code.Org’s Game半小时” – this game offers a free version of its game-designing platform that allows students to use basic coding skills to design games that students can play. International curriculum guides and many related educational resources are likely available and can be adapted to Virginia standards. Aligns with CS 2.1-3, 3.1, 4.1, and 5.1-3. For students without much prior coding experience, consider encouraging them to try Bloxels, Gamestar Mechanic (via Code.org’s Minecraft Hour of Tutorials), or Minecraft (via Mojang’s Fan Resources – Education) – this MIT student-friendly video lesson helps students understand how games connect to coding languages like Python and Scratch. Parallels to language arts are drawn throughout the lesson to help students understand how coding is a language. Align with CS K-1, 1.1, 2.3, 3.1, 4.1, 4.2, and 5.1-3.

Engaging All Learners

Gaming can be an effective instructional tool for a variety of content areas and is a great way to integrate computer science skills with core curricular areas. Gaming has been shown to increase engagement and promote social and emotional learning among students across K-12, with increases observed for problem solving and critical thinking skills as well as improved academic achievement overall. However, before we introduce strategies such as gaming into our classrooms, we need to ensure that the games are appropriate for all learners. For example, the games you select should be available in multiple languages and should also differentiate support to meet students at various stages of learning.

WIDA is an initiative of the University of Wisconsin – Madison that offers resources for teachers, students, and families to support learning among diverse populations, particularly those whose primary language is other than English. Click here to visit the WIDA site to learn more about creating an inclusive elementary classroom, whether you are teaching in a face-to-face or virtually/online environment.