FEATURE

TECHNOLOGY PRESERVATION

Neil Rickus and **Anjali Das** discuss how older technology can be used to develop pupils' knowledge and understanding of computing concepts

With technology continuing to develop at a rapid pace, older technologies can easily be forgotten. The history that underpins an object's birth and evolution, though, is key to understanding its current place in society. In this article, we examine the importance of technology preservation as a vital way of telling future generations the story and impact of what has become such an important part of our lives.

What is technology preservation?

By its commercial nature, technology is often not made to last. Whether it be a device as a whole, or the parts that make up computing systems, technology is physically prone to damage. Storage media, such as punched tape, floppy disks, hard disks, and CDs, are clear examples of this. A common form of degradation affecting LaserDiscs, a storage medium from the late 1970s, for instance, is disc rot. Oxidation spots appear on the surface of the disc and render it unreadable. Similarly, the software that helps these machines work is at risk. Although it is not a physical object and cannot technically be damaged, software is stored on hardware and is therefore vulnerable to damage over time.

Conservation methods are therefore employed to prevent or limit damage to such physical objects. Environmental conditions — for example, relative humidity, ultraviolet radiation, and the temperature at which an object is stored — need to be carefully considered. Conservation scientists are currently carrying out research on this topic, and conservators focus on how to preserve the plastic that goes into a lot of these objects, such as by wearing nitrile gloves when handling objects, which prevents dust and sweat from damaging them.

Links across the curriculum

Studying older technologies can support the development of students' knowledge and understanding of computing and other STEM subjects, providing an engaging context in which to introduce key concepts.

Teachers in the UK leading GCSE and A-level computer science classes (for pupils aged 14–18) could discuss the preservation of storage media, including its reliability and durability, when examining the benefits and drawbacks of different media, along with the need for devices to access the media. Older technology that is beyond repair can be used to examine a computer's components, such as the hard drive, memory, and processor, to enable pupils to view parts of the machine they are studying in class. Many pupils find handling components particularly beneficial in developing their understanding of how digital devices function.

The US-based Computer Science Teachers Association (CSTA) K–12 Standards (for pupils aged 5–18) contain a number of statements that could be incorporated into discussions around technology preservation (**helloworld.cc/CSTAstandards**), in particular:

- **Grades K–2:** *compare how people live and work before and after the implementation or adoption of new computing technology*
- **Grades 3–5:** *discuss computing technologies that have changed the world, and express how those technologies influence, and are influenced by, cultural practices*

Vintage technology can be used to develop children's understanding of the computing curriculum and discuss the need for technology preservation

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■ Video games stored in acid-free boxes and protected in preservation-grade bags

These statements could enable children to examine and use older technology to help them better understand its impact, including making culturally relevant links, for example, understanding the way in which technology has altered communication methods in their local communities, or sharing appropriate role models related to certain technologies. In addition, students could explore the convergence of different technologies, such as how smartphones have, for many individuals, reduced the need for multiple devices.

For older children, the CSTA Standards contain the following related statements:

- **Grades 6–8:** *compare tradeoffs associated with computing technologies that affect people's everyday activities and career options*
- **Grades 11–12:** *predict how computational innovations that have revolutionized aspects of our culture might evolve*

These statements enable students to examine technology in more detail, with older technology giving children an opportunity to see how it has developed over time, as well as predicting how it might develop in the future.

If the statements within your computing national curriculum offer limited opportunities to explore technology preservation, you could make links with the topics studied in other subjects. For instance, in history and geography, the technology, or the people involved with the technology, could form part of an extended project. Pupils could also examine the environmental impact of disposing of technology, making links to recycling and the Right to Repair movement (**repair.eu**). Finally, the environmental and handling conditions of old technology can also provide links to science and geography, along with providing real-world contexts for scientific investigations. Ultimately, though, it might just take a little creativity to link this context to your computing curriculum — for example, you could discuss how old technology is physically moved; pupils could produce algorithms for how items can be safely carried from one location to another.

Opportunities for enrichment activities

Technology preservation can also be examined in a number of settings away from the classroom. Maker spaces allow people to investigate older technology, including repairing non-functioning items or upgrading older hardware to enable it to operate with more recent technologies. For example, within home computers, failing floppy disk drives can be replaced with SD card readers, or antique radios can be modified to work with streaming audio services. Working with technology in this manner can enable students to develop practical skills, as well as developing their understanding of how devices function.

Computer museums preserve our digital heritage by displaying examples of older technologies and telling the stories that accompany them. One such example is The Centre for Computing History in Cambridge, UK, which showcases the historical, social, and cultural impact of personal computing in our lives (**computinghistory.org.uk**). For instance, one article on the museum's website recently examined the importance of video game preservation, particularly its role in showcasing popular culture of the time (**helloworld.cc/gamepreservation**). The article discusses what it means to preserve a video game, and considers both physical and digital games, as well as the marketing that surrounds them. Educational groups visiting the museum experience hands-on learning, with strong links to England's national curriculum for computing, wrapped up in a historical context.

Museums and other organisations also use computers and video game consoles to enable children to have hands-on experiences with technology. For example, The Code Show works with schools to enhance the taught curriculum by bringing old technology to schools to examine how it has developed over time (**thecodeshow.info**). These experiences could even introduce programming concepts to children; through considering the programs used in a game, pupils can discuss the associated algorithms and how programming concepts have been implemented, then go on to implement programs within a block-based programming environment.

Are you incorporating, or considering incorporating, technology preservation into your schemes of work? Please get in touch with us on Twitter: **@computingchamps** (Neil) and **@MuseumsInspire** or **@computermuseum** (Anjali). (HW)

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