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Who is stealing our children's love of Science? Or Wang Mei Zhi Ke! - 望梅止渴。

There is a traditional story from China about a general Cao Cao leading his army. The army was exhausted with a long way to go through wild and inhospitable country with no water and the hot sun beating down on them. They were exhausted. Cao Cao declared that he could sense the distant smell of an orchard of sweet plums and the army was rejuvenated, marching on, thinking of the sweet plums they would soon be eating.

In many ways that is the inspiration we give our young people to study and work hard at school so that when they leave they will find happiness and fulfilment with a good job earning lots of money. Children are in many ways like Cao Cao's army. They do not know what the future holds and the best guides that they have are their parents, their teachers and the society around them.

But how do we guide our young people and how do we bring them back to science when we know how important it is for China and probably for their own careers. We look at the past and see that the people with the most money now are the bankers, the accountants, the finance experts with many others in similar occupations and we tell our children mainly by our actions and attitudes but sometimes even directly that this is good and something they should aim for. Like Cao Cao we can sense the distant sweet smell of plums in the orchards of the banks.

The big questions are: will it be true for our young people when they leave school and university not so many years from now? Will it be true that the route to fulfilment and happiness is money and will it be true that it will be found in the orchards of the banks? Only rarely do their teachers and their parents tell them that science is a most rewarding career with a great deal of independence and opportunity to follow your own inspirations.

For parents today and even more for grandparents we look back and see poverty, hardship and insecurity that would have been largely dismissed with a well-paying and secure job, but is the past a guide to the future? More importantly is our past a guide to our children's future? This article argues that "It aint necessarily so!"

A few years ago there was a big discussion in China around young women who said they would be happy "to cry in the back of a Mercedes..." The implications were that money was everything. This view was widely supported and only a few said they would be "happy riding a bicycle." The wish for the Mercedes is a left over from the insecurity of poverty. We should leave that behind. Fulfilment in life is about much more than money. The world that our children will inherit will be completely different from the world we grew up in. China is much more prosperous now than it was. Most people in China have reasonably secure and well paid jobs, they have secure homes and most importantly of all they can see a future in

which they can achieve their aspirations for improvement in their homes and their lives. This article asks whether like Cao Cao's orchard this prosperity will really be there for our children?

Every year there is a world Economic Forum held in Davos in Switzerland. The President of China, Xi Jinping attended in 2017 and gave the opening speech on one of the four key themes of Free Trade: Globalisation and how to defend it against the rising tide of protectionism. Another theme was the 4th Industrial Revolution. Whilst Xi Jinping addressed the key issue of the day, the 4th Industrial Revolution is the key issue for tomorrow. President Xi did not address that issue. It is clear the China is addressing the issue but like in the West will it be adequate?

The projected job losses in the UK and USA, by the time our primary school children finish their education is around 50%. The projections for China are even higher. Our roads will be full of self-driving cars, trucks, buses and taxis; our doctors and surgeons will increasingly be robots accessed through nurses; our bankers, lawyers and accountants will almost all be robots and it will happen quickly.

The loss of jobs is a loss to the economy as spending power is reduced. One person is not a problem for the economy but millions of job losses are. The Davos forum mainly looked at the impact on Companies. The leading science journal Nature recently had a special section on the future of work, and the BBC recently had a special discussion continuing for a week on one of its leading news programmes asking about the impact of the 4th Industrial revolution on work. None of them questioned the enormous impact on jobs.

There seems to be general agreement that the technology of the new world of the 4th Industrial Revolution will destroy many of the jobs we have now. Very little is said about the new skills that will be required for the 4th Industrial revolution apart from saying that innovation and creativity will be very important. Even less is said about the education requirements apart from saying that Science Technology Engineering and Maths (STEM) is an essential component.

The past 30 years have seen steady economic progress with the banking crash of 2007 as a surprise. The impact of the new world of the 4th Industrial revolution will be much bigger and without effective economic policies it will have a disastrous effect on many people's lives. There is little to compare with stepping into the new world of the 4th Industrial Revolution apart, perhaps, from the step into the new world of the first industrial revolution which completely humiliated China. The main difference this time will be that instead of taking 100 years for the change it will be 20 years at the most to change almost everything in the commercial aspects of our lives.

The challenge is that the jobs will be completely different. In the first industrial revolution how could you get a farm labourer to drive a steam engine when he couldn't even read. This

new world of Industry 4 will be completely different, rather like a butterfly emerging from the caterpillar chrysalis of the old world. The old world that we know with all its well defined jobs and businesses has an education system to support the old caterpillar world. The new world of the butterfly will have a vast range of opportunity for those with the right education and skills for the rest it will be a world of poverty and unemployment.

China is uniquely placed to do well in the 4th Industrial revolution and ensure that it is not humiliated, but although science, engineering and maths are important they are not enough to remove the threats of the 4th Industrial Revolution. We need a population that is able to take advantage of the millions of opportunities for innovation in all areas of life but primarily in new businesses as well as in current businesses when the sweet plums of the banks are no longer be there. The new guidance for the after schools service adopted for primary and middle schools in China early in 2017 is an important change

Economically important technological innovation has four key components: a scientific approach with an ability to think like scientists or entrepreneurs; a wide knowledge of science and technology; diversity in life experience with easy links to people who have a completely different life experience; most of all it requires confidence. The new guidance for after school's services enables all these key aspects to be developed, ensuring that the learning is completely different to the normal school classes.

STEM can deliver the scientific way of thinking and broaden the knowledge base on which the students can innovate. But innovation needs more than this. Diversity in all aspects of life reaps great rewards. For young people life beyond school and the home is a starting point; yes music is wonderful and so are languages, dance and sport for a host of reasons, they particularly develop our brains, but they are really like the wall paper and pictures on the walls of our homes or the clothes that we wear.

The most difficult but probably the most important aspect that will enable our young people to fly like butterflies is the building of confidence to try out new things without fear of failure. One effective way of doing this that is being tried out in the UK is to link young people to local industry and universities around research projects, (www.researchinschools.org). It gives the young people a degree of responsibility and the experience of working in a research team where there is no answer, there is no roof built by others for you to exist under. You are finding out truths that no one else knows. It is most effective in opening the minds and aspirations of young people. Oscar Wilde an Irish playwright said that "we live in the gutter but some of us are looking at the stars". This was the view of a creative genius that our young people can aspire to copy.

It is probable that it is in the hobbies and pass-times developed in the after-school time that we have the germs to develop the new thinking required for innovation in the 4th industrial revolution and working in small research teams, develop the confidence to fly like butterflies.

The new guidance on the after schools service is greatly enriching the more normal sports and hobbies. This flowering of interest as it grows will open up a whole new economy for businesses of all sizes. It has another important effect on young people at school. Most young people feel to be failures because there can only be one top of the class or at most the best person in one of the ten subjects studied. With this new diversity there are developing millions of interests and every student can be the best in something.

We have seen how 望梅止渴 has inspired our children to take up careers outside science. We can see in the future the world will be very different to the world that we have become familiar with where the orchards of sweet plums have been around the banks. In the future the orchards of sweet plums will be around the sciences, with their innovation and creativity. To thrive in the 4th industrial revolution there will have to be an enormous expansion in the diversity of activities fuelled by the after school activities. For our children on the cusp of the 4th Industrial revolution the orchard is the diversity and the sweet plums will grow on the trees fertilised by science.

END

John Baruch

17th November 2017