PAPERT'S LEGACY

Co-creator of Logo, pioneer of programming in schools, and godfather of the maker movement. Seymour Papert has had an immense impact on digital making, mathematics, and CS education

Seymour Papert died in July 2016, leaving behind a legacy of profound impact on so many aspects of education. He provided much of a generation with their first experience of computer programming through the Logo language, particularly its pioneering implementation of turtle graphics. He also developed many of the ideas that lie at the foundation of computing education and digital making. He was the first to coin the term 'computational thinking'; he recognised that there was little point to teaching children to program as an end in itself, but that through their learning to program they would start looking at problems, other subjects, and the world quite differently. He moved beyond Piaget's view of learning as through experience to the theory of 'Constructionism. He foresaw the impact that providing children with access to the world's knowledge would have for the nature of schooling; and finally, he was an advocate for equitable access to cheap digital technology for all.

So much of what we're learning about good practice in computing education was figured out by Seymour Papert 30 or 40 years ago. Papert was one of the first to recognise that a young person could make things in their mind through making things in the world.

Here, four contemporary educators look back on Papert's work, and draw out some of the lessons we can learn from this today. We begin with Dr. Gary Stager, veteran teacher, educator, speaker, and colleague of Papert for twenty years. Gary curates the Papert archive at **dailypapert.com** and is co-author of the highly recommended Invent To Learn – Making, Tinkering, and Engineering in the Classroom.

PAPERT
FATHER OF THE MAKER MOVEMENT

Written by: **Gary S Stager, Ph.D.**

Papert was not only a recognised mathematician, artificial intelligence pioneer, and computer scientist; he was also the father of educational computing and the maker movement.

By the late 1960s, Papert was advocating for every child to have their own computer. At a time when few people had ever seen a computer, Papert believed that children should program them. They should be in charge of the system; learning while programming and debugging. He posed a fundamental question still relevant today: "Does the child program the computer, or does the computer program the child?" Along with colleagues, Papert created Logo, the first programming language designed specifically for children and learning. Logo dialects, like Scratch and Snap!, are still in use fifty years later.

Papert's legacy extends beyond children programming. In 1968, Alan Kay was so impressed by children's work in Logo he sketched the Dynabook, the prototype for the modern personal computer, on his flight home. LEGO's line of robotics gear is named after Papert's seminal book, Mindstorms. In 1993, Papert conjured up images of a knowledge machine that children could use to answer their questions.

Making things and making meaning

As students expressed formal mathematical ideas of how they wanted the robotic Logo turtle to move about in space, it would drag a pen (or lift it up) and move about in space as a surrogate for the child's body; they were learning not only powerful ideas from computer science, but constructing mathematical knowledge by "teaching" the turtle. From the beginning, Papert's vision included physical computing and using the computer to make things that lived on the screen and in the real world. This vision is clear in a paper Cynthia Solomon and Seymour Papert co-authored in 1970-71, "Twenty Things to Do with a Computer." (see box). This made the case for the maker movement more than forty-five years ago.

Computing for all

Social justice and equity was a current running through all of Papert's activities. If children were to engage with powerful ideas and construct knowledge, then they would require agency over the learning process and ownership of the technology used to construct knowledge.

"...Only inertia and prejudice, not economics or lack of good educational ideas, stand in the way of providing every child in the world with the kinds of experience of which we have tried to give you some glimpses"
(Papert and Solomon, 1971)

One laptop per child

It frustrated Papert that kids couldn't build their own computers. In 1995, Papert caused a commotion in a US Congressional hearing on the future of education, when an infuriated venture capitalist scolded him while saying that it was irresponsible to assert that computers could cost $100, have a lifespan of a decade, and be maintained by children themselves (**http://helloworld.cc/2jr6do7**). Later, Papert would be fond of demonstrating how any child anywhere in the world could repair the $100 OLPC laptop with a single screwdriver. The Raspberry Pi finally offers children a low-cost programmable computer that they may build, maintain, expand, and use to control cyberspace and the world around them. (HW)

The One Laptop Per Child XO-1 - one of the many projects inspired by Papert. ◀

20 THINGS TO DO WITH A COMPUTER

"In our image of a school computation laboratory, an important role is played by numerous "controller ports" which allow any student to plug any device into the computer... The laboratory will have a supply of motors, solenoids, relays, sense devices of various kids, etc. Using them, the students will be able to invent and build an endless variety of cybernetic systems." (Papert and Solomon, 1971)