Grand design

The sooner we get high tech machinery into our children's hands, the earlier we'll plug the engineering deficit, says **James Dyson...**

The march of technology into the classroom moves at a rapid pace. Where my early tools were a notepad and a pen, kids today are getting their hands on high tech machines – whether that means iPads or digital microscopes. But it's in the Design and Technology labs where machines have a really fantastic potential to unlock bright ideas and enthuse budding design engineers. Equipment such as 3D printers are causing a buzz amongst the engineering community; opening up a new world of possibilities from printing clothes at home to producing organs for transplants. Excitingly, these machines are already being used on a more tangible level – and revolutionising the classroom as a result.

My Foundation recently asked a group of eleven year olds, "what is an engineer?" Most responses came back along the lines of, "he's a man who fixes the cooker". But this image is a world away from the high tech design engineering going on at places like Dyson. Rapid prototyping is fast becoming an affordable and vital addition to the classroom. If we show children how it feels to quickly prototype their own invention and what it means to be a design engineer, then we might have some hope of plugging the vast engineering deficit our country currently faces.

The problem was the same when I was at school studying woodwork. The work I did seemed irrelevant, it didn't excite me. Nor did I know what engineering was – because we were not exposed to it (my careers advisor told me to be an estate agent!) So I went to art school to study furniture design. As soon as I had my eyes opened to design engineering, though, I was hooked. It is my mission to ensure that young people today are fully exposed to the various paths in front of them.

The world of technology is continually marching forward; our schools can't afford to lag behind. If our students are fully aware of industrial practices from an early age, just think of the world changing ideas they could create.

My Foundation is working with schools around Bath to develop industry-relevant resources aimed at inspiring young engineers. We kitted out each school with industry-standard machines, including routers, laser cutters and 3D printers – and have seen some strong patterns and results emerge. We have been primarily working with year 8s, tasking a teacher in each school with delivering industry-led projects grounded in design and engineering.

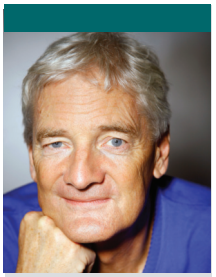
Just as my grandchildren are better versed in using their tablet computers than I am, these pupils have taken to the equipment with ease. From using haptic pens to mould clay models, to using CAD to hash out the intricacies of their design, the children throw their adaptable minds at mastering new machines, and enjoy the challenge. One young boy recently asked, "what CAD software do they use at Dyson?" – an astute question from a 12-year-old. He had already twigged that if he became the expert on industry standard equipment he could approach companies already armed with the skills for which they are looking.

There are many reasons we use these machines in industry: essentially to do with speed, efficiency and ease. 3D printing plays a pivotal role in the iterative design process. Think of this: I made 5,127 prototypes of my first bagless vacuum cleaner. Using cardboard, tape, and later moulded plastic parts, I designed, built, tested and tweaked. It took five years. Had I had access to rapid prototyping machines I'm sure this process could have been much reduced. Of course, design engineers must still get to grips with sketching and cardboard modelling, but 3D printing is a fast way to continue the iterative design process. Students can design and produce multiple parts, test them, change them and test them again; invention cannot help but follow.

Young minds are unfettered by convention – and technology can push this further. Mastering resistant materials is important, and useful. But there's only so many ways you can join wood or fold cardboard. The next step is using 3D printing to free up the 'impossible' – printing intricate interlocking structures. Students calculate what is possible using their knowledge of forces and strain, and armed with this information, they print their invention. If you can draw it, you can make it – and hold it in your hands. And this is what will keep learners coming back for more. Prototypes are the best way to communicate bright ideas.

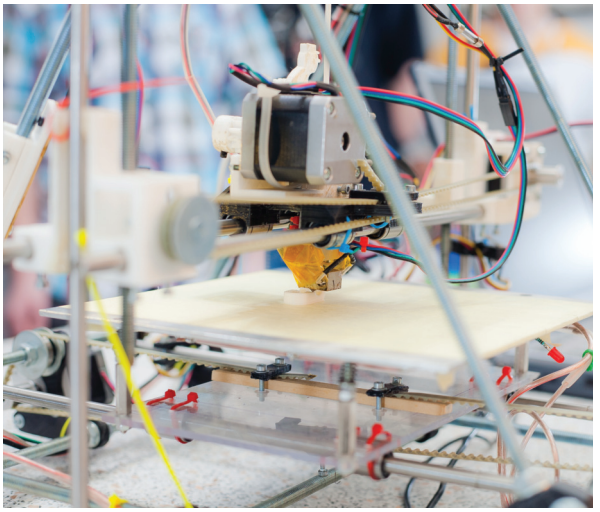
Creativity is the lifeblood of Design and Technology. It is what sets the subject apart from its scientific counterparts. Students can take what they have learnt in maths and science and use their creativity to make something that works. One of the projects being delivered at our Bath schools is to develop a solution to deliver aid in disaster areas. I was impressed by the variety of outcomes that came from the class, with parachutes sitting alongside helicopters and sycamore seed inspired containers.

Educators should be buoyed by the proposed new curriculum for Design and Technology. It will encourage a forward looking subject for mathematical whizzkids with bright ideas. But this is only the start. Schools must see that



ABOUT THE AUTHOR

JAMES DYSON IS THE FOUNDER OF DYSON AND THE JAMES DYSON FOUNDATION.
THE FOUNDATION AIMS TO ENCOURAGE AND INSPIRE THE NEXT GENERATION OF DESIGN ENGINEERS. IT CONDUCTS WORKSHOPS IN SCHOOLS AND UNIVERSITIES AND SENDS OUT FREE EDUCATIONAL RESOURCES. THE FOUNDATION'S 'ENGINEERING BOX' – SPECIFICALLY FOR SECONDARY SCHOOLS – AND THE NEW 'IDEAS BOX' ARE LOANED TO SCHOOLS, FREE OF CHARGE. FIND OUT MORE AT: **JAMESDYSONFOUNDATION.CO.UK**



these machines open a world of possibility. They open the doors of the D&T lab to the wider school community. The cross-curricular ties are clear in all kinds of subjects – students can model 3D terrain in Geography and historical buildings in Classics. Difficult scientific concepts are made tangible by printing cells, atoms, even DNA. We have certainly seen this happening through our work in Bath, with one teacher saying, "D&T is the centre of the universe in my school" – a triumph for a subject so often sidelined to a dark lab in the furthest reaches of the building. At this particular school, where previously they had 18 students studying D&T in the sixth form, they now have 50 budding design engineers getting hands on and inventing. A real re-education has taken place.

I've always felt that Design and Technology should be about using new technology to solve everyday problems. Rapid prototyping has made this process more accessible. This development is not a fad – it is the future.