The Age of Computing

The importance of computational thinking at an early age

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WHEN YOU THINK back over the last hundred years, the technological achievements that we've accomplished have been incredible. Transport, communication and medicine - these are just a few areas that have seen considerable change. So, it begs the questions: What will we witness over the next hundred years, and how will the next generation adapt to the demands of the era?

This is a particularly difficult one to answer because the Digital Age in which we live shows no signs of slowing down. Many experts believe we are merely at the beginning of it and that it will dominate our lives for a long, long time to come. We see the demand of 3D printers gathering pace, as well as biotechnologies, commercial space aviation and, in the near future, driverless cars. Technology plays a huge role in many "best future jobs" lists. Recently, technology was rated as the #2 career path by college advisors, narrowly beaten by healthcare.

Experts forecast that the following roles are likely to be in high demand as soon as 2022:

- Software Systems Developers: People who can write the basic code that software depends on
- Computer Systems Analysts: People who can analyze and improve computer systems
- Software Applications Developers: Similar to Software Systems Developers, these people focus more on the needs of the users rather than the backend parts of computer systems
- IT Security Consultants: As internet hacking continues to proliferate, more cyber protection will be necessary. In all likelihood, there will be a greater need for online policing as well.
- Robotic Engineers: More robots will be required in the military, medical and industrial sectors. Drone controllers are already used in the military industry and may spread to civilian use.

Beyond the next 20 years is difficult for anyone to predict. Many believe that the success or failure of artificial intelligence will determine the next period in human history. How will the next generation adapt to the demands of the time period? If we think back to the dawn of the Industrial Revolution, its arrival eliminated many manual labor professions such as farming. However, it also succeeded in creating more jobs within factories too. A similar pattern can be seen with the transition into the Digital Age. Over time, technology has removed the need for many skilled white-collar jobs. Why employ a Junior Analyst when a computer algorithm somebody has written can perform it to a higher standard, repeatedly, for free?

As a result of these advancements in technology, education in the UK and elsewhere has reacted to growing concerns about the lack of computer scientists by providing a radical overhaul of its computing curriculum. Gone are the days of simply learning how to use Word, Excel or PowerPoint. Now, children as young as five and six are expected to display early signs of 'Computational Thinking.' Essentially, this means that children will not only become confident in using different software but also begin to manipulate software to do what they want it to do.

Recently, I taught a unit where children, aged nine and ten, developed their own simple computer game. As simple as the games may have appeared to the user, hidden from view were long lines of programming that required rigorous planning and manipulation. When confronted by a problem (or bug), debugging was required. Not only did this challenge children's computational thinking, it challenged them to demonstrate resilience and adaptability. Upon completion, many of the class had a newfound appreciation for the complexities of computer science, but perhaps more importantly, had developed an understanding that we can manipulate computers to do what *we* want them to.

By taking on such challenges, it increases children's chances of gaining future employment within the technology sector and writing the algorithms that computers will use, instead of entering a profession where, one day, their job may become redundant due to technology acting in their place.

Obviously, employment where technology plays a minor role will always exist; however, by providing children with exposure to multiple devices, software and programming opportunities, it can only strengthen children's skill-sets as they go on to compete for jobs of the future, where possibility, potential and progression is key. ■