ZEROES & ONES

The geeks, heroes and hackers who changed history

Teaching notes

Author: Cristy Burne

ISBN: 978-1-925143-88-1

Audience: Years 4 to 9

Publication date: March 2017

ABOUT THE BOOK

This book is about the creators of today's digital technologies. It's about the coders, the crackpots and the trailblazers. It's about their failure and despair, their dedication and daring.

But most of all, it's about what ordinary people can do with some creativity, determination, and a whole bunch of zeros and ones. People like you.

ABOUT THE AUTHOR

Children's author and science writer Cristy Burne has worked as a science communicator across Australia, Japan, Switzerland, the UK, US, South Africa and beyond. She has performed in a science circus, worked as a garbage analyst, and was a reporter at CERN when they turned on the LHC. Cristy loves blending STEM and creativity to enthuse, engage and empower.

THEMES

- Information technology
- History
- Innovation
- Creative thinking
- Science, technology, engineering and maths
- Robotics

CURRICULUM LINKS

This book links STEM, STEAM and Technology with History, Literacy and Creative Thinking.

CLASSROOM IDEAS

Before reading:

- Look at the book's cover. What do you think this book will be about?

- Do you think it will be fiction or non-fiction?

- Now read the blurb on the back cover. Does this change your ideas?

- What do you know about the history of computers? Do you know the names of famous inventors of information technology? What do you know about how they lived and worked, and the stories behind their inventions?

After reading *Part 1: Kicking Off*

- **Read Ada Lovelace's story:** *Cow-catchers, party tricks and Flyology*
  - Do you think maths is an antidote to creativity? Why? Why not?
  - Some people don't believe that Ada was the author of her 'Notes'. They say she was delusional and pretended to be smarter than she was. Other people say this is poppycock, and that Ada understood the future of computing even better than Charles. Why do you think these two arguments exist? What makes Ada's achievements so amazing for their time?
  - One of Ada's tutors was a mathematician called Mary Somerville. Mary was one of the few female mathematicians around at that time. Do you think it's important to have the help of someone who has experienced what you're going through? What happens when you're the very first?
  - Every year we celebrate Ada's work on Ada Lovelace Day: the second Tuesday in October. There's also a programming language—Ada—named after her. Charles Babbage also has a programming language named after him, and a moon crater, too. Can you imagine some other ways we might celebrate and remember Ada and Charles' work?

- **Read the story of the world-famous Australian-made Julius tote:** *Race tracks, fast money and a railroad engineer*
  - George Julius built his computer to help with government elections. How do you think he felt when the government rejected his invention? What do you imagine he did next? What would you have done?
  - George helped his dad fix clocks, and George's kids helped him invent the tote. Do you think kids can contribute when they work with adults in a team? What project would you like to work on? Who would you have on your team?
  - What do you think are some of the reasons the government decided to stick with paper votes, and not adopt George's invention to allow electronic voting? What features would you include on your own electronic voting machine?

- **Read the story of why 1937 was such a huge year in computing:** *Lightbulb moments, kitchen antics and binary, baby*
  - John Mauchly and Pres Eckert invented their computer using ideas and information they'd gathered from seeing other people's computers. Do you think this is fair? Is this sort of thing restricted to computing? Where else does it happen?

- The year 1937 was a busy one for computing, and then in 1939, World War II began. Over the next few years, the modern computer was born. Many of the world's largest jumps in technology have come during times of war. Why do you think this is?

- **Read the story of the ENIAC Six:** *Human computers, speeding bullets and the ENIAC Six*
    - ENIAC may well have been the world's first digital computer, but did it have the world's best name? The acronym 'ENIAC' stood for 'Electronic Numerical Integrator And Computer'. Later computers were called EDVAC**,** ILLIAC and JOHNNIAC. What do you think these acronyms stood for? If you were naming a computer, what acronym would you use?
    - The evening after ENIAC's first public demonstration, scientists, army personnel and ENIAC's male inventors went out for a celebratory dinner. But ENIAC's programmers weren't invited, recognised or even thanked. Why do you think this was? Do you think this attitude is changing?
    - On ENIAC's fiftieth anniversary, some fans rebuilt the massive computer on a single microchip. What changes do you foresee in the next fifty years? Do you think things are still changing this quickly?

- **Read the story of Australia's first digital computers:** *CSIRAC, Colonel Bogey and a Melbourne Cup winner*
    - In the early days of IT, people didn't understand what computers could do, or how they might be useful. Australia's early computer pioneers worked hard to convince investors that a computer was worth building. Write a letter to your teachers, convincing them to let you build your own 2.5-tonne computer in your school.
    - Another of Australia's early computers was called UTECOM: University of Technology's Electronic Computer. Around the world there was also WREDAC, EDVAC, ACE, DEUCE, SWAC, SEAC, ABC, UNIVAC, RAMAC, ZEBRA and PEGASUS. What do you think these names stood for?
    - SILLIAC was made possible thanks to the generosity of Sir Adolph Basser, a Polish immigrant who never went to university and started his career selling spectacles. What role do you think individuals can play in changing history? Write a story where one person's action transforms the world.

- **Read the story of what might be the world's first computer game:** *Toilet paper, the Additron and Bertie the Brain*
    - Humans love games, and there are many other contenders for the title of First Ever Computer Game. One so-called 'game' was Bouncing Ball, released in 1951. The game involved watching a pixelated ball bounce around in real-time. Oooh, fun. Bouncing Ball was amazing for demonstrating the laws of physics, but rubbish in terms of being a game, because there was no way to actually play it. So … not really a game, then. How would you use modern computer technology to change Bouncing Ball into a game that kids would love to play?
    - After the National Exhibition, Bertie the Brain was forgotten as Josef worked day and night to earn three university qualifications in three subjects in just three years. What do you think should have happened to Bertie? Imagine a different ending for the world's first computer brain.

Teaching notes are also available on request for Part 2 (Getting Personal), Part 3 (Going Global), Part 4 (Doing Social) and Part 5 (Wrestling).

Please contact cj@cristyburne.com or visit www.cristyburne.com for more information.