

# RETRO VIDEO GAMES IN THE COMPUTING CURRICULUM

Hook or deterrent? **Neil Rickus** explores when, why, and how old video games could be used in computing classes

**A**s a child of the 1980s with a computer science degree, it's perhaps unsurprising that I love playing retro video games. And I've found that games such as Pong, Space Invaders, Pac-Man, and Super Mario Bros can enrich the curriculum and help children to develop their understanding of digital devices, while also providing an opportunity to examine the history of computing.

But by using games in lessons, we could potentially be projecting wrong ideas about what computing is for: children might come away knowing that by studying computer science they could make games, but what about developing open-ended, collaborative, and creative projects, too? Also, gaming is often seen as being solely a male pursuit, so we could risk alienating a large portion of our

learners. I'd like to explore the opportunities for incorporating games in the computing classroom while ensuring that all students feel there's a space for them.

## Curriculum links at different ages

For young learners up to around the age of five, retro video games could provide an opportunity to interact with technology in a safe environment, without having to worry about the online safety dangers posed by modern devices. For example, games such as Pong can be operated with a simple controller to move the on-screen paddle. This teaches children how they can interact with a machine, along with developing their hand-eye coordination. Other controllers, including joysticks, joypads, and keyboards, could provide further opportunities for children to use technology and develop their confidence with digital devices.

The English primary computing national curriculum (for ages 5–11 years) outlines how children should be able to produce programs containing sequences of instructions, along with using the concepts of selection, repetition, and variables. Modern block-based programming environments, such as Scratch, enable children to produce programs comparable in complexity and quality to retro video games. Games such as Space Invaders or Super Mario Bros could be used as a stimulus for learning, along with an opportunity to discuss how programming concepts have been implemented. For example, the movement of a typical enemy in Space Invaders might proceed in a manner similar to the instructions that follow, which could be implemented in Scratch:

**Repeat until touching laser:**

**Move 2 pixels across screen in current direction**

**If touching edge of screen:**

**Change direction of moving across the screen**

**Move 2 pixels down the screen**

Many retro video games are collaborative in nature, such as Bubble Bobble or Gauntlet, and players have to work together to defeat a common enemy. This can enable children to develop their communication and social skills while using technology. It might also help to improve children's resilience as they attempt to solve a problem or complete a level, or when they lose lives in a game, although care needs to be taken to balance the possible enjoyment of completing a section of the game against creating an overly competitive classroom environment.

As children enter secondary school (ages 11–16 years), curriculum content focuses more on how digital devices function, which includes the importance of binary. The graphics in retro video games, which were often constructed using a limited number of pixels, enable concepts such as bits, colour depth, and image size to be studied. Storage can also be examined, and comparisons made with modern systems.

Other teachers I've heard from have also shared how text-based adventure games, which were popular on early home computers, can be developed in Python by secondary students. These games enable subroutines, variables, and arrays to be implemented, and can even link to other subject areas, including English.



## NEIL RICKUS

Neil is a senior lecturer in computing education at the University of Hertfordshire, a primary education consultant for the BCS, and the founder of Computing Champions. He is a CAS community leader, a CEOP Ambassador, and a Raspberry Pi, Google, and Microsoft Certified Educator (@computingchamps).



■ Interacting with vintage computers and video games consoles lets students see how technology has developed over the years

## Is it actually all about history?

The impact of technology might also be considered by students when studying computing. For example, in the US, the Computer Science Teachers' Association Standards have the following statement for students in grades three to five (ages 8–11): "Discuss computing technologies that have changed the world, and express how those technologies influence, and are

modern computing, while bedroom coders — amateur programmers who worked by themselves — produced some of the most memorable titles in video game history, and forged the beginnings of the billion dollar gaming industry today.

Organisations such as the Code Show in the UK specialise in bringing original devices into schools for children to use, while museums, including Cambridge's Centre

playing video games means they have playful experiences with technology, rather than seeing digital devices as tools. This can translate into boys feeling more comfortable when interacting with computers. Perhaps then, through providing opportunities for all learners to interact with simple retro video games in lessons, such as those produced for early computers and video games consoles, we could enable learners to increase their confidence with technology, while also developing their knowledge and understanding of the computing curriculum?

In my opinion, there could be a place for retro video games in the curriculum, if this is balanced by including other non-gaming applications of computer science — such as artificial intelligence, data science, and web design, in conjunction with collaborative, creative projects that have a positive contribution to the world around us. This would encourage learners to find areas that might interest them, as well as introducing the broad scope of careers available through the subject.

What are your thoughts on using retro video games in schools? Is their use suitable for the mainstream classroom, or is this something that's only for an after-school club? I'd love to hear your ideas! Do get in touch on Twitter [@computingchamps](#). 

## “ COLLABORATIVE GAMES CAN HELP TO BUILD RESILIENCE AND DEVELOP SOCIAL SKILLS

influenced by, cultural practices.”

Perhaps there is an opportunity for retro video games to become part of the computing curriculum in the UK? The huge leaps in processing power, storage capacity, and display technology during the later part of the twentieth century were phenomenal, and heavily influence how we use our digital devices today.

As the use of retro video games can enable children to interact with older home computers and consoles, there's also the opportunity to study the history of how hardware and software have developed. Machines such as the ZX Spectrum and the BBC Micro have heavily influenced

for Computing History and The National Museum of Computing at Bletchley Park, enable visitors to use an extensive range of machines. Modern systems, including the Raspberry Pi, can also be used to emulate older machines.

### Video games and computing

While video game use is increasing among all demographics, this doesn't necessarily translate into more young people choosing further study of computer science, and video games are regarded by some as an activity for teenage boys.

Research has outlined how boys' childhood use of computers through